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Commands for Host-Processed and Host-Controlled Modems

Reference Manual

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1 Introduction

1.1 Overview

This manual describes the host command and responses for Conexant™ host-controlled (HCF) and host-processed (HSF or SoftK56) modem families.

The descriptions in this manual apply to all commands and parameters that may be supported by different modem models. Refer to Modem Software Release notes for commands applicable to specific modem models.

The commands and responses are implemented in host software for specific modem models. Additional configuration and implementation information is available in release notes and/or readme files that accompany product software release. The .INF File contains exact application unique information and default values.

1.1.1 Command Syntax

The fundamental DTE interface command syntax is described in Section 2.

1.1.2 Command Descriptions

These commands are grouped into the following categories:

Syntax and procedures	Section 2
Data commands	Section 3
Fax Class 1 and Fax Class 1.0 commands	Section 4
Voice/Audio commands	Section 5

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1.2 Reference Documentation

Document Title	Document No.
RC56HCF-PCI Modem Device Set Designer’s Guide	100759 (formerly 1129)
RC56D-PCI Host Controlled V.90/K56flex Modem Device Family for Desktop Applications Designer’s Guide	100762 (formerly 1174)
SoftK56-PCI Modem Device Set Designer's Guide (Order No. 1160)	100811 (formerly 1160)
SoftK56-PCI Host-Software Processed V.90/K56flex Modem Device Family for Desktop Applications Designer's Guide (Order No. 1201)	100813 (formerly 1201)
RH56LD-PCI Host-Controlled V.90/K56flex Modem Device Family for Mobile Applications	100819 (formerly 1164)
RS56L-PCI Host-Processed V.90/K56flex Modem Device Family for Mobile Applications	100820 (formerly 1202)
RMH56LD/RMS56LD Host-Controlled/Processed V.90/K56flex Modem Device Family for Mobile Applications (Order No. 1203)	100821 (formerly 1203)
CX11252 HSF Modem, Host-Processed V.92/V.90/K56flex Modem Device Family for PCI-Bus Desktop and Mobile Applications Data Sheet	101309
LAN/Soft V.92 SmartDAA Modem Device Set for PCI Data Sheet	101480

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2 Syntax and Procedures

The command and response syntax and procedures generally conform to referenced recommendations and standards. Since these recommendations and standards describe characteristics universal to a large installed base of modems to a maximum degree, there may be syntax and procedural differences due to extensions and behavioral differences in implemented commands, parameters, and responses beyond that described in these recommendations and standards.

The syntax and procedures described in this section are based on V.250 and V.253 with additional information included for implemented extensions, behavioral differences beyond V.250, and legacy commands.

2.1 Alphabet

The T.50 International Alphabet 5 (IA5) is used in this document. Only the low-order seven bits of each character are significant to the modem; any eighth or higher-order bit(s), if present, are ignored for the purpose of identifying commands and parameters. Lower-case characters are considered identical to their upper-case equivalents when received by the modem from the DTE. Result codes from the modem are in upper case.

2.2 DTE Commands Lines

Words enclosed in <angle brackets> are references to syntactical elements. The brackets are not used when the words appear in a command line, the brackets are not used. Words enclosed in [square brackets] represent optional items which may be omitted from the command line at the specified point. The square brackets are not used when the words appear in the command line. Other characters that appear in syntax descriptions must as included as shown.

Any modem responses are mentioned in terms of their alphabetic format; the actual response issued will depend on the setting of parameters that affect response formats, e.g., Q and V commands (see 2.7).

2.2.1 Command Line General Format

A command line is made up of three elements: the prefix, the body, and the termination character.

The command line prefix consists of the characters "AT" or "at" or, to repeat the execution of the previous command line, the characters "A/" or "a/".

The body is made up of individual commands described in this document. Space characters (IA5 2/0) are ignored and may be used freely for formatting purposes, unless they are embedded in numeric or string constants. The termination character may not appear in the body. The modem can accept at least 40 characters in the body.

The termination character may be selected by a user option (parameter S3), the default being CR.

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2.2.2 Command Line Editing

The character defined by parameter S5 (default, BS) is interpreted as a request from the DTE to the modem to delete the previous character. Any control characters (IA5 0/0 through 1/15, inclusive) that remain in the command line after receipt of the termination character are ignored by the modem.

The modem checks characters from the DTE first to see if they match the termination character (S3), then the editing character (S5), before checking for other characters. This ensures that these characters will be properly recognized even if they are set to values that the modem uses for other purposes. If S3 and S5 are set to the same value, a matching character will be treated as matching S3 (S3 is checked before S5).

2.2.3 Command Line Echo

The modem may echo characters received from the DTE during command state and online command state back to the DTE, depending on the setting of the E command. If enabled, characters received from the DTE are echoed in the same format as received. Invalid characters in the command line or incomplete or improperly-formed command line prefixes may not be echoed.

2.2.4 Repeating a Command Line

If the prefix "A/" or "a/" is received, the modem immediately executes once again the body of the preceding command line. No editing is possible, and no termination character is necessary. A command line may be repeated multiple times in this manner. Responses to the repeated command line are issued using format of the original command line. If "A/" is received before any command line has been executed, the preceding command line is assumed to have been empty (that results in an OK result code).

2.2.5 Types of DTE Commands

There are two types of commands: action commands and parameter commands. Commands of either type may be included in command lines, in any order.

Action commands may be "executed" (to invoke a particular function of the equipment, which generally involves more than the simple storage of a value for later use), or "tested" (to determine whether or not the equipment implements the action command, and, if subparameters are associated with the action, the ranges of subparameter values that are supported).

Parameters may be "set" (to store a value or values for later use), "read" (to determine the current value or values stored), or "tested" (to determine whether or not the equipment implements the parameter, and the ranges of values supported).

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2.3 Basic Syntax Commands

2.3.1 Basic Syntax Command Format

The format of Basic Syntax commands, except for the D and S commands, is as follows:

<command>[<number>]

where <command> is either a single character, or the "&" character followed by a single character per V.250. In addition, <command> can be the "%" character followed by a single character, the "*" character followed by a single character, or the "^" character followed by a single character.

<number> may be a string of one or more characters from "0" through "9" representing a decimal integer value. Commands that expect a <number> are noted in the description of the command. If a command expects <number> and it is missing (<command> is immediately followed in the command line by another <command> or the termination character), the value "0" is assumed. If a command does not expect a <number> and a number is present, an ERROR is generated. All leading "0"s in <number> are ignored by the modem.

Additional commands may follow a command (and associated parameter, if any) on the same command line without any character required for separation. The actions of some commands cause the remainder of the command line to be ignored (e.g., A).

See the D command for details on the format of the information that follows it.

2.3.2 S-Parameters

Commands that begin with the letter "S" are known as "S-parameters". The number following the "S" indicates the "parameter number" being referenced. If the number is not recognized as a valid parameter number, an ERROR result code is issued.

Immediately following this number, either a "?" or "=" character must appear. "?" is used to read the current value of the indicated S-parameter; "=" is used to set the S-parameter to a new value.

S<parameter_number>?

S<parameter_number>=[<value>]

If the "=" is used, the new value to be stored in the S-parameter is specified in decimal following the "=". If no value is given (i.e., the end of the command line occurs or the next command follows immediately), the S-parameter specified may be set to 0, or an ERROR result code issued and the stored value left unchanged. The ranges of acceptable values are given in the description of each S-parameter.

If the "?" is used, the modem transmits a single line of information text to the DTE. The text portion of this information text consists of exactly three characters, giving the value of the S-parameter in decimal, with leading zeroes included.

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2.4 Extended Syntax Commands

2.4.1 Command Naming Rules

Both actions and parameters have names, which are used in the related commands. Names always begin with the character "+". Following the "+", from one to 16 additional characters appear in the command name. These characters will be selected from the following set:

A through Z	(IA5 4/1 through 5/10)
0 through 9	(IA5 3/0 through 3/9)
!	(IA5 2/1)
%	(IA5 2/5)
-	(IA5 2/13)
.	(IA5 2/14)
/	(IA5 2/15)
:	(IA5 3/10)
_	(IA5 5/15)

The first character following the "+" must be an alphabetic character in the range of "A" through "Z". This first character generally implies the application in which a command is used (e.g., F for Fax or V for voice).

The modem considers lower-case characters to be the same as their upper-case equivalents.

2.4.2 Values

When subparameters are associated with the execution of an action, or when setting a parameter, the command may include specification of values. This is indicated by the appearance of <value> in the descriptions below.

<value> consists of either a numeric constant or a string constant.

Numeric Constants

Numeric constants are expressed in decimal, hexadecimal, or binary.

Decimal numeric constants consist of a sequence of one or more of the characters "0" through "9", inclusive.

Hexadecimal numeric constants consist of a sequence of one or more of the characters "0" through "9", inclusive, and "A" through "F" inclusive. The characters "A" through "F" represent the equivalent decimal values 10 through 15.

Binary numeric constants consist of a sequence of one or more of the characters "0" and "1".

In all numeric constants, the most significant digit is specified first. Leading "0" characters are ignored by the modem. No spaces, hyphens, periods, commas, parentheses, or other generally-accepted numeric formatting characters are permitted in numeric constants; note in particular that no "H" suffix is appended to the end of hexadecimal constants.

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String Constants

String constants consist of a sequence of displayable IA5 characters, each in the range from 2/0 to 7/15, inclusive, except for the characters ‘"’ (IA5 2/2) and "\" (IA5 5/12). String constants are bounded at the beginning and end by the double-quote character (‘"’, IA5 2/2).

Any character value may be included in the string by representing it as a backslash ("\") character followed by two hexadecimal digits. For example, "\0D" is a string consisting of the single character <CR> (IA5 0/13). If the "\" character itself is to be represented in a string, it is encoded as "\5C". The double-quote character, used as the beginning and ending string delimiter, is represented within a string constant as "\22".

A "null" string constant, or a string constant of zero length, is represented by two adjacent delimiters ("").

Compound Values

Actions may have more than one subparameter associated with them, and parameters may have more than one value. These are known as "compound values", and their treatment is the same in both actions and parameters.

A compound value consists of any combination of numeric and string values (as defined in the description of the action or parameter). The comma character must be included as a separator, before the second and all subsequent values in the compound value. If a value is not specified (i.e., defaults assumed), the required comma separator must be specified; however, trailing comma characters may be omitted if all associated values are also omitted.

2.4.3 Action Commands

Action Execution Command Syntax

There are two general types of action commands: those that have associated subparameter values that affect only that invocation of the command, and those that have no subparameters.

If subparameters are associated with a command, the definition of the action command indicates, for each subparameter, whether the specification of a value for that subparameter is mandatory or optional. For optional subparameters, the definition indicates the assumed (default) value for the subparameter if no value is specified for that subparameter; the assumed value may be either a previous value (i.e., the value of an omitted subparameter remains the same as the previous invocation of the same command, or is determined by a separate parameter or other mechanism), or a fixed value (e.g., the value of an omitted subparameter is assumed to be zero). Generally, the default value for numeric subparameters is 0, and the default value for string subparameters is **""** (empty string).

The following syntax is used for actions that have no subparameters:

+<name>

The following syntax is used for actions that have one subparameter:

+<name>[=<value>]

The following syntax is used for actions that have two or more subparameters:

+<name>[=<compound_value>]

For actions that accept subparameters, if all subparameters are defined as being optional, and the default values for all subparameters are satisfactory, the data terminal equipment (DTE) may use the first syntax above (i.e., omit the "=" from the action execution command as well as all of the subparameter value string).

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If all other relevant criteria are met (e.g., the modem is in the proper state), the command is executed with any indicated subparameters. If <name> is not recognized, the modem issues the ERROR result code and terminates processing of the command line. An ERROR is also generated if a subparameter is specified for an action that does not accept subparameters, if too many subparameters are specified, if a mandatory subparameter is not specified, if a value is specified of the wrong type, or if a value is specified that is not within the supported range.

Action Test Command Syntax

The DTE may test if an action command is implemented in the modem by using the syntax:

+<name>=?

If the modem does not recognize the indicated name, it returns an ERROR result code and terminates processing of the command line. If the modem does recognize the action name, it returns an OK result code. If the named action accepts one or more subparameters, the modem sends an information text response to the DTE, prior to the OK result code, specifying the values supported by the modem for each such subparameter, and possibly additional information. The format of this information text is defined for each action command.

2.4.4 Parameter Commands

Parameter Types

Parameters may be defined as "read-only" or "read-write". "Read-only" parameters are used to provide status or identifying information to the DTE, but cannot be set by the DTE; attempting to set their value is an error. In some cases (specified in the description of the individual parameter), the modem may ignore attempts to set the value of such parameters rather than respond with an ERROR result code, if the continued correct operation of the interface between the modem and DTE will not be affected by such action. Read-only parameters may be read and tested.

"Read-write" parameters may be set by the DTE, to store a value or values for later use. Read-write parameters may be set, read, and tested.

Parameters may take either a single value, or multiple (compound) values. Each value may be either numeric or string; the definition of the parameter will specify the type of value for each subparameter. Attempting to store a string value in a numeric parameter, or a numeric value in a string parameter, is an error.

Parameter Set Command Syntax

The definition of the parameter indicates, for each value, whether the specification of that value is mandatory or optional. For optional values, the definition indicates the assumed (default) value if none is specified; the assumed value may be either a previous value (i.e., the value of an omitted subparameter retains its previous value), or a fixed value (e.g., the value of an omitted subparameter is assumed to be zero). Generally, the default value for numeric parameters is 0, and the default value for string parameters is "" (empty string).

The following syntax is used for parameters that accept a single value:

+<name>=[<value>]

The following syntax is used for parameters that accept more than one value:

+<name>=[<compound_value>]

For each implemented parameter, if all mandatory values are specified, and all values are valid according to the definition of the parameter, the specified values are stored. If <name>

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is not recognized, one or more mandatory values are omitted, or one or more values are of the wrong type or outside the permitted range, the modem issues the ERROR result code and terminates processing of the command line. An ERROR is also generated if too many values are specified. In case of an error, all previous values of the parameter are unaffected.

Parameter Read Command Syntax

The DTE may determine the current value or values stored in a parameter by using the following syntax:

+<name>?

The modem responds by sending the current values stored for the parameter to the DTE in an information text response. The format of this response is described in the definition of the parameter. Generally, the values are sent in the same form in which they would be issued by the DTE in a parameter setting command; if multiple values are supported, they will generally be separated by commas, as in a parameter setting command.

Parameter Test Command Syntax

The DTE may test if a parameter is implemented in the modem, and determine the supported values, by using the syntax:

+<name>=?

If the modem does not recognize the indicated name, it returns an ERROR result code and terminates processing of the command line. If the modem does recognize the parameter name, it returns an information text response to the DTE, followed by an OK result code. The information text response indicates the values supported by the modem for each such subparameter, and possibly additional information. The format of this information text is defined for each parameter.

2.4.5 Additional Syntax Rules

Concatenating Commands after Extended Syntax Commands

Additional commands may follow an extended-syntax command on the same command line if a semicolon (";") is inserted after the preceding extended command as a separator. The semicolon is not necessary when the extended syntax command is the last command on the command line.

Concatenating Commands after Basic Format Commands

Extended syntax commands may appear on the same command line after a basic syntax command without a separator, in the same manner as concatenation of basic syntax commands.

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2.5 Issuing Commands

All characters in a command line must be issued at the same data rate, and with the same parity and format.

The modem will ignore any command line that is not properly terminated. The modem may consider 30 seconds of mark idle time between any two characters as an improperly terminated command line. In this case the modem may or may not generate an ERROR message. The modem will ignore any characters received from the DTE that are not part of a properly-formatted command line.

If the maximum number of characters that the modem can accept in the body is exceeded, an ERROR result code is generated after the command line is terminated.

The DTE will not begin issuing a subsequent command line until at least one-tenth of a second has elapsed after receipt of the entire result code issued by the modem in response to the preceding command line.

2.6 Executing Commands

Upon receipt of the termination character, the modem commences execution of the commands in the command line in the order received from the DTE. Should execution of a command result in an error, or a character be not recognized as a valid command, execution is terminated, the remainder of the command line is ignored, and the ERROR result code is issued. Otherwise, if all commands execute correctly, only the result code associated with the last command is issued; result codes for preceding commands are suppressed. If no commands appear in the command line, the OK result code is issued.

2.6.1 Aborting Commands

Some action commands that require time to execute may be aborted while in progress; these are explicitly noted in the description of the command. Aborting of commands is accomplished by the transmission from the DTE to the modem of any character. A single character is sufficient to abort the command in progress; however, characters transmitted during the first 125 milliseconds after transmission of the termination character are ignored (to allow for the DTE to append additional control characters such as line feed after the command line termination character). **To ensure that the aborting character is recognized by the modem, it should be sent at the same rate as the preceding command line; the modem may ignore characters sent at other rates.** When such an aborting event is recognized by the modem, the modem terminates the command in progress and returns an appropriate result code to the DTE, as specified for the particular command.

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2.6.2 Handling of Invalid Numbers and S-Parameter Values

The modem reacts to undefined numbers and S-parameter values in one of three ways:

1. Issue the ERROR result code, and leave the previous value of the parameter unchanged;
2. Issue the OK result code, and leave the previous value of the parameter unchanged; or,
3. Issue the OK result code, and set the parameter value to the valid value nearest to that specified in the command line.

The description of each command specifies which of these three techniques is used to handle invalid parameter values for that command or parameter.

2.7 Modem Responses

While in command state and online command state, the modem will issue responses using the same rate, word length, and parity as the most recently received DTE command line. In the event that no DTE command has yet been received, rate, word length, and parity used will depend on the capabilities of the modem.

When the modem transitions from the command state or online command state to the online data state, the result code **CONNECT** should be issued at the bit rate and parity used during the command state. When the modem transitions from the online data state to the command state or online command state, the result codes should be issued at the bit rate used during the online data state. Thereafter, any unsolicited result codes should use the bit rate and parity of the last command line issued by the DTE to the modem.

The characters of a response will be contiguous, with no more than 100 milliseconds of mark idle issued between characters in addition to stop elements.

2.7.1 Responses

There are two types of responses that may be issued by the modem: information text and result codes.

Information Text. Information text responses consist of three parts: a header, information text, and a trailer:

1. The characters transmitted for the header are determined by the V command.
2. The trailer consists of two characters, being the character having the ordinal value of parameter S3 followed by the character having the ordinal value of parameter S4.
3. Information text usually consists of a single line; information text returned in response to some commands may contain multiple lines, and the text may therefore include CR, LF, and other formatting characters to improve readability.

Result Code Parts. Result codes consist of three parts: a header, the result text, and a trailer.

1. The characters transmitted for the header and trailer are determined by the V command setting.
2. The result text may be transmitted as a number or as a string, also depending on a the V command setting.

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Result Code Types. There are three types of result codes: final, intermediate, and unsolicited. Result codes are described in Section 3.5.

1. A final result code indicates the completion of a full modem action and an ability to accept new commands from the DTE.
2. An intermediate result code is a report of the progress of an modem action. The CONNECT result code is an intermediate result code. In the case of a dialing or answering command, the modem switches from command state to online data state, and issues a CONNECT result code. This is an intermediate result code for the modem because it cannot accept commands from the DTE while in online data state. When the modem switches back to the command state it then issues a final result code (such as OK or NO CARRIER).
3. Unsolicited result codes (such as RING) indicate the occurrence of an event not directly associated with the issuance of a command from the DTE.

2.7.2 Extended Syntax Result Codes

Extended syntax result codes may be issued in response to either basic or extended commands, or both. The appropriate responses are specified in the definitions of the commands, the responses, or both.

The general format of extended syntax result codes is the same as result codes defined in TIA-602 with regard to headers and trailers. The characters specified in S-parameters S3 and S4 are used in headers and trailers of extended syntax result codes as they are in basic format result codes. The setting of the V command affects the headers and trailers associated with extended syntax result codes in the same manner as basic format result codes; however, unlike basic format result codes, extended syntax result codes have no numeric equivalent, and are always issued in alphabetic form.

Extended syntax result codes are subject to suppression by the Q1 command, as with basic format result codes. The issuance of extended syntax result codes are not be affected by the setting of the X command.

Extended syntax result codes may be either final, intermediate, or unsolicited; the type being indicated in the definition of the result code.

Extended syntax result codes are prefixed by the "+" character to avoid duplication of basic format result codes specified in TIA-602. Following the "+" character, the name of the result code appears; result code names follow the same rules as command names.

Extended syntax result codes may include the reporting of values. The definition of the result code specifies whether or not values are appended to the result code, and, if so, how many, their types, and their assumed default values if omitted.

Data/voice Modes. When no values are to be reported, the result code appears in the simplest form:

+<name>

If a single value is to be reported, the form of the result code is:

+<name>: <value>

A single space character separates the colon character from the <value>; no space appears between the result code name and the colon. If multiple values are to be reported with the result code, the form is:

+<name>: <compound_value>

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Fax Modes. If a single value is to be reported, the form of the result code is:

<value> or (<value>)

2.7.3 +<name>: <compound_value>Information Text Formats for Test Commands

In general, the format of information text returned by extended syntax commands is described in the definition of the command.

The modem may insert intermediate <CR> characters in very long information text responses in order to avoid overrunning DTE receive buffers. If intermediate <CR> characters are included, the modem does not include the character sequences "0 <CR>"or "OK<CR>", so that DTE can avoid false detection of the end of these information text responses.

Range of Values

When the action accepts a single numeric subparameter, or the parameter accepts only one numeric value, the set of supported values may be presented in the information text as an ordered list of values. The list is preceded by a left parenthesis (() , and is followed by a right parenthesis ()). If only a single value is supported, it appears between the parentheses. If more than one value is supported, then the values may be listed individually, separated by comma characters, or, when a continuous range of values is supported, by the first value in the range, followed by a hyphen character (-), followed by the last value in the range. The specification of single values and ranges of values may be intermixed within a single information text. In all cases, the supported values are indicated in ascending order.

For example, the following are some examples of value range indications:

(0)	Only the value 0 is supported.
(1,2,3)	The values 1, 2, and 3 are supported.
(1-3)	The values 1 through 3 are supported.
(0,4,5,6,9,11,12)	The several listed values are supported.
(0,4-6,9,11-12)	An alternative expression of the above list.

Compound Range of Values

When the action accepts more than one subparameter, or the parameter accepts more than one value, the set of supported values is presented as a list of the parenthetically-enclosed value range strings described above, separated by commas. For example, the information text in response to testing an action that accepts three subparameters, and supports various ranges for each of them, could appear as follows:

(0),(1-3),(0,4-6,9,11-12)

This indicates that the first subparameter accepts only the value 0, the second accepts any value from 1 through 3 inclusive, and the third subparameter accepts any of the values 0, 4, 5, 6, 9, 11, or 12.

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3 Data Command Set

3.1 Command Guidelines

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

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

The default values are typical of a fully configured modem supporting all data rates and options. The actual default value is dependent upon modem software as defined by the .INF File.

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

3.1.1 Escape Code Sequence

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

3.2 Data Commands

The modem will respond to the commands detailed below. Parameters applicable to each command are listed with the command description. The defaults shown correspond to default values provided in the .INF File.

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3.2.1 Generic Modem Control

Z - Reset to Default Configuration

This command instructs the modem to reset to default values as altered by non-volatile parameter storage. If the modem is connected to the line, it will be disconnected from the line, terminating any call in progress.

All of the functions of the command are completed before the modem issues the result code. The DTE should not include additional commands on the same command line after the **Z** command because such commands are ignored.

Syntax

Z

Result Code

OK

+FCLASS - Select Active Service Class

This command selects the active service class (mode).

Syntax

+FCLASS=<mode>

Defined Values

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

Result Codes

OK	For <mode> = 0, 1, 1.0, and 8, as supported by the .INF File.
ERROR	Otherwise.

Reporting Current or Selected Values

Command: +FCLASS?

Response: +FCLASS: <mode>

Example: +FCLASS: 0 For the default setting.

Reporting Supported Range of Parameter Values

Command: +FCLASS=?

Response: +FCLASS: (<mode> range)

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

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+VCID - Caller ID (CID)

This command controls the reporting and presentation of data associated with the Caller ID services in the U.S. and Canada in the Incoming Call Line ID (ICLID) data format.

Syntax

+VCID=<pmode>

Defined Values

<pmode> Decimal number corresponding to the selected option.

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

Reporting Current or Selected Values

Command: +VCID?

Response: +VCID: <pmode>

Example: +VCID: 0 For the default setting.

Reporting Supported Range of Parameter Values

Command: +VCID=?

Response: +VCID: (<pmode> range)

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

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+VRID - Report Retrieved Caller ID (CID)

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

Syntax

+VRID=<pmode>

Defined Values

<pmode> Decimal number corresponding to the selected option.

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

Reporting Supported Range of Parameter Values

Command: +VRID=?

Response: +VRID: (<pmode> range)

Example: +VRID: (0,1)

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\N - Operating Mode

This command controls the preferred error correcting mode to be negotiated in a subsequent data connection.

Syntax

\N<mode>

Defined Values

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

0	Selects normal speed buffered mode (disables error-correction mode) and forces &Q6 (selects asynchronous operation in normal mode.)
1	Same as \N0.
2	Selects reliable (error-correction) mode and forces &Q5 (the modem will try to negotiate an error corrected link). 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.
3	Selects auto reliable mode and forces &Q5 (the modem will try to negotiate an error corrected link). 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.
4	Selects LAPM error-correction mode and forces &Q5 (the modem will try to negotiate an error corrected link). Failure to make an LAPM error-correction connection results in the modem hanging up.
5	Selects MNP error-correction mode and forces &Q5 (the modem will try to negotiate an error corrected link). Failure to make an MNP error-correction connection results in the modem hanging up.

Result Codes

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

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&F - Set to Factory-Defined Configuration

This command instructs the modem to set all parameters to factory default values defined in the product Configuration Table

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

Syntax

&F

Result Code

OK

&T - Local Analog Loopback Test

The modem will perform the local analog loopback test if &T1 is selected. The test can be run only when in an asynchronous operation in non-error-correction mode (normal). To terminate the test in progress, the escape sequence must be entered first (see Section 3.1.1). If S18 is non-zero, the test will terminate automatically after the time specified by S18 and the OK result code will be reported.

Syntax

&T[<value>]

Defined Values

<value>	Decimal number corresponding to the selected value.	
	0	Terminates test in progress.
	1	Initiates local analog loopback, V.54 Loop 3. 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.

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I - Request Identification Information

This command causes the modem to report one or more lines of product information text, as selected by the <value> subparameter, followed by a final result code.

Syntax

I[<value>]

Defined Values

<value> Decimal number corresponding to the selected information.

0 Reports product code, e.g.:

```
ATI0
56000
OK
```

1 Reports the least significant byte of the stored checksum in decimal (see firmware release notes). Reports 255 if the prestored checksum value is FFh, e.g.,

```
ATI1
255
OK
```

2 Reports OK, e.g.:

```
ATI2
OK
OK
```

3 Reports identification codes, e.g.:

```
ATI3
2.1.2.127
OK
```

4 Reports product description from the .INF file (the response is customizable by customizing the INF file), e.g.:

```
ATI4
Conexant HCF 56K Data,Fax,Speakerphone
OK
```

5 Reports Country Code parameter (in decimal), e.g.:

```
ATI5
181
OK
```


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6 Reports modem data pump model and internal code revision, e.g.:

```
ATI6
DP Rev
V90    SPX RAM Ver 28
V90    CTL RAM Ver 28
K56FLEX SPX RAM Ver 44
K56FLEX CTL RAM Ver 47
OK
```

7 Reports modem data pump model and internal code revision, e.g.:

```
ATI7
255
OK
```

8 Reports OK, e.g.:

```
ATI8
OK
```

9 Reports country, e.g.:

```
ATI9
USA
OK
```

Result Codes

OK	<value> = 0-9.
ERROR	Otherwise.

+GMI - Request Manufacturer Identification

This command causes the modem to report the modem product manufacturer as provided by the .INF File.

Syntax

+GMI

Typical Response

```
+GMI: Conexant
OK
```


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+GMM - Request Model Identification

This command causes the modem to report the modem product model as provided by the .INF File.

Syntax

+GMM

Typical Response

+GMM: HCF 56K Data, Fax, Speakerphone, PCI Modem
OK

+GMR - Request Revision Identification

This command causes the modem to report the modem version, revision level, or date as provided by the .INF File.

Syntax

+GMR

Typical Response

+GMR: 1.0
OK

+GSN - Request Product Serial Number Identification

This command causes the modem to report the modem product model serial number as provided by the .INF File.

Syntax

+GSN

Typical Response

+GSN:
OK

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+GOI - Request Global Object Identification

This command causes the modem to transmit one or more lines of information text identifying the device, based on the ISO system for registering unique object identifiers. Typically, the text consists of a single line containing numeric strings delimited by period characters. The general format of object identifiers is defined in Section 28 of ITU-T Recommendation X.208; the encoding rules are defined in ITU-T Recommendation X.209. The response is provided by the .INF file.

Syntax

+GOI

Typical Response

+GOI:
OK

+GCAP - Request Complete Capabilities List

This extended-format command causes the modem to transmit one or more lines of information text listing additional capabilities command +<name>s , which is intended to permit the user to identify the overall capabilities of the modem. In particular, if the modem implements a particular modem control standard that uses Extended Syntax Commands, and if that modem control standard includes command(s) that indicate general capabilities, the +<names>(s) of those commands will be reported to the modem in response to a +GCAP command.

Syntax

+GCAP

Example Responses

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

Where:

+FCLASS	T.class1, +F (Class 1 Facsimile modem Control)
+MS	+M commands (Modulation Control: +MS and +MR commands)
+ES	+E commands (Error Control: +ES, +EB, +ER, +EFCS, +ETBM)
+DS	+D commands (Data Compression: +DS and +DR)

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+GCI - Country of Installation

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

Syntax

+GCI=<country_code>

Defined Values

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

Default

If the modem is specified for use in only one country, that country code is the default. Otherwise, the default is the expected country of sale or first installation. The modem may use hardware means to select the country of installation, in which case the modem uses that to determine the default value.

Reporting Current or Selected Values

Command: +GCI?

Response: +GCI: <current country_code>

Example: +GCI: 3D — Indicates that the modem is set for France.

Reporting Supported Range of Parameter Values

Command: +GCI=?

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

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

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3.2.2 DTE-Modem interface commands

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

E - Command Echo

The modem enables or disables the echo of characters to the DTE according to the parameter supplied.

Syntax

E[value>]

Defined Values

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

Result Codes

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

Q - Quiet Results Codes Control

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

Syntax

O[value>]

Defined Values

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

Result Codes

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

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V - Result Code Form

This command selects the sending of short-form or long-form result codes to the DTE.

Syntax

V[value>]

Defined Values

<value> Decimal number corresponding to the selected option.

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

Result Codes

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

W - Connect Message Control

This command, in conjunction with S95 bits 0, 2, 3, and 5 (bits 2, 3, and 5 can be written directly by the host or by the +MR, +ER, and +DR commands, respectively), control the format of CONNECT messages (see Section 3.5 and Table 3-15). The actual result code messages reported reflect the W command setting and the S95 bit settings. (Also see +MR, +ER, and +DR commands.)

Syntax

W[value>]

Defined Values

<value> Decimal number corresponding to the selected option.

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

Result Codes

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

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X - Extended Result Codes

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

Blind dialing is enabled or disabled by country parameters. If the user wishes to enforce dial tone detection, a "W" can be placed in the dial string (see D command). The information below is based upon the default implementation of the X results table. Table 3-1 indicates the messages which are enabled for each X value.

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

Syntax

X<value>

Defined Values

<value> Decimal number corresponding to the selected option.

0	CONNECT result code is given upon entering online data state. Dial tone and busy detection reporting are disabled.
1	CONNECT <text> result code is given upon entering online data state. Dial tone and busy detection reporting are disabled.
2	CONNECT <text> result code is given upon entering online data state. Dial tone detection reporting is enabled, and busy detection reporting is disabled.
3	CONNECT <text> result code is given upon entering online data state. Dial tone detection reporting is disabled, and busy detection reporting is enabled.
4	CONNECT <text> result code is given upon entering online data state. Dial tone and busy detection reporting are both enabled. (Default.)

Result Codes

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

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Table 3-1. Result Codes

Short Form	Long Form	n Value in ATXn Command					Notes
		0	1	2	3	4	
+F4	+FCERROR	x	x	x	x	x	
0	OK	x	x	x	x	x	
1	CONNECT	x	x	x	x	x	
2	RING	x	x	x	x	x	
3	NO CARRIER	x	x	x	x	x	
4	ERROR	x	x	x	x	x	
5	CONNECT 1200	1	x	x	x	x	
6	NO DIALTONE	3	3	x	x	x	
7	BUSY	3	3	3	x	x	
8	NO ANSWER	x	x	x	x	x	
9	CONNECT 600	1	x	x	x	x	
10	CONNECT 2400	1	x	x	x	x	
11	CONNECT 4800	1	x	x	x	x	
12	CONNECT 9600	1	x	x	x	x	
13	CONNECT 7200	1	x	x	x	x	
14	CONNECT 12000	1	x	x	x	x	
15	CONNECT 14400	1	x	x	x	x	
16	CONNECT 19200	1	x	x	x	x	
17	CONNECT 38400	1	x	x	x	x	
18	CONNECT 57600	1	x	x	x	x	
19	CONNECT 115200	1	x	x	x	x	
20	CONNECT 230400	x	x	x	x	x	
22	CONNECT 75TX/1200RX	1	x	x	x	x	
23	CONNECT 1200TX/75RX	1	x	x	x	x	
24	DELAYED	4	4	4	4	x	
32	BLACKLISTED	4	4	4	4	x	
33	FAX	x	x	x	x	x	
35	DATA	x	x	x	x	x	
40	+MRR: 300	x	x	x	x	x	
44	+MRR: 1200/75	x	x	x	x	x	
45	+MRR: 75/1200	x	x	x	x	x	
46	+MRR: 1200	x	x	x	x	x	
47	+MRR: 2400	x	x	x	x	x	
48	+MRR: 4800	x	x	x	x	x	
49	+MRR: 7200	x	x	x	x	x	
50	+MRR: 9600	x	x	x	x	x	
51	+MRR: 12000	x	x	x	x	x	
52	+MRR: 14400	x	x	x	x	x	
53	+MRR: 16800	x	x	x	x	x	
54	+MRR: 19200	x	x	x	x	x	
55	+MRR: 21600	x	x	x	x	x	
56	+MRR: 24000	x	x	x	x	x	
57	+MRR: 26400	x	x	x	x	x	
58	+MRR: 28800	x	x	x	x	x	
59	CONNECT 16800	1	x	x	x	x	
61	CONNECT 21600	1	x	x	x	x	
62	CONNECT 24000	1	x	x	x	x	

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Table 3-1. Result Codes (Continued)

Short Form	Long Form	n Value in ATXn Command					Notes
		0	1	2	3	4	
63	CONNECT 26400	1	x	x	x	x	
64	CONNECT 28800	1	x	x	x	x	
66	+DR: ALT	x	x	x	x	x	
67	+DR: V42B	x	x	x	x	x	
69	+DR: NONE	x	x	x	x	x	
70	+ER: NONE	x	x	x	x	x	
77	+ER: LAPM	x	x	x	x	x	
78	+MRR: 31200	x	x	x	x	x	
79	+MRR: 33600	x	x	x	x	x	
80	+ER: ALT	x	x	x	x	x	
83	LINE IN USE	x	x	x	x	x	
84	CONNECT 33600	1	x	x	x	x	
91	CONNECT 31200	1	x	x	x	x	
134	+MCR: B103	x	x	x	x	x	
135	+MCR: B212	x	x	x	x	x	
136	+MCR: V21	x	x	x	x	x	
137	+MCR: V22	x	x	x	x	x	
138	+MCR: V22B	x	x	x	x	x	
139	+MCR: V23	x	x	x	x	x	
140	+MCR: V32	x	x	x	x	x	
141	+MCR: V32B	x	x	x	x	x	
142	+MCR: V34	x	x	x	x	x	
144	+MCR: K56	x	x	x	x	x	
145	+MCR: V90	x	x	x	x	x	
150	+MRR: 32000	x	x	x	x	x	
151	+MRR: 34000	x	x	x	x	x	
152	+MRR: 36000	x	x	x	x	x	
153	+MRR: 38000	x	x	x	x	x	
154	+MRR: 40000	x	x	x	x	x	
155	+MRR: 42000	x	x	x	x	x	
156	+MRR: 44000	x	x	x	x	x	
157	+MRR: 46000	x	x	x	x	x	
158	+MRR: 48000	x	x	x	x	x	
159	+MRR: 50000	x	x	x	x	x	
160	+MRR: 52000	x	x	x	x	x	
161	+MRR: 54000	x	x	x	x	x	
162	+MRR: 56000	x	x	x	x	x	
165	CONNECT 32000	x	x	x	x	x	
166	CONNECT 34000	x	x	x	x	x	
167	CONNECT 36000	x	x	x	x	x	
168	CONNECT 38000	x	x	x	x	x	
169	CONNECT 40000	x	x	x	x	x	

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Table 3-1. Result Codes (Continued)

Short Form	Long Form	n Value in ATXn Command					Notes
		0	1	2	3	4	
170	CONNECT 42000	x	x	x	x	x	
171	CONNECT 44000	x	x	x	x	x	
172	CONNECT 46000	x	x	x	x	x	
173	CONNECT 48000	x	x	x	x	x	
174	CONNECT 50000	x	x	x	x	x	
175	CONNECT 52000	x	x	x	x	x	
176	CONNECT 54000	x	x	x	x	x	
177	CONNECT 56000	x	x	x	x	x	
178	CONNECT 230400	x	x	x	x	x	
180	CONNECT 28000	x	x	x	x	x	
181	CONNECT 29333	x	x	x	x	x	
182	CONNECT 30667	x	x	x	x	x	
183	CONNECT 33333	x	x	x	x	x	
184	CONNECT 34667	x	x	x	x	x	
185	CONNECT 37333	x	x	x	x	x	
186	CONNECT 38667	x	x	x	x	x	
187	CONNECT 41333	x	x	x	x	x	
188	CONNECT 42667	x	x	x	x	x	
189	CONNECT 45333	x	x	x	x	x	
190	CONNECT 46667	x	x	x	x	x	
191	CONNECT 49333	x	x	x	x	x	
192	CONNECT 50667	x	x	x	x	x	
193	CONNECT 53333	x	x	x	x	x	
194	CONNECT 54667	x	x	x	x	x	
195	+MRR: 28000	x	x	x	x	x	
196	+MRR: 29333	x	x	x	x	x	
197	+MRR: 30667	x	x	x	x	x	
198	+MRR: 33333	x	x	x	x	x	
199	+MRR: 34667	x	x	x	x	x	
200	+MRR: 37333	x	x	x	x	x	
201	+MRR: 38667	x	x	x	x	x	
202	+MRR: 41333	x	x	x	x	x	
203	+MRR: 42667	x	x	x	x	x	
204	+MRR: 45333	x	x	x	x	x	
205	+MRR: 46667	x	x	x	x	x	
206	+MRR: 49333	x	x	x	x	x	
207	+MRR: 50667	x	x	x	x	x	
208	+MRR: 53333	x	x	x	x	x	
209	+MRR: 54667	x	x	x	x	x	

Notes:

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

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&C - RLSD Behavior

This parameter determines how the state of the Received Line Signal Detector (RLSD) output relates to the detection of received line signal from the distant end. Changing the parameter will take effect immediately in both the command and online command states.

In &C1 mode of operation, RLSD is not turned off until all data previously received from the remote modem is delivered to the local DTE. However, such buffered data will be discarded and RLSD will be turned off if the DTE turns off DTR (if &D1 or &D2 is set).

Syntax

&C[<value>]

Defined Values

<value>	Decimal number corresponding to the selected option.	
	0	RLSD is always ON.
	1	RLSD follows the state of the carrier. (Default.)

Result Code

OK	<value> = 0 or 1
ERROR	Otherwise.

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&D - DTR Behavior

This parameter determines how the modem responds when the Data Terminal Ready (DTR) input is changed from the ON to the OFF condition during online data state.

Syntax

&D[<value>]

Defined Values

<value> Decimal number corresponding to the selected option.

0	Modem ignores DTR.
1	Upon an on-to-off transition of DTR, the modem enters online command state and issues an OK result code; the call remains connected.
2	Upon an on-to-off transition of DTR, the modem instructs the underlying modem to perform an orderly cleardown of the call. The disposition of any data in the modem pending transmission to the remote modem is controlled by the +ETBM parameter; otherwise, this data is sent before the call is cleared, unless the remote modem clears the call first (in which case pending data is discarded). The modem disconnects from the line. Automatic answer is disabled while DTR remains off.

Result Code

OK	<value> = 0 or 2
ERROR	Otherwise.

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&K - Flow Control

This command defines the DTE/DCE (terminal/modem) flow control mechanism.

Syntax

&K[<value>]

Defined Values

<value> Decimal number corresponding to the selected option.

0	Disables flow control.
3	Enables RTS/CTS flow control. (Default for data modem modes.)
4	Enables XON/XOFF flow control.
5	Included for compatibility only and has no effect other than returning an OK result code.
6	Included for compatibility only and has no effect other than returning an OK result code.

Result Codes

OK	<value> = 0, 3, 4, 5, or 6.
ERROR	Otherwise.

&M - Asynchronous/Synchronous Mode Selection

This command is included for compatibility only and has no effect other than returning a result code. The only valid values are 0-3.

Syntax

&M[<mode>]

Defined Values

<mode > Decimal number corresponding to the selected value: 0-3.

Result Codes

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

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&Q - Sync/Async Mode

This command determines the DTR operating mode. (Also, see \N.)

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

Syntax

&Q[<mode>]

Defined Values

<mode >	Decimal number corresponding to the selected mode:	
	0	Selects asynchronous operation in normal mode (speed buffering)
	1	Selects asynchronous operation in normal mode (speed buffering)
	2	Selects asynchronous operation in normal mode (speed buffering)
	3	Selects asynchronous operation in normal mode (speed buffering)
	5	Selects asynchronous operation in error correction mode
	6	Selects asynchronous operation in normal mode (speed buffering)

Result Codes

OK	<mode > = 0-3, 5, 6.
ERROR	Otherwise.

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+IPR - Fixed DTE Rate

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

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

Syntax

+IPR=<rate>

Defined Values

<rate> Specifies the DTE-modem interface operation rate in bits/s. The available rates are:

0, 2400, 4800, 9600, 19200, 38400, 57600, or 115200.

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

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

Reporting Current or Selected Values

Command:	+IPR?	
Response:	+IPR: <rate>	
Example 1:	+IPR: 0	for automatic rate detection.
Example 2:	+IPR: 57600	for 57600 bps.

Reporting Supported Range of Parameter Values

Command: +IPR=?

Response: +IPR (<rate> range)

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

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+IFC - DTE-Modem Local Flow Control

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

Syntax

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

Defined Values

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

- 0 None.
- 1 XON/XOFF on transmitted data (XON/XOFF on transmit data); do not pass XON/XOFF characters to the remote modem.
- 2 Circuit 133 (Ready for Receiving). (Default.)

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

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

Reporting Current or Selected Values

Command: +IFC?

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

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

Reporting Supported Range of Parameter Values

Command: +IFC=?

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

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

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+ILRR - DTE-Modem Local Rate Reporting

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

Syntax

+ILRR=<value>

Defined Values

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

Reporting Current or Selected Values

Command: +ILRR?

Response: +ILRR: <current value>

Example: +ILRR: 0 For the default setting

Reporting Supported Range of Parameter Values

Command: +ILRR=?

Response: +ILRR: (<value> range)

Example: +ILRR: (0,1)

Reported Rate

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

Syntax

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

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Defined Values

<rate>	Decimal value representing the current (negotiated or renegotiated) DTE-modem rate: 0, 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, or 115200
<rx_rate>	Optional decimal value reporting the RXD rate, if it is different from the TXD rate: 0, 300, 1200, 2400, 4800, 9600, 19200, 38400, 57600, or 115200

Example

+ILRR: 19200

3.2.3 Call Control

D - Dial

This command directs the modem to go on-line, dial according to the entered string 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 upon receipt of any DTE character before completion of the handshake.

If +FCLASS=1 or 1.0 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 finishes dialing, it will proceed as if the +FRH=3 command is issued. (Refer to the +FRH command to determine how the modem behaves following this stage.)

Syntax

D<modifier>

Defined Values

<modifier>	The valid dial string parameters (modifiers) are described below. Punctuation characters may be used for clarity, with parentheses, hyphen, and spaces ignored.
0-9	DTMF digits 0 to 9.
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).

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P	Select pulse dialing: pulse dial the numbers that follow until a "T" is encountered. Affects current and subsequent dialing. Some countries prevent changing dialing modes after the first digit is dialed.
T	Select tone dialing: tone dial the numbers that follow until a "P" is encountered. Affects current and subsequent dialing. Some countries prevent changing dialing modes after the first digit is dialed.
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 or S6, the modem will abort the rest of the sequence, return on-hook, and generate an error message.
*	The 'star' digit (tone dialing only).
#	The 'gate' digit (tone dialing only).
+	
!	Flash: the modem will go on-hook for a time defined by the value of S29. Country requirements may limit the time imposed.
@	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 will handshake.
$	Wait for credit card dialing tone before continuing with the dial string. If the tone is not detected within the time specified by S7 or S6, the modem will abort the rest of the sequence, return on-hook, and generate an error message.
&	Wait for credit card dialing tone before continuing with the dial string. If the tone is not detected within the time specified by S7 or S6, 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 commands while remaining off-hook. The additional 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.

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T - Set Tone Dial Default

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

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

Syntax

T

Result Codes

OK

P - Set Pulse Dial Default

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

As soon as a dial command is executed which explicitly specifies the dialing mode for that particular call (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.

A - Answer

The modem will go off-hook and will 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 will hang up. Any character entered during the connect sequence will abort the connection attempt.

If +FCLASS=1.0 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. Following a delay of 70 ms, it 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.)

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H - Disconnect (Hang-Up)

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

Syntax

H[<value>]

Defined Values

<value> Decimal number corresponding to the selected option.

- 0 The modem will release the line if the modem is currently on-line.
- 1 If on-hook, the modem will go off-hook and remain in command mode.

Result Codes

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

O - Return to On-Line Data Mode

This command specifies that the modem will enter the on-line data mode from the on-line command mode with or without a retrain. If in the off-line command mode when this command is entered, the modem reports ERROR.

Syntax

O[<value>]

Defined Values

<value> Decimal number corresponding to the selected option.

- 0 Enters on-line data mode from the on-line command mode without a retrain. Handling is determined by the Call Establishment task. Generally, if a connection exists, this command connects the DTE back to the remote modem after an escape (+++).
- 1 Performs a retrain then enters on-line data mode from the on-line command mode.

Result Codes

OK	<value> = 0 or 1 and a connection exists.
ERROR	Otherwise or no connection exists.

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L - Speaker Volume

This command sets the speaker volume control according to the parameter supplied.

Syntax

L[<value>]

Defined Values

<value>	Decimal number corresponding to the selected option.	
	0	Off.
	1	Low volume. (Default.)
	2	Medium volume.
	3	High volume.

Result Codes

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

M - Speaker Control

This command controls speaker on or off according to the supplied parameter.

Syntax

M[<value>]

Defined Values

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

Result Codes

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

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&G - Select Guard Tone

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

Syntax

&G[<value>]

Defined Values

<value>	Decimal number corresponding to the selected option.	
	0	Included for compatibility only and has no effect other than returning an OK result code. (Default.)
	1	Included for compatibility only and has no effect other than returning an OK result code.
	2	Included for compatibility only and has no effect other than returning an OK result code.

Result Code

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

&P - Select Pulse Dial Make/Break Ratio

This command determines the make/break ratio used during pulse dialing. It is only effective if the appropriate bit to enable this command is set through the .INF File. If enabled, it will override the make/break ratios in the OEM parameters in the .INF File. The default is country-dependent.

Syntax

&P[<value>]

Defined Values

<value>	Decimal number corresponding to the selected information.	
	0	Selects 39%-61% make/break ratio at 10 pulses per second. (Default.)
	1	Selects 33%-67% make/break ratio at 10 pulses per second.
	2	Selects 39%-61% make/break ratio at 20 pulses per second.
	3	Selects 33%-67% make/break ratio at 20 pulses per second.

Result Codes

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

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&V - Display Current Configuration and Stored Profile

This command reports the current (active) configuration and the stored (user) profiles.

Syntax

&V

Result Code

OK

Example:

```
AT&V
ACTIVE PROFILE:
E1 L1 M1 Q0 T V1 X0 &C1 &D2 &G0 &T0
S00:000 S01:000 S02:043 S03:013 S04:010 S05:008 S06:004
S07:050 S08:004
S10:014 S12:050 S16:000 S18:000 S29:070

STORED PROFILE 0:
E1 L1 M1 Q0 T V1 X4 &C1 &D2 &G0 &T0
S00:000 S02:043 S06:004 S07:050 S08:004 S10:014 S12:050
S18:000 S29:070

OK
```

&W - Store Current Configuration

This command saves the current (active) configuration (profile), including S-Parameters, in the Registry. 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 an Z command or at power up.

Syntax

&W

Result Code

OK

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*B - Display Blacklisted Numbers

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

Example:

```
NO. - PHONE NUMBER -

------ ------------------------------

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


OK
```

*D - Display Delayed Numbers

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

Example:

```
NO. - PHONE NUMBER -DELAY

------ ------------------------------------------

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


OK
```


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3.2.4 Modulation Control Commands

+MS - Modulation Selection

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

Syntax

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

Where: Possible <carrier>, <min_tx_rate>, <max_tx_rate>, <min_rx_rate>, and <max_rx_rate> values are listed in Table 3-2.

Table 3-2. +MS Command Supported Rates

Modulation	<carrier>	Possible (<min_rx_rate>, <min_rx_rate>, (<min_tx_rate>), and <max_tx_rate>) Rates (bps)
Bell 103	B103	300
Bell 212	B212	1200 Rx/75 Tx or 75 Rx/1200 Tx
V.21	V21	300
V.22	V22	1200
V.22 bis	V22B	2400 or 1200
V.23	V23C	1200
V.32	V32	9600 or 4800
V.32 bis	V32B	14400, 12000, 9600, 7200, or 4800
V.34	V34	33600, 31200, 28800, 26400, 24000, 21600, 19200, 16800, 14400, 12000, 9600, 7200, 4800, or 2400
K56flex	K56	56000, 54000, 52000, 50000, 48000, 46000, 44000, 42000, 40000, 38000, 36000, 34000, 32000
V.90	V90	56000, 54667, 53333, 52000, 50667, 49333, 48000, 46667, 45333, 44000, 42667, 41333, 40000, 38667, 37333, 36000, 34667, 33333, 32000, 30667, 29333, 28000
V.92 downstream	V92	56000, 54667, 53333, 52000, 50667, 49333, 48000, 46667, 45333, 44000, 42667, 41333, 40000, 38667, 37333, 36000, 34667, 33333, 32000, 30667, 29333, 28000
V.92 upstream	V92	48000, 46667, 45333, 44000, 42667, 41333, 40000, 38667, 37333, 36000, 34667, 33333, 32000, 30667, 29333, 28000, 26667, 25333, 24000

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Defined Values

<carrier>	A string which specifies the preferred modem carrier to use in originating or answering a connection. <carrier> values are strings of up to eight characters, consisting only of numeric digits and upper case letters. <carrier> values for ITU standard modulations take the form: <letter><1-4 digits><other letters as needed>. Defined values are listed in Table 3-1.
<automode>	A numeric value which enables or disables automatic modulation negotiation (e.g., 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 3-1. Actual values will be limited to possible values corresponding to the entered <carrier> and fall-back <carrier> as determined during operation. (Default = lowest (<min_rx_rate>) and highest (<max_rx_rate>) rate supported by the selected carrier.)
<min_tx_rate> and <max_tx_rate>	Numeric values which specify the lowest (<min_tx_rate>) and highest (<max_tx_rate>) rate at which the modem may establish a transmit connection. Non-zero values for this subparameter are decimal encoded, in units of bit/s. The possible values for each modulation are listed in Table 3-1. 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.)

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Reporting Current or Selected Values

Command: +MS?

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

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

Example: +MS: K56, 1,75,33600,75,56000

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

Reporting Supported Range of Parameter Values

Command: +MS=?

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

Example: +MS: (B103,B212,V21,V22,V22B,V23C,V32,V32B,V34, K56,V90),(0,1),(75-33600),(75-33600),(75-56000),(75-56000)

Result Code

OK	Valid subparameter string
ERROR	Otherwise.

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+MR - Modulation Reporting Control

This extended-format numeric parameter controls whether or not the extended-format +MCR: <carrier> and +MRR: <rate> intermediate result codes are transmitted from the modem to the DTE (see Section 3.5 and Table 3-14). 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).

Syntax

+MR=[<value>]

Defined Values

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

0	Disables reporting of modulation connection (+MCR: and +MRR: are not transmitted).
1	Enables reporting of modulation connection (+MCR: and +MRR: are transmitted). (Default.)
2	Enables reporting of modulation connection (+MCR: and Receive Rate Only: are transmitted).

Reporting Current or Selected Values

Command: +MR?

Response: +MR: <current value>

Example: +MR: 1 For default setting

Reporting Supported Range of Parameter Values

Command: +MR=?

Response: +MR: (<value>range)

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

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+MCR: Report Syntax

Response: +MCR: <carrier>

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

B103	For Bell 103
B212	For Bell 212
V21	For V.21
V22	For V.22
V22B	For V.22bis
V23C	For V.23
V32	For V.32
V32B	For V.32bis
V34	For V.34
K56	For K56flex
V90	For V.90
V92	For V.92

+MRR: Report Syntax

Response: +MRR: <tx_rate>,<rx_rate>

<tx_rate> Decimal transmit rate in bits/s.

<rx_rate> Decimal receive rate in bits/s.

Example: +MRR: 28800, 48000

%E - Enable/Disable Line Quality Monitor, Auto-Retrain, and Auto-Rate Renegotiation

This command controls whether or not the modem will automatically monitor the line quality and request a retrain (%E1) or a rate renegotiation when line quality merits a change. If enabled, the modem attempts to retrain for a maximum of 30 seconds.

Syntax

%E[<value>]

Defined Values

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

0	Disable line quality monitor, auto-retrain, and auto-rate renegotiation.
1	Enable line quality monitor, auto-retrain, and auto-rate renegotiation. (Default.)

Result Code

OK	<value> = 0 and 1
ERROR	Otherwise.

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3.2.5 Error Control Commands

This section describes parameters used to select and operate the modem in V.42 LAPM or MNP error control mode, Normal (Buffered) Mode, or V.80 Synchronous Access Mode.

+ES - Error Control and Synchronous Mode Selection

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

Syntax

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

Defined Values

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

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

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

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

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

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

Examples

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

Reporting Current or Selected Values

Command: +ES?

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

Example:	+ES: 3,0,2	For default settings.
	+ES: 6,0,8	For V.80 Synchronous Access Mode originator and answerer.

Reporting Supported Range of Parameter Values

Command: +ES=?

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

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

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+EB - Break Handling in Error Control Operation

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

Syntax

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

Defined Values

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

Reporting Current or Selected Values

Command: +EB?

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

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

Reporting Supported Range of Parameter Values

Command: +EB=?

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

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

+ESR - Selective Repeat

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

Syntax

+ESR=[<value>].

Defined Values

<value>	Decimal number 0 specifying that SREJ is not used.

Example:

+ESR:0	For default settings.

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+EFCS - 32-bit Frame Check Sequence

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

Syntax

+EFCS=[<value>]

Defined Values

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

Reporting Current or Selected Values

Command: +EFCS?

Response: +EFCS: <value>

Example: +EFCS: 0 For default setting.

Reporting Supported Range of Parameter Values

Command: +EFCS=?

Response: +EFCS: (<value> range)

Example: +EFCS: (0)

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+ER - Error Control Reporting

This extended-format numeric parameter controls whether or not the extended-format "+ER: " intermediate result code is transmitted from the modem to the DTE (see Section 3.5 and Table 3-15).

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

Syntax

+ER=[<value>]

Defined Values

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

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

Reporting Current or Selected Values

Command: +ER?

Response: +ER: <current value>

Example: +ER: 1 for the default setting

Reporting Supported Range of Parameter Values

Command: +ER=?

Response: +ER: (<value> range)

Example: +ER: (0,1)

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+ER: <type>

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

Syntax

+ER: <type>

Defined Values

<type> An alphanumeric code corresponding to the selected protocol.

NONE	Error control is not in use.
LAPM	V.42 LAPM protocol is in use.
ALT	MNP is in use.

Example

+ER: LAPM

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+ETBM - Call Termination Buffer Management

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

Syntax

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

Defined Values

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

Reporting Current or Selected Values

Command: +ETBM?

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

Example: +ETBM: 0,0,0

Reporting Supported Range of Parameter Values

Command: +ETBM=?

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

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

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3.2.6 Data Compression Commands

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

+DS - Data Compression

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

Syntax

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

Defined Values

<direction> Specifies the desired direction(s) of operation of the data compression function; from the DTE point of view.

- 0 Negotiated; no compression (V.42bis P0=0).
- 3 both directions, accept any direction (V.42bis P0=11). (Default.)

<compr_neg> Specifies whether or not the modem should continue to operate if the desired result is not obtained.

- 0 Do not disconnect if V.42bis is not negotiated by the remote modem as specified in <direction>.

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

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

Reporting Current or Selected Values

Command: +DS?

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

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

Reporting Supported Range of Parameter Values

Command: +DS=?

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

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

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+DS44 - V.44 Compression Select

This extended-format compound parameter controls the V.44 data compression function.

Syntax

+DS44=[<direction>[,< compress_negotiation >[,<capability>[,<max_codewords_tx>[,<max_codewords_rx>[,<max_string_tx>[,<max_string_rx>[,<max_history_tx>[,<max_history_rx>]]]]]]]]]

Defined Values

<direction>	Decimal number that specifies the desired direction(s) of operation of the data compression function; from the DTE point of view.	
	0	Negotiated, no compression.
	1	Transmit only.
	2	Receive only.
	3	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.	
	0	Do not disconnect if V.44 is not negotiated by the remote DCE as specified in <direction>. (Default.)
	1	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.	
	0	Stream method. (Default.)
	1	Packet method.
	2	Multi-packet method.
<max_codewords_tx>	Decimal number from 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 from 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 from 32 to 255 that specifies the maximum string length to be negotiated in the transmit direction. (Default = 32.)	
<max_string_rx>	Decimal number from 32 to 255 that specifies the maximum string length to be negotiated in the receive direction. (Default = 32.)	
<max_history_tx>	Decimal number from 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 from 2048 to 4096 that specifies the maximum size of the history buffer to be negotiated in the receive direction. (Default = 4096.)	

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Reporting Current or Selected Values

Command: +DS44?

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.

Reporting Supported Range of Parameter Values

Command: +DS44=?

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)

+DR - Data Compression Reporting

This extended-format numeric parameter controls whether or not the extended-format "+DR: " intermediate result code is transmitted from the modem to the DTE (see Section 3.5 and Table 3-14).

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

Syntax

+DR=[<value>]

Defined Values

<value> decimal number corresponding to the selected option:

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

Reporting Current or Selected Values

Command: +DR?

Response: +DR: <current value>

Example: +DR: 1 For the default setting.

Reporting Supported Range of Parameter Values

Command: +DR=?

Response: +DR: (<value> range)

Example: +DR: (0,1)

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+DR: <type> Intermediate Result Code

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

The format of this result code is:

Result Code Syntax

+DR: <type>

Defined Values

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

NONE	Data compression is not in use.
V42B	V.42bis is in use in both directions.
ALT	MNP 5 compression.

Example

+DR: V42B

%C - Enable/Disable Data Compression

Enables or disables data compression negotiation. The modem can only perform data compression on an error corrected link.

Syntax

%C[<value>]

Defined Values

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

0	Disables data compression.
1	Enables both V.42 bis and MNP 5 data compression.
2	Enables both V.42 bis and MNP 5 data compression.
3	Enables both V.42 bis and MNP 5 data compression. (Default.)

Result Codes

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

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N - Automode Enable

This command is included for compatibility only and has no effect other than returning a result code. The only valid values are 0-1.

Syntax

N[<mode>]

Defined Values

<mode >	Decimal number corresponding to the selected value: 0-1.

Result Codes

OK	<mode> = 0 to 1.
ERROR	Otherwise.

3.2.7 V.8/V.8bis Commands

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

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

Syntax

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

Defined Values

<v8o>	Decimal number which enables/disables issuance of +A8*x* 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 +A8*x* indications.
<v8a>=	Decimal number which enables/disables issuance of +A8*x* 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 +A8*x* indications.

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<v8cf>=	Set the V.8 CI signal call function to the hexadecimal octet value X.
<v8b>=	Decimal number which enables/disables V.8bis negotiation. 0 Disable V.8bis negotiation. (Default.) 1 Enable DCE-controlled V.8bis negotiation. 2 Enable DTE-controlled V.8bis negotiation.
<cfrange>=	"<string of values>". Applicable only for <v8a>=5 (not supported).
< protrange >=	"<string of values>". Applicable only for <v8a>=5 (not supported).

Default values: 1,1,,1,"","""

The ATD and ATA commands behave as specified in §6.3.1/V.25ter and §6.3.5/V.25ter, respectively, and +A8n indications are not generated by the modem.

For subparameter values <v8o>=6 and <v8a>=5, the +A8I, +A8C, +A8A, +A8J, and +A8M indications are issued during the course of the V.8 session to notify the DTE when the relevant V.8 signals are received. The modem controls the V.8 session, however, and the +A8M command is not used.

Reporting Current or Selected Values

Command: +A8E?

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

Example: +A8E: 1,1,,1,"","" For the defaults

Reporting Supported Range of Parameter Values

Command: +A8E=?

Response: +A8E: (<v8o> range),(<v8a> range), (maximum size of v8cf in octets), (<v8b> range),(<cfrange> option bit range),(<protrange> option bit range)

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

+A8M - Send V.8 Menu Signals

This command, applicable only in DTE-controlled V.8, directs the modem to send a V.8 CM or JM signal using the specified hexadecimal coded string. If the modem can decode the menu octet string, and if it cannot implement a specified feature, the modem reports an ERROR final result code, but stays in V.8 operation awaiting another command.

Syntax

+A8M=<hexadecimal coded CM or JM octet string>

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+A8I: - CI Signal Indication

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

Indication Syntax

+A8I:<v8cf><CR>

Defined Values

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

Example

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

+A8C: - Calling Tone Indication

This indication is issued by an answering modem, if +A8E,<v8a> ≠ 0, to indicate detection of 1100 Hz or 1300 Hz calling tones, or sigC signals, as defined in T.30, V.8 and in V.25.

Indication Syntax

+A8C: <type><CR>

Defined Values

<type> Decimal number which indicates the corresponding detected calling tone.

0	The modem concluded answer tone transmission without reporting detection of any calling tone.
1	CNG tone (1100 Hz) detected.
2	1300 Hz V.25 data modem calling tone detected.
3	sigC signal: V.32/V.32*bis* AA tone detected.

Example

+A8C: 1	For CNG tone detected.

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+A8A: - Answer Signal Indication

This indication is issued by a calling modem, if +A8E <v8o> ≠ 0, to indicate detection of an answering signal.

Indication Syntax

+A8A:<type><CR>

Defined Values

<type><CR> Decimal number which indicates the corresponding detected answer signal.

0	The modem timed out waiting for an answering signal.
1	V.8 ANSam signal (2100 Hz with amplitude modulation) detected.
2	V.25 answer tone (2100 Hz) detected.
3	V.25 answer tone with phase reversals detected. (Note)
4	sigA signal: V.21 Ch2 with flags (e.g., T.30 control preamble) detected.
5	sigA signal: V.22bis USB1 signal detected.
6	sigA signal: V.32bis AC signal detected.
7	sigA signal: V.34 ToneA signal detected.

Example

+A8A:1 For V.8 ANSam signal (2100 Hz with amplitude modulation) detected.

+A8J: - V.8 Negotiation Complete

This indication is issued by either modem when the negotiation is complete and CJ is sent or detected. An answering modem will issue this on detection of CJ from the remote terminal. A calling modem will send a CJ signal to the remote terminal at the same time as a +A8J indication. +A8J:1 indicates CJ; +A8J:0 indicates that the modem timed out waiting for a CJ signal.

Indication Syntax

+A8J:<value><CR>

Defined Values

<value> Decimal number corresponding to the selected option.

0	The modem timed out waiting for a CJ signal.
1	CJ signal sent or detected.

Example

+A8J:1 For CJ sent to a remote terminal.

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+A8M: - V.8 Menu Report

This indication is issued by either modem, during V.8 negotiation, to indicate the contents of a valid received CM or JM signal. A +A8M:0 indicates that the modem timed out waiting for a CM or JM signal.

Report Syntax

+A8M:< hex_string>

Defined Values

< hex_string>	CM or JM hexadecimal coded string. A +A8M:0 indicates that the modem timed out waiting for a CM or JM signal.

Example

A8M:XXX	YYY

+A8R: - V.8bis Signal and Message Reporting

If enabled by +A8E=,,,[<v8b>=2] command, the modem monitors for V.8*bis* signals and messages, and uses the +A8R: intermediate result code response to report that signal. Two concatenated V.8*bis* messages are reported with two consecutive <message> indications.

Report Syntax

+A8R:<signal>[,[<1st message>]][,<2nd message>]<CR>

Defined Values

<signal>	The V.8*bis* signal, if detected, is indicated using a <signal> value (see Table 3-3). Values of 4 and 8 are not reported, i.e., the modem is not expected to discern the power level of received CRe and MRd signals. If a V.8*bis* message is detected without a preceding V.8*bis* signal, the preamble is reported as a 0 <signal> value.
<1st message>	The contents of valid V.8*bis* message(s), if detected, are reported using hexadecimal octet coded string(s) (A.4.1). Flag detection and consumption, flag transparency 0-bit deletion and FCS checking are performed by the modem. The modem does not report invalid messages (e.g., bad FCS). If two consecutive messages are detected but the first is invalid, the modem indicates this with no characters between the first and second comma (e.g., +A8R:<signal>,,<2nd message>).
<2nd message	See <1st message>.

Example

+A8R:0,XX,YY	For a V.8*bis* message detected without a preceding V.8*bis* signal.
+A8R:0,XX,YY	For a V.8*bis* message detected with a preceding V.8*bis* signal.

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Table 3-3. V.8/V.8bis Example Commands/Responses for Originator and Answerer

	Originator		Answerer	
Scenario	**DTE Command**	**Modem Response or Indication**	**DTE Command**	**Modem Answerer Response or Indication**
1	AT&FS0=1<cr>	AT&FS0=1<cr><cr><lf>OK<cr><lf>	AT&FS0=1<cr>	AT&FS0=1<cr><cr><lf>OK<cr><lf>
	ATDT102<cr>	ATDT102<cr>		<cr><lf>RING<cr><lf>
		<cr><lf>CONNECT 57600<cr><lf>		<cr><lf>CONNECT 57600<cr><lf>
2	AT&FS0=1<cr>	AT&FS0=1<cr><cr><lf>OK<cr><lf	AT&FS0=1<cr>	AT&FS0=1<cr><cr><lf>OK<cr><lf>
			AT+A8E=6,5<cr>	AT+A8E=6,5<cr><cr><lf>OK<cr><lf>
	ATDT102<cr>	ATDT102<cr>		<cr><lf>RING<cr><lf>
		<cr><lf>CONNECT 57600<cr><lf>		<cr><lf>+A8I: 0<cr><lf>
				<cr><lf>+A8M: C145<cr><lf>
				<cr><lf>+A8J: 1<cr><lf>
				<cr><lf>CONNECT 57600<cr><lf>
3	AT&FS0=1<cr>	AT&FS0=1<cr>	AT&FS0=1<cr>	AT&FS0=1<cr><cr><lf>OK<cr><lf>
	AT+A8E=6,5<cr>	AT+A8E=6,5<cr><cr><lf>OK<cr><lf>		
	ATDT102<cr>	ATDT102<cr>		<cr><lf>RING<cr><lf>
		<cr><lf>+A8A: 1<cr><lf>		
		<cr><lf>+A8M: C145<cr><lf>		
		<cr><lf>+A8J: 1<cr><lf>		
		<cr><lf>CONNECT 57600<cr><lf>		<cr><lf>CONNECT 57600<cr><lf>
4	AT&FS0=1<cr>	AT&FS0=1<cr>	AT&FS0=1<cr>	AT&FS0=1<cr>
	AT+A8E=6,5<cr>	AT+A8E=6,5<cr><cr><lf>OK<cr><lf>	AT+A8E=6,5<cr>	AT+A8E=6,5<cr><cr><lf>OK<cr><lf>
	ATDT102<cr>	ATDT102<cr>		<cr><lf>RING<cr><lf>
		<cr><lf>+A8A: 1<cr><lf>		<cr><lf>+A8I: C1<cr><lf>
		<cr><lf>+A8M: C145<cr><lf>		<cr><lf>+A8M: C145<cr><lf>
		<cr><lf>+A8J: 1<cr><lf>		<cr><lf>+A8J: 1<cr><lf>
		<cr><lf>CONNECT 57600<cr><lf>		<cr><lf>CONNECT 57600<cr><lf>
5	AT&FS0=1<cr>	AT&FS0=1<cr>	AT&FS0=1<cr>	AT&FS0=1<cr>
	AT+A8E=6,5,21<cr>	AT+A8E=6,5,21<cr><cr><lf>OK<cr><lf>	AT+A8E=6,5<cr>	AT+A8E=6,5<cr><cr><lf>OK<cr><lf>
	ATDT102<cr>	ATDT102<cr>		<cr><lf>RING<cr><lf>
		<cr><lf>+A8A: 1<cr><lf>		<cr><lf>+A8I: 21<cr><lf>
		<cr><lf>+A8M: C1000000<cr><lf>		<cr><lf>+A8M: 2145<cr><lf>
		<cr><lf>+A8J: 1<cr><lf>		<cr><lf>+A8J: 0<cr><lf>
		<cr><lf>NO CARRIER<cr><lf>		<cr><lf>NO CARRIER<cr><lf>
6	AT&FS0=1<cr>	AT&FS0=1<cr>	AT&FS0=1<cr>	AT&FS0=1<cr>
	AT+A8E=6,5,21<cr>	AT+A8E=6,5,21<cr><cr><lf>OK<cr><lf>	AT+A8E=6,5,21<cr>	AT+A8E=6,5,21<cr><cr><lf>OK<cr><lf>
	ATDT102<cr>	ATDT102<cr>		<cr><lf>RING<cr><lf>
		<cr><lf>+A8A: 1<cr><lf>		<cr><lf>+A8I: 21<cr><lf>
		<cr><lf>+A8M: 2145<cr><lf>		<cr><lf>+A8M: 2145<cr><lf>
		<cr><lf>+A8J: 1<cr><lf>		<cr><lf>+A8J: 1<cr><lf>
		<cr><lf>CONNECT 57600<cr><lf>		<cr><lf>CONNECT 57600<cr><lf>
7	AT&FS0=1<cr>	AT&FS0=1<cr>	AT&FS0=1<cr>	AT&FS0=1<cr>
	AT+A8E=6,5,21<cr>	AT+A8E=6,5,21<cr><cr><lf>OK<cr><lf>	AT+A8E=6,5,,,"1"<cr>	AT+A8E=6,5,,,"1"<cr><cr><lf>OK<cr><lf>
	ATDT102<cr>	ATDT102<cr>		<cr><lf>RING<cr><lf>
		<cr><lf>+A8A: 1<cr><lf>		<cr><lf>+A8I: 21<cr><lf>
		<cr><lf>+A8M: 2145<cr><lf>		<cr><lf>+A8M: 2145<cr><lf>
		<cr><lf>+A8J: 1<cr><lf>		<cr><lf>+A8J: 1<cr><lf>
		<cr><lf>CONNECT 57600<cr><lf>		<cr><lf>CONNECT 57600<cr><lf>

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Table 3-3. V.8/V.8bis Example Commands/Responses for Originator and Answerer (Continued)

	Originator		Answerer	
Scenario	**DTE Command**	**Modem Response or Indication**	**DTE Command**	**Modem Answerer Response or Indication**
8	Originating Modem that Sends a Protocol Octet that indicates LAPM		AT&FS0=1<cr>	AT&FS0=1<cr>
			AT+A8E=6,5<cr>	AT+A8E=6,5<cr><cr><lf>OK<cr><lf>
				<cr><lf>RING<cr><lf>
				<cr><lf>+A8I: C1<cr><lf>
				<cr><lf>+A8M: C145000026<cr><lf>
				<cr><lf>+A8J: 1<cr><lf>
				<cr><lf>NO CARRIER<cr><lf>
9	Originating Modem that Sends a Protocol Octet that indicates LAPM		AT&FS0=1<cr>	AT&FS0=1<cr>
			AT+A8E=6,5,,,,"1"<cr>	AT+A8E=6,5,,,,"1"<cr><cr><lf>OK<cr><lf>
				<cr><lf>RING<cr><lf>
				<cr><lf>+A8I: C1<cr><lf>
				<cr><lf>+A8M: C145000026<cr><lf>
				<cr><lf>+A8J: 1<cr><lf>
				<cr><lf>CONNECT 57600<cr><lf>

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3.2.8 Synchronous Access Mode Commands

+ESA - Configure Synchronous Access Mode

This extended-format compound parameter controls the manner of operation of the Synchronous Access Mode in the modem.

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

Syntax

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

Defined Values

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

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

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

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

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

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

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

<crc_type> Decimal number which specifies the CRC polynomial used while operating in Framed sub-Mode. The options are:

- 0 CRC generation and checking disabled. (Default and fixed.)

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<nrzi_en>	Decimal number which specifies if Non Return to Zero Inverted (NRZI) encoding is to be used by the modem for transmit and receive data. The options are: 0 NZRI encoding and decoding disabled (default and fixed).
<syn1>, <syn2>	Decimal number which specifies the octet value(s) to be used while performing character-oriented framing. <syn1> is to be commanded to 255 (FFh); <syn2> is not to be commanded.

Reporting Current or Selected Values

Command: +ESA?

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

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

Reporting Supported Range of Parameter Values

Command: +ESA=?

Response: +ESA: (<trans_idle> range), (<framed_idle> range),(<framed_un_ov> range), (<hd_auto> range), (<crc_type> range), (<nrzi_en> range),(<syn1> range), (<syn2> range)

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

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+ITF - Transmit Flow Control Thresholds

In V.80 Synchronous Access Mode, this optional compound parameter allows the DTE to determine the effective input buffer size in the modem for data on transmit data from the DTE, to control the thresholds used for flow control of such data, and to control how often the modem reports to the DTE the number of octets in this buffer. Note that the DTE can adjust its own thresholds for flow control of data on received data from the modem.

Syntax

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

Defined Values

<off>	Determines the threshold, in octets, above which the modem will generate a flow off signal. Applicable in Synchronous Access Mode. The <off> range is 20 -7000. Default <off> value is 128. For the <on> and <off> subparameters, the input buffer is assumed to reside between the modem's V.24 interface and the Synchronous Access protocol layer; i.e., the buffer count includes all octets, including EM codes, received from the DTE, with the exception of XON and XOFF if these are used to signal <modem-by-DTE> flow control. The modem returns the ERROR result code if the DTE specifies that the <off> subparameter be set to a value less than or equal to the <on> subparameter; in this case, the current parameter value settings are set to default values.
<on>	Determines the threshold, in octets, below which the modem will generate a flow on signal. Applicable in Synchronous Access Mode. The <on> range is 10 -5000. Default <on> value is 64.
<report_period>	Not supported. A fixed value of zero is used and reported.

Reporting Current or Selected Values

Command: +ITF?

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

Example: +ITF: 128,64,0 For default values

Reporting Supported Range of Parameter Values

Command: +ITF=?

Response: +ITF: (<off> range),(<on> range),(<report_period> range)

Example: +ITF: (20-7000),(10-5000),(0)

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3.2.9 Diagnostic and Test Commands

#UD – Last Call Status Report

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

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

1. Power off
2. Hard reset (e.g., negate DTR with &D3 set; reset button)
3. Soft reset = ATZ or AT&F
4. ATD command issued
5. ATA command issued
6. Automatic answer (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:

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

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Command Syntax

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

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

Syntax

#UD

Response

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

Defined Values

DIAG	5 hexadecimal characters (44h, 49h, 41h, 47h, 20h)
<	Left angle bracket (less than sign) (3Ch)
token	Unique 32-bit hexadecimal string 2A4D3263(32h, 4h1, 34h, 44h, 33h, 32h, 36h, 33h)
space	space character (20h)
Key	One- or two-digit hexadecimal number (see Key in Table 3-3)
=	Equal sign (3Dh)
Value	Any string as defined below (Table 3-3 - as Table 3-8 appropriate)
>	Right angle bracket (greater than sign) (3Eh)

Unless otherwise noted, all values are hexadecimal numbers. Any numeric values from tables in ITU V.58 are converted to hexadecimal. Multi-digit values are reported MSD first. Leading 0's may be deleted. See examples in Table 3-12.

Monitoring an active connection

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

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

Notes for Tables

1. The modem may insert a delay (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).

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callCleared codes from 3.6.4/V.58-1994

callCleared: indicates that the DCE has gone on hook and that the previously existing network connection has been cleared. These value are hex, converted from decimal in V.58. callCleared codes are described in Table 3-11.

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

Key	Value(s)	Definition
0	2 digits	Diagnostic Command Specification revision number, digit.digit
1	Table 3-4	Call Setup Result code
2	Table 3-5	Multi-media mode
3	Table 3-7	DTE-DCE interface mode
4	String	V.8 CM octet string, same format as V.250, in quotes
5	String	V.8 JM octet string, same format as V.250, in quotes
10	0-2F	Received signal power level, in –dBm (0-43)
11	0-1F	Transmit signal power level, in –dBm (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 3-7	V.34 INFO bit map
20	Table 3-8	Transmit Carrier Negotiation Result
21	Table 3-8	Receive Carrier Negotiation Result
22	0-1F40	Transmit Carrier symbol rate (0-8000) in symbol/s
23	0-1F40	Receive Carrier symbol rate (0-8000) in symbol/s
24	0-FA0	Transmit Carrier frequency (0-4000) in Hz
25	0-FA0	Receive Carrier frequency (0-4000) in Hz
26	0-FA00	Initial transmit carrier data rate (0-64000) in bit/s
27	0-FA00	Initial receive carrier data rate (0-64000) in bit/s
30	0-FF	Temporary carrier loss event count
31	0-FF	Carrier Rate re-negotiation event count
32	0-FF	Carrier Retrains requested
33	0-FF	Carrier Retrain requests granted
34	0-FA00	Final transmit carrier data rate in bit/s
35	0-FA00	Final receive carrier data rate in bit/s
40	Table 3-9	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 3-10	Compression Negotiation Result
50	0-2	Transmit flow control: 0 = off; 1 = DC1/DC3; 2 = V.24 circuit 106/133
51	0-2	Receive flow control: 0 = off; 1 = DC1/DC3; 2 = V.24 circuit 106/133
52	0-FFFFFFFF	Transmit characters sent from DTE
53	0-FFFFFFFF	Received characters sent to DTE
54	0-FFFF	Transmit characters lost (data overrun errors from DTE)
55	0-FFFF	Received characters lost (data overrun errors to DTE)
56	0-FFFFFFFF	Transmit I- Frame count, if error control protocol running
57	0-FFFFFFFF	Received I-Frame count, if error control protocol running
58	0-FFFF	Transmit I-Frame error count, if error control protocol running
59	0-FFFF	Received I- Frame error count, if error control protocol running
60	Table 3-11	Termination Cause
61	0-FF	Call Waiting event count

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Table 3-5. Call Setup Result Codes

Code	Definition
0	No previous call (modem log has been cleared since any previous calls)
1	No dial tone detected
2	Reorder signal detected, network busy
3	Busy signal detected
4	No recognized signal detected (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 3-6. Multimedia Modes

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

Table 3-7. DTE-DCE modes

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

Table 3-8. V.34 INFO bit report

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

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Table 3-9. gstnModulationSchemeActive from 3.7.2/V.58

Value	Description
0	V.17 (G3 Fax call)
1	V.21
2	V.22
3	V.22bis
4	V.23 Constant Carrier (1200/75)
8	V.27ter (G3 Fax call)
9	V.29 HD (G3 Fax call)
A	V.32
B	V.32bis
C	V.34
E	V.90
81	K56flex™
84	Bell 212A
85	Bell 103

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

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

Table 3-11. compressionActive from 3.2.2/V.58

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

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

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

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Example Modem Response and Usage

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

Table 3-13. Completed Data Call, with Some Errors and Rate Retrain during the Call

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

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%TT - PTT Test Command

This command facilitates PTT testing of signal levels by providing continuous signals regards of whether or not the modem is connected to the line. The signal transmitted is in accordance with the parameter provided.

A range of commands allows the user to initiate a series of signals required to obtain PTT approval. The signals emitted include answer tone, modulation, carriers, and other pertinent signals. A test is initiated upon receipt of a %TTn (the second T is a password and n is a test number), and the test is aborted when any keyboard character is entered. The modem will continuously transmit the tone or carrier according to the parameter supplied.

Syntax

%TT0x — x corresponds to the desired DTMF dial digit (0, 1, 2, 3, 4, 5, 6, 7, 8, 9, *, #, A, B, C, or D).

0	Dial digit 0
1	Dial digit 1
2	Dial digit 2
3	Dial digit 3
4	Dial digit 4
5	Dial digit 5
6	Dial digit 6
7	Dial digit 7
8	Dial digit 8
9	Dial digit 9
A	Dial digit *
B	Dial digit #
C	Dial digit A
D	Dial digit B
E	Dial digit C
F	Dial digit D

%TT1x — x corresponds to the desired FSK mode (V21Ch1, V21Ch2, V23Ch1, V23Ch2, Bell103Ch1, or Bell103Ch2).

0	V21Ch1
1	V21Ch2
2	V23Ch1
3	V23Ch2
4	Bell103Ch1
5	Bell103Ch2
6-F	Reserved

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%TT2x x corresponds to the desired QAM mode (V22Org, V22Ans, Bell212Org, Bell212Ans, V22BisOrg, V22BisAns, V32@4800, V32@7200, V32@9600, V.32Bis@12000, or V32Bis@14400).

0	V22Org
1	V22Ans
2	Bell212Org
3	Bell212Ans
4	V22BisOrg
5	V22BisAns
6	V32@4800
7	V32@7200
8	V32@9600
9	V.32Bis@12000
A	V32Bis@14400
B-F	Reserved

%TT3x x corresponds to the selected MISC function (Silence, 2100Hz, 1300Hz, or 1100Hz).

0	Silence
1	2100Hz
2	Reserved
3	1300Hz
4	1100Hz
5	5-F Reserved

%TT4x x corresponds to the selected FAX mode (V27@2400, V27@4800, V29@7200, V29@9600, V17@7200LT, V17@7200ST, V17@9600LT,V17@9600ST, V17@12000LT, V17@12000ST, V17@14400LT, or V17@14400ST).

0	Reserved
1	V27@2400
2	V27@4800
3	V29@7200
4	V29@9600
5	V17@7200LT
6	V17@7200ST
7	V17@9600LT
8	V17@9600ST
9	V17@12000LT
A	V17@12000ST
B	V17@14400LT
C	V17@14400ST
D-F	Reserved

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%TT5xyz

x corresponds to the desired V.34 bit rate (2400, 4800, 7200, 9600, 12000, 14400, 16800, 19200, 21600, 24000, 26400, 28800, 31200, or 33600):

0	2400
1	4800
2	7200
3	9600
4	12000
5	14400
6	16800
7	19200
8	21600
9	24000
A	26400
B	28800
C	31200
D	33600
E-F	Reserved

y corresponds to the desired V.34 symbol rate (2400, 2800, 3000, 3200, or 3429).

0	2400 ($x \leq 21600$)
1	Reserved
2	2800 ($x \leq 26400$)
3	3000 ($x \leq 28800$)
4	3200 ($x \leq 31200$)
5	3429 ($x \leq 33600$)
6-F	Reserved

z = Pre-Emphasis Filter 0...A

0	Pre-Emphasis Filter 0
1	Pre-Emphasis Filter 1
2	Pre-Emphasis Filter 2
3	Pre-Emphasis Filter 3
4	Pre-Emphasis Filter 4
5	Pre-Emphasis Filter 5
6	Pre-Emphasis Filter 6
7	Pre-Emphasis Filter 7
8	Pre-Emphasis Filter 8
9	Pre-Emphasis Filter 9
A	Pre-Emphasis Filter A
B-F	Reserved

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3.2.10 V.92 +P and –Q Commands

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

+PCW - Call Waiting Enable

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

Syntax

+PCW=<value>

Defined Values

<value>	Decimal number corresponding to the selected operation.	
	0	Request modem-on-hold if enabled by +PMH and collect caller ID information if enabled by +VRID. Toggle V.24 circuit 125. (Default.)
	1	Hang-up.
	2	Ignore call waiting.

Result Codes

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

Reporting Selected Value(s)

Command: +PCW?

Response: +PCW: <value>

Example: +PCW: 0 For the default setting.

Reporting Supported Range of Parameter Values

Command: +PCW=?

Response: +PCW: (<value> range)

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

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+PMH - Modem-on-Hold Enable

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

Syntax

+PMH=<value>

Defined Values

<value>	Decimal number corresponding to the selected operation.	
	0	Modem-on-hold enabled in V.92 Mode. (Default.)
	1	Disabled modem-on-hold.

Result Codes

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

Reporting Current or Selected Value

Command: +PMH?

Response: +PMH: <current value>

Example: +PMH: 0 For the default setting.

Reporting Supported Range of Parameter Values

Command: +PMH=?

Response: +PMH: (<value> range)

Example: +PMH: (0,1)

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+PMHT – Modem-on-Hold Timer

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

Syntax

+PMHT=<value>

Defined Values

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

Result Codes

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

Reporting Current or Selected Values

Command: +PMHT?

Response: +PMHT: <value>

Example: +PMHT: 0 For the default setting.

Reporting Supported Range of Parameter Values

Command: +PMHT=?

Response: +PMHT: (<value> range)

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

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+PMHR - Initiate Modem-on-Hold

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

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

Syntax

+PMHR

Response

+PMHR:<value>

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

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

Result Codes

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

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+PIG - PCM Upstream Ignore

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

Note: This command is not applicable to HCF products.

Syntax

+PIG=<value>

Defined Values

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

Result Codes

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

Reporting Selected Value(s)

Command: +PIG?

Response: +PIG: <value>

Example: +PIG: 1 For the default setting.

Reporting Supported Range of Parameter Values

Command: +PIG=?

Response: +PIG: (<value> range)

Example: +PCW: (0,1)

+PMHF - V.92 Modem-on-Hold Hook Flash

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

Syntax

+PMHF

Result Code

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

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+PQC - V.92 Phase 1 and Phase 2 Control

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

Syntax

+PQC=<value>

Defined Values

<value>	Decimal number corresponding to the selected setting.	
	0	Enable Short Phase 1 and Short Phase 2. (Default.)
	1	Enable Short Phase 1 only.
	2	Not supported.
	3	Disable Short Phase 1 and Short Phase 2.

Result Codes

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

Reporting Selected Values

Command: +PQC?

Response: +PQC: <value>

Example: +PQC: 0

Reporting Supported Range of Parameter Values

Command: +PQC=?

Response: +PQC: (<value> range)

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

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+PSS - Use Short Sequence

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

Note: This command is not applicable to HCF products.

Syntax

+PSS=<value>

Defined Values

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

Result Codes

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

Reporting Selected Values

Command: +PSS?

Response: +PSS: <value>

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

Reporting Supported Range of Parameter Values

Command: +PSS=?

Response: +PSS: (<value> range)

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

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-QCPC - Force Full Startup Procedure Next Connection

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

Syntax

-QCPC

Result Code

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

-QCPS - Enable Quick Connect Profile Save

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

Syntax

-QCPS=<value>

Defined Values

<value> Decimal number corresponding to the desired operation.

0	Do not allow the quick connect profile to be saved.
1	Allow the quick connect profile to be saved. (Default.)

Result Codes

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

Reporting Selected Value(s)

Command: -QCPS?

Response: -QCPS: <value>

Example: -QCPS: 1 For the default setting.

Reporting Supported Range of Parameter Values

Command: -QCPS=?

Response: -QCPS: (<value> range)

Example: -QCPS: (0,1)

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3.3 S-Parameters

The supported S-Parameters are summarized in Table 3-14.

Table 3-14. S-Parameter Summary

Register	Function	Units
S0	Number of Rings to Automatic Answer	rings
S1	Ring Counter	rings
S2	Escape Character	ASCII
S3	Line Termination Character	ASCII
S4	Response Formatting Character	ASCII
S5	Command Line Editing Character	ASCII
S6	Wait Time for Dial Tone Before Blind Dialing, or After “W” Dial Modifier	s
S7	Wait Time For Carrier After Dial, For Silence, or For Dial Tone After “W” Dial Modifier	s
S8	Pause Time for Dial Delay Modifier	s
S10	Carrier Loss Disconnect Time	0.1 s
S11	DTMF Tone Duration	0.001 s
S12	Escape Prompt Delay	0.02 s
S18	Test Timer	s
S29	Flash Dial Modifier Time	10 ms
S30	Disconnect Inactivity Timer	10 s
S46	Data Compression Control	-
S95	Result Code Messages Control	-

AT=x - Write to Selected S-Parameter

This command writes the value x to the currently selected S-Parameter. An S-Parameter can be selected by using the ATSn command. All of the S-Parameters will return the OK response if x is a number. Some registers may not be written due to country specific PTT limitations.

Syntax

S=x

Result Codes

OK For all arguments.

AT? - Read Selected S-Parameter

This command reads and displays the selected S-Parameter. An S-Parameter can be selected by using the ATSn command.

Syntax

S=?

Result Codes

OK For all arguments.

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Sn - Read/Write S-Parameter

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

n	Establishes S-Parameter n as the last register accessed.
n=v	Sets S-Parameter n to the value v.
n?	Reports the value of S-Parameter n.

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

ATS7 establishes S7 as the last accessed register.

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

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

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

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

3.3.1 Factory Defaults

The factory default values are stored in the Registry and are loaded into the active configuration at power up or by the Z command. In addition, the default profile is subsequently loaded, and may change some of the factory default values.

The default values in the Registry may be loaded at any time by entering the &F command.

3.3.2 S-Parameter Definitions

S0 - Number of Rings to Automatic Answer

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

Range: 0-255 rings

Default: 0

S1 - Ring Counter

S1 is incremented each time the modem detects a ring signal on the telephone line. S1 is cleared if no rings occur over an eight second interval.

Range: 0-255 rings

Default: 0

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S2 - Escape Character

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

Range: 0-255, ASCII decimal

Default: 43 (+)

S3 - Line Termination Character

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

Range: 0-127, ASCII decimal

Default: 13 (Carriage Return)

S4 - Response Formatting Character

S4 sets the decimal value of the character generated by the modem as part of the header, trailer, and terminator for result codes and information text, along with the S3 parameter (see the description of the V parameter for usage). If the value of S4 is changed in a command line, the result code issued in response to that command line will use the new value of S4.

The Response Formatting character is output after the Line Termination character if verbose result codes are used.

Range: 0-127, ASCII decimal

Default: 10 (Line Feed)

S5 - Command Line Editing Character

S5 s sets the decimal value of the character recognized by the modem as a request to delete from the command line the immediately preceding character. The modem will not recognize the Command Line Editing 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 Command Line Editing character, an ASCII space character and a second Command Line Editing character; this means a total of three characters are transmitted each time the modem processes the Command Line Editing character.

Range: 0-32, ASCII decimal

Default: 8 (Backspace)

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S6 - Wait Time for Dial Tone Before Blind Dialing, or After “W” Dial Modifier

S6 sets one of two possible parameters:

1. Sets the length of time, in seconds, that the modem will wait before starting to dial after going off-hook when blind dialing.
2. If enabled by country options in the INF file, S6 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.

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

Range: 2-255 seconds

Default: 2

S7 - Wait Time For Carrier After Dial, For Silence, or For Dial Tone After “W” Dial Modifier

S7 sets one of three possible parameters:

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 after the billing delay in answer mode. 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. If enabled by country options in the INF file, S7 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.

Range: 1-255 seconds

Default: 50

S8 - Pause Time For Dial Delay

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

Range: 0-255 seconds

Default: 2

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S10 - Lost Carrier To Hang Up Delay

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

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

Range: 1-255 tenths of a second

Default: 14 (1.4 seconds)

S11 - DTMF Tone Duration

S11 sets the duration of tones in DTMF dialing. This value has no effect on pulse dialing.

Range: 50-255 milliseconds

Default: 95 (95 milliseconds)

S12 - Escape Prompt Delay (EPD)

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

Range: 0-255 1/50 of a second

Default: 50 (1 second)

S18 - Test Timer

S18 sets the length of time, in seconds, that the modem conducts a test (commanded by &T1) before returning to the command mode. If this parameter value is zero, the test will not automatically terminate; the test must be terminated from the command mode by issuing an &T0 or H command. When S18 is non-zero, the modem returns the OK message upon test termination.

Range: 0-255 seconds

Default: 0

S29 - Flash Dial Modifier Time

S29 sets the length of time, in units of 10 ms, that the modem will go on-hook when it encounters the flash (!) dial modifier in the dial string. The time can be limited as it is a country dependent parameter.

Range: 0-255 10 ms intervals

Default: 70 (700 ms)

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S30 - Disconnect Inactivity Timer

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

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

Default: 0 (disabled)

S46 - Data Compression Control

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

Range: 136 or 138

Default: 138

S46=136 Execute error correction protocol with no compression.

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

S95 - Extended Result Codes Control

A bit set to a 1 in this parameter, in conjunction with the W command, will enable the corresponding extended result code (see Section 3.5 and Table 3-14).

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

Default: 0

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

Bit 1 Reserved

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

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

Bit 4 Reserved.

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

Bits 6-7 Reserved.

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3.4 Cellular Commands

3.4.1 PDC Mode Enable/Disable

+WS - Enable/Disable PDC

The modem enables or disables PDC mode according to the parameter supplied.

Syntax

+WS=[value>]

Defined Values

<value>	Decimal number corresponding to the selected option.	
	1	Disables PDC mode. (Default.)
	20	Enables PDC mode.

Result Codes

OK	<value> = 1 or 20.
ERROR	Otherwise.

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3.4.2 PDC High-Speed Data Communication Mode Commands

Commands supported in PDC mode are listed below. All parameters and setting are in accordance commands described elsewhere in this document unless otherwise stated. Consult the software release notes for current command applicability.

Communication: PDC high-speed data mode (RCR STD-27F) (Low-speed mode and fax mode are not supported.)

Supported Mode: Data communication, control serial data pass-through mode (600 bps)

The following commands are effective in the PDC mode:

A Go off-hook and start negotiation with remote equipment.

D Go off-hook, dial specified number, and start negotiation with remote modem.

E Set DTE echo format according to specified parameter.

H Execute hang-up sequence.

I Issue modem IDs.

O Enter online mode from command mode.

Sn Read or write S register values.

V Control result code output format.

W Control CONNECT message output format.

X Control extended result code output format.

Z Soft-reset the modem.

&C Control RLSD and DCD signals output.

&D Control DTR signal output.

&F Recover factory default parameters.

&V Display current configuration.

&W Store current configuration.

%Z Start control serial data pass-through mode; return to normal mode by escape sequence (“+++”).

Notes:

1. Other commands will be accepted in PDC mode, but no action will be taken except to return the “OK” result code.
2. BREAK signal transfer is not supported.
3. IWF setting is always “default”.
4. Default (or POTS) mode is stored with &W: “ATZ” starts POTS mode.
   PDC mode is stored with &W: “ATZ” starts PDC mode.

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3.5 Result Codes

The modem responds to commands from the DTE and to activity on the line by signaling to the DTE in the form of result codes. The result codes that the modem can send are described in Table 3-15.

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

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

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Table 3-15. Result Code Definitions

Code	Message	Meaning
+F4	+FCERROR	High speed fax data (V.27, V.29, V.33, or V.17) is expected but a V.21 signal is received.
0	OK	A command line has been executed.
1	CONNECT	For X command values specifying no speed reporting, the modem has connected to the line and either the line speed is 300 bps and line speed is enabled, or the DTE speed is 300 bps and DTE speed reporting is enabled.
2	RING	An incoming ring signal is detected on the line. What qualifies as a ring signal is determined by country-dependent parameters, modifiable through ConfigurACE. When cellular interface is selected, RING indicates that the cellular phone is receiving an receiving an incoming call.
3	NO CARRIER	Sent when attempting to establish a call if: Ringback is detected and later ceases but no carrier is detected within the period of time determined by register S7, or 1. No ringback is detected within the period of time determined by register S7. 2. Also sent when the modem auto-disconnects due to loss of carrier. For X0, sent for the following conditions: 1. If busy tone detection is enforced, busy or circuit busy has been detected. 2. If dial tone detection is enforced or selected, dial tone has not been detected.
4	ERROR	Sent during an attempt to execute a command line if any of the following conditions occur: 1. The command line contains a syntax error. 2. The modem cannot execute a command contained in the command line, i.e., the command does not exist or is not supported. 3. A command parameter within the command line is outside the permitted range. For X0, X1, X2, and X3, this message is sent instead of DELAYED and BLACKLISTED.
5	CONNECT 1200	The modem has connected to the line and either the line speed is 1200 bps and DCE speed reporting is enabled, or the DTE speed is 1200 bps and DTE speed reporting is enabled.
6	NO DIALTONE	For X2 and X4, the modem has been instructed to wait for dial tone during dialing but none is received. When cellular phone interface is selected, indicates that cellular service is not currently available.
7	BUSY	For X3 and X4, if busy tone detection is enforced, the busy (engaged) signal is detected on the line when the modem is attempting to originate a call.
8	NO ANSWER	The modem is attempting to originate a call if a continuous ringback signal is detected on the line until the expiration of the timer S7.
9	CONNECT 600	The modem has connected to the line, the DTE speed is 600 bps, and DTE speed reporting is enabled.
10	CONNECT 2400	The modem has connected to the line and either the line speed is 2400 bps and DCE speed reporting is enabled, or the DTE speed is 2400 bps and DTE speed reporting is enabled.
11	CONNECT 4800	The modem has connected to the line and either the line speed is 4800 bps and DCE speed reporting is enabled, or the DTE speed is 4800 bps and DTE speed reporting is enabled.
12	CONNECT 9600	The modem has connected to the line and either the line speed is 9600 bps and DCE speed reporting is enabled, or the DTE speed is 9600 bps and DTE speed reporting is enabled.
13	CONNECT 7200	The modem has connected to the line at 7200 bps and DCE speed reporting is enabled.
14	CONNECT 12000	The modem has connected to the line at 12000 bps and DCE speed reporting is enabled.
15	CONNECT 14400	The modem has connected to the line at 14400 bps and DCE speed reporting is enabled.
16	CONNECT 19200	The modem has connected to the line and either the line speed is 19200 bps and DCE speed reporting is enabled, or the DTE speed is 19200 bps and DTE speed reporting is enabled.
17	CONNECT 38400	The modem has connected to the line, the DTE speed is 38400 bps, and DTE speed reporting is enabled.
18	CONNECT 57600	The modem has connected to the line, the DTE speed is 57600 bps, and DTE speed reporting is enabled.
19	CONNECT 115200	The modem has connected to the line, the DTE speed is 115200 bps, and DTE speed reporting is enabled.
22	CONNECT 75TX/1200RX	The modem has established a V.23 originate connection and line speed reporting is enabled.

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Table 3-15. Result Code Definitions (Continued)

Code	Message	Meaning
23	CONNECT 1200TX/75RX	The modem has established a V.23 answer connection and line speed reporting is enabled.
24	DELAYED	For X4, sent when a call fails to connect and the number dialed is considered 'delayed' due to country blacklisting requirements.
32	BLACKLISTED	For X4, sent when a call fails to connect and the number dialed is considered 'blacklisted'.
33	FAX	A fax modem connection is established in a facsimile mode.
35	DATA	A data modem connection is established in a facsimile mode.
40	+MRR: 300	The modem has connected to the line at 300 bps and carrier reporting is enabled. (See S95 and Xn.)
44	+MRR: 1200/75	The V.23 backward channel carrier is detected and carrier reporting is enabled. (See S95 and Xn.)
45	+MRR: 75/1200	The V.23 forward channel carrier is detected and carrier reporting is enabled. (See S95 and Xn.)
46	+MRR: 1200	The modem has connected to the line at 1200 bps and carrier reporting is enabled. (See S95 and Xn.)
47	+MRR: 2400	The modem has connected to the line at 2400 bps and carrier reporting is enabled. (See S95 and Xn.)
48	+MRR: 4800	The modem has connected to the line at 4800 bps and carrier reporting is enabled. (See S95 and Xn.)
49	+MRR: 7200	The modem has connected to the line at 7200 bps and carrier reporting is enabled. (See S95 and Xn.)
50	+MRR: 9600	The modem has connected to the line at 9600 bps and carrier reporting is enabled. (See S95 and Xn.)
51	+MRR: 12000	The modem has connected to the line at 12000 bps and carrier reporting is enabled. (See S95 and Xn.)
52	+MRR: 14400	The modem has connected to the line at 14400 bps and carrier reporting is enabled. (See S95 and Xn.)
53	+MRR: 16800	The modem has connected to the line at 16800 bps and carrier reporting is enabled. (See S95 and Xn.)
54	+MRR: 19200	The modem has connected to the line at 19200 bps and carrier reporting is enabled. (See S95 and Xn.)
55	+MRR: 21600	The modem has connected to the line at 21600 bps and carrier reporting is enabled. (See S95 and Xn.)
56	+MRR: 24000	The modem has connected to the line at 24000 bps and carrier reporting is enabled. (See S95 and Xn.)
57	+MRR: 26400	The modem has connected to the line at 26400 bps and carrier reporting is enabled. (See S95 and Xn.)
58	+MRR: 28800	The modem has connected to the line at 28800 bps and carrier reporting is enabled. (See S95 and Xn.)
59	CONNECT 16800	The modem has connected to the line, the DTE speed is 16800 bps and DTE speed reporting is enabled.
61	CONNECT 21600	The modem has connected to the line, the DTE speed is 21600 bps and DTE speed reporting is enabled.
62	CONNECT 24000	The modem has connected to the line, the DTE speed is 24000 bps and DTE speed reporting is enabled.
63	CONNECT 26400	The modem has connected to the line, the DTE speed is 26400 bps and DTE speed reporting is enabled.
64	CONNECT 28800	The modem has connected to the line and either the line speed is 28800 bps and DCE speed reporting is enabled, or the DTE speed is 28800 bps and DTE speed reporting is enabled.
66	+DR: ALT	The modem has connected to the line in MNP Class 5 and +DR: message reporting is enabled. (See S95, Wn, and Xn.)
67	+DR: V.42B	The modem has connected to the line in V.42 bis and +DR: message reporting is enabled. (See S95, Wn, and Xn.)

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Table 3-15. Result Code Definitions (Continued)

Code	Message	Meaning
69	+DR: NONE	The modem has connected to the line without data compression and +DR: message reporting is enabled. (See S95, Wn, and Xn.)
70	+ER: NONE	The modem has connected to the line without any form of error correction and the +ER: message reporting has been enabled. (See S95, Wn, and Xn.)
77	+ER: LAPM	The modem has connected to the line in V.42 LAPM error correction mode and +ER: message reporting has been enabled. (See S95, Wn, and Xn.)
78	+MRR: 31200	The modem has connected to the line at 31200 bps and carrier reporting is enabled. (See S95 and Xn.)
79	+MRR: 33600	The modem has connected to the line at 33600 bps and carrier reporting is enabled. (See S95 and Xn.)
80	+ER: ALT	Sent when the modem has connected in the MNP mode of error correction, and +ER: message reporting has been enabled. (See S95, Wn, and Xn.)
83	LINE IN USE	The modem attempted to go off-hook when an extension was already occupying the line.
84	CONNECT 33600	The modem has connected to the line, the DTE speed is 33600 bps and the DTE speed reporting is enabled.
91	CONNECT 31200	The modem has connected to the line DTE speed is 31200 bps and the modem is to report the DTE speed upon connecting.
134	+MCR: B103	The modem has connected to the line with Bell 103 modulation and modulation reporting is enabled. (See +MR, S95 and Xn.)
135	+MCR: B212	The modem has connected to the line with Bell 212 modulation and modulation reporting is enabled. (See +MR, S95 and Xn.)
136	+MCR: V21	The modem has connected to the line with ITU-T V.21 modulation and modulation reporting is enabled. (See +MR, S95 and Xn.)
137	+MCR: V22	The modem has connected to the line with ITU-T V.22 modulation and modulation reporting is enabled. (See +MR, S95 and Xn.)
138	+MCR: V22B	The modem has connected to the line with ITU-T V.22 bis modulation and modulation reporting is enabled. (See +MR, S95 and Xn.)
139	+MCR: V23	The modem has connected to the line with ITU-T V.23 modulation and modulation reporting is enabled. (See +MR, S95 and Xn.)
140	+MCR: V32	The modem has connected to the line with ITU-T V.32 modulation and modulation reporting is enabled. (See +MR, S95 and Xn.)
141	+MCR: V32B	The modem has connected to the line with ITU-T V.32 bis modulation and modulation reporting is enabled. (See +MR, S95 and Xn.)
142	+MCR: V34	The modem has connected to the line with ITU-T V.34 modulation and modulation reporting is enabled. (See +MR, S95 and Xn.)
144	+MCR: K56	The modem has connected to the line with K56flex modulation and modulation reporting is enabled. (See +MR, S95 and Xn.)
145	+MCR: V90	The modem has connected to the line with ITU-T V.90 modulation and modulation reporting is enabled. (See +MR, S95 and Xn.)
150	+MRR: 32000	The modem has connected to the line at 32000 bps and carrier reporting is enabled. (See S95 and Xn.)
151	+MRR: 34000	The modem has connected to the line at 34000 bps and carrier reporting is enabled. (See S95 and Xn.)
152	+MRR: 36000	The modem has connected to the line at 36000 bps and carrier reporting is enabled. (See S95 and Xn.)
153	+MRR: 38000	The modem has connected to the line at 38000 bps and carrier reporting is enabled. (See S95 and Xn.)
154	+MRR: 40000	The modem has connected to the line at 40000 bps and carrier reporting is enabled. (See S95 and Xn.)
155	+MRR: 42000	The modem has connected to the line at 42000 bps and carrier reporting is enabled. (See S95 and Xn.)
156	+MRR: 44000	The modem has connected to the line at 44000 bps and carrier reporting is enabled. (See S95 and Xn.)
157	+MRR: 46000	The modem has connected to the line at 46000 bps and carrier reporting is enabled. (See S95 and Xn.)

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Table 3-15. Result Code Definitions (Continued)

Code	Message	Meaning
158	+MRR: 48000	The modem has connected to the line at 48000 bps and carrier reporting is enabled. (See S95 and Xn.)
159	+MRR: 50000	The modem has connected to the line at 50000 bps and carrier reporting is enabled. (See S95 and Xn.)
160	+MRR: 52000	The modem has connected to the line at 52000 bps and carrier reporting is enabled. (See S95 and Xn.)
161	+MRR: 54000	The modem has connected to the line at 54000 bps and carrier reporting is enabled. (See S95 and Xn.)
162	+MRR: 56000	The modem has connected to the line at 56000 bps and carrier reporting is enabled. (See S95 and Xn.)
165	CONNECT 32000	The modem has connected to the line at 32000 bps and DCE speed reporting is enabled.
166	CONNECT 34000	The modem has connected to the line at 34000 bps and DCE speed reporting is enabled.
167	CONNECT 36000	The modem has connected to the line at 36000 bps and DCE speed reporting is enabled.
168	CONNECT 38000	The modem has connected to the line at 38000 bps and DCE speed reporting is enabled.
169	CONNECT 40000	The modem has connected to the line at 40000 bps and DCE speed reporting is enabled.
170	CONNECT 42000	The modem has connected to the line at 42000 bps and DCE speed reporting is enabled.
171	CONNECT 44000	The modem has connected to the line at 44000 bps and DCE speed reporting is enabled.
172	CONNECT 46000	The modem has connected to the line at 46000 bps and DCE speed reporting is enabled.
173	CONNECT 48000	The modem has connected to the line at 48000 bps and DCE speed reporting is enabled.
174	CONNECT 50000	The modem has connected to the line at 50000 bps and DCE speed reporting is enabled.
175	CONNECT 52000	The modem has connected to the line at 52000 bps and DCE speed reporting is enabled.
176	CONNECT 54000	The modem has connected to the line at 54000 bps and DCE speed reporting is enabled.
177	CONNECT 56000	The modem has connected to the line at 56000 bps and DCE speed reporting is enabled.
178	CONNECT 230400	The modem has connected to the line, the DTE speed is 230400 bps, and DTE speed reporting is enabled.
180	CONNECT 28000	The modem has connected to the line at 28000 bps and DCE SPEED reporting is enabled.
181	CONNECT 29333	The modem has connected to the line at 29333 bps and DCE SPEED reporting is enabled.
182	CONNECT 30667	The modem has connected to the line at 30667 bps and DCE SPEED reporting is enabled.
183	CONNECT 33333	The modem has connected to the line at 33333 bps and DCE SPEED reporting is enabled.
184	CONNECT 34667	The modem has connected to the line at 34667 bps and DCE SPEED reporting is enabled.
185	CONNECT 37333	The modem has connected to the line at 37333 bps and DCE SPEED reporting is enabled.
186	CONNECT 38667	The modem has connected to the line at 38667 bps and DCE SPEED reporting is enabled.
187	CONNECT 41333	The modem has connected to the line at 41333 bps and DCE SPEED reporting is enabled.
188	CONNECT 42667	The modem has connected to the line at 42667 bps and DCE SPEED reporting is enabled.
189	CONNECT 45333	The modem has connected to the line at 45333 bps and DCE SPEED reporting is enabled.
190	CONNECT 46667	The modem has connected to the line at 46667 bps and DCE SPEED reporting is enabled.
191	CONNECT 49333	The modem has connected to the line at 49333 bps and DCE SPEED reporting is enabled.
192	CONNECT 50667	The modem has connected to the line at 50667 bps and DCE SPEED reporting is enabled.
193	CONNECT 53333	The modem has connected to the line at 53333 bps and DCE SPEED reporting is enabled.
194	CONNECT 54667	The modem has connected to the line at 54667 bps and DCE SPEED reporting is enabled.
195	+MRR: 28000	The modem has connected to the line at 28000 bps and carrier reporting is enabled. (See S95 and Xn.)
196	+MRR: 29333	The modem has connected to the line at 29333 bps and carrier reporting is enabled. (See S95 and Xn.)
197	+MRR: 30667	The modem has connected to the line at 30667 bps and carrier reporting is enabled. (See S95 and Xn.)
198	+MRR: 33333	The modem has connected to the line at 33333 bps and carrier reporting is enabled. (See S95 and Xn.)
199	+MRR: 34667	The modem has connected to the line at 34667 bps and carrier reporting is enabled. (See S95 and Xn.)
200	+MRR: 37333	The modem has connected to the line at 37333 bps and carrier reporting is enabled. (See S95 and Xn.)

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Table 3-15. Result Code Definitions (Continued)

Code	Message	Meaning
201	+MRR: 38667	The modem has connected to the line at 38667 bps and carrier reporting is enabled. (See S95 and Xn.)
202	+MRR: 41333	The modem has connected to the line at 41333 bps and carrier reporting is enabled. (See S95 and Xn.)
203	+MRR: 42667	The modem has connected to the line at 42667 bps and carrier reporting is enabled. (See S95 and Xn.)
204	+MRR: 45333	The modem has connected to the line at 45333 bps and carrier reporting is enabled. (See S95 and Xn.)
205	+MRR: 46667	The modem has connected to the line at 46667 bps and carrier reporting is enabled. (See S95 and Xn.)
206	+MRR: 49333	The modem has connected to the line at 49333 bps and carrier reporting is enabled. (See S95 and Xn.)
207	+MRR: 50667	The modem has connected to the line at 50667 bps and carrier reporting is enabled. (See S95 and Xn.)
208	+MRR: 53333	The modem has connected to the line at 53333 bps and carrier reporting is enabled. (See S95 and Xn.)
209	+MRR: 54667	The modem has connected to the line at 54667 bps and carrier reporting is enabled. (See S95 and Xn.)

Notes:

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

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4 Fax Class 1 and Fax Class 1.0 Commands

4.1 Fax I/O Processing

The fax I/O interface supports asynchronous serial and parallel interfaces. The character format is 8 bits 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.

4.1.1 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.

4.1.2 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.

4.1.3 Fax Mode Selection

Fax Class 1 and Fax Class 1.0 commands are identified in Table 4-1. Fax Class 1.0 includes all Fax Class 1 commands.

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Table 4-1. 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
+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
+IFC	Local DTE-modem flow control (see +IFC command in Section 3.2.1)	X	X
A	Answer (see A command in Section 3.2.3)	X	X
D <string>	Dial (see D command in Section 3.2.3)	X	X
H	Hangup (see H command in Section 3.2.3)	X	X
X = Applicable; - = Not applicable			

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4.1.4 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.

4.1.5 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.

4.1.6 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.

4.1.7 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.

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The modem then generates either 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.

4.1.8 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.

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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.

4.1.9 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.

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4.2 Commands and Parameters

4.2.1 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 4-1. (See +FCLASS in Section 3.2.1 for the definition of the FCLASS command.)

+FCLASS=1.0 - Select Facsimile Class 1.0 Mode

+FCLASS=1.0 selects the Fax Class 1.0 Mode. The Fax Class 1.0 Mode commands and responses described in this section are applicable when command +FCLASS=1 as shown Table 4-1. (See +FCLASS in Section 3.2.1 for the definition of the FCLASS command.)

4.2.2 Mode Commands

+FAE - Auto Answer Enable

This command enables or disables fax adaptive answer.

Syntax

+FAE=<value>

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.

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+FTS - Transmit Silence

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

Syntax

+FTS=<time>

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 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

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+FRS - Receive Silence

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.

Syntax

+FRS =<time>

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

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+FTM - Transmit Facsimile

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.

Syntax

+FTM=<mod>

Defined Values

<mod> Decimal number corresponding to the selected modulation mode and data rates shown in Table 4-2.

Table 4-2. 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 a 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 was not NUL, the modem will turn off the transmit carrier, return to the command state, and report the OK result code.

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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

+FRM - Receive Facsimile

This command causes the modem to enter the receiver mode using the modulation defined below.

Syntax

+FRM=<mod>

Defined Values

<mod>	Decimal number corresponding to the selected modulation mode and data rates shown in Table 4-2.

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.

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+FTH - Transmit Data with HDLC Framing

This command causes the modem to transmit data using HDLC protocol and the modulation defined below.

Syntax

+FTH=<mod>

Defined Values

<mod>	Decimal number corresponding to the selected modulation mode and data rates shown in Table 4-2.

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.

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+FRH - Receive Data with HDLC Framing

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.

Syntax

+FRH=<mod>

Defined Values

<mod>	Decimal number corresponding to the selected modulation mode and data rates shown in Table 4-2.

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.

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4.2.3 Service Class 1 Parameters

+FAR - Adaptive Reception Control

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.

Write Syntax

+FAR=<value>

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)

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+FCL - Carrier Loss Timeout

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.

Write Syntax

+FCL=<time>

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)

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+FDD - Double Escape Character Replacement

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.

Syntax

+FDD=<value>

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)

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+FIT - DTE Inactivity Timeout

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.

Syntax

+FIT=<time>,<action>

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 4-3.

<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 4-3. 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

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+FPR - Fixed DTE Rate

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)

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+FMI - Request Manufacturer Identification

This command causes the modem to report the modem product manufacturer as provided by the .INF File.

Syntax

+FMI or +FMI?

Typical Response

Conexant
OK

+FMM - Request Model Identification

This command causes the modem to report the modem product model as provided by the .INF File.

Syntax

+FMM or +FMM

Typical Response

HCF 56K Data, Fax, Speakerphone, PCI Modem
OK

+FMR - Request Revision Identification

This command causes the modem to report the modem version, revision level, or date as provided by the .INF File.

Syntax

+FMR or +FMR

Typical Response

1.0
OK

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+FLO - Flow Control

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.

4.3 Examples

Examples of calling (transmitting) and answering (receiving) one page using fax class 1 commands are shown in Table 4-4 and Table 4-5, 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 (e.g., AT+FRH=3) and comments are in lower case. All streams of data denoted by <..frame> are terminated by the <DLE><ETX> characters.

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Table 4-4. 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	

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Table 4-5. 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		

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5 Voice Commands

5.1 Voice Commands Overview

Voice commands are identified in Table 5-1.

Table 5-1. 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)
+VTR	Start Voice Transmission and Reception (Duplex)
+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
+VBT	Buffer Threshold Setting
+VPR	Select DTE/modem Interface Rate (Turn off autobaud)
Speakerphone	
+VSP	Speakerphone ON/OFF
+VDX	Speakerphone Duplex Mode
+VGM	Microphone Gain
+VGS	Speaker Gain

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5.1.1 <DLE> Shielded Event Codes Sent to the DTE

Table 5-2 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 5-2. 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
/	(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
l	(6/12)	Loop Current Interruption
b	(6/2)	BUSY
d	(6/4)	DIALTONE
u	(7/5)	Transmit Buffer Underrun
a	(6/1)	Facsimile or Data Answer
f	(6/6)	Data Answer

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

Table 5-3 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 5-3. 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").
^	(5/E)	End Voice Duplex State (see +VTR command).

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5.2 Voice Commands

5.2.1 Configuration Commands

+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 +FCLASS command in Section 3.2.1 for the definition of the FCLASS command.)

+VNH - Automatic Hang-up Control

This command enables or disables automatic hangups.

Syntax

+VNH=<hook>

Defined Values

<hook> Decimal number corresponding to the selected option.

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).

Reporting Current or Selected Values

Command: +VNH?

Response: +VNH: <hook>

Example: +VNH: 0 For the default setting.

Reporting Supported Range of Parameter Values

Command: +VNH=?

Response: +VNH: (<hook> range)

Example: +VNH: (0-2)

Result Codes

OK	<hook> = 0-2.
ERROR	Otherwise.

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5.2.2 Voice Commands

+VIP - Voice Initialize All Parameters

This command causes the modem to initialize all voice parameters to their default values.

Syntax

+VIP

Result Code

OK	
ERROR	If not in Voice Mode.

+VRX - Start Modem Receive (Record)

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

Syntax

+VRX<n>

Defined Values

<n>	Decimal number corresponding to the selected option.	
	0	Start receive voice without periodic tone production during a voice receive operation.
	1	Start receive voice with periodic tone production during a voice receive operation.

Result Codes

OK	<n> = 0 or 1.
ERROR	Otherwise, or if not in Voice Mode.

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+VTR - Start Voice Transmission and Reception (Voice Duplex)

This command causes the modem to start the voice transmission and reception process (Voice Duplex) without either acoustic echo cancellation or line echo cancellation. The modem begins the Voice Duplex State by returning the CONNECT result code to the DTE. The modem then sends <DLE> shielded voice data to the DTE, and the DTE can send <DLE> shielded voice data to the modem. The modem will accept data from the DTE and send data to the DTE in the format previously selected by the +VSM command, and use the flow control method selected by the +IFC command.

The modem signals termination of the voice data stream by appending a <DLE><ETX> command and padding out to an octet boundary if needed. The modem will issue the <DLE><ETX> character pair (thereby ending the modem to DTE voice data flow) followed by the OK result code, and return to the command mode after the modem has completely transmitted the contents of its buffer.

There are two methods to leave the Voice Duplex State: the DTE sending a <DLE><^> shielded code or the inactivity timer elapsing in the modem. The Voice Command State is entered upon Voice Duplex State termination.

This command will function when the input and output are from/to the same I/O device, such as local handset, line, or mic/speaker.

Syntax

+VTR

Result Codes

OK	Upon command acceptance.
ERROR	The modem is not connected to the line and a non-line device.

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+VTS - Send Voice Tone(s)

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) are 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.

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Reporting Supported Range of Parameter Values

Command: +VTS=?

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

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

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 a duration given by the +VTD command.
3. Play DTMF 2 with a 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 a duration given by the +VTD command.
6. Play DTMF * with a duration of 60 ms.
7. Play tone pair at 800 Hz and 1300 Hz with a duration of 500 ms.
8. Play DTMF 9 with a 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 a duration given by the +VTD command.
2. Play DTMF 2 with a duration given by the +VTD command.
3. Play tone pair at 1000 Hz and 1300 Hz with a duration of 500 ms.
4. Play tone pair at 800 Hz with a duration given by the +VTD command.
5. Play DTMF 9 with a 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 a duration given by the +VTD command.
2. Play silence with a duration of 500 ms.
3. Play DTMF 2 with a duration given by the +VTD command.
4. Play silence with a duration given by the +VTD command.
5. Play DTMF 9 with a duration given by the +VTD command.

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+VTX - Start Modem Transmit (Playback)

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.

+VGR - Voice Gain Receive (Record Gain)

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

Syntax

+VGR=<gain>

Defined Values

<gain>	Decimal number between 0 and 255 corresponding to the gain.

Reporting Current or Selected Values

Command: +VGR?

Response: +VGR: <gain>

Example: +VGR: 0 For the default setting.

Reporting Supported Range of Parameter Values

Command: +VGR=?

Response: +VGR: <gain> range

Example: +VGR: 0-255

Result Codes

OK	<gain> = 0-255.
ERROR	Otherwise, or if not in Voice Mode.

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+VGT - Voice Gain Transmit (Playback Volume)

This command causes the modem to set the volume level.

Syntax

+VGT=<level>

Defined Values

<level>	Decimal number (120-135) corresponding to the volume level.

Reporting Current or Selected Values

Command: +VGT?

Response: +VGT: <level>

Example: +VGT: 128 For the default setting.

Reporting Supported Range of Parameter Values

Command: +VGT=?

Response: +VGT: <level> range

Example: +VGT: 120-135

Result Codes

OK	<level> = 120-135.
ERROR	Otherwise, or if not in Voice Mode.

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+VIT - Voice Inactivity Timer (DTE/Modem)

This command sets the modem's initial value for the DTE/modem inactivity timer.

Syntax

+VIT=<timer>

Defined Values

<timer>	Decimal number(0 and 255) 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: +VIT: <timer>

Example: +VIT: 0 For the default setting.

Reporting Supported Range of Parameter Values

Command: +VIT=?

Response: +VIT: <timer> range

Example: +VIT: 0-255

Result Codes

OK	<timer> = 0-255.
ERROR	Otherwise, or if not in Voice Mode.

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+VLS - Analog Source/Destination Selection

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 option (see Table 5-4).

Table 5-4. +VLS Command Options

Label	Description
0	Modem on-hook. Local phone connected to the line.
1	Modem off-hook and connected to the line. Local phone provided with power to detect hook condition.
2	Modem on-hook and connected to the Local phone.
3	Modem off-hook and connected to the line and Local phone.
4	Internal Speaker connected to the Modem. Modem on-hook. Local phone connected to the line.
5	Internal Speaker connected to the line. Modem off-hook and connected to the line. Local phone provided with power to detect hook condition.
6	Internal Microphone connected to the Modem. Modem on-hook. Local phone connected to the line.
7	Internal Microphone and Internal Speaker connected to the line. Squelching active. Modem off-hook and connected to the line. Local phone provided with power to detect hook condition.
8	External Speaker connected to the Modem. Modem on-hook. Local phone connected to the line.
9	External Speaker connected to the line. Modem off-hook and connected to the line. Local phone provided with power to detect hook condition.
10	Internal Microphone and External Speaker connected to the line. Squelching active. Modem off-hook and connected to the line. Local phone provided with power to detect hook condition.
11	External Microphone connected to the Modem. Modem on-hook. Local phone connected to the line.
12	External Microphone and Internal Speaker connected to the line. Squelching active. Modem off-hook and connected to the line. Local phone provided with power to detect hook condition.
13	External Microphone and External Speaker connected to the line. Squelching active. Modem off-hook and connected to the line. Local phone provided with power to detect hook condition.
14	External Microphone and Speaker combination (handset or headset) connected to the Modem. Modem on-hook. Local phone connected to the line.
15	External Microphone and Speaker combination (handset or headset) connected to the line. Modem off-hook and connected to the line. Local phone provided with power to detect hook condition.
16 or 30	Mute Speakerphone Microphone.
17 or 31	Unmute Speakerphone Microphone.
18 or 32	Mute Speakerphone Speaker.
19 or 33	Unmute Speakerphone Speaker.
128	Modem on-hook, local phone connected to the line, external speaker connected to the modem. Caller ID relay output active.
129	Modem off-hook, local phone connected to the line, MIC_M routed to TXA. Typically used for music during handset conversation. Do not use this mode to answer incoming ring.
130	Modem off-hook, local phone disconnected from the line, MIC_M routed to TXA. Typically used to play greeting from audio codec.
131	Modem off-hook, local phone connected to the line, external speaker connected to the line. Typically used for recording a handset conversation through a sound card.
Notes: 1. Internal and External Microphone are treated the same by the Modem device set. 2. Internal and External Speaker are treated the same by the Modem device set.	

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Reporting Current or Selected Values

Command: +VLS?

Response: +VLS: <label>

Example: +VLS: 0 For the default setting.

Reporting Supported Range of Parameter Values

Command: +VLS=?

Response: +VLS: <label> range

Example: +VLS: 0-19, 30-33, 128-131

Result Codes

OK	<label> = 0-19, 30-33, 128-131.
ERROR	Otherwise.

+VRA - Ringback Goes Away Timer

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 0.01 to 60.0 seconds for <interval> = 1 to 255.

Reporting Current or Selected Values

Command: +VRA?

Response: +VRA: <interval>

Example: +VRA: 50 (0.5 seconds) For the default setting.

Reporting Supported Range of Parameter Values

Command: +VRA=?

Response: +VRA: (<interval> range)

Example: +VRA: (0-255)

Result Codes

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

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+VRN - Ringback Never Appeared Timer

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 (0-60) 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 60 seconds for <interval> = 1 to 60.

Reporting Current or Selected Values

Command: +VRN?

Response: +VRN: <interval>

Example: +VRN: 10 (10 seconds) For the default setting.

Reporting Supported Range of Parameter Values

Command: +VRN=?

Response: +VRN: (<interval> range)

Example: +VRN: (0-255)

Result Codes

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

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+VSD - Silence Detection (Quiet and Silence)

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: +VSD: <sds>,<sdi>

Example: +VSD: 128, 50 For the default setting.

Reporting Supported Range of Parameter Values

Command: +VSD=?

Response: +VSD: (<sds> range),(<sdi> range)

Example: +VSD: (0,127,128,129),(0-255)

Result Codes

OK <hook> = 0 or 1.

ERROR Otherwise, or if not in Voice Mode.

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+VSM - Compression Method Selection

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

Example: +VSM: 130,UNSIGNED PCM,8,0,127,0

Reporting Supported Range of Parameter Values

Command: +VSM=?

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

<cml>	Decimal number identifying the compression method (1, 128 to 133).
<cmid>	Alphanumeric string describing the compression method (UNSIGNED PCM, 8-BIT LINEAR, ADPCM, ULAW, ALAW, or LINEAR).
<bps>	Decimal number defining the average number of bits in the compressed sample not including silence compression (4, 8, or 16).
<tm>	Decimal number (0) reporting the time interval, in units of 0.1 second, between timing marks. A value of 0 reports that timing marks are not supported.
<vsr>	<range of values> containing the supported range of voice samples per second of the analog signal (7200 or 8000).
<scs>	<range of values> containing the supported range of sensitivity settings for voice receives (0).
<sel>	<range of values> containing the supported range of expansion values for voice transmits (0).

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Example:

AT+VSM=?

1,"UNSIGNED PCM",8,0,(7200,8000),(0),(0)
128,"8-BIT LINEAR",8,0,(7200,8000),(0),(0)
129,"ADPCM",4,0,(7200,8000),(0),(0)
130,"UNSIGNED PCM",8,0,(7200,8000),(0),(0)
131,"ULAW",8,0,(7200,8000),(0),(0)
132,"ALAW",8,0,(7200,8000),(0),(0)
133,"LINEAR",16,0,(7200,8000),(0),(0)

Result Codes

OK	Valid range.
ERROR	Otherwise, or if not in Voice Mode.

+VTD - Beep Tone Duration Timer

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 a manufacturer specific time interval. The range is 0.01 to 5 seconds for <dur> = 1 to 500.

Reporting Current or Selected Values

Command: +VTD?

Response: +VTD: <dur>

Example: +VTD: 0 For the default setting.

Reporting Supported Range of Parameter Values

Command: +VTD=?

Response: +VTD: (<dur> range)

Example: +VTD: (0-500)

Result Codes

OK	<dur>= 0-500.
ERROR	Otherwise, or if not in Voice Mode.

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+VDR - Distinctive Ring

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: +VDR: <enable>,<report>

Example: +VDR: 0,0 For the default setting.

Reporting Supported Range of Parameter Values

Command: +VDR=?

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

Example: +VDR: (0,1),(0-60)

Result Codes

OK	<enable>,<report> = (0,1),(0-60)
ERROR	Otherwise, or if not in Voice Mode.

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+VDT - Control Tone Cadence Reporting

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 300to 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.
	1	The modem will produce control tone cadence report as specified for the <report> subparameter.
<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: +VDT: <enable>,<report>

Example: +VDT: 0,0 For the default setting.

Reporting Supported Range of Parameter Values

Command: +VDT=?

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

Example: +VDT: (0,1),(0)

Result Codes

OK	<enable>,<report> = (0,1),(0)
ERROR	Otherwise, or if not in Voice Mode.

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+VBT - Buffer Threshold Setting

This command causes the modem to report the <deassert> and <assert> subparameter values as a <compound ranges of values>. The OK result code follows the report.

Syntax

+VBT=<deassert>,<assert>

Defined Values

To be added

Reporting Current or Selected Values

Command: +VBT?

Response: +VBT: <deassert>,<assert>

Example: +VBT: TBD For the default setting.

Reporting Supported Range of Parameter Values

Command: +VBT=?

Response: +VBT: (<deassert> range), (assert>range)

Example: +VBT: (820-4096),(6144-7372), 8192

Result Codes

OK	<deassert>,<assert>= 0 or 1.
ERROR	Otherwise, or if not in Voice Mode.

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

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 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

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)

Result Codes

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

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5.2.3 Speakerphone Commands

+VSP - Speakerphone ON/OFF

This command turns the speakerphone ON or OFF

Syntax

+VSP=<mode>

Defined Values

<mode>	Decimal number corresponding to the selected option.	
	0	The speakerphone function is OFF.
	1	The speakerphone function is ON.

Reporting Current or Selected Values

Command: +VSP?

Response: +VSP: <mode>

Example: +VSP: 0 For the default setting.

Reporting Supported Range of Parameter Values

Command: +VSP=?

Response: +VSP: (<mode> range)

Example: +VSP: (0,1)

Result Codes

OK	<mode> = 0 or 1.
ERROR	Otherwise, or if not in Voice Mode.

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+VDX - Speakerphone Duplex Mode

This command selects speakerphone half-duplex or full duplex mode.

Syntax

+VDX=<mode>

Defined Values

<mode>	Decimal number corresponding to the selected option.	
	0	The speakerphone mode is half duplex.
	1	The speakerphone mode is full duplex.

Reporting Current or Selected Values

Command: +VDX?

Response: +VDX: <mode>

Example: +VDX: 0 For the default setting.

Reporting Supported Range of Parameter Values

Command: +VDX=?

Response: +VDX: (<mode> range)

Example: +VDX: (0,1)

Result Codes

OK	<mode> = 0 or 1.
ERROR	Otherwise, or if not in Voice Mode.

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+VGM - Microphone Gain

This command causes the modem to set the microphone gain of the speakerphone function.

Syntax

+VGM=<gain>

Defined Values

<gain>	Decimal number between 0 and 255 corresponding to the gain.

Reporting Current or Selected Values

Command: +VGM?

Response: +VGM: <gain>

Example: +VGM: 130 For the default setting.

Reporting Supported Range of Parameter Values

Command: +VGM=?

Response: +VGM: <gain> range

Example: +VGM: 0-255

Result Codes

OK	<gain> = 0-255.
ERROR	Otherwise, or if not in Voice Mode with speakerphone enabled (+VSP=1).

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+VGS - Speaker Gain

This command causes the modem to set the speaker gain of the speakerphone function.

Syntax

+VGS=<gain>

Defined Values

<gain>	Decimal number between 0 and 255 corresponding to the gain.

Reporting Current or Selected Values

Command: +VGS?

Response: +VGS: <gain>

Example: +VGS: 130 For the default setting.

Reporting Supported Range of Parameter Values

Command: +VGS=?

Response: +VGS: <gain> range

Example: +VGS: 0-255

Result Codes

OK	<gain> = 0-255.
ERROR	Otherwise, or if not in Voice Mode with speakerphone enabled (+VSP=1).

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