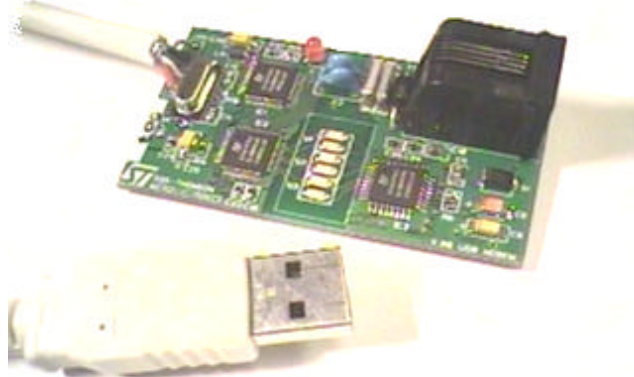




USB modem Dongle

USB Modem User's Manual



REVISION 1.2

WIRELINE DIVISION

NORTH AMERICA DEVELOPMENT APPLICATION GROUP

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TABLE OF CONTENTS

1. INTRODUCTION

2. MINIMUM SYSTEM REQUIREMENTS

3. FEATURES

3.1 Data Protocols

3.2 Data Speed

3.3 Data Compression

3.4 Error Correction

3.5 Fax Protocols

3.6 Fax Speed

3.7 General

4. FEATURES CURRENTLY NOT SUPPORTED

5. INSTALLATIONS

6. COUNTRY CODE SETTINGS

7. AT COMMAND SETS

7.1 Basic AT commands

7.2 AT& Commands

7.3 AT\ Commands - Error Correction Control

7.4 AT% Commands

7.5 AT+MS Commands

7.6 AT+F Commands - Fax Support

7.7 AT# Commands - Voice Modem Support

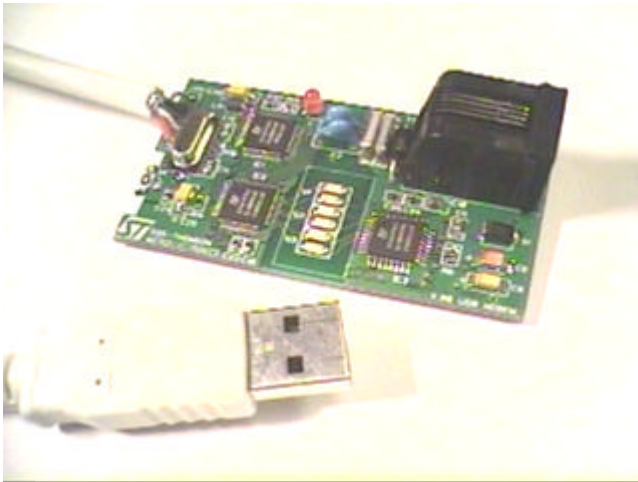
7.8 S-Registers

8. REGULATORY INFORMATION

1. INTRODUCTION

The goal of this manual is to provide general information for the developers on evaluation of the ST USB Modem. The USB provide a 12Mbps high bandwidth for virtually unlimited data throughput instead of the legacy 16550 UART bottleneck with the traditional modems.

ST USB Modem is a very flexible modem that has one of the smallest real estate and power consumption out on the market. Because of the simplicity of the modem design, the time to market is quick and less overhead. With this modem, all the future feature driver updates will be a simple software update. This product has been developed in cooperation with Smart Link Ltd, who ported "USB-Modio", its host based modem and system software into ST system and hardware platform. ST USB modem provides an easy installation and a strong performance that reduces the Total Cost of Ownership.



No power supply needed for the ST USB Modem

2. MINIMUM SYSTEM REQUIREMENTS

- Pentium 166MMX
- 16 MB RAM
- USB port
- Win98 or NT5.0

3. FEATURES

3.1 Data Protocols:

- V.90, K56Flex, V.34, V.34bis, V.32, V.22bis, V.22, V.21, V.23, Bell 212A, Bell 103

3.2 Data Speed:

- V.90 and K56Flex, 54k, 52k, 50k, 48k, 46k, 44k, 42k, 40k, 38k, 36k, 34k, 33.6k, 31.2k, 28.8k, 26.4k, 24k, 21.6k, 19.2k, 16.8k, 14.4k, 12k, 9600, 7200, 4800, 2400, 1200, 300

3.3 Data Compression

- V.42bis, MNP5

3.4 Error Correction

- V.42 LAPM, MNP2,3,4

3.5 Fax Protocols:

- Group 3 Compatible, Class 1 fax: V.17, V.29, V.27ter, V.21

3.6 Fax Speed:

- 14.4k, 12k, 9600, 7200, 4800, 2400, 300

3.7 General:

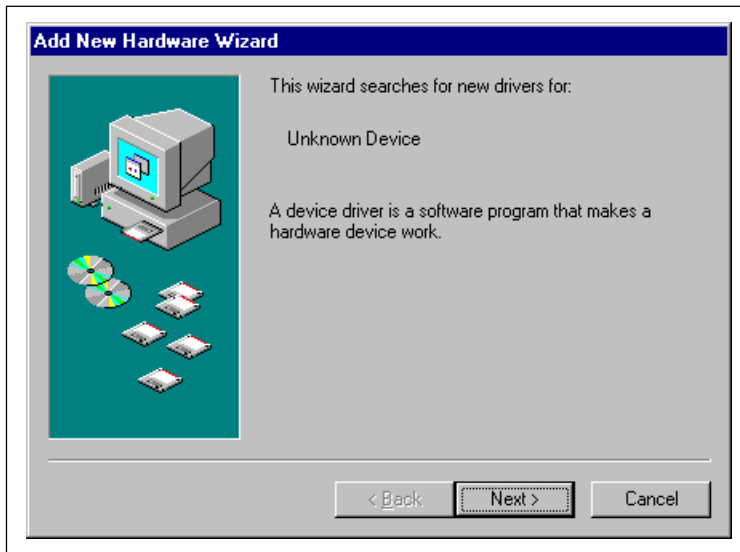
- Standard AT commands
- V.8 and Automode
- V.80
- Virtual UART (460.8kpbs)
- Caller ID
- DTMF detection and generation
- Wake-up on ring
- ADPCM
- OnNow Power Management
- Low power consumption
- Virtual DTE
- Distinctive ring for data/fax/voice
- World wide country support
- Answering machine (voice)

4. FEATURES CURRENTLY NOT SUPPORTED

- Call waiting
- Class 2 fax
- Full duplex speaker phone

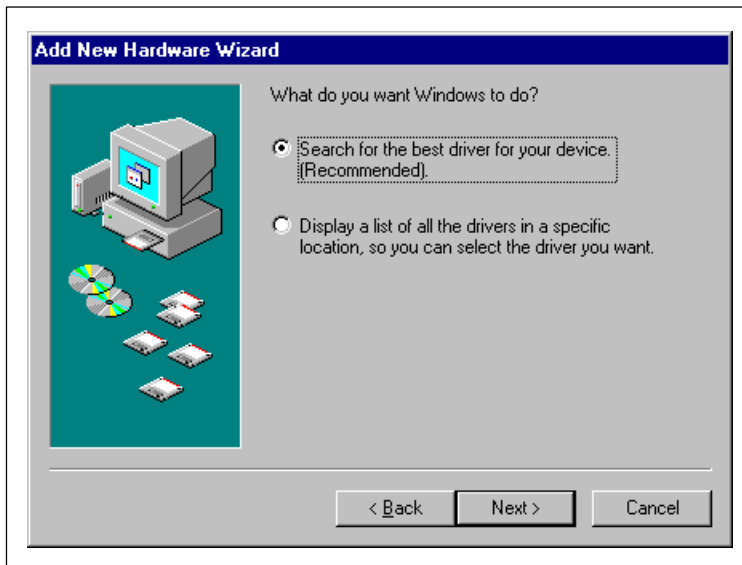
5. INSTALLATIONS

Start your PC as usual, then plug in ST USB Modem to any spare USB port on your system. Windows will report that it has found a new hardware and will open the *Add New Hardware Wizard* reporting that it searches for the new drivers for an *Unknown Device*.

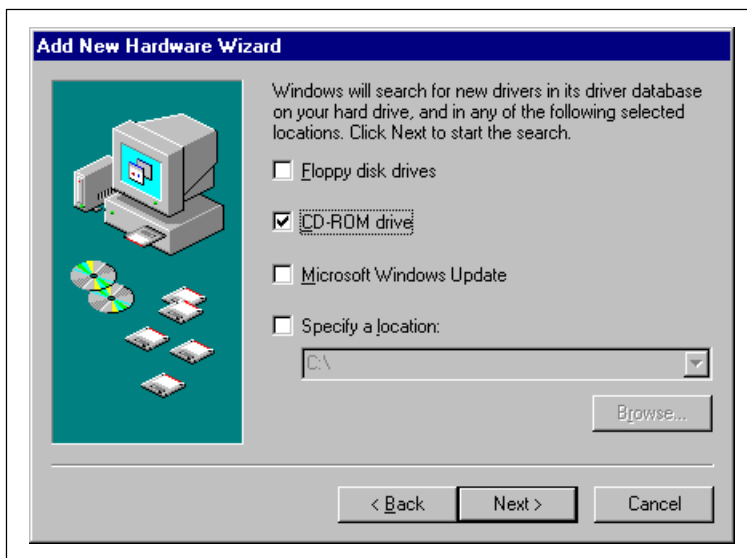


Click on the *Next* button.

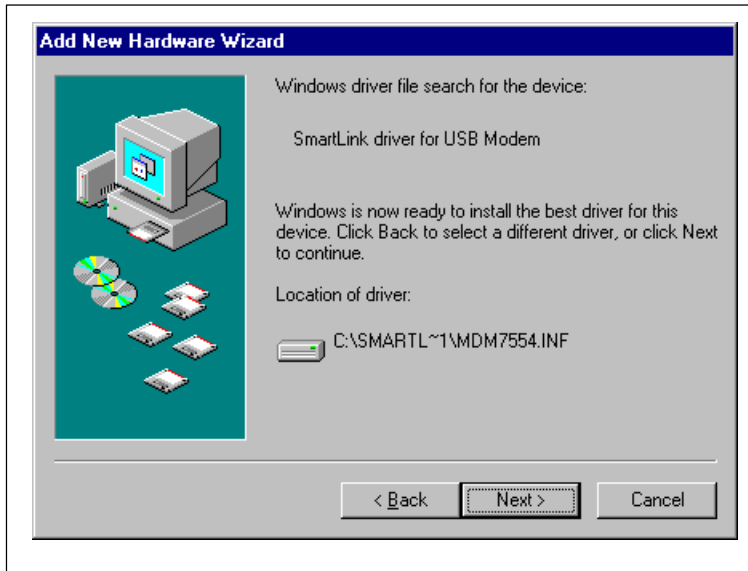
Windows will propose to search for the best drivers for your device.



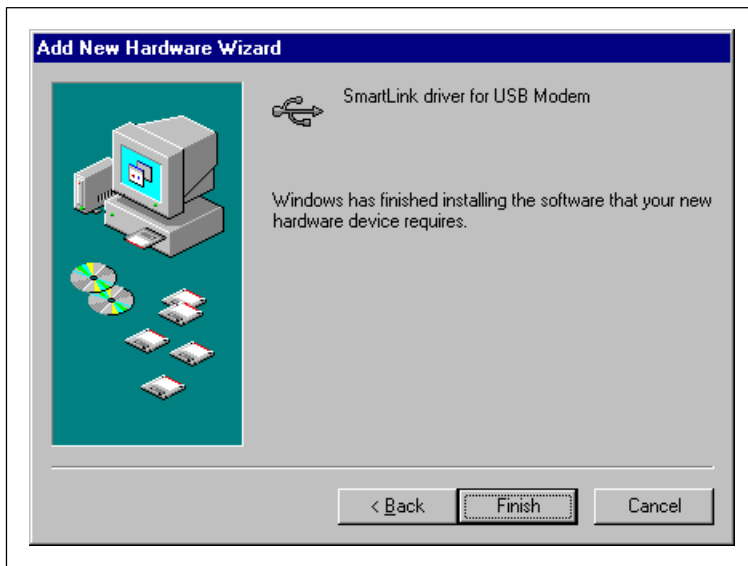
Click on the *Next* button. Insert ST USB Modem software CD-ROM or USB Modem driver diskette. Select *CD-ROM drive* or *Floppy disk drive* in the *Add New Hardware Wizard* window and click the *Next* button.



The *SmartLink driver for USB Modem* will be proposed.



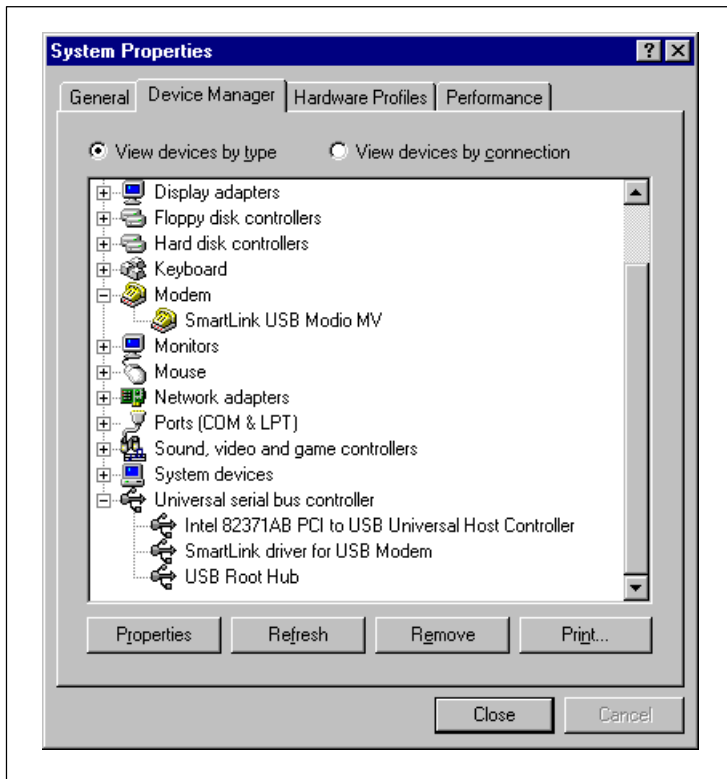
Click on the *Next* button. Windows will build a database for this device.



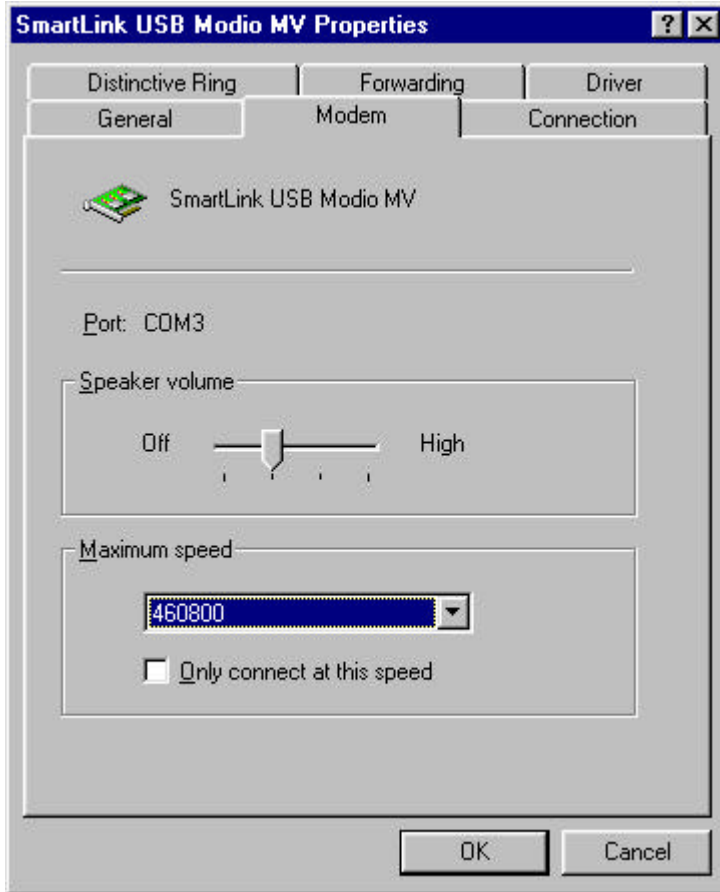
Click again on the *Next* button to finish the installation of the USB driver.

Windows will detect again a *New Hardware* and will install the Modem drivers.

At the end of this installation process, the *Device Manager* panel of the *System Properties* will show the addition of *SmartLink USB Modio MV* in the Modem section and *SmartLink driver for USB Modem* in the USB section:

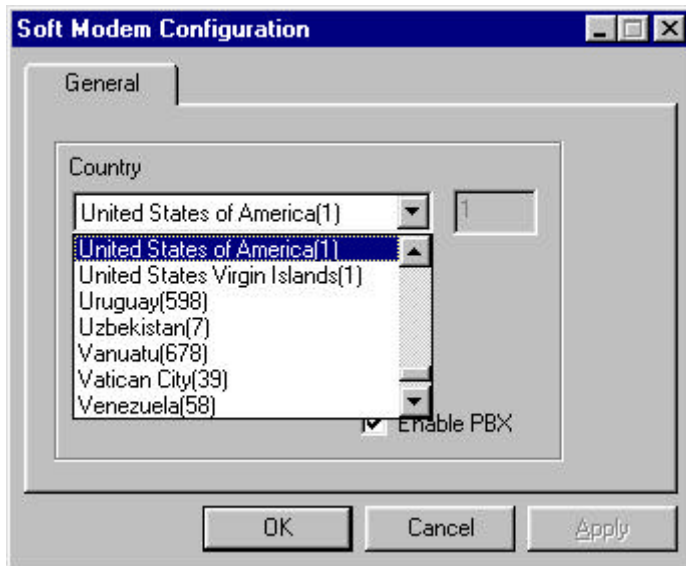


Finally, double click on the *SmartLink USB Modio MV* and choose the *modem* folder as shown below. Make sure that the Maximum speed is set to 460800.



6. COUNTRY CODE SETTINGS

Once the modem is installed correctly, launch *smc.exe*. Please choose the country that you are calling from as displayed by the following. With this program, you can take the ST USB modem and be able to dial from any country world wide.



Once your USB modem has been set up, plug it on the telephone network

7.0 - AT COMMAND SETS

Modem operation is controlled by AT commands. These AT commands include the following:

- basic AT commands, for example ATDT123
- extended AT commands, for example AT&E, ATVA, AT%*C*, AT+MS
- S-Register commands, for example AT*S0*=1
- Fax Class 1 commands, for example AT+FTM
- Voice commands, for example AT#VTX

The command syntax and operation guidelines for each command category are described in the following sections.

A command line is a string of characters sent from a DTE (Terminal or Data Terminal Equipment) to the DCE (Data Terminal Circuit Equipment) while the DCE is in command state. Command lines have a prefix, a body and a terminator. The prefix consists of the ASCII character **AT** or **at**. The body consists of printable ASCII characters. Space characters other than <CR> (see register *S3*) and <BS> (see register *S5*) are ignored. <CR> is command terminator.

Characters preceding the AT prefix are ignored.

AT Command Guidelines:

- Basic AT commands consist of single ASCII characters which may be preceded by a prefix character, for example **&**, and followed by a decimal number, for example **AT&W1**.
- Missing decimal parameters are interpreted as 0. For example, if **ATH** is typed, the command **ATH0** is assumed.
- Fax commands are preceded with the **+F** characters and terminated by semicolon (;) or <CR> character.
- the modem supports editing command lines by recognising the <BS> character.
- The AT command sequence may be followed by any number of commands in sequence, with the exception of commands Z, D or A where all characters following on the same command line will be ignored.
- When a syntax error is found in the command line an ERROR response will be returned to the DTE. Execution of commands D and A will be aborted if another character is entered before completion of the handshake.
- When the modem has entered on-line data mode, it is possible to break the data transmission in order to issue more AT commands. This is done by the DTE sending a sequence of three escape characters defined in *S2*, '+' by default.

The modem will comply with the commands listed below. Parameters applicable to each command are listed below. Default factory configuration settings are marked by an asterisk *.

Features marked with (-) are not yet available in current version of **Modio**.

7.1 - Basic AT Commands

A/ Re-execute Command

The modem repeats the last command line sent by the DTE. Usually used for re-dialing.

Note: This command should not be terminated by <CR>.

A Answer

The modem will go off-hook and attempt to answer an incoming call. Upon successful completion of handshake, the modem will go on-line in answer mode.

Notes:

If +FCLASS=0 is selected, the modem will enter the connect state after exchanging carrier with the remote system. If no carrier is detected within the period specified in S7, the modem hangs up. Any character entered while connecting will abort the connection process.

If +FCLASS=1, the modem will go off-hook in V21 answer mode. It will generate the V21 2100 Hz answer tone for 3 +/- 0.5 seconds, and following a delay of 70 ms, will proceed as if the +FTH=3 command were issued. At any stage up to (but excluding) the +FTH=3 command state, any character will abort the communication.

If +FCLASS=8 (#CLS=8), the modem will go off-hook and a voice session will take place.

Related S-Reg: S0

Bn CCITT Control

B0 Connect at V.22 1200 bps

Result codes:

OK n=0

Error Otherwise

Dn Dial

Directs the modem to go on-line, dial according to the string entered, and attempt to establish a connection.

The Dial String may consist of any of the characters described below:

T Tone dialing (first character in the string)

P Pulse dialing (first character in the string)

L Redial last dialed number (first character in the string)

0-9 Digits 0 to 9.

* Asterisk (tone only)

Hash (tone only)

W Wait for dial tone; the modem will wait for dial tone before dialing the digits following "W". S6 register will be used for timeout. (X3 or higher)

, (Comma); Pause for the time specified by S8 before resuming the dialing

; (Semicolon) Return to command mode after dialing. This allows the user to issue additional AT commands while remaining off-hook. Actual call progress will be entered only after a dial command issued without the ";" terminator.

S=n Dial the number stored in the directory; n=0-3 (see &Z).

! (NA in V1.0x) Flash; The modem will go on hook for a time defined by S24.

@ (NA in V1.0x) Wait for silence; The modem will wait for at least 5 seconds of silence before resuming the dialing. If no such silence is detected before the expiration of the call abort timer (S7), the modem will terminate with NO ANSWER response (or BUSY if

applicable). If answer tone arrives during execution of this parameter, the modem handshakes. (X3 or higher)

(), < > (space) String format characters - ignored
 < i > any other character - ignored.

Notes:

If +FCLASS=0 is selected, the modem will attempt to connect with another data modem. The modem will use the time period specified in S6 and S7 as time-outs in the handshake process. If a timeout expires, the modem will go on-hook and respond with NO CARRIER response. The command will be aborted in progress is a DTE character is entered before completion of the handshake.

If +FCLASS=1, the modem will attempt to connect with a fax machine (or modem) by entering the HDLC V21 channel 2 receive state (as if +FRH=3 had been issued).

The command will be aborted upon receipt of a DTE character if the modem has not finished dialing. In this case the modem will go on-hook and return to command mode responding with NO CARRIER message. If the modem has finished dialing, It proceeds as if +FRH=3 command has been issued.

If +FCLASS=8 (#CLS=8), the modem will go off-hook in V21 answer mode. It will decide (based on timers) when the other side answers in voice and a voice session will take place.

Related S-Reg: S5,S6,S7,S16,S22,S28,S56

En Set local echo

The modem enables/disables echo of characters to DTE.

Parameter value is written to S13.

E0 Disable command echo.

E1 Enable command echo (Default)

Result codes:

OK n=0 or 1

Error Otherwise

Related S-Reg: S13

Hn Set ON/OFF hook

H0 Modem hangs up (goes on-hook).

H1 Modem goes off hook.

Result codes:

OK n=0 or 1

Error Otherwise

In Identification/Information

I1 Modem Name, Vendor Name, Modem Version, for example:
 ModemX Data,Fax,Voice Combo

1.23

I2 SW Provider /SW Version, for example:

Smartlink Ltd.

1.23

I3 Chip Vendor/Chip ID

ST Microelectronics

- I4 Modem active profile for example:
 Active Profile:
 S00=000 S01=000 S02=000 S03=000 S04=000 S05=000 S06=000 S07=000 S08=000
 S00=009 S10=000 S11=000 S12=000 S13=000 S14=000 S15=000 S16=000 S17=000
 S18=000 S01=019 S20=000 S21=000 S22=000 S23=000 S24=000 S25=000 S26=000
 S27=000 S28=000 S29=000 S30=000 S31=000 S32=000 S33=000 S34=000 S35=000
 S36=000 S37=000 S38=000 S39=000 S40=000 S41=000 S42=000 S43=000 S44=000
 S45=000 S46=000 S47=000
- I5 Stored profile 0
 Active Profile 0:
 (Same format as above)
- I6 Stored profile 1
 Active Profile 1:
 (Same format as above)
- I7 Display stored phone numbers
 (See &Z command)
- Ln Speaker volume**
 Select speaker volume.
- L0 Low
- L1 Low (Default)
- L2 Medium
- L3 High
- Result codes:
 OK n=0-3
 Error Otherwise
 Related S-Reg: S30
- Mn Speaker control**
 Select when the speaker is On/Off.
- M0 Speaker always OFF
- M1 Speaker ON from start of dialing until receiving carrier (Default)
- M2 Speaker always ON
- M3 Speaker OFF from end of dialing until receiving carrier
- Result codes:
 OK n=0-3
 Error Otherwise
 Related S-Reg: S29
- Nn Automode control**
 Enable/Disable Automode detection.
- N0 Automode detection disabled. A subsequent handshake will be conducted according to the contents of S32.
- N1 Automode enabled. A subsequent handshake will be conducted according to the Automode algorithm (Default)
- Result codes:

OK n=0 or 1
 Error Otherwise
 Related S-Reg: S31

On Returns to on-line data mode

This command is normally used to connect the DTE back after an escape (+++) has been issued.

O0 Return to on-line data mode.
 O1 Return to on-line data mode, retrain first.

Result codes:

OK n=0-1
 Error Otherwise

P Pulse dialing

Forces pulse dialing. Applies to subsequent dialing commands.

This command holds until the next T dial modifier or T command is received.

The modem will go off hook and attempt to answer an incoming call. Upon successful completion of handshake, the modem will go on-line in answer mode.

Related S-Reg: S16

Q Quiet result codes control

Q0 Enable sending result codes to DTE (Default).

Q1 Disable sending result codes to DTE.

Result codes:

OK n=0 or 1
 Error Otherwise

Related S-Reg: S14

S Read/Write S-Register

This command has a few derivatives:

Sn=v Sets the value v (decimal) to S-register n (v=0-255)

Sn? Displays the value of S-register in decimal format (3 digits)

Note: Some registers are read-only

Result codes:

OK All parameters valid
 Error Invalid S register or value. Trying to write to a read-only register

T Tone dialing

Forces tone dialing. Applies to subsequent dialing commands. This command holds until the next T dial modifier or T command is received.

This command changes S14 to reflect the current dialing mode.

Related S-Reg: S16

Vn Verbose/Numeric result codes

Select the time of result messages sent to the DTE.

For a list of result codes and verbal messages see X command.

V0 Short form (numeric) result codes to be sent to DTE.

V1 Long form (verbose) result codes to be sent to DTE (Default).

Result codes:

OK n=0 or 1

Error otherwise

Related S-Reg: S15

Xn Extended result codes

Select the subset of result codes to be used by the modem to the DTE.

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

X0 Supported messages: OK, CONNECT, RING, NO CARRIER and ERROR, Blind call enabled.

X1 Supported messages: OK, CONNECT xxxx, RING, NO CARRIER and ERROR, Blind call enabled.

X2 Same as X1 + NO DIAL TONE message, Blind call disabled

X3 Same as X1 + BUSY message, Blind call enabled.

X4 All messages supported, Blind call disabled (Default).

Notes:

W,@ dial modifiers are ignored in X1, X2

S6 (Wait before dial) is ignored in X2, X4 if no W is specified in dial string

S6 is set to 0 means a blind call

Table 1: Result Codes and Messages

Result Code	Message	X0	x1	x2	x3	x4
0	OK	*	*	*	*	*
1	CONNECT	*	*	*	*	*
2	RING	*	*	*	*	*
3	NO CARRIER	*	*	*	*	*
4	ERROR	*	*	*	*	*
5	CONNECT 1200	1	*	*	*	*
6	NO DIAL TONE	3	3	*	3	*
7	BUSY	3	3	3	*	*
8	NO ANSWER	3	3	3	*	*
9	CONNECT 0300	1	*	*	*	*
10	CONNECT 0600	1	*	*	*	*
11	CONNECT 2400	1	*	*	*	*
12	CONNECT 4800	1	*	*	*	*
13	CONNECT 7200	1	*	*	*	*
27	CONNECT 9600	1	*	*	*	*
14	CONNECT 12000	1	*	*	*	*

15	CONNECT 14400	1	*	*	*	*
16	CONNECT 16800	1	*	*		
17	CONNECT 19200	1	*	*	*	*
18	CONNECT 21600	1	*			
19	CONNECT 24000	1	*	*	*	*
20	CONNECT 26400	1	*	*	*	*
21	CONNECT 28800	1	*	*	*	*
22	CONNECT 31200	1	*	*	*	*
40	CONNECT 32000	1	*	*	*	*
23	CONNECT 33600	1	*	*	*	*
24	CONNECT 34800	1	*	*	*	*
25	CONNECT 40000	1	*	*	*	*
26	CONNECT 42000	1	*	*	*	*
28	CONNECT 44000	1	*	*	*	*
29	CONNECT 46000	1	*	*	*	*
30	CONNECT 48000	1	*	*	*	*
31	CONNECT 50000	1	*	*	*	*
32	CONNECT 52000	1	*	*	*	*
33	CONNECT 54000	1	*	*	*	*
34	CONNECT 56000	1	*	*	*	*
66	COMPRESSION: CLASS 5	-	*	*	*	*
67	COMPRESSION: V.42BIS	-	*	*	*	*
69	COMPRESSION: NONE	-	*	*	*	*
70	FAX	*	*	*	*	*
71	DATA	*	*	*	*	*
76	PROTOCOL: NONE	-	*	*	*	*
77	PROTOCOL: LAPM	-	*	*	*	*
78	PROTOCOL: MNP	-	*	*	*	*
1021	MODULATION: V.21	-	*	*	*	*
1022	MODULATION: V.22	-	*	*	*	*
1032	MODULATION: V.32	*	*	*	*	
1034	MODULATION: V.34	-	*	*	*	*
1103	MODULATION: B103	-	*	*	*	*
1122	MODULATION: V.22BIS	-	*	*	*	*
1132	MODULATION: V.32BIS	-	*	*	*	*
1134	MODULATION: V.34BIS	-	*	*	*	*
1212	MODULATION: B212	-	*	*	*	*
+F4	+FCERROR	*	*	*	*	*

<*> message will be generated when n has been selected
 <i> message will be replaced by message <i> when n has been selected
 <-> message will not be generated when n has been selected.
 Related S-Reg: S56

Yn Select default configuration

Select the default user defined configuration.

Note: The default configuration is not loaded by Yn (See Zn)

Y0 Select user template 0

Y1 Select user template 1

Y2 Select factory setting 0 (Default)

Y3 Select factory setting 1

Related S-Reg: S161

Zn Select user defined configuration

Select the user defined configuration.

Z0 Select default user template (as defined by Yn)

Z1 Select user template 0

Z2 Select user template 1

Z3 Select factory setting 0 (&F0)

Z4 Select factory setting 1 (&F1)

Result codes:

OK n=0-5

Error Otherwise

Related S-Reg: S59

7.2 - AT& Commands

&An Connect message format

Select the format of the CONNECT message.

&A0 no extra messages besides CONNECT xxxxx (Default)

&A1 Add Modulation indicator:

V.21/ V.22/ V.22BIS/ V.32/ V.32BIS/ V.34/ V.34BIS/ B103/ B212

For example:

Modulation: V.34

&A2 Add Error Detection Protocol and Data Compression indicators.

For example:

Protocol: LAPM/MNP/NONE

Compression: CLASS 5/V.42BIS/NONE

&A3 Add Modulation Indicator + Error Detection Protocol + Data Compression indicators (see above).

Related S-Reg: S70, S71

&Cn Control Carrier Detect (CD, RLSD) behavior

Controls the RLSD output behavior.

- &C0 RLSD is assumed to be ON all the time
- &C1 RLSD follows the carrier state (Default)
 Result codes:
 OK n=0 or 1
 Error Otherwise
 Related S-Reg: S60
- &Dn Controls DTR behavior (NA)**
 Controls the DTR output behavior.
Note: This command is supported for compatibility. It has no significance in Modio environment.
- &D0 DTR is taken to be ON all the time
- &D1 DTR drop causes entry to command mode without disconnect (Default)
- &D2 DTR follows DTR circuit definition
- &D3 DTR drop causes software reset (as in Z0)
 Result codes:
 OK n=0-3
 Error Otherwise
 Related S-Reg: S63
- &En Connect message speed source**
 Select the requested source for the speed field in the CONNECT message.
- &E0 DCE Speed
- &E1 DTE Speed
- Note:** Since a virtual port is involved, the DTE is not bound by any UART limitation and may be theoretically set as high as 921600. DTE speed is supported for compatibility only. It bears little significance in Modio environment.
 Related S-Reg: S71
- &Fn Sets factory configuration**
 Select one of the factory settings.
- &F0 Select factory setting 0
- &F1 Select factory setting 1
 Result codes:
 OK n=0-1
 Error Otherwise
 Related S-Reg: S59
- &Hn Sets flow control**
 Select the user defined configuration.
- &H0 Flow control disabled (NA)
- &H1 "HW" flow control RTS/CTS emulation (Default)
 Result codes:
 OK n=0-1
 Error Otherwise
 Related S-Reg: S62

&Pn Set pulse dial make/break ratio

&P0 US & Canada 39%/61% (10 pps) (Default)
 &P1 UK & Hong Kong 33%/67% (10 pps)
 &P2 Same as 0, except at 20 pps
 &P3 Same as 1, except at 20 pps
 Result codes:
 OK n=0-3
 Error Otherwise
 Related S-Reg: S28

&Rn Controls RTS behavior

Controls the RTS output behavior.
Note: This command is supported for compatibility. It has no significance in Modio environment
 &R0 RTS ignored
 &R1 Modem receives data only on RTS (NA)
 Result codes:
 OK n=0 or 1
 Error Otherwise
 Related S-Reg: S61

&Sn Controls DSR behavior

Note: This command is supported for compatibility. It has no significance in Modio environment.
 &S0 DSR override (is assumed to be ON all the time)
 &S1 DSR follows circuit definition
 Result codes:
 OK n=0 or 1
 Error Otherwise
 Related S-Reg: S64

&Tn Test mode

&T0 TBD (Default)
 &T1 TBD
 &T2 TBD
 &T3 TBD
 Result codes:
 OK n=0-3
 Error Otherwise
 Related S-Reg: S18, S50-S55

&V Display Verbose Information

Display Active profile, Stored Profiles, Stored Phone Numbers
 (Equivalent to I4-I7 combined)

&Wn Writes current configuration

&W0 Write to template 0

&W1 Write to template 1

Result codes:

OK n=0-1

Error Otherwise

Written to registry.

&Zn Stores dial string

Stores/Displays dial string (up to 47 characters)

&Zn=s Store dial string (n=0-4)

&Zn=L Store the last dialed string (n=0-4)

&Zn? Display the nth string

&ZL? Display the last dialed string

Written to registry.

7.3 - AT \ Commands - Error correction control

\An Maximum MNP block Size

\A0 64 characters maximum block size

\A1 128 characters maximum block size

\A2 192 characters maximum block size

\A3 256 characters maximum block size

Result codes:

OK n=0-3

Error Otherwise

Related S-Reg: S<basereg+1> of V.42 registers

\Bn Transmit break to remote (-)

In non-error correction mode, the modem will transmit a break signal to the remote modem with a length of n*100ms. If a number above 9 is entered, 9 is used.

Result codes:

OK if connected in data modem mode

Error if not connected or if connected in fax modem mode

\Kn Break Control (-)

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

The behavior parameter is written to Sxx

\K0 Enter on-line command mode, no break sent to remote modem

\K1 Clear data buffers and send break to remote modem

\K2 Same as 0

\K3 Send break to remote modem immediately

\K4 Same as 0

\K5 Send a break to remote modem in sequence with transmitted data (Default)

Related S-Reg: S<basereg+x> of V.42 registers

Result codes:

OK n=0-5

Error Otherwise

\Nn Error correction operating mode

\N0 Normal (Speed buffering) - No error correction

\N1 Direct (pass-through) 128 characters maximum block size

\N2 Reliable (error correction) mode. The Modem will attempt LAPM and then MNP

\N3 Auto reliable mode. Same as \N2, but will fall back to Normal

\N4 LAPM error correction mode only, hang up upon failure (Default)

\N5 MNP error correction mode only, hang up upon failure

Result codes:

OK n=0-5

Error Otherwise

Related S-Reg: S<basereg> of V.42 registers

7.4 - AT% Commands

%Cn Compression control

%C0 Disable data compression

%C1 Enable MNP5 data compression

%C2 Enable V.42bis data compression

%C3 Enable MNP5/V.42bis data compression (Default)

Result codes:

OK n=0-3

Error Otherwise

Related S-Reg: S<basereg+2> of V.42 registers

%En Line quality monitor control

Controls whether or not the modem will automatically monitor the line quality and request a retrain (%E1), or fall back when quality is insufficient or fall forward when line quality improves (%E2).

%E0 Disable line quality control

%E1 Enable line quality control and auto retrain

%E2 Enable line quality control and fallback/forward

Result codes:

OK n=0-3

Error Otherwise

Related S-Reg: S39

7.5 - AT+MS Command

+MS Modulation select

This command selects the modulation, optionally enables/disables Automode, and optionally specifies the lowest and highest connection rates.

The command format is:

AT+MS= [<mod>][,<automode>][,<min_rate>][,<max_rate>]]]

- <mod> a decimal number specifying the preferred modulation (automode enabled), or the modulation (automode disabled).
- <automode> 0/1 Automode disabled/enabled
- <min_rate> minimum rate for connection. If lower than the actual minimum rate for the selected modulation, the actual lowest supported rate will be taken.
- <max_rate> maximum rate for connection. If higher than the actual maximum rate for the selected modulation, the actual highest supported rate will be taken.

Table 2: +MS command parameters

<mod>	Modulation	Possible rates
22	V.22	1200
122	V.22bis	2400, 1200
32	V.32	9600, 4800
132	V.32bis	14400, 12000, 9600, 7200, 4800
34	V.34	33600, 31200, 28800, 26400, 24000, 21600, 19200, 16800, 14400, 12000, 9600
212	Bell 212	1200
103	Bell 103	300

Examples:

- AT+MS=34,0,4800,33600 V.34, No Automode, Min. speed 4800, Max speed 33600
- AT+MS=,1 Automode
- AT+MS=32,1,,14400 V.32 Automode, Max speed 14400 (min speed as before)

Factory Settings: 34,1,300,33600

The requested modulation scheme will be written to S32

The requested min rate will be written to S33

The requested max rate will be written to S34

The actual rate may be read from S35

The actual modulation scheme may be read from S37

(codes as specified in the Xn command)

Other derivatives of the +MS command:

AT+MS? report current MS settings (e.g. 34,1,9600,33600)

AT+MS=? list the supported values +MS:(22,122.....), (0,1), (300-33600), (300-33600)

Result codes:

OK Syntax OK

Error Otherwise

Related S-Reg: S31-S37

7.6 - AT+F Commands - Fax Support

+FCLASS Data/Fax Class1/Voice mode

Sets Data/Fax Class1/Voice (0,1,8) mode

+FCLASS=<value>

[<value> - 0,1,8 (Data/Fax Class1/Voice)]

Result codes:

OK Syntax OK

Error Otherwise

+FCLASS? Returns current setting

Related S-Regs: S32, S150

+FAE Data/Fax Auto Answer

Select Data/Fax Auto Answer

+FAE=<value> [<value> - 0,1 (Data/Fax Class1)]

+FAE? Returns the current setting

Related S-Regs: S151

+FTS Stop transmission and wait

+FTS= <value>

Terminates transmission and waits for <value>*10ms interval before responding with OK.

ERROR is issued if the modem is on-hook.

+FTS? Returns the current setting

+FRS Receive Silence

+FRS= <value>

Report back to DTE with OK after <value>*10ms silence interval has been detected. The command is aborted if any character is received from the DTE (The response will still be OK).

ERROR is issued if modem is on-hook.

+FRS? Returns the current setting

+FTM Transmit Modulated Data

+FTM=<value>

Transmits data according to the defined modulation. ERROR is issued if modem is on-hook.

Value	Modulation
24	V.27 ter 2400 bps
48	V.27 ter 4800 bps
72	V.29 7200 bps
73	V.17 7200 bps long
74	V.27 7200 bps short
96	V.29 9600 bps
97	V.17 9600 bps long
98	V.17 9600 bps short
121	V.17 12000 bps long
122	V.17 12000 bps short
145	V.17 14400 bps long

146	V.17 14400 bps short
-----	----------------------

+FTM=? Return "24, 48, 72, 73, 74, 96, 97, 98, 121, 122, 145, 146"

+FRM Receive Modulated Data

+FRM=<value>

Receives data according to the defined modulation (See Values above)

ERROR is issued if modem is on-hook.

+FRM=? Return "24, 48, 72, 73, 74, 96, 97, 98, 121, 122, 145, 146"

see +FTM

+FRH Receive HDLC Data

+FRH=<value>

Receives data using HDLC protocol and the defined modulation. ERROR is issued if modem is on-hook.

<value> = 3 (V.21 channel 2 300 bps)

+FRH=? Return "3"

+FTH Transmit HDLC Data

+FTH=<value>

Transmits data using HDLC protocol and the defined modulation. ERROR is issued if modem is on-hook.

<value> = 3 (V.21 channel 2 300 bps)

+FTH=? Return "3"

7.7 - AT# Commands - Voice Modem Support

Note: All the following commands will return OK as a result code (or ERROR if the parameters are faulty), unless stated otherwise.

#BDR DTE Baud Rate

Sets DTE Baud Rate

#BDR=<value>

<value> - DTE Baud rate (0-48) *2400

#CID Caller ID

Enables the Caller ID feature in any mode

#CID=<value>

#CID=0 - Disable Caller ID

#CID=1 - Enable Caller ID (Verbose)

#CID=2 - Enable Caller ID (Numeric)

Writes the value to Sreg

Related S-Reg: S75

#RG Receive gain level

Sets receive gain level (effects the AUDIO IN level)

#RG=<value>

<value> - 0-7fff

#TL Transmit level

Sets transmit level (effects the AUDIO OUT level)

#TL=<value>

<value> - 0-7fff

#CLS Data/Fax Class1/Voice mode

Same as +FCLASS=<value>

#CLS=<value>

Sets Data/Fax Class1/Voice (0,1,8) mode.

Related S-Regs: S32, S150

#VBS ADPCM or PCM

Bits per sample (ADPCM or PCM)

#VBS=<value> [<value> - 2,4 (ADPCM), 8,16 (PCM)]

#VBS? Returns the current setting

#VBS=? Returns "2,4,8,16"

Related S-Regs: S76

#VBT Beep tone timer

Sets Beep tone timer for generating tones and DTMF

#VBT=<value> [<value> - 0-40 (* 1/10 ms)]

#VBT? Returns the current setting

#VBT=? Returns "0-40"

Related S-Regs: S77

#VIP Voice Parameters

Initializes Voice Parameters

Related S-Regs: S75-S89

#VIT Inactivity timer

Sets Inactivity timer

#VIT=<value> [0-255 (* 1/10 ms)]

#VIT? Returns the current setting

#VIT=? Returns "0-255"

Related S-Regs: S19

#VLS Voice Source selection

Select Voice Source

#VLS=<value>

0 - Telephone Line Select (Go on hook)

2 - Speakers

3 - Microphone

6 - Speakerphone

#VLS? Returns the current setting

#VLS=? Returns "0,2,3,6"

Result codes:

OK n=0, 6

VCON n=2, 3

ERROR Otherwise

(For 0, 6, VCON will be issued upon line connection)

Related S-Regs: S78

#VRA Ringback Goes Away Timer (originate)

This value is used during call progress to detect a voice answer.

This is the interval between ringback ending and voice answer determined.

#VRA=<value> [0-255 (*1/10 MS)]

#VRA? Returns the current setting

#VRA=? Returns "0-255"

Related S-Regs: S79

#VRN Ringback Never Came Timer (originate)

This value is used during call progress to detect a voice answer.

This is the interval without detection of ringback before voice answer is determined.

#VRN=<value> [0-255 (*1/10 MS)]

#VRN? Returns the current setting

#VRN=? Returns "0-255"

Related S-Regs: S80

#VRX Voice Receive Mode

Go to Voice Receive Mode

Result codes:

CONNECT Data may be sent

ERROR VLS=0,6 and line not connected

Note: Any input from the terminal will abort Voice Receive Mode

#VSD Silence deletion

Enables/Disables silence deletion (voice receive, ADPCM)

#VSD=<value> [0,1 - Disable/Enable]

#VSD? Returns the current setting

#VSD=? Returns "0,1"

Related S-Regs: S81

#VSP Silence Period

Sets Silence Period (voice receive, ADPCM)

#VSP=<value> [0-255 (*1/10 ms)]

#VSP? Returns the current setting

#VSP=? Returns "0,255"

Related S-Regs: S83

#VSR Sample Rate

Sets Sample Rate (PCM, ADPCM)

#VSR=<value> [7200, 11025, 8000]
 #VSR? Returns the current setting
 #VSR=? Returns "7200, 11025, 8000"
 7200 is currently supported
 Related S-Regs: S91

#VSS Silence Sensitivity

Sets Silence Sensitivity (voice receive, ADPCM)
 #VSS=<value> [0-3] (0-Disable, 3-allow noisy conditions)
 #VSS? Returns the current setting
 #VSS=? Returns "0-3"
 Related S-Regs: S82

#VTD DTMF reporting capabilities

Sets DTMF reporting capabilities in Voice Transmit, Receive, and Voice Online Command Modes

#VTD=<value><value><value> [0-3F]
 #VTD? Returns the current setting
 #VTD=? Returns "<0-3F>,<0-3F>,<0-3F>"

Bit	Description
0	Disable/Enable DTMF detection
1	Disable/Enable V.25 1300 Hz detection
2	Disable/Enable T.30 1100 Hz detection (Fax)
3	Disable/Enable V.25/T.30 2100 Hz detection (Modem)
4	Disable/Enable Bell 2225 Hz detection
5	Disable/Enable Busy/Dial tone detection
6-7	reserved

Related S-Regs: S84-S86

#VTM timing mark

Enables timing mark placement.
 #VTM=<value> [0-10 (* 1/10 ms)]
 #VTM? Returns the current setting
 #VTM=? Returns "0-10"
 Related S-Regs: S87

#VTS tone signal

Generates a tone signal.
 #VTS= [x,y,z] | {x,z} | x, ...
 [x,y,z] x represents the first frequency (Hz)
 y represents second frequency (Hz)
 z represents the duration (in 100 ms units)
 {x,z} DTMF Digits with Variable Duration.
 x represents the DTMF digit (0-9,A-D,* ,#)
 z represents the duration (in 100 ms units)

x DTMF Digits, with duration defined by #VBT. This is represented by a value x (non-bracketed) corresponding to a DTMF digit (0-9,A-D,*,#).

#VGT Playback Volume

Sets Playback Volume [Default 192]

#VGT=<value> [0-255 (*1/10 ms)]

#VGT? Returns the current setting

#VGT=? Returns "0-255"

Related S-Regs: S74

#VTX Voice Receive Mode

Go to Voice Receive Mode

Result codes:

CONNECT Data may be sent

ERROR VLS=0,6 and line not connected

#SPK Full Duplex Speakerphone

Sets Full Duplex Speakerphone parameters

#SPK=<mute>,<speaker>,<mic>

<mute> 0 Microphone Mute

1 Microphone On (default)

2 Room Monitor (mic on Max, Speaker off)

<speaker>

0-15 and 2-30 = dB attenuation

5 = default

16 = speaker mute

<mic> 0 - 0 dB gain

1 - 6 dB gain (Default)

2 - 9 dB gain

3 - 12 dB gain

Related S-Regs: S88-S90

7.8 - S Registers

S#	Function	Range	Units	W	Default	AT
S0	Rings to Auto-Answer	0-255	rings	*	0	A
S1	Ring Counter	0-255	rings		0	
S2	Escape Character	0-255	ASCII	*	43	
S3	CR Character	0-255	ASCII		13	
S4	LF Character	0-255	ASCII		10	
S5	BS Character	0-255	ASCII		8	
S6	Wait Time for Dial Tone	2-255	s	*	2	D
S7	Wait Time for Carrier	1-255	s	*	60	D
S8	Pause Time for Dial (,)	0-255	s	*	2	D
S9	Carrier Detect Response Time	1-255	0.1s	*	6	
S10	Carrier Loss Disconnect Time	1-255	0.1s	*	7	
S11	DTMF Tone duration	50-255	0.001s	*	70	D
S12	Reserved					
S13	Echo	0-1		*	1	E
S14	Quiet	0-1		*	0	Q
S15	Verbose	0-1		*	1	V
S16	Pulse/Tone	0-1		*	1	T,P,D
S17	Reserved					
S18	Test Timer	0-255	s	*	0	&T
S19	System Inactivity Timer	0-255	min	*	0	
S20	Reserved					
S21	Break Length	0-9	100ms	*	9	\B
S22	Origin/Answer	0-1			0	
S23	XOFF	Character (NA)	0-127	ASCII	*	19
S24	Flash Timer	0-255		*	0	
S25	Delay to DTR	Off (NA)	0-255	0.01ms	*	5
S26	RTS to CTS delay (NA)	0-255	0.01ms	*	1	
S27	Auto Answer clear timeout	0-255	s	*	8	
S28	Pulse Set/Break Ratio	0-4		*	0	&P,P,D
S29	Speaker Control	0-3		*	1	M
S30	Speaker Volume	0-3		*	1	L
S31	Automode Select	0-1		*	1	+MS
S32	Requested Modulation (DP)		Mod Code	*	34	+MS

S33	Requested MIN Speed		bps Code	*		+MS
S34	Requested MAX Speed		bps Code	*		+MS
S35	Actual Speed after CONNECT		bps Code			
S36	Current Data Pump Status		Mod Code			
S37	Actual Modulation (DP)		Mod Code			
S38	Actual Rx Speed		bps Code			
S39	Line Quality Control	0-2		*	2	%E
S40	Reserved					
S41	Received Signal Level				4	
S42	SNR		dB			
S43	Result Codes control			*	0	X
S44						
S45	Transmit Gain Level	0-10	-dBm	*	3	
S46-S49	Reserved					
S50-S55	Reserved for Test					&T
S56	Extended Code	0-4		*	4	X
S57	Reserved					
S58	Reserved					
S59	Current Setting (Zn,&Fn)	0-5		*	3	Z, &F
S60	CD	0-1		*	1	&C
S61	RTS	0-1		*	1	&R
S62	Flow Control	0-3		*	1	&H
S63	DTR	0-3		*	0	&D
S64	DSR	0-1		*	0	&S
S65		0-1		*	1	&C
S66	Circuit 106 (RTS)	0-1			0	
S67	Circuit 107 (DSR)	0-1			0	
S68	Circuit 109 (CD)	0-1			0	
S69						
S70	CONNECT message format	0-1		*	0	&A
S71	CONNECT message speed source	0-1		*	0	&E
S72-S73	Reserved					
S74	Playback Volume	tbd				#VGT
S75	CID Enable	0,1		*	0	#CID
S76	ADPCM Bits Per Sample	4,8,16				#VBS
S77	Beep Tone Timer	0-40	1/10 s		20	#VBT
S78	Line Selection Duration		0,2,3,6			#VLS

S79	Ring Goes Away Timer	0-255	1/10 s		70	#VRA
S80	Ring Never Came Timer	0-255	1/10 s		100	#VRN
S81	Silence Detect Enable	0,1			0	#VSD
S82	Silence Detect Sensitivity	0-3			2	#VSS
S83	Silence Detect Duration	0-255	1/10 s		55	#VSP
S84	Dtmf Tone Reports Cap0	0-3F			0	#VTD
S85	Dtmf Tone Reports Cap1	0-3F			0	#VTM
S86	Dtmf Tone Reports Cap2	0-3F			0	#VTM
S87	Time Mark Placement	0-255	1/10 s		0	#VTM
S88	SPK <mute>	0-2			1	#SPK
S89	SPK <speaker>	0-15			5	#SPK
S90	SPK <mic>	0-3			1	#SPK
S91	Voice Sample Rate	1,2		1	0	#VSR
S92	Reserved				1	
S93-S99	Reserved for Diagnostics					
S100-S149	Reserved for V42					\A,\N, %C
S150	FCLASS Value	0,1,8		*	0	+FCLASS
S151	FAE Value	0,1		*	0	+FAE
S152-S160	Reserved					
S161	Default Setting	0-1		*	2	Y
S162	Country Type	0-7			1	
S163-S169	Reserved					
S170-S174	Debug Registers					
S197-S199	Reserved for Diagnostics			*	2	

8.0 - REGULATORY INFORMATION

8.1 - FCC Registration

This device complies with Part 15 and Part 68 of the FCC rules. The Registration Number and Ringer Equivalence Number (REN) are located on the bottom of your USB modem. You must provide this information to the telephone company if requested.

The REN is used to determine the number of devices you may legally connect to your telephone line. In most areas, the sum of the REN of all devices connected to one line must not exceed five (5.0). You should contact your telephone company to determine the maximum REN for your calling area.

A variety of Universal Service Ordering Code telephone wall jacks are available for different types of devices or services. Please note that the USOC jack required for this unit is RJ11.

The telephone company may change technical operations or procedures affecting your equipment. You will be notified of changes in advance to give you ample time to maintain uninterrupted telephone service.

If you experience trouble with this telephone equipment, please contact :

ST MICROELECTRONICS
2055 Gateway Place, Suite 700
San Jose, CA 95110

for information on obtaining services or repairs. The telephone company may ask that you disconnect this equipment from the network until the problem has been resolved. If your equipment continues to disrupt the network, the telephone company may temporarily disconnect service. If this occurs you will be informed of your right to file a complaint with the FCC.

This equipment may not be used on coin service provided by the telephone company. Connection to party lines is subject to state tariffs.

An FCC compliant telephone cord and modular plug are provided with this equipment, which is designed to connect to the telephone network or premises wiring using a compatible modular jack that is Part 68 complaint. See installation instructions for details.

FCC FAX BRANDING REQUIREMENTS

The Telephone Protection Act of 1991 makes it unlawful for any person to use a computer or other electronic device to send any message via a telephone, fax machine, or modem unless such message clearly contains in a margin at the top or bottom of each transmitted page or on the first page of the transmission, the date and time it is sent and an identification of the business or other entity, or other individual sending the message and the telephone number of the sending machine or such business, other entity or individual.

Programming of this information is a function of the fax software which runs on your computer. In order to program this information, please consult the documentation provided with your fax software.

WARNING

This device complies with part 15 of the FCC Rules. Operation is subject to the two following conditions:

- (1) this device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

RADIO AND TELEVISION INTERFERENCE

This equipment generates and uses radio frequency energy. If not installed and used in accordance with the manufacturer's instructions, it could cause interference to radio and television reception. It has been tested and complies with the limits for a Class B computing device in accordance with the specifications in Part 15 of the FCC Rules designed to provide reasonable protection against interference in a residential installation. There is no guarantee that interference will not occur. If this equipment causes interference to radio or television, as determined by turning the equipment off and on, the user is encouraged to correct the interference by using the following measures:

- * Reorient the receiving antenna
- * Relocate the computer with respect to the receiver
- * Plug the computer into a different outlet so the computer and receiver are on different branch circuits.

Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

If necessary, the user should consult the dealer or a radio/television technician for additional suggestions. You may find the following booklet, prepared by the Federal Communications Commission helpful:

How to identify and resolve radio-TV interference problems.
Stock No. 004-000-0345-4
U.S. Government Printing Office
Washington, DC 20402

SHIELDED CABLES

This product has been tested and complies with FCC limits for Class B computing device. Testing was done with shielded computer cables. Using unshielded cables could cause your system to emit excess radio frequency, increasing the chance of interference. To comply with FCC regulations it is necessary to use shielded computer cables with your installation.

8.2 -INDUSTRY CANADA Registration

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the interference-causing equipment standard entitled Digital Apparatus ICES-003 of Industry Canada.

NOTICE: IC labels are affixed to each unit sold in Canada. This label has the certification number for that particular unit. The numbers are different for each model. The Industry Canada label identifies certified equipment. This certification means the equipment meets certain telecommunications network protective, operational and safety requirements. The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single-line, individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorised Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

For your own protection, make sure that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural area.

CAUTION

Do not attempt to make such connections yourself. Instead contact the appropriate electric inspection authority, or electrician, as appropriate.

RINGER EQUIVALENCE NUMBER

The Ringer Equivalence Number (REN) assigned to each terminal device provides an indication of the maximum number of terminals allowed to be connected to a telephone interface. The termination on an interface may consist of any combination of devices subject only to the requirement that the sum of the Ringer Equivalence Number of all the devices does not exceed five (5.0)