# AT Command Set and Register Summary for Cisco MICA Six-Port Modules

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This document describes modem **AT** commands and S registers for Cisco MICA six-port modules.

**AT** commands are modem commands that are prefixed with the characters **AT**. Cisco MICA stands for modem ISDN channel aggregation, the Cisco high-density modem technology.

For information about managing modems on Cisco access servers using Cisco IOS commands, refer to the software configuration guide for the access server in which the modems are installed.

**Note** The defaults and limits on parameters described in this document are valid for the United States. They may not be appropriate for use in other countries.

If you have questions or need help, refer to the section "Obtaining Documentation" on page 61 .

This document contains the following sections:

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# Entering AT Commands

To send **AT** commands to the modem, you must first put the modem in **AT** command mode. Entering **AT** command mode involves a reverse Telnet procedure. The table below shows how to enter **AT** command mode from Cisco IOS EXEC mode using reverse Telnet.

**Note** Cisco MICA does not support the **modem at-mode** commands used in Cisco IOS line configuration mode. Therefore, you cannot issue **AT** commands to Cisco MICA modems from the Cisco IOS command line.

| Step | Command | Purpose |
|------|---------|---------|
| 1 | `> `**`telnet`**` ip-address line#`  <br><br><br><br><br><br>`Trying 172.0.0.1, 2001 ... Open` | Open a reverse Telnet connection to the modem. In this example, `ip-address` is the IP address of the access server and `line#` is the two-digit line number of the modem, prefixed by 20. (For example, enter **telnet 172.0.0.1 2001** if the IP address is 172.0.0.1 and the modem line number is 1.) If you do not know which line number to use, enter the **show line** command and check the resulting display for tty numbers that have `inout` in the Modem column. Use one of those numbers. <br><br>The Telnet connection is open when the word `Open` appears. |
| 2 | `at`  <br>`OK` | There is no command prompt in **AT** command mode. To confirm that you can enter **AT** commands, type **at** and press **Return**. If you are in **AT** command mode, the modem returns `OK`. |
| 3 | `Ctrl-Shift-6 X`  <br><br><br>`# `**`disconnect`** | When you have finished entering **AT** commands, exit **AT** command mode and return to privileged EXEC mode. To do so, type **Ctrl-Sh-6 X** (that is, hold down the **Control** and **Shift** keys and press **6**, and then release everything and press **X**). <br><br>Enter **disconnect** to end the Telnet connection. |

Use these guidelines when you send **AT** commands to a modem:

- Enter the **AT** prefix before all commands except **A/** (Repeat Last Command) and +++ (Escape code). Commands are executed when you press **Return** or **Enter**.

- Command lines are limited to 128 characters, not including the **AT** prefix and **Return** characters. Dial strings, however, are limited to 49 characters.

- You can enter several commands on the same command line, as long as you do not exceed the 128-character limit (see preceding item). Enter commands with no spaces or separators between them. The commands are executed in the order in which they appear on the command line. If an individual command fails (returns ERROR), any subsequent commands on that line are not executed.

- Certain commands work only if they are the last command on the line. Such commands include **A** (answer), **D** (dial), **H** (hang up), **Z** (reset), and any command that takes time to execute or that does not return a result immediately.

- Spaces within **AT** commands are permitted anywhere except between the A and the T. For example, enter **ATS0?**, **AT S0?**, **ATS 0?**, but not **A TS0?**.

- Enter commands as either uppercase or lowercase, not mixed case.

- Type **Ctrl-C** (**^C**) to abort a partially entered command. The modem echoes ^c.

- Use the **Backspace** key (or another key specified in register S5) to erase characters on the command line, except for the leading characters AT. To clear the characters AT, press **Return** for a fresh command line. For information on changing the command-line erase key, see "S5 (Backspace Character)" on page 26 .

- A missing numeric argument is assumed to be zero. For example, the Quiet command **Q** is equivalent to **Q0.**

- The modem operates in the following modes:

- Command state: The modem is idle and waiting for commands.

  - Set-up state: Establishing a connection.

  - Online state: Connected to another modem. To return to the online state from any other state, enter **ATO** and press **Return**. You will see a fresh connect message.

  - Escape state: Allows you to enter commands while the modem is on line. To go to escape state, enter +++ (+++ is the default escape code; see "S2 (Escape Code Character)," on page 25 for details on changing the escape code). When you enter the +++ command, pause for at least a second before and after typing it, but do *not* pause between characters. Do not press **Return**. Wait for the OK prompt before entering commands.

    The escape code can be enabled and disabled; for instructions, see "S2 (Escape Code Character)," on page 25, and "S47 (Hayes +++ Escape Detection)" on page 46 .

# Alphabetic Command Set

This section describes modem commands that begin with an alphabetic character (A to Z).

## A/ (Repeat Last Command)

Re-executes the last command one time. If there is no previous command, the modem displays OK. Do not enter the **AT** prefix before **A/**. Usually, you need not enter **Return** after **A/**.

**Note** Because of the data forwarding method used in some Telnet connections, it may be necessary to press **Return** after **A/** in some cases.

## A (Answer)

Forces the modem off-hook in answer mode, regardless of the value of register S11. The modem must be in the command state when you use the Answer command. If the modem is not in the command state, it responds to this command with a result code of ERROR.

# AT (Attention)

Informs the modem that commands are being sent to it. The modem displays OK. **AT** must precede all other commands except **A/** and +++.

# D {*dial string*} (Dial)

Dials a telephone number, establishing a connection. Always make the Dial command the last (or the only) command on the command line. The *dial string* can contain up to 49 characters; valid characters are the digits 0 to 9, and for tone dialing, the letters A, B, C, and D, and the characters # and *. If your access server is running Cisco IOS Release 12.1(4)T or greater, you can also use these dial modifiers in your dial string: the letters W (wait for dial tone) and X (switch to DTMF signaling) and the comma character, (delay by the number of seconds specified in register S8). If you are running a release earlier than 12.1(4)T, the W, X, and comma modifiers are accepted but ignored.

The modem ignores invalid characters. If you enter dial strings longer than 49 characters, the result code ERROR appears. The following example shows the command used to dial the telephone number 1 (617) 555-1234:

```
D 1 (617) 555-1234
```

The modem ignores the spaces, parentheses, and hyphen in the example's dial string: they are not dialed and they do not count against the 49-character limit.

To cancel the Dial command, press any key, or clear the call from the router or access server.

The modem must be in the command state when you use the Dial command. If the modem is in the escape state, it responds to this command with a result code of ERROR.

For compatibility, the modem accepts these dial modifiers but does not act on them:

- P
- T
- @ (at sign)
- ! (exclamation point)
- ; (semicolon)

# DEBUGTHISMODEM (Debug This Modem)

Enables debugging features, which include the following:

| AT Command Enabled |
| --- |
| \D{command} {modem} (DSP Debug Options), page 20 |
| **S Registers Enabled** |
| S41 (V.34 Maximum Symbol Rate), page 43 |
| S42 (V.34 Minimum Symbol Rate), page 44 |
| S43 (V.34 Carrier Frequency), page 44 |
| S44 (V.34 Preemphasis Filter Selection), page 45 |

| AT Command Enabled |
| --- |
| S56 (Set Maximum V.34+ Transmit Rate) |
| S71 (V.90 Uplink Max Symbol Rate) |
| S72 (V.90 Uplink Min Symbol Rate) |

# DI {*dial string*} (ISDN Dial)

Places an ISDN call, establishing a connection. In order to use the DI command, you must set register S29 to a compatible call type. The call type for ISDN is V.110 (S29 = 8). See "S29 (Modulation Standard)," on page 36.

The ISDN Dial command must be the last command on the command line. The *dial string* can contain up to 49 characters; valid characters are the digits 0 to 9, and for tone dialing, the letters A, B, C, and D and # and *. If your access server is running Cisco IOS Release 12.1(4)T or greater, you can also use these dial modifiers in your dial string: the letters W (wait for dial tone) and X (switch to DTMF signaling) and the comma character, (delay by the number of seconds specified in register S8). If you are running a release earlier than 12.1(4)T, the W, X, and comma modifiers are accepted but ignored.

The modem (and/or the host) ignores invalid characters. If you enter a dial string longer than 49 characters, the modem returns the result code ERROR. The following example shows the command used to dial the telephone number 1 (617) 555-1234

```
DI 1 (617) 555-1234
```

The modem ignores the spaces, parentheses, and hyphen in the example's dial string: they are not dialed and they do not count against the 49-character limit.

To cancel the ISDN Dial command, press any key, or clear the call from the router or access server.

The modem must be in the command state when you use the ISDN Dial command. If the modem is in the escape state, it responds to this command with a result code of ERROR.

For compatibility, the modem accepts these dial modifiers but does not act on them:

- P
- T
- @ (at sign)
- ! (exclamation point)
- ; (semicolon)

# E*n* (Command Echo)

Configures the modem to echo commands to the workstation.  lists command echo options.

**Default**

E1

**Table 1          Command Echo Options**

| Command Option | Meaning |
| --- | --- |
| E0 | Disables echoing of commands to the workstation |
| E1 | Enables echoing of commands to the workstation |

# H (Hang Up)

Disconnects this modem from the remote system and hangs up the telephone line.

# I*n* (Inquiry)

Displays modem information and results of checksum tests on firmware. The following table lists inquiry command options.

**Table 2        Inquiry Command Options**

| Command Option | Meaning |
|---|---|
| I0 | Displays the modem product ID code |
| I1 | Runs a checksum on firmware and displays the result |
| I2 | Runs a checksum on firmware and displays the checksum status: |
| | 0 (OK in verbose mode) if the checksum is correct |
| | 1 (ERROR in verbose mode) if the checksum is not correct |
| I3 | Displays the country code, modulation standards, and revision levels, as shown in this example: |
| | ATI3 |
| | Cisco MICA Hex Modem Module Product Information |
| | Country Code     001 |
| | V.90, K56FLEX 1.1, V.34+, V.32terbo, V.22bis, V.42, MNP2-4, V.42bis, MNP5, Fax, V.110, SS7_COT, TRACE, VOICE |
| | HEX modem index    00 |
| | CP code revision    2.7.2.0 |
| | CP revision date    May 30 2000 |
| | SP code revision    2.7.2.0 |
| | SP revision date    05/30/2000 (MM/DD/YYYY) |
| | OK |

| Command Option | Meaning |
| --- | --- |
| I4 | Displays one of the following lines describing the features available in the version of Portware running on the modem: |
| | Cisco MICA V34+ |
| | Cisco MICA K56FLEX |
| | Cisco MICA K56FLEX/FAX |
| | Cisco MICA V.90/K56FLEX |
| | Cisco MICA V.90/K56FLEX/FAX |
| | Cisco Mica V.90/K56FLEX/FAX/V.110 |
| | Cisco Mica V.92(MOH,QC)/V.90/K56FLEX/FAX/V.110 |

# L*n* (Monitor Speaker Loudness)

This command is provided for compatibility; it has no effect. (The modem responds OK but takes no action.) However, the value of *n* must be in the range 0 to 3; if you enter a different value, the modem displays an ERROR result code.

# M*n* (Monitor Speaker Mode)

This command is provided for compatibility; it has no effect. (The modem responds OK but takes no action.) However, the value of *n* must be in the range 0 to 2; if another value is used, the modem returns an ERROR result code.

# O (Online from Escape Mode)

Changes the modem to the online state (connected, or steady state) from escape mode. The modem displays a connect message.

# P (Pulse Dial)

This command is provided for compatibility; it has no effect. (The modem responds OK but takes no action.)

# Q*n* (Quiet)

Configures the modem to send (or not send) result and status codes, such as OK, ERROR, and BUSY, to your workstation.  The following table lists quiet mode command options.

Note    The **Q** command does not affect output from **AT** commands such as **I**, **S*n*?**, **\S**, and **%R**.

**Default**

Q0

**Table 3        Quiet Mode Command Options**

| Command Option | Meaning |
| --- | --- |
| Q0 | Enables output of result codes |
| Q1 | Disables output of result codes |
| Q2 | Enables output of result codes only when the modem is originating calls |

# S*n* (Point to a New Configuration Register)

Sets the modem register pointer to S register *n* (where *n* is a decimal number). Register *n* becomes the current register and is addressed by subsequent register commands. If you enter a value for *n* that is outside the range of S register numbers, the command fails (returns ERROR). For descriptions of the S registers and a summary of commands you can use to manipulate S registers, see "Modem S Register Summary" on page 23 . See also "%R (Verbose Display of the Modem Configuration)" on page 12 .

**Range**

0 to 75. (The range is determined by the numbers of the S registers, which can change from one Cisco MICA Portware release to the next as new S registers are added.)

**Default**

**S0**

# S*n*? (Read Configuration Register)

Displays the contents of S register *n* (where *n* is a decimal number). For descriptions of the S registers, see "Modem S Register Summary" on page 23 . See also "%R (Verbose Display of the Modem Configuration)" on page 12 .

**Range**

0 to 75

**Default**

**S0**

# S*n*=*y* (Set Configuration Register to a Decimal Value)
# S*n*=>*y* (Set Configuration Register to a Hexadecimal Value)

Sets the contents of S register *n* (where *n* is a decimal number) to the value *y*. Some invalid values for *y* cause the command to fail (returning ERROR), even though other invalid values are accepted. For descriptions of the S registers, see "Modem S Register Summary" on page 23 .

**Range**
*n*: 0 to 75
*y*: depends on *n*, the register selected

# T (Tone Dial)

This command is provided for compatibility; it has no effect. (The modem responds OK but takes no action.)

# V*n* (Result Code Format)

Selects the format (short or long) of the result codes sent to your workstation.  describes the result codes. The following table lists options for the result code format command.

**Note**   The **V** command does not affect output from **AT** commands such as **I**, **S*n*?**, **\S**, and **%R**.

**Table 4**      **Result Codes**

| Numeric Result Code | Long Result Code | Description |
|---|---|---|
| 0 | OK | Command accepted, ready for next command. |
| 1 | CONNECT | A connection has been established. The long result code may be followed on the same line by speed and protocol information, depending on the setting of the X command. See "Xn (Extended Result Codes)" in the next section. |
| 2 | RING | Ring signal indicated. |
| 3 | NO CARRIER | Indicates one of the following: Carrier signal was not detected. Carrier signal was lost for the period specified in register S10. The other modem indicated disconnection (with error correction only). An unrecoverable error occurred (with error correction only). |
| 4 | ERROR | Indicates one of the following: Invalid command or checksum. Command line exceeds 128 characters. Dial string exceeds 49 characters. |
| 5 | — | Not used. |
| 6 | NO DIALTONE | Dial tone was not detected, or in channelized T1 there was no trunk to seize. |
| 7 | BUSY | Busy (line engaged) signal or number unobtainable signal detected.) |
| 8 | NO ANSWER | There was no answer-back tone. (Either the call was not answered, or a human being answered.) |
| 9 | (ABORTED) | An operator pressed any key to abort a D (Dial) or A (Answer) command. |

**Default**

V1

**Table 5**      **Options for Result Code Format Command**

| Command Option | Meaning |
|---|---|
| V0 | Sends short result codes (numeric codes defined in ) |
| V1 | Sends long result codes (text codes defined in ) |

# X*n* (Extended Result Codes)

Selects the extended result code format sent to the workstation.  lists options for the extended result codes command.

Before dialling, the modem waits for the time delay specified in register S6. (See "S6 (Wait Before Dialing)" on page 26 for information on register S6.)

See also the previous section, "Vn (Result Code Format)." You can use the **V***n* command to select short or long form result codes.

**Default**

X4

**Table 6    Options for Extended Result Codes Command**

| Command Option | Meaning |
| --- | --- |
| X0 | Sends the CONNECT result code when a connection is established. |
| X1 X2 X3 X4 | Sends a verbose connect message[1] when a connection is established. |

1. The connect message for X1 through X4 includes the rate in bits per second of the connection, the protocol used, and the compression type. For example, a connect message might read "CONNECT 33600 /V.42/V.42bis". (X0 sends only the result code, CONNECT.)

# Z (Reset)

Hangs up the telephone line, clears the modem, and restores the factory default settings.

# Percent Command Set

This section describes the modem command that begins with a percent (**%**) character.

# %R (Verbose Display of the Modem Configuration)

Reads and displays the modem configuration, showing the contents of modem S registers first as a list of values in hexadecimal and decimal format (the Configuration Summary), and then as a more detailed table with register settings in decimal (in the Value column) and descriptions of the registers. Press **Q** to stop the display. This is a sample of the output resulting from the **%R** command:

```
AT%R
Cisco MICA Hex Modem Module Configuration

CONFIGURATION SUMMARY

REG = HEX/DEC REG = HEX/DEC REG = HEX/DEC REG = HEX/DEC
S00 = 0002/2 S02 = 002B/43 S03 = 000D/13 S04 = 000A/10
```

```
S05 = 0008/8 S06 = 0002/2 S07 = 003C/60 S08 = 0002/2
S09 = 012D/301 S10 = 000E/14 S11 = 0000/0 S12 = 0008/8
S13 = 0000/0 S14 = 0001/1 S15 = 0001/1 S16 = 0032/50
S17 = 0064/100 S18 = 000D/13 S19 = 000C/12 S20 = 0100/256
S21 = 000F/15 S22 = 0000/0 S23 = 0001/1 S24 = 0001/1
S25 = 0000/0 S26 = 0000/0 S27 = 0000/0 S28 = 0000/0
S29 = 000C/12 S30 = 8340/33600 S31 = 012C/300 S32 = 0002/2
S33 = 01F4/500 S34 = 07D0/2000 S35 = 0032/50 S36 = 0014/20
S37 = 003C/60 S38 = 000E/14 S39 = 0007/7 S40 = 0004/4
S41 = 0005/5 S42 = 0000/0 S43 = 0002/2 S44 = 000B/11
S45 = 0000/0 S46 = 0000/0 S47 = 0002/2 S48 = 0001/1
S49 = 0000/0 S50 = EA60/60000 S51 = 6D60/28000 S52 = 0001/1
S53 = 0003/3 S54 = 00C8/200 S55 = 0000/0 S56 = 8340/33600
S57 = 2580/9600 S58 = 0000/0 S59 = 0006/6 S60 = 000F/15
S61 = 0000/0 S62 = 0000/0 S63 = 0003/3 S64 = 0000/0
S65 = 0800/2048 S66 = 0800/2048 S67 = 00FF/255 S68 = 00FF/255
S69 = 3A98/15000 S70 = 3A98/15000
S71 = 0005/5 S72 = 0003/3 S73 = 0000/0


Reg Value Description
--- ----- -----------
S0 [ 2] Automatic Answer
S2 [ 43] Escape Code Character
S3 [ 13] Carriage Return Character
S4 [ 10] Line Feed Character
S5 [ 8] Backspace Character
S6 [ 2] Pause Before Blind Dialing (seconds)
S7 [ 60] Connect Complete Timeout (seconds)
S8 [ 2] Comma Dial Modifier Time (seconds)
S9 [ 317] Bit-Mapped Register
 0 = Command echo
 0 = E0 - No echo
 1 = E1 - Echo
 1,2 = Result codes
 0 = Q0 - Output result code
 1 = Q1 - No result codes
 2 = Q2 - No result codes in Answer mode
 3 = Result type
 0 = V0 - Short form
 1 = V1 - Long form
 4,5 = Data Terminal Ready
 0 = &D0 - Ignore DTR
 1 = &D1 - Modem enters command state
 2 = &D2 - Modem goes on hook
 3 = &D3 - Modem is reset
 6,7,8 = CONNECT Result Code & Call Progress
 Text Busy NoDT
 0 = X0 - N N N
 1 = X1 - Y N N
 2 = X2 - Y N Y
 3 = X3 - Y Y N
 4 = X4 - Y Y Y
S10 [ 14] Automatic Disconnect Delay
S11 [ 0] Link Initiate Action
 0 = Answer 1 = Originate
S12 [ 8] Number of async data bits
 - NO PROTOCOL ASYNC MODE ONLY -
 7 = 7 data bits
 8 = 8 data bits
S13 [ 0] Parity Configuration
 - NO PROTOCOL ASYNC MODE ONLY -
 0 = No parity
 1 = Even parity
 2 = Odd parity
```

```
                                  3 = Mark parity
                                  4 = Space parity
                                 S14 [ 1] Stop Bit Configuration
                                  - NO PROTOCOL ASYNC MODE ONLY -
                                  1 = 1 stop bit 2 = 2 stop bits
                                 S15 [ 1] V.42 detect phase
                                  0 = Disabled 1 = Enabled
                                 S16 [ 50] EC Autodetect Time-out (100 msec)
                                 S17 [ 100] EC Negotiate Time-out (100 msec)
                                 S18 [ 13] EC Fallback Character
                                 S19 [ 12] EC Retransmission Limit
                                 S20 [ 256] EC max packet length (64..1024)
                                  max window = 8192/<length>
                                 S21 [ 15] Data Compression (bit mapped)
                                  0 = Disabled
                                  1 = V.42bis
                                  2 = MNP5
                                  4 = V.44 Tx
                                  8 = V.44 Rx
                                 Note:Combinations are supported. The
                                 priority from highest to lowest is:
                                  LAPM- V.44, V.42bis, none.
                                  MNP- V.42bis, MNP5, none.
                                 S22 [ 0] ARA Error Correction
                                  0 = Disabled
                                  1 = Answer any ARA, don't originate
                                  2 = Originate ARA1.0, answer any
                                  3 = Originate ARA2.0, answer any
                                 S23 [ 1] V.42 (LAPM) Error Correction
                                  0 = Disabled 1 = Enabled
                                 S24 [ 1] MNP (2-4) Error Correction
                                  0 = Disabled 1 = Enabled
                                 S25 [ 0] Fallback Link Protocol
                                  0 = Async data mode
                                  1 = Sync data mode
                                  2 = Hangup
                                 S26 [ 0] MVIP Timeslice
                                 S27 [ 0] Calling Tone
                                  0 = Disabled 1 = Enabled
                                 S28 [ 0] Guard Tone
                                  0 = Disabled 1 = Enabled
                                 S29 [ 12] Modulation Standards
                                  0 = V.34+ Automode, with terbo
                                  1 = V.34+ Automode, no terbo
                                  2 = V.32 terbo Automode
                                  3 = V.32bis Automode
                                  4 = V.22bis Automode
                                  5 = K56FLEX 1.1 Automode
                                  6 = V.90 Automode
                                  7 = SS7
                                  8 = V.110 Automode
                                  9 = Piafs Automode
                                  12 = V.92 Automode
                                 S30 [33600] Maximum Connect Rate
                                  (75 to 33600 bps, >=Min)
                                 S31 [ 300] Minimum Connect Rate
                                  (75 to 33600 bps, <=Max)
                                 S32 [ 2] Signal Quality Threshold
                                  0 = No action on bit errors
                                  1 = Bers >= 1:100
                                  2 = Bers >= 1:1000
                                  3 = Bers >= 1:10000
                                  4 = Bers >= 1:100000
                                  5 = Bers >= 1:1000000
```

```
S33 [ 500] Speed change squelch time (1 msec)
S34 [ 2000] Fall-forward timer (10 msec)
S35 [ 50] Fallback timer (10 msec)
S36 [ 20] Terminate timeout (1 sec)
S37 [ 60] S7:Delay til data mode (1 sec)
S38 [ 14] S10:Lost carrier hangup timer (100 msec)
S39 [ 7] Transmit Level Setting
 0:-6dBm 4:-10dBm 8:-14dBm 12:-18dBm
 1:-7dBm 5:-11dBm 9:-15dBm 13:-19dBm
 2:-8dBm 6:-12dBm 10:-16dBm 14:-20dBm
 3:-9dBm 7:-13dBm 11:-17dBm 15:-21dBm
S40 [ 4] Consecutive retrain disconnect threshold
S41 [ 5] V.34 Maximum Symbol Rate
S42 [ 0] V.34 Minimum Symbol Rate
S43 [ 2] V.34 Carrier Frequency
S44 [ 11] V.34 Preemphasis Filter Selection
S45 [ 0] Signaling type for use on T1/R2 trunks
 0 = Null Signaling 4 = Hi Band R2 Signaling
 1 = MF Signaling 5 = Modified R1 Signaling
 2 = DTMF Signaling 6 = SS7/COT Signaling
 3 = Low Band R2 Signaling
S46 [ 0] Call progress detection (bit mapped)
 0 = Disabled 2 = Ringback
 1 = Dialtone 4 = Busy
S47 [ 2] Hayes escape detector
 0 = Disabled 1 = Enabled
 2 = Enabled only in Originate mode
S48 [ 1] AT command processor
 0 = Disabled 1 = Enabled
S49 [ 0] Call Setup delay (100 msec)
S50 [60000] PCM Maximum Connect Rate
 (28000 to 60000 bps, >=Min)
S51 [28000] PCM Minimum Connect Rate
 (28000 to 60000 bps, <=Max)
S52 [ 1] PCM Digital Pad compensation
 0 = Disabled 1 = Enabled
S53 [ 3] V.8bis capability (bit mapped)
 0 = All V.8bis Options Disabled - (disables K56flex)
 1 = Enable/Disable V.8bis negotiation
 2 = Enable/Disable V.90 negotiation in V.8bis
 3 = Enable V.90 negotiation in V.8bis - (enables K56flex)
S54 [ 200] General Purpose (bit mapped)
 0 = All general options DISABLED
 1 = Automatic Host Debug Messages ENABLED
 2 = Aggressive Client Capping ENABLED
 4 = Force four point training
 8 = Enable power control
 16 = Enable error correction quality checking
 32 = Cap Rx rate to 26400 when detecting PC-Tel
 64 = Enable UART functionality
 128 = Boost SQ threshold by 0.5
 256 = Disable DSP reset functionality
 512 = Enable V110 blind connect
 1024 = Enable additional S detector bandedge check
 2048-32768 = Reserved for Future Use
S55 [ 0] SS7/COT Control
 RTcc.cttt.tttt.tttt RT:0=1780,1=2010 Hz
 ccc:0=R-T,1=T-R,2=R,3=T,4=R&T t:10ms
S56 [33600] Maximum V.34 TX bit rate
 (4800 to 33600 bps, >=Min)
S57 [ 9600] V.110 User Rate
 (600 to 38400 bps, >=Min)
S58 [ 0] V.110 Flow/Clock bits
 0 = Originate
```

```
 Set by Q.931 = Answer
S59 [ 6] V90 Transmit Level Setting
 0:-6dBm 4:-10dBm 8:-14dBm 12:-18dBm
 1:-7dBm 5:-11dBm 9:-15dBm 13:-19dBm
 2:-8dBm 6:-12dBm 10:-16dBm 14:-20dBm
 3:-9dBm 7:-13dBm 11:-17dBm 15:-21dBm
S60 [ 15] Sticky Flags
 0 = All negotiable features disabled
 1 = UnsTermMsg
 2 = Mica Capabilities Mask
 4 = Activate in-band PPP mode switches
 8 = Redwood. Link information maintained in shared memory
 between Portware and Boardware
S61 [ 0] Reserved for future use
S62 [ 0] MOH Exchange
 0:MOH Disabled 1:10 Seconds 2:20 Seconds 3:30 Seconds
 4:40 Seconds 5:1 Minute 6:2 Minutes 7:3 Minutes
 8:4 Minutes 9:6 Minutes 10:8 Minutes 11:12 Minutes
 12:16 Minutes 13:Unlimited
S63 [ 3] QC Exchange
 Bit 0:Quick Connect Enable/Disable
 Bits 1-2 (ANSpcm level) :
 00:-9dBm
 01:-12dBm
 10:-15dBm
 11:-18dBm
S64 [ 0] Link Standards
 0 = Disable Automode
 1 = V.90
 2 = K56FLEX 1.1
 3 = V.34
 4 = V.32bis
 5 = V.32
 6 = V.22bis
 7 = V.22
 8 = V.21
 9 = V.23
 10 = BELL212
 11 = BELL103
S65 [ 2048] V.44 Max Tx Codewords
 (256 to 2048)
S66 [ 2048] V.44 Max Rx Codewords
 (256 to 2048)
S67 [ 255] V.44 Max Tx String Length
 (32 to 255)
S68 [ 255] V.44 Max Rx String Length
 (32 to 255)
S69 [15000] V.44 Max Tx History Size
 (512 to 15000)
S70 [15000] V.44 Max Rx History Size
 (512 to 15000)
S71 [ 5] V.90 Uplink Maximum Symbol Rate
S72 [ 3] V.90 Uplink Minimum Symbol Rate
S73 [ 0] Link Info #32 Select
 0 = Combination of 1,2 and 3
 1 = DIL status/client modem ID (V.90 only)
 2 = TxQ underrun
 3 = CP-DSP DMA over/underruns
 4 = Raw bad frame count
OK
```

# Ampersand Command Set

This section describes modem commands that begin with an ampersand (**&**) character.

## &C*n* (Serial Port DCD Control)

This command is provided for compatibility; it has no effect. (The modem responds OK but takes no action.) Note, however, that n must be 0 or 1. The modem range-checks the value of n, so if you enter something other than 0 or 1, the modem returns an error.

**Note** It is likely that functionality will be added to this command in a future release of the Cisco MICA Portware.

## &D*n* (DTR Control)

Specifies the modem action when the host's (DTE's) data terminal ready (DTR) transitions off (as when the user's session ends). DTR processing is virtualized on Cisco MICA modems because there is no physical EIA interface. Table 7 lists DTR control command options.

**Note** It is likely that functionality will be added to this command in a future release of the Cisco MICA Portware.

**Default**

**&D3**

**Table 7    DTR Control Command Options**

| Command Option | Meaning |
|---|---|
| &D0 &D1 &D2 | The end of a call does not reset the modem configuration. These options are provided for compatibility. |
| | These options maintain settings within a session. Thus, if you change settings, dial, hear a busy signal, and dial again, your new settings will still be in effect. However, your settings may remain in effect for the next user of the modem. |
| &D3 | The modem disconnects at the end of a call, then enters command state. The modem configuration is reset to factory defaults. To restore local settings, you must re-apply the modemcap from the Cisco IOS interface of the modem's host device. |
| | **Note:** The modem treats the end of a connection (hang-up, call drop) as a DTR loss and resets its configuration if &D3 is set. |

## &F (Restore Factory Defaults)

Hangs up the telephone line, clears the modem, and restores the factory default configuration, with several exceptions—the following values are preserved:

- Country code
- Central office signaling type (S45)
- Sticky flags (S60)

This command can also be entered as **&F0**.

## &T*n* (Diagnostic Test Mode)

Tests the modem hardware.  The following table lists modem test options.

**Default**

&T5

**Table 8        Modem Test Options**

| Command Option | Meaning |
|---|---|
| &T0 | Ends the test in progress. |
| &T1 | Enters local analog loopback (LAL) mode, in which the modem establishes a connection to itself and loops all user data back to the user. This helps to verify that the modem hardware is functioning properly. |
| &T3 | Enters local digital loopback (LDL) mode, in which the modem loops all data received off the line back to the line. |
| &T5 | This option is provided for compatibility; it has no effect. (The modem responds OK but takes no action.) |
| &T8 | Runs a local analog loopback test (see &T1, above) and a self test. |

# +F Command Set

Fax Class 2 and Class 2.0 modem commands begin with the characters +F. Fax commands are not used by humans; they are accessed by software only.

The following table lists the Fax commands supported by Cisco Portware. For more information on Class 2 commands, see the Electronic Industries Association publication Standards Proposal No. 2388, August 20, 1990, Asynchronous Facsimile DCE Control Standard. For more information on Class 2.0 commands, see the Electronic Industries Association publication EIA/TIA-592, Asynchronous Facsimile DCE Control Standard.

**Table 9    Fax (+F) Commands Supported by Portware**

| Fax Class 2 Commands (See EIA/TIA SP 2388) | Fax Class 2.0 Commands (See EIA/TIA-592) |
|---|---|
| AT+FDT | AT+FDT |
| AT+FET=*code* | AT+FKS |
| AT+FKS | AT+FIP |
| AT+FDR | AT+FDR |
| AT+FAXERR? | AT+FBO |
| AT+FBADLIN | AT+FBS? |
| AT+FBADMUL | AT+FBU |
| AT+FBOR | AT+FCC |
| AT+FBUF? | AT+FCLASS |
| AT+FBUG | AT+FCQ |
| AT+FCLASS | AT+FCR |
| AT+FCQ | AT+FCS? |
| AT+FCR | AT+FCT |
| AT+FCTCRTY | AT+FEA |
| AT+FDCC | AT+FFC |
| AT+FDCS? | AT+FHS? |
| AT+FDIS | AT+FIE |
| AT+FDFFC | AT+FIS |
| AT+FECM | AT+FLI |
| AT+FLID | AT+FLP |
| AT+FLNFC | AT+FLO |
| AT+FLPL | AT+FMI? |
| AT+FMDL? | AT+FMM? |
| AT+FMFR? | AT+FMR? |
| AT+FMINSP | AT+FMS |
| AT+FPHCTO | AT+FNR |
| AT+FREV? | AT+FNS |
| AT+FRBC | AT+FPI |
| AT+FREL | AT+FPP |
| AT+FSPL | AT+FPR |
| AT+FTBC | AT+FPS |
| AT+FVRFC | AT+FRQ |
| AT+FWDFC | AT+FRY |
|  | AT+FSP |

In addition to the commands listed above, these Class 2 commands are defined in TIA/EIA SP-2388 and are supported in Cisco MICA Portware: **ATA**, **ATD***number*, **ATE0**, **ATS0=***n*, and **ATV1**.

AT Command Set and Register Summary for Cisco MICA Six-Port Modules

The Class 2.0 command **ATD***number* is defined in TIA/EIA-592 and is supported in Cisco MICA Portware.

# Backslash Command Set

This section describes modem commands that begin with a backslash (\) character.

## \B (Transmit a Break)

Sends a break (in async mode, a 300-millisecond break) that is nondestructive (does not cause data to be lost) and expedited (does not wait behind data that was entered before it). The break can be transmitted in LAP-M mode, MNP mode, and async mode.

For compatibility, Cisco MICA modems accept a numeric argument immediately following the **\B** command, but the argument is ignored.

**Default**

**\B**

## \D{*command*} {*modem*} (DSP Debug Options)

Sends the specified debug command to another modem on the same module as this modem. Replace *command* with a number from 0 to 4:

| Number | Command |
|--------|---------|
| 0 | Fallback |
| 1 | Fall forward |
| 2 | Retrain |
| 3 | Jtag_immune |
| 4 | Reset DSP |

Replace *modem* with the number identifying the modem to which you want to issue the command. For example, enter **AT\D2 1** to send a retrain command to modem number 1. If you omit the *modem* argument, Cisco MICA sends the command to the current modem.

In order to use this protected command, you must first execute the DEBUGTHISMODEM command.

**Default**

\D0

## \Qn (Flow Control)

In fax mode, enables and disables flow control for the modem. The following table lists flow control command options.

**Note** When the modem is not operating in fax mode, this command has no effect.

**Default**

\Q0

**Table 10        Flow Control Command Options (Fax Mode Only)**

| Command Option | Meaning |
|---|---|
| \Q0 | Disables flow control. |
| \Q1 | Enables bidirectional Xon/Xoff flow control. Data transmission is stopped by an Xoff character and restarted by an Xon character. The modem generates Xon and Xoff characters at the same parity used on the serial port. The serial port responds to Xon and Xoff characters sent by the local workstation in the same way. |
| \Q2 | Reserved for future use. |
| \Q3 | Reserved for future use. |
| \Q4 | Reserved for future use. |

# \S (Verbose Display of Current Modem Statistics)

Displays a detailed list of the modem's current link statistics, including the elapsed connect time, counts of bytes in and out, and IP and EC packets sent and received. Press any key to display the next screen. Press **Q** to cancel the display. If a number is too large to be displayed, its left-most digit appears as a hash mark (#).

This is an example of the output resulting from the **\S** command:

```
AT\S

Cisco MICA Hex Modem Link Statistics

Host interface protocol (IP) RAW
Data compression protocol V.44 Both
Line interface protocol (EC) V.42 (LAP-M)
Line modulation standard V.34+
Line transfer rates 28800 bps TX and 28800 bps RX
The modem has been connected 0 days, 0:00:45
Last disconnect reason 0x0000
Current line quality 5

Bytes sent to host 514 Bytes rcvd from host 12
Bytes rcvd from line 11 Bytes sent to line 4
Bytes estimated lost 0 Bytes resent to line 0

IP packets rcvd from line 0 IP packets sent to line 0
IP packets rcvd errored 0 IP packets aborted 0

EC frames rcvd from line 4 EC frames sent to line 4
```

```
EC avg RX frame length 0 EC current TX frame length 256
EC NAKs rcvd from line 0 EC NAKs sent to line 0
EC frames known lost 0 EC frames retransmitted 0
EC retransmission cycles 0 EC timer recoveries 0

EC neg RX frame length 256 EC neg TX frame length 256
EC neg RX window 30 EC neg TX window 30

DC negotiated RX Codewords 2048 DC negotiated TX Codewords 2048
DC negotiated RX String Length 255 DC negotiated TX String Length 255
DC negotiated RX History Size 15000 DC negotiated TX History Size 15000
DC Decoder State (RX) COMPRESSED DC Encoder State (TX) COMPRESSED
DC RX Dictionary Reset Count 1 DC TX Dictionary Reset Count 1
DC RX Compression Ratio *100 98 DC TX Compression Ratio *100 188

 .Tx. / .Rx.
Carrier Frequency (Hz) 1959 / 1959
Symbol rate (baud/sec) 3429 / 3429
Trellis code 16 / 16
Non-linear encoding Off / Off
Precoding Off / Off
Constellation shaping Off / Off
Preemphasis index 0 / 0
Power level (dBm) -15 / -14
Power level reduction (dBm) 2 / 2
Strike a key when ready (Q to QUIT)


SNR (dB) 40
Far-end echo (dBm) -68
Round-trip delay (ms) 3
Frequency offset (Hz) 0.0
Phase roll freq (Hz) 4.0
Phase jitter freq (Hz) 0.0
Phase jitter level (deg) 0
RBS Pattern 0x00
Digital Pad (dB) 0.0
Digital Pad Compensation Off
SS7/COT Status (iWwOBbT) 0x0000

Line Probe Results:
...............................*
...............................*
...............................*
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```

```
...............................*
...............................*

Line Rate Histogram:

OK
```

# Modem S Register Summary

The modem saves configuration settings in S registers that are similar to Hayes Smartmodem 2400 registers. Each register controls a single modem function or is bit-mapped to control several functions. (For information on how to use bit-mapped registers, see "Bit-Mapped Registers" on page 24 .)

## S Register Commands

This section describes **AT** commands that display or change register values.

### Read All Registers

The **%R** command displays the contents of all S registers. The register contents are displayed as a table in decimal and hexadecimal format.

### Read a Configuration Register

The **S**$n$**?** command displays the contents of register $n$ in decimal format. Register $n$ becomes the reference register.

### Point to a New Reference Register

The **S**$n$ command sets the modem register pointer to register $n$. Register $n$ then becomes the reference register for subsequent register commands.

### Change the Value of a Register

The **S**$n$=$x$ command changes the value of register $n$ to $x$, where $x$ is a decimal value. The **S**$n$=>$y$ command changes the value of register $n$ to $y$, where $y$ is a hexadecimal value. In either case, register $n$ becomes the reference register.

### Display the Value of the Reference Register

The **?** command displays the value of the last S register referenced in a read, change, or point command.

### Change the Value of the Reference Register

The =$x$ command changes the value of the last S register referenced to $x$, where $x$ is a decimal number. The =>$y$ command changes the value of the last S register referenced to $y$, where $y$ is a hexadecimal number.

# Bit-Mapped Registers

Some S registers are bit-mapped so that they control several functions. (For example, see the sections on S9 and S46.) For each bit-mapped register, the section "S Register Descriptions" includes a table like the one below that lists register values and describes the feature associated with each value. To turn on a single feature, set the register to the appropriate value. To turn on two or more features, add their values and set the register to the total.

For example, suppose you want to set the register described in  to disable quick retrains (value = 0), no result codes in answer mode (value = 4), and disable 8S-2D trellis encoding (value = 8). Total the values: 0 + 4 + 8 = 12, and set the register to 12. (This sample register is used for purposes of illustration and does not correspond to any actual Cisco MICA register.)

**Table 11    Sample Bit-Mapped Register**

| Bit | Meaning | Values[1] | |
|---|---|---|---|
| 0 | Quick retrains | **0** | **Enable quick retrains** |
| | | 1 | Disable quick retrains |
| 1, 2 | Result codes | **0** | **Result codes** |
| | | 2 | No result codes |
| | | 4 | No result codes in answer mode |
| 3, 4, 5, 6, 7 | Trellis encoding | **0** | **Enable trellis encoding** |
| | | 8 | Disable 8S-2D trellis encoding |
| | | 16 | Disable 16S-4D trellis encoding |
| | | 32 | Disable 32S-4D trellis encoding |
| | | 64 | Disable 64S-4D trellis encoding |
| | | 128 | Disable nonlinear coding |

1.Default values are in bold type.

# S Register Descriptions

This section describes the purpose and format of each S register.

**Note**    In future Cisco MICA Portware releases, new functionality (including new S registers) will be added. To maintain backward compatibility, existing S register functionality will rarely change.

# S0 (Automatic Answer in Seconds)

Specifies the interval in seconds between the time the modem receives notification of an incoming call and the time the modem answers the call.

### Range

0 (Answer immediately)
1 to 255 (Wait 1 to 255 seconds before answering)

### Default

2 (Answer in two seconds)

## S1 (Unused)

Register S1 is not used.

## S2 (Escape Code Character)

Specifies the ASCII value of the character used in the escape code. (The escape code is the escape character entered three times in succession.) When the modem is in connect state and it receives the escape code, the modem enters command state. Setting register S2 to 128 or above disables the escape code character.

✎
**Note**    Two registers, S2 and S47, control the escape code. To enable the escape code, you must set S2 to a value in the range 0 to 127, *and* you must set S47 to enabled (1 or 2). (See "S47 (Hayes +++ Escape Detection)" on page 46 .) To disable the escape code, you can either set S2 to 128 or higher, or you can set S47 to disabled (0).

### Range

0 to 255 (ASCII decimal)
128 or higher disables the escape feature

### Default

**43** (+)

## S3 (Carriage Return Character)

Specifies the ASCII value of the carriage return (CR) character. The carriage return terminates command lines and result codes.

### Range

0 to 127 (ASCII decimal)

### Default

13 (carriage return)

## S4 (Line Feed Character)

Specifies the ASCII value for the line feed (LF) character. The line feed character follows a carriage return at the end of long-form result codes. Short-form result codes are sent without line feeds. (See "Vn (Result Code Format)" on page 10  for descriptions of long-form and short-form result codes.)

### Range

0 to 127 (ASCII decimal)

### Default

10 (Line feed)

# S5 (Backspace Character)

Specifies the ASCII value for the backspace (BS) character that you can use to edit the command line.

**Range**

0 to 127 (ASCII decimal)

**Default**

8 (Backspace)

# S6 (Wait Before Dialing)

Specifies the time the modem waits after going off-hook before it dials. This is a minimum of 2 seconds, even if register S6 is set to a value less than 2. Register S6 is used only when the **X0**, **X1**, or **X3** command (Extended Result Codes) is set.

**Range**

2 to 225 seconds

**Default**

2 seconds

# S7 (Wait for Circuit to Establish)

For originate mode, the maximum amount of time to await for the circuit to establish (for example. for PSTN call setup signaling to complete).

**Note** To set the maximum amount of time to be allowed for modem training for both originate and answer mode, use S37.

The S7 timer starts when Cisco IOS software tells Cisco MICA portware to initiate the origin of a call (the timer does not operate when Cisco MICA is answering a call). The timer stops when Cisco IOS either hangs up the call, or tells Cisco MICA to InitiateLink, which indicates that the PSTN has connected the call.

If the S7 timer times out, some aspect of dialing, signaling, or call progress did not finish in the configured time (for example there might have been no dialtone, or the called party failed to answer). On timeout, Cisco MICA reports an 0x7F02 call failure:NO ANSWER.

The S7 timer does not run when Cisco MICA is actually dialing digits, but it restarts (with full S7 value) after each dial string has been signaled. The timer also restarts (full value) on an **X** or **W** dial modifier.

**Note** The S7 register used to be linked to the S37 (Wait for Carrier After Dial) register. Functionality of these two registers is now independent. The function of the S7 register applies only to dialout.

**Range**

0 to 255 seconds

**Default**

60 seconds

# S8 (Pause Time for Comma Dial Modifier)

Specifies the time the modem waits when the pause dial modifier (**,**) is used in a dial string.

**Note**  Register S8 and the comma dial modifier are provided for command compatibility with modems that use these features.

**Range**

0 to 255 seconds

**Default**

2

# S9 (Modem Settings)

The modem uses S9 to store the values that you set with the **E**, **Q**, **V**, **&D**, and **X** commands.

**Note**  We recommend that, wherever possible, you use the **E**, **Q**, **V**, **&D**, and **X** commands rather than changing S9 directly.

S9 is a bit-mapped register. See "Bit-Mapped Registers" on page 24 for information on how to set bit-mapped registers.  defines the bits in S9, with the default values shown in bold.

**Table 12  S9 Values**

| Bit | Meaning | Values[1] | |
|---|---|---|---|
| 0 | Command echo | 0 | No echo (E0) |
| | | **1** | **Echo (E1)** |
| 1, 2 | Result codes | 0 | Result codes (Q0) |
| | | 2 | No result codes (Q1) |
| | | **4** | **No result codes in answer mode (Q2)** |
| 3 | Result type | 0 | Short form (V0) |
| | | **8** | **Long form (V1)** |
| 4, 5 | Action on loss of Data terminal ready (DTR) signal | 0 | Ignore DTR (&D0) |
| | | 16 | Modem enters command state (&D1) |
| | | 32 | Sets modem on hook (&D2) |
| | | **48** | **Resets modem (&D3)** |
| 6, 7, 8 | Connect result code format and call progress | 0 | Sends connect result code, ignores dial tones and busy signals (X0) |
| | | 64 | Sends verbose connect result code, ignores dial tones and busy signals (X1) |
| | | 128 | Sends verbose connect and no dial tone result codes, ignores busy signals (X2) |
| | | 192 | Sends verbose connect and busy result codes, ignores dial tone (X3) |
| | | **256** | **Sends verbose connect, no dial tone, and busy result codes (X4)** |

1.Default values are in bold type.

**Range**

0 to 317

**Default**

317

# S10 (Delay for Hang-up After Carrier Loss)

Specifies the time the modem waits before hanging up after loss of carrier. This waiting period allows the modem to recover from a temporary loss of carrier without breaking the connection. Modems at both ends of the connection should have the same values set. If the S10 values of the two modems are unequal, disconnection occurs when the lower value is reached. When register S10 is set to 255, the modem functions as if carrier were always present; it never hangs up due to loss of carrier. After disconnecting in originate mode, the modem waits a minimum of 5 seconds before going off-hook.

Register S10 is linked to register S38 so that the two registers share a single value. Changing the value of S10 changes the value of S38, and changing S38 changes S10.

**Range**

0 (Do not disconnect after carrier loss)
1 to 255 (Time to disconnect in 0.1-second increments)

**Default**

14 (1.4 seconds)

# S11 (Link Initiate Action)

If the modem is idle (in escape or command state) and receives the **ATO** (on line) command, it originates or answers a call, based on the contents of this register.

**Range**

0 (Answer)
1 (Originate)

**Default**

0 (Answer)

# S12 (Number of Async Data Bits)

Specifies the number of asynchronous (start-stop mode) data bits for the call. Outgoing characters have this many significant bits. This number of bits is assembled for each incoming character.

Set this register to 7 if you wish to use the error correction (EC) parity feature. The EC parity feature is active only when all of the following are true:

• Error correction is successfully negotiated (see registers S15, S22, S23, and S24)

• Bit 6 in Register S54 is set to 64 (see "S54 (General Options)," on page 49)

• This register is set to 7

If EC has not been negotiated, or if bit 6 in register S54 is set to 0, the modem always uses 8-bit data, regardless of how this register is set.

**Range**

7 or 8

**Default**

8

# S13 (Parity Configuration)

Specifies the character parity for the call in start-stop (asynchronous) mode. The modem sets this value on outgoing (to line) characters and checks it on incoming characters.

**Note** See "S12 (Number of Async Data Bits)" on page 28 for information on the factors that control the availability of the EC parity feature.

**Range**

0 (No parity)
1 (Even parity)
2 (Odd parity)
3 (Mark parity)
4 (Space parity)

**Default**

0 (No parity)

# S14 (Stop Bit Configuration)

Specifies the number of stop bits for the call in start-stop (asynchronous) mode. The modem sets this value on outgoing (to line) characters.

**Note** If error correction is successfully negotiated (see registers S15, S22, S23, and S24), stop bits are meaningless, and the setting of this register has no effect.

**Range**

1 or 2

**Default**

1

**AT Command Set and Register Summary for Cisco MICA Six-Port Modules**

# S15 (V.42 Detect Phase Operation)

Enables or disables V.42 detect phase, during which two modems prepare to negotiate a common error correction protocol. This register controls the originating modem's behavior only; in answering mode, detect phase is automatic. The length of the negotiation period is controlled by S16.

**Note** V.42 detect phase is also disabled under either of the following conditions, regardless of the setting of this register:
–If LAP-M error correction is disabled by setting S23 to 0. See "S23 (V.42 LAP-M Error Correction)" on page 33 .
–If the modulation standard in effect uses FSK (frequency shift keying). FSK modulations include V.21, V.23, and Bell103. For information on setting the modulation standard, see "S29 (Modulation Standard)," on page 36.

### Range

0 (Disable V.42 detect phase)
1 (Enable V.42 detect phase)

### Default

1 (Enable V.42 detect phase)

# S16 (Error Correction Autodetect Timeout)

Specifies, in 100-millisecond steps, the period for which the modem can remain in V.42 detect phase. This timeout period is used only if V.42 detect phase is enabled; see the preceding section, "S15 (V.42 Detect Phase Operation)." See "S25 (Link Protocol Fallback)" on page 34  for a description of the fallback action invoked by the modem if the detect phase times out.

### Range

0 (Run detect mechanism until manual intervention occurs or a pattern match is found)
1 to 8589 (Run detect mechanism for 0.1 to 858.9 seconds.)

Values larger than 8589 will be accepted but will yield unpredictable results.

The value of S16 must be smaller than the value of S17. See "S17 (Error Correction Negotiation Timeout)."

### Default

50 (5 seconds)

# S17 (Error Correction Negotiation Timeout)

Specifies, in 100-millisecond steps, the period during which the modem tries to detect and negotiate an error correction protocol. The clock for this timeout starts at the same time as the clock for the error correction autodetect timeout controlled by register S16. The time allowed for error correction negotiation is the difference between the values of S16 and S17. For example, suppose that S16 is set to 50 (5 seconds) and S17 is set to 100 (10 seconds). If the modems spend the full 5 seconds in autodetect phase, only 5 seconds remain for error correction negotiation.

Unsuccessful negotiation results in fallback at the end of the specified time period. The fallback action is set using S25; see "S25 (Link Protocol Fallback)" on page 34 .

### Range

0 (Wait indefinitely for protocol negotiation or manual intervention)
1 to 8589 (Wait 0.1 to 858.9 seconds before unsuccessful negotiation causes fallback)

Values larger than 8589 will be accepted but will yield unpredictable results.

The value of S17 must be larger than the value of S16. See "S16 (Error Correction Autodetect Timeout)."

### Default

100 (10 seconds)

# S18 (Error Correction Fallback Character)

Specifies the ASCII value of the error correction (EC) fallback character. The partner modem can send this character three times during EC protocol detect phase (during call establishment) to force this modem to stop negotiating and use the fallback option specified in S25. See "S15 (V.42 Detect Phase Operation)" on page 30 and "S25 (Link Protocol Fallback)" on page 34 .

If you set bit 7 to 128, the fallback character needs to be entered only one time. (That is, you can enter the fallback character once during protocol detect phase, instead of three times, to force the modem to stop negotiating and use the fallback option specified in S25.) This parameter is only 8 bits wide.

S18 is a bit-mapped register. See "Bit-Mapped Registers" on page 24 for information on how to set bit-mapped registers.  defines the bits in S18, with the defaults shown in bold.

**Table 13   Error Correction Fall-back Character**

| Bit | Meaning | Values[1] |
|-----|---------|-----------|
| 7 | Number of times fallback character must be entered | **0    Three times**<br>128  Once |
| 6 to 0 | ASCII decimal code for fallback character | 0   No fallback character<br>:<br>:<br>**13  Carriage return**<br>:<br>:<br>127 |

1.Default values are in bold type.

### Range

0 to 255

### Default

13 (three carriage returns)

# S19 (Error Correction Retransmission Limit)

Specifies the number of successive data frame transmissions that take place before the modem performs a special recovery action and repeats the specified number of retransmissions. If the retransmissions fail, the modem disconnects.

The special recovery action might include shifting the bit rate or retraining.

**Note**   The error correction retransmission limit is used only during a call; it is not in effect during link establishment.

### Range

0 (Do not disconnect on excessive retransmission; do not perform special recovery action before retries)
1 to 65535 (This number of successive frame retransmissions causes recovery, then disconnect)

### Default

12 retransmissions

# S20 (Error Correction Max Frame Length)

Specifies the maximum length for error correction frames (that is, for MNP, LAP-M, and ARA frames). Higher values are more efficient; lower values work better on a line with poor transmission quality.

### Range

64 to 1024 octets of data

### Default

256 octets

# S21 (Data Compression)

Specifies the methods of permitted data compression. Unless both modems permit a particular data compression method, this register is not used.

S21 is a bit-mapped register.

**Note**   MNP5 can operate only when MNP error correction is active. (See S24 (MNP Error Correction), page 34.) Thus, if S21 is set to 2 (MNP5), LAP-M connections will have no data compression.

### Range

0 = Disabled
1 = V.42bis
2 = MNP5
3 = V.42bis or MNP5 (V.42bis has precedence)
4 = V.44 Tx
8 = V.44 Rx
15 = All compression types enabled

> **Note** When multiple compression types are enabled, the order of precedence is V.44, V.42bis, MNP5, None.

**Default**

15 for Cisco MICA portware version 2.9.x.x and NextPort version 7.xx and above
3 for Cisco MICA portware version 2.7.x.x and NextPort version 6.xx and below

## S22 (ARA Error Correction Options)

Specifies the AppleTalk Remote Access error correction method.

If more than one method of error correction is enabled at each end of the connection, the modem chooses a method based on the following order of precedence:

(a)  ARA originate only [highest precedence]

(b)  LAP-M

(c)  MNP/ARA answer only

(d)  Fall back (refer to "S25 (Link Protocol Fallback)" on page 34 )
     [lowest precedence]

**Range**

0 (ARA1.0 and ARA2.0 disabled)
1 (ARA1.0 and ARA2.0 enabled for answer only)
2 (ARA1.0 and ARA2.0 enabled for answer, ARA1.0 enabled for call origination)
3 (ARA1.0 and ARA2.0 enabled for answer, ARA2.0 enabled for call origination)

> **Note** For compatibility with the Cisco IOS ARA implementation, S22 must be set to 0.

**Default**

0 (ARA1.0 and ARA2.0 disabled for Cisco MICA Portware Version 2.5.1.0 and above.)
1 (ARA1.0 and ARA2.0 enabled for answer only for Cisco MICA Portware 2.3.1.0 and below.)

## S23 (V.42 LAP-M Error Correction)

Enables or disables V.42 (LAP-M) error correction.

If more than one method of error correction is enabled at each end of the connection, the modem chooses a method based on the following order of precedence:

(a)  ARA originate only [highest precedence]

(b)  LAP-M

(c)  MNP/ARA answer only

(d)  Fall back (refer to "S25 (Link Protocol Fallback)" on page 34 )
     [lowest precedence]

> **Note** See also S15 (V.42 Detect Phase Operation), page 30.

**Range**

0 (V.42 (LAP-M) disabled)
1 (V.42 (LAP-M) originate and answer enabled)

**Default**

1 (V.42 (LAP-M) originate and answer enabled)

# S24 (MNP Error Correction)

Enables or disables MNP error correction.

If more than one method of error correction is enabled at each end of the connection, the modem chooses a method based on the following order of precedence:

(a) LAP-M [highest precedence]

(b) ARA

(c) MNP

(d) Fall back (refer to "S25 (Link Protocol Fallback)" on page 34 )
[lowest precedence]

**Range**

0 (MNP disabled)
1 (MNP originate and answer enabled)

**Default**

1 (MNP originate and answer enabled)

# S25 (Link Protocol Fallback)

If either V.42 detect phase or error correction negotiation phase (see S15, S16, and S17) ends in failure to agree on an error correction protocol, the modem takes the fallback action specified in this register. The partner modem can also force this modem to fall back using the character specified in S18. In asynchronous framing mode (S25 = 0), the modem uses the settings of S12, S13, and S14. For more information on V.42 detect phase, see "S15 (V.42 Detect Phase Operation)" on page 30 , "S16 (Error Correction Autodetect Timeout)" on page 30 , "S17 (Error Correction Negotiation Timeout)" on page 30 , and "S18 (Error Correction Fallback Character)" on page 31 .

**Range**

0 (Enter asynchronous framing mode (start/stop/parity bits))
1 (Enter synchronous framing mode (raw 8 bits to line))
2 (Disconnect)

**Default**

0 (Enter asynchronous framing mode (start/stop/parity bits))

## S26 (DSP Processor MVIP TDM Slice)

Indicates the time-division multiplexing (TDM) pair assigned to the digital signal processor (DSP) on the modem card. There are three DSPs per modem card, and each processor is assigned one TDM pair.

> **Note**  The value of this register is set automatically to match a value determined by the router or access server. The value of S26 is maintained for diagnostic purposes, and the system does not allow you to change it. If you try, the modem returns ERROR.

### Range

0 to 15

### Default

0

## S27 (Calling Tone)

Enables or disables the V.25 optional calling tone, a 1300-Hz signal that allows the called party to determine whether the calling device is a modem. Some phone systems outside the United States and Canada require a modem to send a calling tone when it originates a connection.

### Range

0 (Calling tone disabled)
1 (Send calling tone)

### Default

0 (Calling tone disabled)

## S28 (Guard Tone)

Enables or disables the 1800-Hz guard tone in V.22 and V.22bis modes. Some phone systems outside the United States and Canada require a modem to send a guard tone.

### Range

0 (Guard tone disabled)
1 (Use guard tone (V.22 and V.22bis only))

### Default

0 (Guard tone disabled)

# S29 (Modulation Standard)

Specifies the modulation standards to be used. When negotiating a connection with another modem, the modem attempts to set up a connection based on a standard acceptable to both, based on the sequence and timing of generated and detected tones. For example, when S29 is set to 0, the modem opens negotiations by generating ANSAM, a single tone that is a valid starting point for many standards, including K56FLEX, V.90, V.34+, V.34, V.32bis, V.32, V.22bis, V.22, and V.21. If there is no response, the modem generates a sequence specific to V.32bis. Then the modem tries V.22/V.22bis, then V.32 again, then V.21, and so on.

If both modems are Cisco MICA, they will at a minimum be able to agree on one of the standards in setting 4. If one modem is not Cisco MICA, the modems may fail to negotiate a standard and disconnect.

**Note** For more options, see S64 (Link Standard). S64 is a superset, which allows you to specify an S64 option specifically or, if S64 is set to 0, activates S29. S64 has more options (for example, support for V.23) than are available with S29.

## Digital and Analog Modulations

K56Flex and V.90 (used in settings 5 and 6 of this register) use digital pulse code modulation (PCM); the other types of modulation (V.34, V.22, etc.) are analog.

## Effect of FSK on Framing

Certain modulations, including V.21, V.23, and Bell103, use frequency shift keying (FSK). FSK causes MNP connections to use MNP2 (character mode framing), rather than the standard MNP3 (sync framing). FSK also causes LAP-M/V.42 and V.42 detect phase to be disabled.

**Range**

| Value | Modulation Standards |
|---|---|
| 0[1] | V.34+, V.34<br>V.32bis, V.32<br>V.23<br>V.22bis, V.22<br>V.21<br>BELL212<br>BELL103 |
| 1[1] | V.34+, V.34<br>V.32bis, V.32<br>V.23<br>V.22bis, V.22<br>V.21<br>BELL212<br>BELL103 |
| 2 | Not used. |
| 3 | V.32bis, V.32<br>V.23<br>V.22bis, V.22<br>V.21<br>BELL212<br>BELL103 |
| 4 | V.23<br>V.22bis, V.22<br>V.21<br>BELL212<br>BELL103 |
| 5 | K56Flex 1.1<br>V.34+, V.34<br>V.32bis, V.32<br>V.23<br>V.22bis, V.22<br>V.21<br>BELL212<br>BELL103 |
| 6 | V.90<br>K56Flex 1.1<br>V.34+, V.34<br>V.32bis, V.32<br>V.23<br>V.22bis, V.22<br>V.21<br>BELL212<br>BELL103 |
| 7 | SS7/COT |

| Value | Modulation Standards |
|-------|---------------------|
| 8 | V.110 |
| 9 | PIAFS [2] |
| 12 | V.92<br>V.90<br>K56Flex 1.1<br>V.34+, V.34<br>V.32bis, V.32<br>V.23<br>V.22bis, V.22<br>V.21<br>BELL212<br>BELL103 |

1. For historical reasons, settings 0 and 1 are functionally identical.

2. Refer to the *AT Command Set and Register Summary for MICA Six-Port Modules with PIAFS*

**Default**

12

# S30 (Maximum Connect Rate)

Maximum rate at which the modem will receive data, in bits per second. If this modem's range of connect rates does not overlap with the other modem's range (that is, if one modem's maximum connect rate is lower than the other modem's minimum connect rate (see S31)), a connection cannot be established and the modems disconnect.

**Note** If the modem is using K56Flex or V.90 modulation, S30 and S31 control the data rate in the receive direction only; S50 and S51 control transmit speeds. See "S50 (Maximum PCM Connect Rate)," on page 47, and "S51 (Minimum PCM Connect Rate)," on page 48. If the modem is *not* using K56Flex or V.90, S30 and S31 control the rates of both received and transmitted data. Table 14 The table shows which S registers control data rates under the various modulation standards.

*Table 14    S Registers Controlling Data Rates Under Different Modulation Standards*

| Modulation Standard | S Registers Controlling Transmit Rate | S Registers Controlling Receive Rate |
|---------------------|---------------------------------------|--------------------------------------|
| V.32terbo and lower | S30 and S31 | S30 and S31 |
| V.34 | S56 | S30 and S31 |
| V.90 and K56Flex | S50 and S51 | S30 and S31 |
| V.92, V.90 and K56Flex | S50 and S51 | S30 and S31 |

**Range**

75 to 33600 bps
This value must be equal to or greater than the value of S31 and must be equal to or greater than its corresponding minimum connect rate.

**Default**

33600 bps

# S31 (Minimum Connect Rate)

Minimum rate at which the modem will receive data, in bits per second. If this modem's range of connect rates does not overlap with the other modem's range (that is, if one modem's maximum connect rate (see S30) is lower than the other modem's minimum connect rate), a connection cannot be established and the modems disconnect.

**Note** If the modem is using K56Flex or V.90 modulation, S30 and S31 control the data rate in the receive direction only; S50 and S51 control transmit speeds. See "S50 (Maximum PCM Connect Rate)," on page 47, and "S51 (Minimum PCM Connect Rate)," on page 48. If the modem is *not* using K56Flex or V.90, S30 and S31 control the rates of both received and transmitted data. The table above shows which S registers control data rates under the various modulation standards.

**Range**

75 to 33600 bps
This value must be equal to or less than the value of S30 and must be equal to or less than its corresponding maximum connect rate.

**Default**

300 bps

# S32 (Signal Quality Threshold)

Specifies the minimum bit error rate at which the modem initiates recovery, and below which the modem considers the line to be good. Recovery consists of a retrain or of falling back to a lower data rate, depending on the modulation standard currently in use. If the line quality consistently exceeds the threshold, the modem falls forward to a higher data rate (see the "S34 (Fall-forward Timer)" section on page 41).

This register works in conjunction with bit 7 of S54 to control the signal quality threshold and receive speed. Table 14 The following table shows the relationship between the S register settings, the effective signal quality threshold, the trigger bit error rate (BER), and, for a given bandwidth/signal-to-noise ratio, the receive speed.

**S Registers, Signal Quality Thresholds, BER and Receive Speed**

| S Register Settings | Effective SQ Threshold | BER Threshold | Receive Speed at Bandwidth/SNR | |
|---|---|---|---|---|
| | | | 3200 Hz/33 dB | 3429 Hz/37 dB |
| S32 = 2 S54 bit 7 = 0 | 2 | 1:1000 | 26400 bps | 31200 bps |
| S32 = 2 S54 bit 7 = 128[1] | 2.5 | 1:3000 | 24000 bps | 28800 bps |
| S32 = 3 S54 bit 7 = 0 | 3 | 1:10000 | 21600 bps | 26400 bps |

1.These are the default values.

**Range**

| S32 Value | Meaning if S54 bit 7 = 0 | Meaning if S54 bit 7 = 128 |
|---|---|---|
| 0 | No action on bit errors | No action on bit errors |
| 1 | Bit error rates of at least 1 in 100 cause recovery | Bit error rates of at least 1 in 300 cause recovery |
| 2 | Bit error rates of at least 1 in 1000 cause recovery | Bit error rates of at least 1 in 3000 cause recovery |
| 3 | Bit error rates of at least 1 in 10,000 cause recovery | Bit error rates of at least 1 in 30,000 cause recovery |
| 4 | Bit error rates of at least 1 in 100,000 cause recovery | Bit error rates of at least 1 in 300,000 cause recovery |
| 5 | Bit error rates of at least 1 in 1,000,000 cause recovery | Bit error rates of at least 1 in 3,000,000 cause recovery |

**Default**

2

# S33 (Speed Change Squelch Timer)

Specifies, in milliseconds, the time to delay after a speed shift before another speed shift is allowed.

**Range**

0 (Timer disabled)
1 to 65535 (Delay time; maximum value is about 1 minute)

**Default**

500 (0.5 second)

## S34 (Fall-forward Timer)

The elapsed time, in 10-millisecond increments, during which signal quality is consistently good, that the modem waits before increasing transmission speed. To set signal quality, see "S32 (Signal Quality Threshold)" on page 39 .

### Range

0 (Fall-forward disabled)
1 to 65535 (0.01 to 655.35 seconds before speed increase; maximum is almost 11 minutes)

### Default

2000 (20 seconds)

## S35 (Fallback Timer)

The elapsed time, in 10-millisecond increments, during which signal quality is consistently poor, that the modem waits before decreasing transmission speed. To set signal quality, see "S32 (Signal Quality Threshold)" on page 39 .

### Range

0 (Fallback disabled)
1 to 65535 (0.01 to 655.35 seconds before fallback)

### Default

50 (0.5 second)

## S36 (Terminate Timeout)

Specifies, in seconds, the maximum time to delay after a host disconnect request before forcing the link to disconnect. (The disconnect request can be an ATH (hang up) command or a Cisco IOS request from the router or access server.) During this period, the modem sends buffered data and then clears the link. Low values cause the modem to disconnect faster, but may result in some final data being lost and in the remote modem hanging on to a dead line for a while.

### Range

0 to 858 seconds

### Default

20 seconds

## S37 (Wait for Carrier After Dial)

Maximum time until Layer 1 data mode is established. This timer starts when Cisco IOS software tells Cisco MICA portware to InitiateLink, which is when the PSTN reports that it has physically connected the called party. Cisco MICA starts its trainup phases when Cisco IOS commands InitiateLink. This timing occurs while either originating or answering a call.

The timer stops when Cisco IOS either hangs up the call, or when the Cisco MICA DSP determines that trainup has been successful and enters layer 1 (L1) data mode. Cisco MICA state is seen to progress beyond Trainup (for example, EC_NEGOTIATE, STEADY). If the timer stops, then no error has occurred, and the call is successful so far. If the timer times out, this means that some aspect of trainup did not finish in a reasonable amount of time but somehow was not signaled otherwise as a call failure. On this timeout, Cisco MICA reports an 0x6008 call failure: ConnectTimeout.

**Note** Error Control (EC) protocol negotiation (for example, LAPM) is not guarded by the S37 timer. Such negotiation is guarded by its own timers and has its own disconnect reasons.

**Note** This S register used to be linked to the S7 (Wait for Circuit to Establish) register. Functionality of these two registers is now independent.

### Range

0: wait forever for data mode
1 to 255: Maximum time the link takes to establish before disconnection (in 1 second steps)

### Default

60 seconds

# S38 (Delay for Hang-up After Carrier Loss)

Register S38 is linked to register S10 so that the two registers share a single value. Changing the value of S38 changes S10, and changing S10 changes S38. For a description of the function of the two registers, see "S10 (Delay for Hang-up After Carrier Loss)" on page 28 .

# S39 (Transmit Level Setting)

Specifies the decibel level the modem uses for transmissions.

**Note** The actual range of transmit levels you can use is specified by the country in which the modem is operating. Transmit levels are also controlled by the country code setting that is made at installation. For example, if you set S39 to 3, –9 dBm, but your country imposes a ceiling of –10 dBm on transmit levels, your modem will transmit at –10 dBm, despite the setting of –9 dBm.

Transmit level settings for V.90 are controlled by "S59 (V.90 Transmit Level Setting)," on page 53.

### Range

| Value | Decibel level |
|-------|---------------|
| 0 | –6 dBm |
| 1 | –7 dBm |
| 2 | –8 dBm |

| Value | Decibel level |
|-------|---------------|
| 3 | –9 dBm |
| 4 | –10 dBm |
| 5 | –11 dBm |
| 6 | –12 dBm |
| 7 | –13 dBm |
| 8 | –14 dBm |
| 9 | –15 dBm |
| 10 | –16 dBm |
| 11 | –17 dBm |
| 12 | –18 dBm |
| 13 | –19 dBm |
| 14 | –20 dBm |
| 15 | –21 dBm |

**Default**

7 (–13 dBm)

## S40 (Consecutive Retrain Disconnect Threshold)

After this number of consecutive failed retrains, the modem disconnects. (If the modem loses synchronization with its partner, it can try to regain synchronization with a retrain.)

**Range**

0 (Never disconnect because of failed retrains)
1 to 255 (Disconnect after this number of failed retrains)

**Default**

4 retrains

## S41 (V.34 Maximum Symbol Rate)

Specifies the maximum symbol (baud) rate that pertains when the modem is using V.34 modulation. (To select the modulation standard, see "S29 (Modulation Standard)" on page 36 .) This register is read-only unless you use the DEBUGTHISMODEM command. See "DEBUGTHISMODEM (Debug This Modem)," on page 4.

**Note** This is a read-only register for Cisco MICA version 2.7.3.0 and below. You must add DEBUGTHISMODEM to change this register. For example, ATDEBUGTHIS MODEMs41=4 (using reverse telnet) or &F&D2DEBUGTHISMODEMs41=4 (using modemcap).

**Range**

0 (2400 baud)
1 (2743 baud)
2 (2800 baud)
3 (3000 baud)
4 (3200 baud)
5 (3429 baud)

**Default**

5 (3429 baud)

# S42 (V.34 Minimum Symbol Rate)

Specifies the minimum symbol (baud) rate that pertains when the modem is using V.34 modulation. (To select the modulation standard, see "S29 (Modulation Standard)" on page 36 .) This register is read-only unless you use the DEBUGTHISMODEM command. See "DEBUGTHISMODEM (Debug This Modem)," on page 4.

**Note** This is a read-only register for Cisco MICA version 2.7.3.0 and below. You must add DEBUGTHISMODEM to change this register. For example, ATDEBUGTHIS MODEMs42=4 (using reverse telnet) or &F&D2DEBUGTHISMODEMs42=4 (using modemcap).

**Range**

0 (2400 baud)
1 (2743 baud)
2 (2800 baud)
3 (3000 baud)
4 (3200 baud)
5 (3429 baud)

**Default**

0 (2400 baud)

# S43 (V.34 Carrier Frequency)

Specifies the carrier frequency that pertains when the modem is using V.34 modulation. (To change the modulation standard, see "S29 (Modulation Standard)" on page 36 .) This register is read-only unless you use the DEBUGTHISMODEM command. See "DEBUGTHISMODEM (Debug This Modem)," on page 4.

**Note** This is a read-only register for Cisco MICA version 2.7.3.0 and below. You must add DEBUGTHISMODEM to change this register. For example, ATDEBUGTHIS MODEMs43=1 (using reverse telnet) or &F&D2DEBUGTHISMODEMs43=1 (using modemcap).

**Range**

0 (Low carrier)
1 (High carrier)
2 (Automatic carrier selection)

**Default**

2 (Automatic carrier selection)

# S44 (V.34 Preemphasis Filter Selection)

Specifies the filter to use on the transmit signal when the modem is using V.34 modulation. (To select the modulation standard, see "S29 (Modulation Standard)" on page 36 .) The default setting, 11, selects a filter automatically based on line impairments and conditions. Settings 0 to 10 select fixed preemphasis filters without regard for line impairments and conditions. We recommend that you leave this register set to the default value, 11 (automatic selection), unless you are advised otherwise by a Cisco representative. For more information on preemphasis filter selection, see CCITT Recommendation V.34. This register is read-only unless you use the DEBUGTHISMODEM command. See "DEBUGTHISMODEM (Debug This Modem)," on page 4.

**Note** This is a read-only register for Cisco MICA version 2.7.3.0 and below. You must add DEBUGTHISMODEM to change this register. For example, ATDEBUGTHIS MODEMs44=10 (using reverse telnet) or &F&D2DEBUGTHISMODEMs44=10 (using modemcap).

**Range**

0 to 10 (Select fixed filters)
11 (Automatic preemphasis filter selection)

**Default**

11 (Automatic preemphasis filter selection)

# S45 (Signaling Type)

Specifies the type of central office transmit and receive signaling the modem uses on T1/R2 trunks.

Setting 6 puts the modem into a mode where it performs SS7/COT signaling. This prevents the modem from operating normally—that is, from operating as a modem. Typically this setting is initiated by the host; it is not recommended for human users.

If you set S29 to 8 for V.110, the modem ignores the value of this register and uses null signaling (0).

**Range**

0 (Null signaling)
1 (MF signaling)
2 (DTMF signaling)
3 (Low-band R2 signaling)
4 (High-band R2 signaling)
5 (Modified R1 signaling)
6 (SS7/COT signaling)

**Default**

0 (Null signaling)

# S46 (Call Progress Tone Detection)

Determines whether the modem detects dial tones, ring-back tones, and busy signals emitted by other devices during call establishment. S46 is a bit-mapped register. See "Bit-Mapped Registers" on page 24 for information on how to set bit-mapped registers. The bits are defined in Table 14.

**Table 15    Call Progress Tone Detection**

| Bit | Meaning | Values[1] |
|-----|---------|-----------|
| 0 | Dial tone | **0  Ignore dial tone** |
| | | 1  Detect dial tone |
| 1 | Ring back | **0  Ignore ring back** |
| | | 2  Detect ring back |
| 2 | Busy signal | **0  Ignore busy signal** |
| | | 4  Detect busy signal |

1. Default values are in bold type.

**Range**

0 to 7

**Default**

0 (No tone detection)

# S47 (Hayes +++ Escape Detection)

Enables or disables detection of the escape code (+++ by default) that you enter to put the modem into escape mode. Escape mode enables you to enter commands while this modem is connected to another modem.

✎
**Note**    Two registers, S2 and S47, control the escape code. To enable the escape code, you must set S2 to a value in the range 0 to 127, *and* you must set S47 to enabled (1 or 2). (See "S2 (Escape Code Character)" on page 25 .) To disable the escape code, you can either set S2 to 128 or higher, or set S47 to disabled (0).

In addition, if you use register S48 to turn off the **AT** command processor, executing the escape code will have no effect.

If escape code detection is enabled on the modem for a host that echoes the user's input, the host modem may inadvertently be placed in online command mode when a user enters the escape code on his or her own modem. For this reason, we recommend disabling escape code detection (setting S47 to 0) on host/server modems. However, if the host/server echoes only when answering calls, then S47 = 2 is a good setting.

**Range**

0 (Disabled)
1 (Enabled)
2 (Enabled in originate mode only)

**Default**

2 (Enabled in originate mode only)

# S48 (AT Command Processor)

Enables or disables the **AT** command processor.

**Range**

0 (Disabled)
1 (Enabled)

**Default**

1 (Enabled)

# S49 (Call Setup Delay)

Specifies, in 100-msec increments, the amount of time that the modem waits before initiating a new link.

**Range**

0 (No delay before link initiation)
1 to 255 (Wait 0.1 to 25.5 seconds)

**Default**

0 (No delay before link initiation)

# S50 (Maximum PCM Connect Rate)

Maximum rate, in bits per second, at which the modem will transmit data when it is using the K56Flex or V.90 modulation standards. (Use S29 to set the modulation standard.) This parameter is unidirectional; it does not affect the speed of data received. If this modem's range of connect rates does not overlap with the other modem's range (that is, if one modem's maximum connect rate is lower than the other modem's minimum connect rate (see S51)), a connection cannot be established and the modems disconnect.

Pulse code modulation (PCM) is digital; the other types of modulation available on Cisco MICA modems (V.34, V.22, etc.) are analog.

**Note** If the modem is using K56Flex or V.90 modulation, S50 and S51 control the data rate in the transmit direction only; S30 and S31 control receive speeds. See "S30 (Maximum Connect Rate)," on page 38, and "S31 (Minimum Connect Rate)," on page 39. If the modem is *not* using K56Flex or V.90, S30 and S31 control the rates of both received and transmitted data. Table 14The following table shows which S registers control data rates under the various modulation standards.

**Table 16        S Registers Controlling Data Rates Under Different Modulation Standards**

| Modulation Standard | S Registers Controlling Transmit Rate | S Registers Controlling Receive Rate |
|---|---|---|
| V.34 and lower | S30 and S31 | S30 and S31 |
| K56Flex | S50 and S51 | S30 and S31 |
| V.90 | S50 and S51 | S30 and S31 |

**Range**

28000 bps to 60000 bps
This value must be equal to or greater than the value of S51.

**Default**

60000 bps

# S51 (Minimum PCM Connect Rate)

Minimum rate, in bits per second, at which the modem will transmit data when it is using the K56Flex or V.90 modulation standards. (Use S29 to set the modulation standard.) This parameter is unidirectional; it does not affect the speed of data received. If this modem's range of connect rates does not overlap with the other modem's range (that is, if one modem's maximum connect rate (see S50) is lower than the other modem's minimum connect rate), a connection cannot be established and the modems disconnect.

**Note**    If the modem is using K56Flex or V.90 modulation, S50 and S51 control the data rate in the transmit direction only; S30 and S31 control receive speeds. See "S30 (Maximum Connect Rate)," on page 38, and "S31 (Minimum Connect Rate)," on page 39. If the modem is *not* using K56Flex or V.90, S30 and S31 control the rates of both received and transmitted data. The table above shows which S registers control data rates under the various modulation standards.

**Range**

28000 bps to 60000 bps
This value must be equal to or less than the value of S50.

**Default**

28000 bps

# S52 (Digital Pad Compensation)

For V.90 transmissions, Cisco MICA can boost the signal it transmits when the partner analog modem detects a digital pad (attenuator) in the circuit. Boosting the signal to compensate for digital pad attenuation can improve throughput. This register controls whether Cisco MICA allows the partner analog modem to compensate on circuits where a digital pad is detected.

This register has no effect on transmissions in modes other than V.90.

**Range**

0 (No compensation)
1 (This modem supports digital pad compensation for V.90 transmissions)

**Default**

0 for Cisco MICA version 2.7.1.0 and below
1 for Cisco MICA version 2.7.1.1 and above

# S53 (V.8bis Capability)

V.8bis is a protocol used for exchanging K56Flex information. It is used during modem train-up prior to all other exchanges/tones. If you are not expecting to connect to K56Flex clients, disable V.8bis (set this register to 0) to shorten modem train-up times for other protocols by about 3 seconds.

**Note** Enabling V.8bis has no effect unless you are using a modulation standard that includes K56Flex. To set the modulation standard, use register S29 (Modulation Standard), page 36.

**Note** Setting S53 to 0 effectively disables K56Flex, because K56Flex cannot operate without V.8bis.

S53 is a bit-mapped register. See "Bit-Mapped Registers" on page 24  for information on how to set bit-mapped registers. The bits are defined in Table 17.

*Table 17      V.8bis Capability*

| Bit | Meaning | Values[1] |
|-----|---------|-----------|
| 0 | V.8bis negotiation | 0  Disable V.8bis negotiation<br>**1  Enable V.8bis negotiation** |
| 1 | V.90 negotiation in V.8bis | 0  Disable V.90 negotiation in V.8bis<br>**2  Enable V.90 negotiation in V.8bis** |

1.Default values are in bold type.

**Range**

0 to 7

**Default**

1 for Cisco MICA version 2.5.x.x.
3 for Cisco MICA version 2.6.1.5 and above (including 2.6.2.0)

# S54 (General Options)

S54 is a bit-mapped register that controls several options. See "Bit-Mapped Registers" on page 24  8for information on how to set bit-mapped registers. The bits are defined in Table 18.

*Table 18     General Options*

| Bit | Meaning | Values[1] |
|-----|---------|-----------|
| 0 | Sends automatic  messages to host router when a modem session has debug information to log | **0  Disable host debug messages**<br>1  Enable host debug messages |
| 1 | Aggressive client capping | **0  Disable aggressive client capping**<br>2  Enable aggressive client capping |
| 2 | Force 4-point training | **0  Do not force 4-point training**<br>4  Force 4-point training |
| 3 | Power control | 0  Disable power control<br>**8  Enable power control** |
| 4 | Error correction (EC) quality checking | **0   Disable EC quality checking**<br>16  Enable EC quality checking |
| 5 | Cap the receive rate at 26400 on detecting a PC-Tel modem | **0   Disable receive rate cap**<br>32  Enable receive rate cap |
| 6 | Error correction (EC) parity. Enables 7E, 7O, and 7N data to be passed over a modem connection that has EC. Note that S12 and S13 apply to modem connections that have EC when EC parity is enabled. Set S12 to 7 in order for 7E, 7O, and 7N data to be passed on an EC modem connection when EC parity is enabled in S54. When EC parity is disabled, EC data is passed in 8N mode and the settings of S12 and S13 are ignored. | **0   Disable EC parity**<br>64  Enable EC parity |
| 7 | Enable 0.5 boost in signal quality (SQ) threshold setting, to lower the receive rate. This parameter works in conjunction with S32. See "S32 (Signal Quality Threshold)," on page 39. When this bit is set to enable the SQ threshold shift, the BER for recovery is multiplied by a factor of approximately 3. | 0     Disable SQ threshold shift<br>**128  Enable SQ threshold shift** |
| 8 | DSP reset | **0     Disable DSP reset**<br>256  Enable DSP reset |
| 9 | Enable V.110 blind connect. With this bit enabled MICA will not wait to see the originating TAs S&X bit transition to ON (0) after syncing to at least 3 incomming V.110 frames. | **0  Disable V.110 blind connect**<br>512 Enable V.110 blind connect |

*Table 18    General Options*

| Bit | Meaning | Values[1] |
|-----|---------|-----------|
| 10 | Enable additional S detector bandedge check. This test will look for spikes at the bandedges of the S signal, to make sure MICA doesn't false detect S when there's a spike at a bandedge instead of S signal being present. | **0 Disable additional S detector**<br>1024 Enable additional S detector |

1.Default values are in bold type.

### Range

0 to 2047

### Default

8 for Cisco MICA version 2.7.1.2 and below
136 for Cisco MICA version 2.7.1.3 through 2.7.2.1
200 for Cisco MICA version 2.7.3.0 and above

# S55 (SS7/COT Control)

Do not set this bit-mapped register. It is reserved for SS7/COT control, and is set by the host router or access server. (SS7/COT is in effect only when S45 is set to 6, SS7/COT signaling. See the "S45 (Signaling Type)" section on page 45).

The bits in S55 are defined in Table 18, which is provided only so that you can read the register. Bit 15 is the most significant bit.

**Table 19    SS7/COT Control**

| Bit | Meaning | Values[1] |
|-----|---------|-----------|
| 15 | Receive frequency | **0  1780 Hz**<br>1  2010 Hz |
| 14 | Transmit frequency | **0  1780 Hz**<br>1  2010 Hz |
| 13, 12, 11 | Operation | **0  Transmit, then receive**<br>1  Receive, then transmit<br>2  Receive monitor only[2]<br>3  Transmit generate only[2]<br>4  Receive monitor and transmit generate[2]<br>5 to 7  Reserved for future use |
| 10 to 0 | Timeout period, in increments of 10 ms. The host router or access server performs its own timing and always sets this field to zero. | **0  No timeout**<br>1  10 ms<br>2  20 ms<br>:<br>:<br>2000  20,000 ms (20 seconds) |

1.Default values are in bold type.
2.Test modes—not for operational use.

**Range**

0 to 2009

**Default**

0

# S56 (Set Maximum V.34+ Transmit Rate)

Set the maximum allowable V.34+ transmit rate in bits per second (bps). This register is read-only unless you use the DEBUGTHISMODEM command. See "DEBUGTHISMODEM (Debug This Modem)," on page 4.

> **Note** This is a read-only register for Cisco MICA version 2.7.3.0 and below. You must add DEBUGTHISMODEM to change this register. For example, ATDEBUGTHIS MODEMs56=24000 (using reverse telnet) or &F&D2DEBUGTHISMODEMs56=24000 (using modemcap).

**Range**

4800, 7200, 9600, 12000, 14400, 16800, 19200, 21600, 24000, 26400, 28800, 31200, 33600

**Default**

33600

# S57 (V.110 User Rate)

Do not set this register; it is set by the host router or access server. S57 specifies the user rate (send and receive speed) for originating V.110 calls. The user rate is communicated to the remote modem.

**Range**

600, 1200, 2400, 4800, 7200, 9600, 14400, 19200, 38400

**Default**

9600

# S58 (V.110 Flow Control and Clock Bits)

S58 is set by the host. If the modem is in originate mode, S58 is set to 0. If the modem is in answer mode, the host sets S58 according to Q.931 call setup standards. The information is useful to the remote modem for debugging.

**Range**

Per Q.931

**Default**

0

# S59 (V.90 Transmit Level Setting)

Specifies the level in decibels for V.90 transmissions. (Transmit level settings for other operating modes are controlled by "S39 (Transmit Level Setting)," on page 42.)

These are the maximum transmit level settings in Cisco MICA Portware:

- United States: –12 dBm

- Japan: –15 dBm  (In Japan, Cisco MICA modems always transmit at  –15 dBm regardless of register settings.)

- All other countries: –10 dBm

**Note**    The range of transmit levels you can use is specified by the country in which the modem is operating. Transmit levels are also controlled by the country code setting that is made at installation. For example, if you set S59 to 3, –9 dBm, but your country imposes a ceiling of –10 dBm on transmit levels, your modem will transmit at –10 dBm, despite the setting of –9 dBm.

**Range**

| Value | Decibel level |
|-------|---------------|
| 0 | –6 dBm |
| 1 | –7 dBm |
| 2 | –8 dBm |
| 3 | –9 dBm |
| 4 | –10 dBm |
| 5 | –11 dBm |
| 6 | –12 dBm |
| 7 | –13 dBm |
| 8 | –14 dBm |
| 9 | –15 dBm |
| 10 | –16 dBm |
| 11 | –17 dBm |
| 12 | –18 dBm |
| 13 | –19 dBm |
| 14 | –20 dBm |
| 15 | –21 dBm |

**Defaults**

For Japan: 9 (–15 dBm)
All other countries: 6 (–12 dBm)

**AT Command Set and Register Summary for Cisco MICA Six-Port Modules**

# S60 (Sticky Flags)

Do not set this bit-mapped register. It is reserved for use by the host router or access server. The bits are defined in Table 18; this information is provided only so that you can read the register. In the table, default values are shown in bold type.

**Table 20    Sticky Flags**

| Bit | Meaning | Values[1] |
|---|---|---|
| 0 | Specifies whether the host accepts expedited Terminate_Event messages, which convey accounting information about call termination from the modem to the host. | **0 Disable Terminate_Event messages**<br>1 Enable Terminate_Event messages |
| 1 | Specifies whether the modem will send a capabilities mask, which identifies the modem's call type capabilities, to the host. The capabilities mask is sent once in the lifespan of a Portware release. Based on the information sent, the host sets various S registers, including S12, S13, S14, S29 (V.110 only) S55, and S57. | **0 Disable capabilities mask**<br>2 Enable capabilities mask |
| 2 | Activates in-band PPP mode switches. | **0 Disable switches**<br>4 Enable PPP switches |
| 3 | Specifies whether the ConnectInfo and TerminateInfo messages contain data. If the messages contain no data, the host reads the information directly from the shared memory area. | **0 Messages contain data**<br>8 Messages contain no data |

1.Default values are in bold type.

See "Bit-Mapped Registers" on page 24  for information on bit-mapped registers.

**Range**
0 to 15

**Default**
0

# S61 (Unused)

Register S61 is not used.

# S62 (Modem on Hold Exchange)

Sets the maximum time a user is allowed to stay on-hold every time a Modem on Hold event is requested. A timeout of 0 seconds disables Modem on Hold. A message is issued indicating that a Modem on Hold event is not allowed.

**Note**  Available in Cisco MICA version 2.9.1.0 and above

| Value | Timeout |
|-------|---------|
| 0 | MoH disabled |
| 1 | 10 seconds |
| 2 | 20 seconds |
| 3 | 30 seconds |
| 4 | 40 seconds |
| 5 | 1 minute |
| 6 | 2 minutes |
| 7 | 3 minutes |
| 8 | 4 minutes |
| 9 | 6 minutes |
| 10 | 8 minutes |
| 11 | 12 minutes |
| 12 | 16 minutes |
| 13 | No Limit |

**Range**

0 to 13

**Default**

0

## S63 (Quick Connect Exchange)

Enables or disables V.92 Quick Connect and also sets the ANSpcm tone level to be used during Quick Connect negotiation.

**Note**  Available in Cisco MICA version 2.9.1.0 and above

| Value | Meaning |
|-------|---------|
| 0 | QC Disabled |
| 2 | QC Disabled |

| Value | Meaning |
|-------|---------|
| 3 | QC Enabled, ANSpcm level: -12dB |
| 4 | QC Disabled |
| 5 | QC Enabled, ANSpcm level: -15dB |
| 6 | QC Disabled |
| 7 | QC Enabled, ANSpcm level: -18dB |

**Range**

0, 2 to 7

**Default**

3

# S64 (Link Standard)

Enable or disable automoding by setting to connect at a fixed modulation.

**Note** This register is available in portware version 2.7.2.1 and above.

**Note** By using the S64 register, Cisco MICA is forced to try ONLY the standard specified in S64. The only exception is if S64 is set to 1 (V.90) where, due to the V.8 specification, a fallback to V.34 is allowed.

For example, if a client modem is set to V.90 automode, and Cisco MICA is set to S64=5 (V.32), both modems conect at V.32. However, if the client modem is set to V.21 and Cisco MICA is set to S64=7 (V.22), the connection is dropped, because Cisco MICA does not try any modulation other than V.22 in this case. When S64 is set to S64=6, fixed modulation is set at V.22bis.

See also S29 (Modulation Standard).

| Value | Meaning |
|-------|---------|
| 0 | Automode enabled (proceed according to S29) |
| 1 | V.90 |
| 2 | K.56Flex |
| 3 | V.34 |
| 4 | V.32bis |

| Value | Meaning |
|-------|---------|
| 5 | V.32 |
| 6 | V.22bis |
| 7 | V.22 |
| 8 | V.21 |
| 9 | V.23 |
| 10 | Bell212A |
| 11 | Bell103 |

**Range**

0 to 11

**Default**

0

# S65 (V.44 Maximum TX Codewords)

Sets the maximum number of codewords that will be negotiated and used in the transmitter's V.44 compression dictionary.

**Note** Available in Cisco MICA version 2.9.1.0 and above.

**Range**

256 to 2048

**Default**

2048

# S66 (V.44 Maximum RX Codewords)

Sets the maximum number of codewords that will be negotiated and used in the receiver's V.44 compression dictionary.

**Note** Available in Cisco MICA version 2.9.1.0 and above.

**Range**

256 to 2048

**Default**

2048

# S67 (V.44 Maximum TX String Length)

Sets the maximum string length that will be negotiated and used in the transmitter's V.44 compression dictionary.

**Note** Available in Cisco MICA version 2.9.1.0 and above.

**Range**

32 to 255

**Default**

255

# S68 (V.44 Maximum RX String Length)

Sets the maximum string length that will be negotiated and used in the receiver's V.44 compression dictionary.

**Note** Available in Cisco MICA version 2.9.1.0 and above.

**Range**

32 to 255

**Default**

255

# S69 (V.44 Maximum TX History Size)

Sets the maximum history size that will be negotiated and used in the transmitter's V.44 compression dictionary.

**Note** Available in Cisco MICA version 2.9.1.0 and above.

**Range**

256 to 15000

**Default**

15000

# S70 (V.44 Maximum RX History Size)

Sets the maximum history size that will be negotiated and used in the receiver's V.44 compression dictionary.

**Note** Available in Cisco MICA version 2.9.1.0 and above.

**Range**

256 to 15000

**Default**

15000

# S71 (V.90 Uplink Max Symbol Rate)

Sets the maximum symbol rate that will be negotiated and used during V.90 calls. This register is read-only unless you use the DEBUGTHISMODEM command. See "DEBUGTHISMODEM (Debug This Modem)," on page 4.

**Note** Registers S71 and S72 have been added in Cisco MICA Portware Version 2.7.3.0.

**Note** This is a read-only register for Cisco MICA version 2.7.3.0. You must add DEBUGTHISMODEM to change this register. For example, ATDEBUGTHIS MODEMs71=4 (using reverse telnet) or &F&D2DEBUGTHISMODEMs71=4 (using modemcap). Note, too, that the default values for this register have changed.

| Value | Meaning |
|-------|-----------|
| 3 | 3000 baud |
| 4 | 3200 baud |
| 5 | 3429 baud |

**Range**

3 to 5

**Default**

4 for Cisco MICA Portware Version 2.9.2.0 and above (available soon)

5 for Cisco MICA Portware Version 2.7.3.0

# S72 (V.90 Uplink Min Symbol Rate)

Sets the minimum symbol rate that will be negotiated and used during V.90 calls. This register is read-only unless you use the DEBUGTHISMODEM command. See "DEBUGTHISMODEM (Debug This Modem)," on page 4.

**Note** Registers S71 and S72 have been added in Cisco MICA Portware Version 2.7.3.0.

**AT Command Set and Register Summary for Cisco MICA Six-Port Modules**

**Note** This is a read-only register for Cisco MICA version 2.7.3.0. You must add DEBUGTHISMODEM to change this register. For example, ATDEBUGTHIS MODEMs72=4 (using reverse telnet) or &F&D2DEBUGTHISMODEMs72=4 (using modemcap). Note, too, that the default values for this register have changed.

| Value | Meaning |
|-------|-----------|
| 3 | 3000 baud |
| 4 | 3200 baud |
| 5 | 3429 baud |

**Range**

3 to 5

**Default**

3 in Cisco MICA Portware Version 2.7.3.0 and above.

# S73 (LinkInfo#32 Information Selector)

Selects the information that will be displayed in the LinkInfo#32 field, General Portware Information.

**Note** Available in Cisco MICA version 2.7.3.0 and above.

.

| Value | Meaning |
|-------|-----------|
| 0 | Combination of all fields bit packed |
| 1 | V.90 client modem ID using DIL |
| 2 | TXQ underrun counter |
| 3 | CP-DSP DMA over/underrun count |

**Range**

0 to 3

**Default**

0

# Related Links

- Cisco IOS Release 12.2 Master Indexes
- *SPE and Firmware Download Enhancements*
- Cisco AS5300 universal access servers Cisco MICA release notes index page
- Cisco AS5x00 Cisco MICA 6-Port and 12-Port Modem Module Portware/Cisco IOS Software Compatibility Matrixes
- Cisco AS5300 access servers, Appendix A, "Managing Modems," and Appendix B, "Rom Monitor," in the *Cisco AS5300 Universal Access Server Software Configuration Guide*
- *Modem Management Commands*
- *Cisco IOS Dial Services Command Reference for Cisco IOS Software Release 12.2*
- Cisco IOS Dial Technologies Configuration Guide, Release 12.2
- *Quick Start Guide, Cisco AS5300 Universal Access Server Install and Configure*
- V.90 and RFC-2217 dialout support for fax/data

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http://www.cisco.com/tac

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- P3—Your network performance is degraded. Network functionality is noticeably impaired, but most business operations continue.
- P4—You need information or assistance on Cisco product capabilities, product installation, or basic product configuration.

In each of the above cases, use the Cisco TAC website to quickly find answers to your questions.

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http://www.cisco.com/tac/caseopen

## Contacting TAC by Telephone

If you have a priority level 1 (P1) or priority level 2 (P2) problem, contact TAC by telephone and immediately open a case. To obtain a directory of toll-free numbers for your country, go to the following website:

http://www.cisco.com/warp/public/687/Directory/DirTAC.shtml

P1 and P2 level problems are defined as follows:

- P1—Your production network is down, causing a critical impact to business operations if service is not restored quickly. No workaround is available.
- P2—Your production network is severely degraded, affecting significant aspects of your business operations. No workaround is available.

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