



Chameleon

**Flexible, Powerful, Industrial Cellular
Data Modem solutions for CDMA**



CTM-130/132

AT Command Reference

Revision 2.1

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1

Introduction

The CTM130/132 CDMA Wireless Data Modems from Cypress Solutions use both standard and proprietary AT commands for configuration and control of the modem.

AT commands can be entered in either Upper or Lower case.

All specific CTM-130/132 command parameters can be stored in non-volatile memory using the AT&W command.

This release of AT Commands is for firmware version 1.3.0 and above.

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Serial Port Configuration

Most terminal emulation programs such as Windows HyperTerminal can be used to access the CTM-130/132 with AT commands. Terminal configuration parameters are:

Data rate	115,200 baud
Data bits	8
Parity	None
Stop bits	1
Flow control	Hardware

4**General Modem Commands**

ATZ	Profile restore Resets the modem and restores currently saved settings Use AT&W to save this setting to non-volatile memory.
AT&Fn	Factory settings restore n=0 Restore currently saved settings n=1 Restore factory settings If n is left blank this is equivalent to n = 0 Use AT&W to save the factory restored settings to non-volatile memory.
AT&W	Store current configuration settings in non-volatile memory
AT&V n	View configuration - displays active settings n=0 (or blank) Basic setting information n=1 All setting information
ATIn	Modem information n=0 Modem model n=1 Modem manufacturer n=2 Basic information n=3 Expanded information
ATEn	Echo n=0 Disable echo n=1 Enable echo (Default) Use AT&W to save this setting to non-volatile memory.
ATVn	Verbose mode - Result code form n=0 Numeric result codes n=1 Verbose result codes (Default) Use AT&W to save this setting to non-volatile memory.
ATQn	Quiet mode - Result code display option n=0 Disable Quiet mode (return result codes) (Default) n=1 Enables Quiet mode (disables result codes) Use AT&W to save this setting to non-volatile memory.
A/	This command repeats the previously entered AT command.

Multiple AT commands can be entered on the same line simply by dropping the “AT” of all commands following the first.

Example: **ATE0&W** This will set Echo off and save the setting.

5**CTM-130/132 Commands****5.1 Network Connectivity****5.1.1 AT^USER**

Format:
AT^USER=<string> Where <string> is the user name for the wireless network PPP session.
AT^USER? Queries the current user name.
Description:
This command is the user name for the PPP network session associated with the password in AT^PSWD. This is often in the format of [name]@[service provider].com Use AT&W to save this command to non-volatile memory.
Example:
AT^USER=6045551234@1x.telusmobility.com AT^USER?

5.1.2 AT^PSWD

Format:
AT^PSWD=<string> Where <string> is a password.
AT^PSWD? Queries the current password
Description:
This command sets the password for the wireless network PPP session. This can be a string of ASCII characters - often the modems Electronic Serial Number (ESN). This password is associated with the user name set in AT^USER command. Use AT&W to save this command to non-volatile memory.
Example:
AT^PSWD=12300123456 AT^PSWD?

5.1.3 AT^NUM

Format:
AT^NUM=<string> Where <string> is the telephone number that the modem will dial to access the CDMA connection to setup a PPP session.
AT^NUM? Queries the current telephone number.

Description:
This command sets the telephone number for the PPP session. For a 1x connection it is often #777, while for a Quick Net Connect (QNC) it is often #888. Use AT&W to save this command to non-volatile memory.
Example:
AT^NUM=#777 AT^NUM?

5.1.4 AT^MODE

Format:
AT^MODE=n Where n is a decimal number in the range from 1 to 3. AT^MODE? Queries the current mode.
Description:
This command sets the operating mode for the modem. 1 = Manual connection – default 2 = Auto-connect to CDMA network “always on” 3 = Auto-connect to both CDMA network and host interface (Only valid in PAD mode - if in other modes, equivalent to mode 2). This command will always provide a response even if the modem is in “always on” mode. If MODE 2 or 3 is active on the modem then AT command mode will be active at power up until the modem CONNECTs to the CDMA network – this allows time to exit MODE 2 or 3. Once the modem has CONNECTed use the escape sequence (default is +++) to drop the connection and return to AT command mode. It is recommended that this command be used at the end of any modem command sequence. Use AT&W to save this command to non-volatile memory.
Example:
AT^MODE=2 AT^MODE?

5.1.5 AT^FRIENDS

Format:
AT^FRIENDS=n,x.x.x.x,y.y.y.y Where n = index in Friends List, range 0 to 7 x.x.x.x is the IP address/range to allow. Range 0.0.0.0 to 255.255.255.255 y.y.y.y is the netmask of addresses to allow. Range 0.0.0.0 to 255.255.255.255 AT^FRIENDS? Queries the current Friends List configuration
Description:
This command sets up the modem’s internal IP Friends List which is used to block incoming packets from an IP address that is not specifically enabled. Use this to define a range of IP addresses that you wish to be accepted by the modem. This feature will only block packets destined for the modem’s internal features: MODBUS; PAD; embedded web server; telnet

AT commands. It will not block pass-through packets for the connected host device.	
Defaults:	
0: 0.0.0.0 , 0.0.0.0	Enable all
1: 0.0.0.0 , 255.255.255.255	Block all
2: 0.0.0.0 , 255.255.255.255	“
3: 0.0.0.0 , 255.255.255.255	“
4: 0.0.0.0 , 255.255.255.255	“
5: 0.0.0.0 , 255.255.255.255	“
6: 0.0.0.0 , 255.255.255.255	“
7: 0.0.0.0 , 255.255.255.255	“
Use AT&W to save this command to non-volatile memory.	
Example:	
AT^FRIENDS=0,208.171.165.56,255.255.255.255 Allows only incoming requests from the IP address 208.171.165.56 to connect to the modem.	
AT^FRIENDS=0,208.171.0.0,255.255.0.0 Allows the block of IP addresses from 208.171.0.0 to 208.171.255.255 to connect to the modem. Anything that matches the AND of the IP address with the netmask will be allowed.	
AT^FRIENDS=0,208.0.0.0,255.0.0.0 Allows anything from 208.x.x.x to connect to the modem.	
AT^FRIENDS=0,208.171.165.0,255.255.0.0 This is equivalent to AT^FRIENDS=0,208.171.0.0,255.255.0.0 because the netmask is applied to both the IP address in the Friends List as well as the incoming IP address.	
AT^FRIENDS?	

5.1.6 AT\$QCMIP

Format:
AT\$QCMIP=n Where n is 0 or 1
AT\$QCMIP? Queries the current setting of this parameter.
Description:
This command sets the Mobile IP operation of the modem. n=0 sets Simple IP only (Mobile IP disabled) n=1 sets Mobile IP preferred (default) Use AT&W to save this command to non-volatile memory.
Example:
AT\$QCMIP=1 AT\$QCMIP?

5.1.7 AT\$KWMODE

Format:
AT\$KWMODE=n

Where n is 1 or 2
Description:
This command is used to set the modem module mode as part of the network activation commands. n = 1 Sets the modem module into command mode. Use this before entering the AT\$KWSPC command. n = 2 Resets the modem module. Use this after entering the AT\$KWDIR command. Note that the modem must be in MODE 1 for this command to take effect.
Example:
AT\$KWMODE=1

5.1.8 AT\$KWSPC

Format:
AT\$KWSPC=nnnnnn Where nnnnnn is a six digit decimal value
Description:
This command is used to enter the modem's SPC Lock code as part of the network activation commands. The 6 digit number is used by the modem's module to compare against the pre-loaded 6-digit OTSL (One Time Subsidy Lock), MSL (Master Subsidy Lock), or SPC (Service Provisioning Code). This number is provided by the service provider at the time of service activation. Use AT\$KWMODE=1 to put the modem module into command mode first. Note that the modem must be in MODE 1 for this command to take effect.
Example:
AT\$KWSPC=123456

5.1.9 AT\$KWDIR

Format:
AT\$KWDIR= pppppppppp Where pppppppppp is the 10 digit telephone number allocated to the modem. AT\$KWDIR? Queries the modem's 10 digit telephone number currently active.
Description:
This command sets the NAM (Number Assignment Module) value for the modem. It is a 10 digit phone number assigned to the modem by the service provider. Use AT\$KWSPC command to unlock the modem first. Use AT\$KWMODE=2 to reset the modem module after setting the NAM value. The NAM value may be queried at any time by using the AT\$KWDIR? command. Note that the modem must be in MODE 1 for this command to take effect.
Example:
AT\$KWDIR=5551234567 AT\$KWDIR?

5.1.10 ATDT

Format:
ATDTnnnnnnnnn Where nnnnnnnnn is the telephone number for the modem to dial.
Description:
This command is used to initiate a circuit switched connection to another modem. If the modem has been configured in PAD mode and no number is entered then the modem will initiate a packet connection to the currently configured IP address and port (default port is 5005) in the modem.
Example:
ATDT6045551234 This will initiate a circuit switched connection. ATDT This will initiate a packet connection to the pre-configured IP address.

5.1.11 ATDTn.n.n.n

Format:
ATDTn.n.n.n Where n.n.n.n is an IP address. Range 0.0.0.0 to 255.255.255.255
Description:
This command will initiate a packet connection using the provided IP address which will over-ride any pre-configured IP address in the modem. The modem's configured port will be used (default 5005). Use this to initiate a manual PAD connection only.
Example:
ATDT123.100.100.2

5.1.12 ATDTn.n.n.n:p

Format:
ATDTn.n.n.n:p Where n.n.n.n is an IP address: range 0.0.0.0 to 255.255.255.255 p is the port number: range 0 to 65535
Description:
This command will initiate a packet connection using the provided IP address and port number which will over-ride any pre-configured IP address and port in the modem. Use this to initiate a manual PAD connection only.
Example:
ATDT123.100.100.2:6000

5.1.13 AT^COMMWD

Format:
AT^COMMWD=t Where t is the watchdog timeout in minutes: 0 = disable; range 2 to 65535 minutes AT^COMMWD?
Description:
This command will initiate a watchdog for PAD and MODBUS configured communications.

If no data is sent or received over the wireless connection during the watchdog set period then the modem will perform a reset. Default is 0 (disabled).
Use AT&W to save this setting.

Example:

AT^COMMWD=30	Sets the PAD/MODBUS communications watchdog period to 30 minutes.
AT^COMMWD?	Queries the Comms watchdog current setting.

5.1.14 AT^CEADDR**Format:**

AT^CEADDR= iii.iii.iii.iii

Where iii.iii.iii.iii is the remote IP address, range 0.0.0.0 to 255.255.255.255 decimal.

AT^CEADDR?

Description:

Use AT^HOSTIF=5 to set the modem into its Circuit Switched emulation mode. This then enables legacy connected equipment making a ATDT<phone number> connection to be provided with a packet switched connection with all data to and from the RS232 port being encapsulated (UDP) for packet transmission. Connection is dropped after being idle for PADSVCT time.

This command will set the remote IP address of the device that will accept the UDP data. Use along with AT^CEPORT.

Use AT&W to save this setting.

Example:

AT^CEADDR=123.65.0.2

AT^CEADDR?

5.1.15 AT^CEPORT**Format:**

AT^CEPORT=ppppp

Where ppppp is the remote port number, range 0 to 65535 decimal.

AT^CEPORT?

Description:

This command will set the port for the remote IP address of the device that will accept the UDP data. Use along with AT^CEADDR.

Use AT&W to save this setting.

Example:

AT^CEPORT=5005

AT^CEPORT?

5.2 Host Interface

5.2.1 AT^HOSTIF

Format:
AT^HOSTIF=n Where n is a decimal number in the range from 0 to 5. AT^HOSTIF? Queries the current setting of interface type.
Description:
This command sets the interface type to the host PC. 0 = Point to Point Protocol (PPP) - default 1 = Serial Line Interface Protocol (SLIP) 2 = Packet Assembly and Disassembly (PAD) 3 = Direct Connect (disables the modems internal stack). Used for circuit switched connections and fax (use Winfax Pro version 10 or higher) 4 = MODBUS 5 = Circuit Switched Emulation mode: device making a ATDT<number> call will be returned CONNECT and provided with a packet (UDP) connection. Use AT&W to save this command to non-volatile memory.
Example:
AT^HOSTIF=2 AT^HOSTIF?

5.2.2 AT^HOSTSP

Format:																
AT^HOSTSP=n,p,d,s or AT^HOSTSP=n where n is the baud rate:																
<table> <tr><td>1200</td><td>1200 Baud</td></tr> <tr><td>2400</td><td>2400 Baud</td></tr> <tr><td>4800</td><td>4800 Baud</td></tr> <tr><td>9600</td><td>9600 Baud</td></tr> <tr><td>19200</td><td>19200 Baud</td></tr> <tr><td>38400</td><td>38400 Baud</td></tr> <tr><td>57600</td><td>57600 Baud</td></tr> <tr><td>115200</td><td>115200 Baud (Default)</td></tr> </table>	1200	1200 Baud	2400	2400 Baud	4800	4800 Baud	9600	9600 Baud	19200	19200 Baud	38400	38400 Baud	57600	57600 Baud	115200	115200 Baud (Default)
1200	1200 Baud															
2400	2400 Baud															
4800	4800 Baud															
9600	9600 Baud															
19200	19200 Baud															
38400	38400 Baud															
57600	57600 Baud															
115200	115200 Baud (Default)															
p is the parity configuration:																
<table> <tr><td>n or N</td><td>no parity</td></tr> <tr><td>e or E</td><td>even parity</td></tr> <tr><td>o or O</td><td>odd parity</td></tr> </table>	n or N	no parity	e or E	even parity	o or O	odd parity										
n or N	no parity															
e or E	even parity															
o or O	odd parity															
d is the number of data bits:																
<table> <tr><td>7</td><td>7 data bits</td></tr> <tr><td>8</td><td>8 data bits</td></tr> </table>	7	7 data bits	8	8 data bits												
7	7 data bits															
8	8 data bits															
s is the number of stop bits:																
<table> <tr><td>1</td><td>1 stop bit</td></tr> <tr><td>2</td><td>2 stop bits</td></tr> </table>	1	1 stop bit	2	2 stop bits												
1	1 stop bit															
2	2 stop bits															

<p>AT^HOSTSP? Queries the current host interface baud rate and configuration.</p>
<p>Description:</p> <p>This command configures the modems serial port baud rate and data format. After implementing this command it will be necessary to change the baud rate of the host application to match the new configuration. Use AT&W (at the new baud rate) to save this command to non-volatile memory, or use the extension &W at the end of the command: AT^HOSTSP=n,p,d,s&W</p>
<p>Example:</p> <p>AT^HOSTSP=9600,N,8,1 AT^HOSTSP=38400 AT^HOSTSP?</p>

5.2.3 AT^MODEMID

<p>Format:</p> <p>AT^MODEMID=<string> Where <string> is an ASCII text string up to 11 characters (no spaces).</p> <p>AT^MODEMID? Queries the current modem ID string. The modem's ESN is returned if no user entry has been made.</p>
<p>Description:</p> <p>This command is used to give the modem an ID that can be used in the end application to easily identify the modem. The ID can be a string of ASCII text up to 11 characters. If no ID is given then the modems 11 digit decimal ESN will be used. Use AT&W to save this command to non-volatile memory.</p>
<p>Example:</p> <p>AT^MODEMID=Site42 AT^MODEMID?</p>

5.2.4 ATSO

<p>Format:</p> <p>ATSO=n Where n is 0 or 1</p> <p>ATSO? Queries the current setting for this parameter.</p>
<p>Description:</p> <p>This command enables or disables the modem's circuit switched auto answer mode. Use n=1 to enable or n=0 to disable. Default n=1. Use this command in conjunction with AT^HOSTIF=3 to set circuit switched mode. Use AT&W to save this command to non-volatile memory.</p>
<p>Example:</p> <p>ATSO=1 ATSO?</p>

5.2.5 AT&D

Format:
AT&Dn Where n has a value of 0, 1, or 2
Description:
This command configures the RS232 port DTR signal operation. n=0 Ignore DTR n=1 Enter command state for an on-to-off DTR transition. The modem condition (on or offline) is not affected. n=2 Hang up and enter command state for an on-to-off DTR transition. (Default) Use AT&W to save this command to non-volatile memory.
Example:
AT&D2

5.2.6 AT&K

Format:
AT&Kn Where n has a value of 0 or 1
Description:
This command configures the RS232 port hardware flow control operation. n=0 Disable flow control n=1 Enable flow control (Default) For host connected devices that do not support hardware flow control set n=0. Use AT&W to save this command to non-volatile memory.
Example:
AT&K0

5.2.7 AT&C

Format:
AT&Cn Where n has a value of 0, 1, or 2
Description:
This command configures the RS232 port DCD signal operation. n=0 DCD is always ON n=1 DCD reflects state of connection n=2 Unix compatible DCD control. DCD is always ON except for a short time (~1s) when the carrier is lost. (Default) Use AT&W to save this command to non-volatile memory.
Example:
AT&C0

5.2.8 AT^SLIPIP

Format:
AT^SLIPIP=nnn.nnn.nnn.nnn Where nnn.nnn.nnn.nnn is the IP address, range 0.0.0.0 to 255.255.255.255 decimal. AT^SLIPIP? Queries the current SLIP IP address
Description:
This command sets the host devices IP address for routing purposes when AT^HOSTIF is set to 1 (SLIP). Note that your PC connection will also need to be setup to use this same static IP. Default is 192.0.3.2 Use AT&W to save this command to non-volatile memory.
Example:
AT^SLIPIP=192.168.100.2 AT^SLIPIP?

5.3 Power Management

5.3.1 AT^PWRSDWN

Format:
AT^PWRSDWN=a,b,o,dddd Where a is the RS232 event qualifier: 0=disable, 1=enable. b is the standby signal event qualifier: 0=disable, 1=enable. o is the operator for the standby signal and RS232 qualifiers: 1=OR, 2=AND dddd is the delay time after the standby signal/RS232 event being valid that the modem will go into power shutdown mode. Range 0 to 65535 seconds. AT^PWRSDWN?
Description:
This command is used to configure the modem's behavior upon the standby signal and RS232 port changing state. It can be used to put the modem into shutdown mode based on these two events. Default is AT^PWRSDWN=0,1,1,10 (modem will switch on and off based on the standby signal and ignore the state of the RS232 port). Note that if the standby signal/ignition is disabled then other features will not be able to report the status of this signal. Use AT&W to save this command.
Example:
AT^PWRSDWN=1,1,2,3600 This will cause the modem to power down after both the standby signal AND the RS232 port have been inactive for 1 hour. The modem will power back up when both the standby signal AND RS232 port are active (no delay). AT^PWRSDWN?

5.3.2 AT^PWRMODE

Format:
AT^PWRMODE= <i>n</i> Where <i>n</i> is the power mode configuration parameter: value 1,2, or 3
Description:
This command controls the modems power mode: <i>n</i> =1 puts the modem in shutdown mode - it can be woken up either by a power cycle or an input alarm event if configured (but not by the periodic wake-up event). <i>n</i> =2 puts the modem in standby mode - it can be woken up either by a power cycle, an incoming call event if configured, or an input alarm event if configured (but not by the periodic wake-up event). <i>n</i> =3 will power cycle the modem immediately.
Example:
AT^PWRMODE=2

5.3.3 AT^PWRWEOE

Format:
AT^PWRWEOE= <i>m</i> , <i>t1</i> , <i>t2</i> , <i>r</i> , <i>i</i> , <i>a</i> , <i>dddd</i> Where: <i>m</i> is the required power mode: 0= disable, 1 = shutdown, 2 = standby, 3 = shutdown with periodic wake-up. <i>t1</i> is the on time - the modem will remain on for this time once it has woken up due to a RING, input, or periodic wake-up event . Range 0 to 65535 minutes. 0= disable the timer (stay on forever) <i>t2</i> is the off timer - the time that the modem will stay in standby or shutdown if a RING, input, or periodic wake-up event does not occur. Range 0 to 65535 minutes. 0= disable the timer (stay in standby or shutdown mode forever or until a RING or input event occurs). <i>r</i> is the RING event parameter: 0 = disable; 1 = enable (note - use <i>m</i> = 2 when enabling RING) <i>i</i> is the input event parameter: 0 = disable; 1 to 6 selects which input alarm will trigger wake up. <i>a</i> is the immediate operand: 1 = activate this command now without waiting for the on timer to expire; 0 = implement this command after a power cycle or when the on time expires (note – need to save using AT&W prior to the modem going into shutdown or standby power mode). <i>dddd</i> is the delay time after the standby signal (ignition) event occurs that the modem will go into shutdown mode. Range 0 to 65535 minutes. 0=disable the delay time (stay on forever). Only used in Power Mode 3.
AT^PWRWEOE? Query the current configuration of wake on event.
Description:
This command is used to configure what event will wake the modem up (incoming circuit switched call, input trigger, or timer expire) and how long the modem will stay awake after the event. This is used to have the modem in low power mode until it is required to communicate over the CDMA network. When using <i>m</i> = 1 or 2 the <i>dddd</i> timer is ignored.

When using $m = 3$ the immediate operand a is ignored. It is recommended that the modem be power cycled after setting $m = 3$ in order to avoid conflict with the $AT^PWRSDWN$ configuration.

Default configuration is 0,0,10, 0, 0,10 (wake on event disabled)

Use $AT\&W$ to save this command to non-volatile memory. Note: if use $a=1$ (immediate sleep) then it will not be possible to save this configuration – once the modem wakes up again it will revert to the previous configuration.

Once this command has been entered and saved, power cycle the modem or use the $AT^PWRMODE$ command to put the modem into the required sleep mode (shutdown or standby), or simply wait for the $t1$ or $dddd$ timer to expire.

Example:

$AT^PWRWOE=1,5,0,0,2,0$ This will cause the modem to go into shutdown mode in 5 minutes. An alarm event on input #2 will cause it to wake up for 5 minutes then go back to sleep. Note that the $dddd$ parameter is not required.

$AT^PWRWOE=2,5,55,1,0,0$ This will cause the modem to go into standby mode in 5 minutes. Every 55 minutes or an incoming call will cause it to wake up and remain on for 5 minutes then go back to sleep. Note that the $dddd$ parameter is not required.

$AT^PWRWOE=3,10,230,0,0,120$ This will cause the modem to go into shutdown mode 2 hours after the standby signal (ignition) has been turned off. The modem will then turn on for 10 minutes every 4 hours until the standby signal (ignition) is turned back on.

$AT^PWRWOE?$

5.3.4 $AT^PWRVCCT$

Format:

$AT^PWRVCCT=vv.v,t$

Where: $vv.v$ is the threshold supply voltage at which the modem will go into shutdown.

Range 0.0 to 25.5

t is the time in seconds after which the modem will go into shutdown once the supply voltage has gone below the threshold voltage. Range 10 to 254.

$AT^PWRVCCT?$

Queries the current settings.

Description:

This command controls the supply voltage below which the modem will automatically go into shutdown mode. The default level is 9.0 volts which is appropriate for a 12 volt battery supply. The default time is 10 seconds.

Use $AT\&W$ to save this command to non-volatile memory.

Example:

$AT^PWRVCCT=20.0,10$ Sets the threshold to 20.0 volts with 10 seconds delay – this may be appropriate for a 24 volt supply.

$AT^PWRVCCT?$

5.3.5 AT^VCC?

Format:
AT^VCC?
Description:
This command returns the current value of the modem's supply voltage. Read only.
Example:
AT^VCC?

5.4 GPS Triggered Reporting

Note that the GPS related commands will only provide valid GPS information for the CTM-132 modem. On the CTM-130 modem the GPS information will be invalid (set to zero).

5.4.1 AT^GPSREMIP

Format:
AT^GPSREMIP= <i>n</i> , <i>iii.iii.iii.iii</i> Where <i>n</i> is the GPS report number, range 0 to 7 or 10 decimal. <i>iii.iii.iii.iii</i> is the remote IP address, range 0.0.0.0 to 255.255.255.255 decimal.
AT^GPSREMIP? Queries the current IP address configuration of all GPS reports.
Description:
This command is used to set the IP address of the remote server that the GPS report will be sent to. Up to 8 GPS reports may be configured. Use report #10 for the modem's fixed format status report (see AT^CTMSTS). The default remote IP address for report #10 is 0.0.0.0 Use AT&W to save this command to non-volatile memory.
Example:
AT^GPSREMIP=0,192.168.1.1 AT^GPSREMIP?

5.4.2 AT^GPSREMPORT

Format:
AT^GPSREMPORT= <i>n</i> , <i>xxxxx</i> Where <i>n</i> is the GPS report number, range 0 to 7 or 10 decimal. <i>xxxxx</i> is the remote port number, range 0 to 65635 decimal.
AT^GPSREMPORT? Queries the current IP port configuration of all GPS reports.
Description:
This command is used to set the IP port number of the remote server that the GPS report will

be sent to. Up to 8 GPS reports may be configured.
 Use report #10 for the modem's fixed format status report (see AT^CTMSTS). The default remote port for report #10 is 6102.
 Use AT&W to save this command to non-volatile memory.

Example:

```
AT^GPSREMPORT=0,5005
AT^GPSREMPORT?
```

5.4.3 AT^GPSLOCPORT**Format:**

```
AT^GPSLOCPORT=n,xxxxx
```

Where

n is the GPS report number, range 0 to 7 or 10 decimal.

xxxxx is the local port number, range 0 to 65535 decimal.

```
AT^GPSLOCPORT?
```

Queries the current local port of all GPS reports.

Description:

This command is used to set the port number of the local server that the GPS report will be sent to. Up to 8 GPS reports may be configured.

Use report #10 for the modem's fixed format status report (see AT^CTMSTS). The default local port for report #10 is 6102.

Use AT&W to save this command to non-volatile memory.

Example:

```
AT^GPSLOCPORT=0,5005
AT^GPSLOCPORT?
```

5.4.4 AT^GPSCOND**Format:**

```
AT^GPSCOND=n,t,o1,d,o2,ms,Ms,o3,h,hs,o4,mt
```

Where

n is the GPS report number, range 0 to 7 decimal.

t is the timeout in seconds.

o1 is the conditional parameter for the timeout value (Off=0,AND=1, OR=2)

d is the distance traveled threshold in meters.

o2 is the conditional parameter for the distance value (Off=0,AND=1, OR=2)

ms is the low speed threshold in kph.

Ms is the high speed threshold in kph.

o3 is the conditional parameter for the speed values (Off=0,AND=1, OR=2)

h is the heading change in degrees.

hs is the minimum speed threshold to make heading measurement valid, in kph

o4 is the conditional parameter for the heading values (Off=0,AND=1, OR=2)

mt is the maximum reporting rate in seconds (minimum time between reports).

```
AT^GPSCOND?
```

Queries the current condition(s) of all GPS reports

<p>Description:</p> <p>This command is used to set the condition(s) that would trigger a GPS report. The conditional parameter is used to indicate how that parameter is used to determine if a report is triggered.</p> <p>case 1) timeout=10[AND],ms=20,Ms=60[AND],mt=1 means that a report will be generated once every 10 seconds during the time when the speed is between 20kph and 60kph.</p> <p>case 2) timeout=10[OR],ms=20,Ms=60[OR],mt=1 means that a report will be generated once every 1 second during the time when the speed is between 20kph and 60kph, and once every 10 seconds otherwise.</p> <p>Use AT&W to save this command to non-volatile memory.</p>
<p>Example:</p> <p>AT^GPSCOND=0,10,1,50,1,20,60,1,90,10,1,1 (sends report #0 every 10seconds IF distance is greater than 50metres AND speed is between 20kph and 60kph AND change in heading is greater than 90 degrees)</p> <p>AT^GPSCOND=0,10,1 (sends report #0 every 10 seconds)</p> <p>AT^GPSCOND?</p>

5.4.5 AT^GPSREP

<p>Format:</p> <p>AT^GPSREP=<i>n,l,r</i></p> <p>Where</p> <p><i>n</i> is the GPS report number, range 0 to 7 decimal</p> <p><i>l</i> is the local report type parameter</p> <ul style="list-style-type: none"> 0: Disabled (Default) 1: Asynchronous NMEA or ULCP messages 2: Asynchronous NMEA or ULCP messages with a ULCP header 3: In-Band NMEA or ULCP messages in a UDP Packet 4: In-Band NMEA or ULCP messages with a ULCP header and in individual UDP packets. <p><i>r</i> is the remote report type parameter</p> <ul style="list-style-type: none"> 0: Disabled (Default) 3: In-Band NMEA or ULCP messages in a UDP Packet 4: In-Band NMEA or ULCP messages with a ULCP header and in individual UDP packets 5: email reports 6: SMS messages <p>AT^GPSREP?</p> <p>Queries the current report type configuration of all GPS reports.</p>
<p>Description:</p> <p>This command is used to set the reporting types for each GPS report for the local and remote servers.</p> <p>Use AT&W to save this command to non-volatile memory.</p>
<p>Example:</p> <p>AT^GPSREP=0,3,3</p> <p>AT^GPSREP?</p>

5.4.6 AT^GPSEMAIL

Format:
AT^GPSEMAIL= <i>n</i> , <i>name@domain</i> Where <i>n</i> is the GPS report number, range 0 to 7 decimal. <i>name@domain</i> is the email address to which the report will be sent
AT^GPSEMAIL? Queries the current email address configured for all GPS reports.
Description:
This command is used to set the email address that the GPS report will be sent to (if configured for email using AT^GPSREP). Up to 8 email addresses may be configured – one for each of the 8 GPS reports. The default email address is blank. Note that an email server is required – see AT^EMAILSRV. Use AT&W to save this command to non-volatile memory.
Example:
AT^GPSEMAIL=0,me@home.com AT^GPSEMAIL?

5.4.7 AT^GPSSMS

Format:
AT^GPSSMS= <i>n</i> , <i>pppppppppp</i> Where <i>n</i> is the GPS report number, range 0 to 7 decimal. <i>pppppppppp</i> is the phone number to which the report will be sent
AT^GPSSMS? Queries the current SMS phone numbers configured for all GPS reports.
Description:
This command is used to set the phone number that the GPS report will be sent to (if configured for SMS using AT^GPSREP). Up to 8 phone numbers may be configured – one for each of the 8 GPS reports. The default phone number is blank. Use AT&W to save this command to non-volatile memory.
Example:
AT^GPSSMS=1,6044111234 AT^GPSSMS?

5.4.8 AT^GPSADDMES

Format:
AT^GPSADDMES= <i>n,xx</i> Where <i>n</i> is the GPS report number, range 0 to 7 decimal. <i>xx</i> is the message type to be added – see list in section 6.
Description:
This command is used to add a message to a GPS report. One message is added at a time with up to 4 messages included in a single report. Messages will be sent in a report in the same order that they are added here.

Note that ULCP header messages will be sent as individual UDP packets – NMEA format messages will be combined.

Use AT&W to save this command to non-volatile memory.

Example:

AT^GPSADDMES=0,16

5.4.9 AT^GPSDELMES

Format:

AT^GPSDELMES=n,xx

Where:

n is the GPS report number, range 0 to 7 decimal.

xx is the message to be deleted.

if xx is 0, all messages associated with the report will be deleted.

Description:

This command is used to delete a message from a GPS report.

Use AT&W to save this command to non-volatile memory.

Example:

AT^GPSDELMES=0,16

5.4.10 AT^GPSMES?

Format:

AT^GPSMES?

Description:

This command is used to display all message types associated with each GPS report.

Read only.

Example:

AT^GPSMES?

5.4.11 AT^GPSGGA?

Format:

AT^GPSGGA?

Description:

This command is used to locally display a current NMEA GGA message. See section 6 for a full description of this message.

Read only.

Example:

AT^GPSGGA?

5.4.12 AT^GPSRMC?

Format:

AT^GPSRMC?

Description:

This command is used to locally display a current NMEA RMC message. See section 6 for a full description of this message.

Read only.

Example:

AT^GPSRMC?

5.4.13 AT^CTMSTS**Format:**

AT^CTMSTS=n

Where n is used to select the status message reporting operation:

n=0 to switch status reporting off

n=1 for local reporting only (default)

n=2 for remote reporting only

n=3 for both local and remote reporting

AT^CTMSTS?

Queries the current setting for the modem's status report.

Description:

This command is used to configure the reporting mode of the modems status report.

This status report is controlled by GPS report #10: use AT^GPSLOCPORT, AT^GPSREMIP, and AT^GPSREMPORT to configure the reporting destination. Default destinations are: local port 6102; remote IP 0.0.0.0, remote port 6102. This report sends messages #03 (Modem ID), #30 (Network status), #80 (NMEA GGA), and #82 (NMEA RMC). The report is sent every 10 seconds.

Use AT&W to save this command to non-volatile memory.

Example:

AT^CTMSTS=0

AT^CTMSTS?

5.5 Input Triggered Reporting**5.5.1 AT^DOUT****Format:**

AT^DOUT=n,x

Where:

n is the output number 1 to 4

x is the output state: off = 0, On = 1

Description:

This command is used to set the state of the four outputs.

Use AT&W to save this command to non-volatile memory.

Example:

AT^DOUT=2,1

AT^DOUT?

5.5.2 AT^INSETUP**Format:**

AT^INSETUP=n,d,x.x,p,a

<p>Where:</p> <p>n is the input number 1 to 6</p> <p>d sets the input as analog (A) or digital (D)</p> <p>x.x sets the voltage threshold for alarm reporting (valid if input set as Analog only, use 0.0 for digital input)</p> <p>p sets the polarity of the input: P = positive, N = negative (this also affects the alarm setting)</p> <p>a sets the alarm state: 0 = alarm off, 1 = alarm on, 2 = alarm on change state</p>
<p>Description:</p> <p>This command is used to configure the six inputs. Their use as a digital or analog input can be set along with their alarm states.</p> <p>Use AT&W to save this command to non-volatile memory.</p>
<p>Example:</p> <p>AT^INSETUP=2,D,0.0,P,1</p> <p>AT^INSETUP=4,A,7.5,P,1</p> <p>AT^INSETUP?3</p>

5.5.3 AT^IN?

<p>Format:</p> <p>AT^IN?n</p> <p>Where:</p> <p>n is the input number 1 to 6</p>
<p>Description:</p> <p>This command is used to read the value and state of the inputs. Both the analog voltage (range 0 to 10 Volts) and digital state (0 for off and 1 for on) are returned.</p> <p>Read only.</p>
<p>Example:</p> <p>AT^IN?5</p>

5.5.4 AT^IOREMIP

<p>Format:</p> <p>AT^IOREMIP=n,iii.iii.iii.iii</p> <p>Where</p> <p>n is the I/O report number, range 0 to 7 decimal.</p> <p>iii.iii.iii.iii is the remote IP address, range 0.0.0.0 to 255.255.255.255 decimal.</p> <p>AT^IOREMIP?</p> <p>Queries the current IP address configuration of all I/O reports.</p>
<p>Description:</p> <p>This command is used to set the IP address of the remote server that the I/O data will be sent to. Up to 8 I/O reports may be configured.</p> <p>Use AT&W to save this command to non-volatile memory.</p>
<p>Example:</p> <p>AT^IOREMIP=0,192.168.1.1</p> <p>AT^IOREMIP?</p>

5.5.5 AT^IOREMPORT

Format:
AT^IOREMPORT=n,xxxxx Where n is the I/O report number, range 0 to 7 decimal. xxxxx is the remote port number, range 0 to 65635 decimal. AT^IOREMPORT? Queries the current IP port configuration of all I/O reports.
Description:
This command is used to set the IP port number of the remote server that the I/O data will be sent to. Up to 8 I/O reports may be configured. Use AT&W to save this command to non-volatile memory.
Example:
AT^IOREMPORT=0,5005 AT^IOREMPORT?

5.5.6 AT^IOLOCPORT

Format:
AT^IOLOCPORT=n,xxxxx Where n is the I/O report number, range 0 to 7 decimal. xxxxx is the local port number, range 0 to 65535 decimal. AT^IOLOCPORT? Queries the current local port of all I/O reports.
Description:
This command is used to set the port number of the local server that the I/O data will be sent to. Up to 8 I/O reports may be configured. Use AT&W to save this command to non-volatile memory.
Example:
AT^IOLOCPORT=0,5005 AT^IOLOCPORT?

5.5.7 AT^IOCOND

Format:
AT^IOCOND=n,t,o1,i1,o2,i2,o3,mt Where: n is the I/O report number range 0 to 7 t = timeout in seconds o1 is the conditional operator for timeout (off = 0, AND = 1, OR = 2) i1 = input number 1 to 6 (alarm on input will trigger condition test) o2 is the conditional operator for i1, (off = 0, AND = 1, OR = 2) i2 = input number 1 to 6 (alarm on input will trigger condition test) o3 is the conditional operator for i2, (off = 0, AND = 1, OR = 2) mt is the maximum reporting rate in seconds (minimum time between reports).

<p>AT^IOCOND? Queries the current condition of all I/O reports</p>
<p>Description: This command is used to set the conditions that will trigger an I/O report. The conditional parameters are used to determine how the associated parameter is used to trigger a report. Use AT&W to save this command to non-volatile memory.</p>
<p>Example: AT^IOCOND=0,10,1 (sends report #0 every 10 seconds) AT^IOCOND=1,0,0,3,2,6,2,60 (sends report #1 once per minute max if inputs 3 or 6 go into alarm) AT^IOCOND?</p>

5.5.8 AT^IOREP

<p>Format: AT^IOREP=n,l,r Where n is the I/O report number, range 0 to 7 decimal. l is the local report type parameter 0: Disabled (Default) 1: Asynchronous NMEA or ULCP messages 2: Asynchronous NMEA or ULCP messages with a ULCP header 3: In-Band NMEA or ULCP messages in a UDP Packet 4: In-Band NMEA or ULCP messages with a ULCP header and in individual UDP packets r is the remote report type parameter 0: Disabled (Default) 3: In-Band NMEA or ULCP messages in a UDP Packet 4: In-Band NMEA or ULCP messages with a ULCP header and in individual UDP packets 5: email reports 6: SMS messages AT^IOREP? Queries the current report type configuration of all I/O reports.</p>
<p>Description: This command is used to set the reporting types for each I/O report for the local and remote servers. Use AT&W to save this command to non-volatile memory.</p>
<p>Example: AT^IOREP=0,3,3 AT^IOREP?</p>

5.5.9 AT^IOEMAIL

<p>Format: AT^IOEMAIL=n,name@domain Where n is the IO report number, range 0 to 7 decimal. name@domain is the email address to which the report will be sent</p>

AT^IOEMAIL? Queries the current email address configured for all IO reports.
Description: This command is used to set the email address that the IO report will be sent to (if configured for email using AT^IOREP). Up to 8 email addresses may be configured – one for each of the 8 IO reports. The default email address is blank. Note that an email server is required – see AT^EMAILSRV. Use AT&W to save this command to non-volatile memory.
Example: AT^IOEMAIL=0,me@home.com AT^IOEMAIL?

5.5.10 AT^IOSMS

Format: AT^IOSMS=n, pppppppppp Where n is the IO report number, range 0 to 7 decimal. ppppppppppp is the phone number to which the report will be sent AT^IOSMS? Queries the current SMS phone numbers configured for all IO reports.
Description: This command is used to set the phone number that the IO report will be sent to (if configured for SMS using AT^IOREP). Up to 8 phone numbers may be configured – one for each of the 8 IO reports. The default phone number is blank. Use AT&W to save this command to non-volatile memory.
Example: AT^IOSMS=1,6044111234 AT^IOSMS?

5.5.11 AT^IOADDMES

Format: AT^IOADDMES=n,xx Where n is the IO report number, range 0 to 7 decimal. xx is the message type to be added – see list in section 6.
Description: This command is used to add a message to an I/O report. One message is added at a time with up to 4 messages included in a single report. Messages will be sent in a report in the same order that they are added here. Note that ULCP header messages will be sent as individual UDP packets – NMEA format messages will be combined. Use AT&W to save this command to non-volatile memory.
Example: AT^IOADDMES=0,16

5.5.12 AT^IODELMES

Format:
AT^IODELMES=n,xx Where: n is the I/O report number, range 0 to 7 decimal. xx is the message to be deleted. if xx is 0, all messages associated with the report will be deleted.
Description:
This command is used to delete a message from an I/O report. Use AT&W to save this command to non-volatile memory.
Example:
AT^IODELMES=0,16

5.5.13 AT^IOMES?

Format:
AT^IOMES?
Description:
This command is used to display all messages associated with each I/O report. Read only.
Example:
AT^IOMES?

5.6 Store and Forward

It is possible to have the modem store all messages that are configured to be sent while the wireless network connection is unavailable, and to forward these messages once the network connection is back up. Up to four of the configured reports may be stored for forwarding when the network connection is available.

5.6.1 AT^SNF

Format:
AT^SNF=a1,[a2],[a3],[a4],b,c Where a1-4 are the GPS report #s that triggers the store function (a2, a3, a4 are optional): for GPS reports 0 to 7 use values 0 to 7 for Time based ULCP report use 8 for Delta Position based ULCP report use 9 for IO reports 0 to 7 use values 10 to 17 b is the store setting: 0 = disable store; 1 = store when out of coverage or not connected; 2 = always store. c is the time delay before forwarding once coverage is resumed: 0 = disable forward; range 1 to 65,535 seconds. AT^SNF? Queries the current store and forward settings.
Description:

This command is used to setup the reporting store and forward function. All messages associated with the selected reports (up to four per report) will be stored. Once network coverage is resumed the missed reports can be forwarded. The storage capacity is 2000 reports.

Use AT&W to save this command to non-volatile memory.

Example:

AT^SNF=1,1,30	Stores GPS report #1 and Forwards after 30 seconds when reconnected.
AT^SNF=1,2,14,15,1,60	Stores GPS reports #1 & 2, and IO reports #4 & 5, and Forwards after 1 minute when reconnected.
AT^SNF?	

5.6.2 AT^SNFLOG

Format:

AT^SNFLOG=n

Where n is the number of store reports to be displayed. Range 1 to 2000.

AT^SNFLOG?

Queries the number of stored reports and their status:

T:t where t is the total number of stored reports

I:i where i is the number of stored reports while in coverage and connected

O:o where o is the number of stored reports while out of coverage

F:f where f is the number of reports forwarded

N:n where n is the number of reports not yet forwarded

Description:

This command is used to display locally the contents of the store and forward log. The log can contain up to 2000 records.

Read only.

Example:

AT^SNFLOG=100

AT^SNFLOG?

5.6.3 AT^SNFFLUSH

Format:

AT^SNFFLUSH

Description:

This command is used to clear the entire contents of the store and forward log.

Example:

AT^SNFFLUSH

5.7 Packet Assembler/Disassembler (PAD)

5.7.1 AT^PADMODE

Format:

AT^PADMODE=x

<p>Where x is the PAD mode</p> <ul style="list-style-type: none"> 0: UDP - start up in client, revert to server when AT^PADSVCT expires (default). 1: TCP - start up in client, revert to server when server drops connection or AT^PADSVCT expires 2: UDP single session – reverts to AT command mode when connection closed 3: TCP single session – reverts to AT command mode when connection closed 4: UDP auto client reconnect - maintain UDP client “connection” (AT^PADSVCT disabled). The connection is remade every 15 secs if no data traffic is present. 5: TCP auto client reconnect - maintain TCP client connection (remakes the TCP connection if the server disconnects or AT^PADSVCT expires) <p>AT^PADMODE? Queries the current PAD mode.</p>
Description:
This command is used to set the PAD mode. AT^HOSTIF=2 must be set. Use AT&W to save this command to non-volatile memory.
Example:
AT^PADMODE=1 AT^PADMODE?

5.7.2 AT^PADADR

Format:
AT^PADADR=iii.iii.iii.iii Where iii.iii.iii.iii is the remote IP address, range 0.0.0.0 to 255.255.255.255 decimal.
AT^PADADR? Queries the current remote PAD IP address.
Description:
This command is used to set the remote PAD IP address. Use 0.0.0.0 to set the modem in PAD server mode. Default is 0.0.0.0 Use AT&W to save this command to non-volatile memory.
Example:
AT^PADADR=192.168.1.1 AT^PADADR?

5.7.3 AT^PADPORT

Format:
AT^PADPORT=xxxxx Where xxxxx is the remote PAD port number, range 0 to 65535 decimal.
AT^PADPORT? Queries the current PAD port number.
Description:
This command is used to set the remote PAD port number. This is the listening port if the modem is in PAD server mode. Default is 5005. Use AT&W to save this command to non-volatile memory.
Example:

AT^PADPORT=5005 AT^PADPORT?

5.7.4 AT^PADAUTOADR

Format:
AT^PADAUTOADR=a.a.a.a Where a.a.a.a is an IP address of range 0.0.0.0 to 255.255.255.255 AT^PADAUTOADR? Queries the current parameter setting.
Description:
This command is used to setup an IP address that will be used to send any unsolicited data from a modem configured in PAD server mode. If set to 0.0.0.0 then any unsolicited data will not be sent out by the modem. Default is 0.0.0.0 Use AT&W to save this command to non-volatile memory.
Example:
AT^PADAUTOADR=123.1.2.3 AT^PADAUTOADR?

5.7.5 AT^PADAUTOPORT

Format:
AT^PADAUTOPORT=nnn Where nnn is a UDP or TCP port number, range 0 to 65535 AT^PADAUTOPORT? Queries the current parameter setting.
Description:
This command is used to setup a port associated with the IP address configured using AT^PADAUTOADR that will be used to send any unsolicited data from a modem configured in PAD server mode. Default is 0 Use AT&W to save this command to non-volatile memory.
Example:
AT^PADAUTOPORT=5000 AT^PADAUTOPORT?

5.7.6 AT^PADFWDC

Format:
AT^PADFWDC=xx Where xx is the PAD forwarding character, range 0 to 255 decimal. AT^PADFWDC? Queries the current PAD forwarding character.
Description:
This command is used to set the PAD forwarding character. Default = 13 (ASCII enter). If no value is specified (blank) then PADFWDT or PADFWDL will invoke sending the packet. Use AT&W to save this command to non-volatile memory.

Example:

```
AT^PADFWDC=20
AT^PADFWDC?
```

5.7.7 AT^PADFWDT**Format:**

```
AT^PADFWDT=xx
```

Where xxxxx is the PAD forwarding time, range 0 to 255 in 100ms increment.

```
AT^PADFWDT?
```

Queries the current PAD forwarding time.

Description:

This command is used to set the PAD forwarding time. Default = 10 (1 second). If 0 is specified then this disables the forwarding timer and every character will be sent immediately.

Use AT&W to save this command to non-volatile memory.

Example:

```
AT^PADFWDT=10
AT^PADFWDT?
```

5.7.8 AT^PADFWDL**Format:**

```
AT^PADFWDL=xx
```

Where xx is the maximum PAD packet length, range 0 to 1000 decimal.

```
AT^PADFWDL?
```

Queries the current maximum PAD packet length.

Description:

This command is used to set the maximum PAD packet length. Default = 40. If 0 is specified then every character is sent immediately.

Use AT&W to save this command to non-volatile memory.

Example:

```
AT^PADFWDL=10
AT^PADFWDL?
```

5.7.9 AT^PADECHO**Format:**

```
AT^PADECHO=n
```

Where n is used to enable or disable PAD echo mode: 0 to disable, 1 to enable.

```
AT^PADECHO?
```

Queries the current PAD echo mode.

Description:

This command is used to set the PAD echo mode – if echo is enabled then all data sent to the modem on its RS232 port by an external device is echoed back to that device. Default is

enabled (1). Use AT&W to save this command to non-volatile memory.
Example:
AT^PADECHO=1 AT^PADECHO?

5.7.10 AT^PADESC

Format:
AT^PADESC=<str> Where <str> is the PAD escape sequence, 10 characters maximum, no white_spaces. AT^PADESC? Queries the current PAD escape sequence.
Description:
This command is used to set the PAD escape sequence used to return to AT command mode. Default is +++. When using the escape sequence it is necessary to wait the guard time before entering – enter only the escape sequence (do not enter any other characters including <CR> or <LF>) within the PADFWDT setting – then wait the guard time until the modem escapes from PAD mode. Use AT&W to save this command to non-volatile memory.
Example:
AT^PADESC=+++ AT^PADESC?

5.7.11 AT^PADESCT

Format:
AT^PADESCT=n Where n is the PAD escape sequence guard time, range 0 to 65535 in increment of 100ms. AT^PADESCT? Queries the current PAD escape sequence guard time.
Description:
This command is used to set the PAD escape sequence guard time. This is the idle time before and after the PAD escape sequence which must be present for the escape sequence to be recognized. Default is 30 (3 seconds) Use AT&W to save this command to non-volatile memory.
Example:
AT^PADESCT=30 AT^PADESCT?

5.7.12 AT^PADSVCT

Format:
AT^PADSVCT=n, t Where n is the PAD server connection time, range 0 to 65535 in seconds. t is an optional parameter used to set the maximum PAD connection time: 0 = disable (default); range 1 to 65535 seconds.

AT^PADSVCT?	
Queries the current PAD server connection time.	
Description:	
This command is used to set the PAD server connection time. If no data is sent or received within this timeout value, the PAD connection will be dropped and the modem will return to server mode. Default is 15 (seconds). Setting to 0 disables the timer. Note that using AT^PADMODE=4 or 5 will maintain the modem in client mode. If using the optional PAD disconnect timer parameter this will perform a hard cutoff of the PAD connection regardless of the data connection condition. Use AT&W to save this command to non-volatile memory.	
Example:	
AT^PADSVCT=10	This will cause the modem to revert to server mode after 10 seconds of data inactivity.
AT^PADSVCT=15,60	This will cause the PAD connection to be dropped after 60 seconds.
AT^PADSVCT?	Queries the current PADSVC settings.

5.7.13 AT^PADDISC

Format:	
AT^PADDISC=n	
Where n is the PAD blank packet disconnect enable/disable parameter n=0 disables the feature (default); n=1 enables the feature.	
AT^PADDISC?	
Queries the current setting	
Description:	
This command is used to enable or disable the PAD feature which allows a blank PAD packet being received by the modem to immediately disconnect the PAD session. This can be used by a remote device to force the modem to disconnect. Note that this feature only works with UDP PAD, not with TCP PAD. Use AT&W to save this command to non-volatile memory.	
Example:	
AT^PADDISC=1	
AT^PADDISC?	

5.8 MODBUS Configuration

The modem can be configured for MODBUS operation. This can be as a MODBUS master used to send MODBUS messages received on its serial port, over the wireless network to remote modems configured as MODBUS slaves. The modem can also be configured to be a MODBUS device itself.

The “report by exception” mode is supported by the modem in slave mode for host connected MODBUS devices wishing to send a report by exception over the network to the MODBUS master.

5.8.1 AT^MODBUSMODE

Format:

<p>AT^MODBUSMODE=n Where n is 0, 1, or 2</p> <p>AT^MODBUSMODE? Queries the current setting of this parameter</p>
<p>Description: This command sets the modem's MODBUS mode to master or slave: 0 = slave (default) 1 = master 2 = MODBUS TCP server gateway Use AT&W to save this command to non-volatile memory.</p>
<p>Example: AT^MODBUSMODE=1 AT^MODBUSMODE?</p>

5.8.2 AT^MODBUSPROTOCOL

<p>Format: AT^MODBUSPROTOCOL=n Where n is 0 or 1</p> <p>AT^MODBUSPROTOCOL? Queries the current setting of this parameter</p>
<p>Description: This command sets the serial MODBUS protocol to be used by the modem: 0 = MODBUS RTU (default) 1 = MODBUS ASCII (note that all wireless communications is done using MODBUS RTU in order to minimize data volume – the modem will convert this to MODBUS ASCII) Use AT&W to save this command to non-volatile memory.</p>
<p>Example: AT^MODBUSPROTOCOL=1 AT^MODBUSPROTOCOL?</p>

5.8.3 AT^MODBUSPORT

<p>Format: AT^MODBUSPORT=nnnn Where nnnn is a UDP port number, range 0 to 65535 decimal</p> <p>AT^MODBUSPORT? Queries the current setting of this parameter</p>
<p>Description: This command sets the UDP port that the master and slave MODBUS modems will listen on: the slave device has 5 seconds to respond to the incoming request – otherwise the response will be treated as an unsolicited message (report by exception). It is also the UDP port that the slave modem will send any unsolicited messages to – in this case the master modem must be listening on the same port. For MODBUS TCP server gateway operation this is the TCP</p>

port that the modem will be listening on. Default is 502. Use AT&W to save this command to non-volatile memory.
--

Example:

AT^MODBUSPORT=5000 AT^MODBUSPORT?

5.8.4 AT^MODBUSDEFIP**Format:**

AT^MODBUSDEFIP=a.a.a.a Where a.a.a.a is an IP address range 0.0.0.0 to 255.255.255.255

AT^MODBUSDEFIP? Queries the current setting of this parameter
--

Description:

This command sets the default IP address of the master MODBUS modem that the slave MODBUS modem will send unsolicited (report by exception) MODBUS messages to. If no unsolicited messages will be sent by the slave MODBUS modem then set this IP address to 0.0.0.0 (default). Use AT&W to save this command to non-volatile memory.

Example:

AT^MODBUSDEFIP=123.1.2.3 AT^MODBUSDEFIP?

5.8.5 AT^MODBUSID**Format:**

AT^MODBUSID=bbb Where bbb is a MODBUS ID range 0 to 247 decimal.

AT^MODBUSID? Queries the current setting of this parameter

Description:

This command sets the MODBUS ID of the slave MODBUS modem. If the slave modem is not acting as a MODBUS device itself then set this parameter to 0 (default). Setting this to a value in the range 1 to 247 will cause the modem to intercept all MODBUS messages with this ID and action them itself – all other MODBUS ID messages will be passed through to the serial port. Use AT&W to save this command to non-volatile memory.
--

Example:

AT^MODBUSID=20 AT^MODBUSID?

5.8.6 AT^MODBUSIDMAP**Format:**

AT^MODBUSIDMAP=n,a.a.a.a,p Where n is the MODBUS ID, range 1 to 247 decimal
--

<p>a.a.a.a is the MODBUS slave modem IP address, range 0.0.0.0 to 255.255.255.255 p is the UDP port that the slave modem will be listening on, range 0 to 65535</p> <p>AT^MODBUSIDMAP? Queries the current setting of this parameter – up to 247 entries.</p>
<p>Description: This command sets up the MODBUS ID to modem IP:port map for each remote MODBUS slave device. Up to 247 entries can be made. The default for all entries is n,0.0.0.0,0 Use n,0.0.0.0,0 to erase an entry. Use AT&W to save this command to non-volatile memory.</p>
<p>Example: AT^MODBUSIDMAP=24,123.1.2.3,5000 AT^MODBUSIDMAP?</p>

5.8.7 AT^MODBUSSVCT

<p>Format: AT^MODBUSSVCT=nnnn Where nnnn is the time in seconds, range 0 to 65535</p> <p>AT^MODBUSSVCT? Queries the current setting of this parameter.</p>
<p>Description: This command is used to set the TCP connection idle disconnect timer in MODBUS TCP slave gateway configuration. If the master device does not break the TCP connection after the connection has been idle for this time then the slave gateway modem will break the connection. Default is 10 seconds. Use AT&W to save this command to non-volatile memory.</p>
<p>Example: AT^MODBUSSVCT=30 AT^MODBUSSVCT?</p>

5.9 Email

It is possible to use AT commands to send emails directly from the CTM-130/132 modem. In order to send the email it is also necessary to set the email server IP address using the AT^EMAILSVR command, and for there to be a current network connection.

5.9.1 AT^EMAILSRV

<p>Format: AT^EMAILSRV=a.a.a.a Where a.a.a.a is the IP address of the email server to be used for email GPS and IO reports.</p> <p>AT^EMAILSRV? Queries the current email server IP configured for GPS and IO reports.</p>
<p>Description: This command is used to set the email server address that the GPS and IO email reports will be sent to (if configured for email using AT^GPSREP). This can be your own email server if</p>

required or the Telus email server 199.185.220.245 may be used. The default email server address is 0.0.0.0

Use AT&W to save this command to non-volatile memory.

Example:

```
AT^EMAILSVR=199.185.220.245
AT^EMAILSVR?
```

5.9.2 AT^EMAILTO

Format:

```
AT^EMAILTO=name@domain
```

```
AT^EMAIL?
```

Queries the current setting of this parameter.

Description:

This command is used to set the TO address for the email to be sent.

Example:

```
AT^EMAILTO=you@home.com
AT^EMAILTO?
```

5.9.3 AT^EMAILFROM

Format:

```
AT^EMAILFROM=name@domain
```

```
AT^EMAILFROM?
```

Queries the current setting of this parameter.

Description:

This command is used to set the FROM address for the email to be sent.

Example:

```
AT^EMAILFROM=me@work.com
AT^EMAILFROM?
```

5.9.4 AT^EMAILSUBJECT

Format:

```
AT^EMAILSUBJECT=<string>
```

Where <string> is an ASCII string of up to 128 characters.

```
AT^EMAILSUBJECT?
```

Queries the current setting of this parameter.

Description:

This command is used to set the SUBJECT for the email to be sent.

Example:

```
AT^EMAILSUBJECT=New AT Commands
```

AT^EMAIL?

5.9.5 AT^EMAILTEXT

Format:
AT^EMAILTEXT=<string><delimiter> Where <string> is an ASCII string including carriage returns, of up to 1024 characters. <delimiter> is a sequence of a blank line followed by a carriage return and then the sequence ". "
Description:
This command is used to enter the text content of the email.
Example:
AT^EMAILTEXT= Hello John, There are new AT commands for the Chameleon modem that can be used to send emails. Regards, Fred. . AT^EMAIL?

5.9.6 AT^EMAILSEND

Format:
AT^EMAILSEND
Description:
This command is used to SEND the previously setup email. If successful it will return OK. If unsuccessful it will return ERROR.
Example:
AT^EMAILSEND

5.10 SMS

It is possible to use AT commands to send SMS text messages directly from the CTM-130/132 modem to a phone number.

5.10.1 AT^SMSTO

Format:
AT^SMSTO=ppppppppp Where: ppppppppp is the phone number which the text message will be sent to

AT^SMSTO? Queries the current setting of this parameter.
Description: This command is used to set the phone number the SMS text message to be sent. Settings are not saved in non-volatile memory.
Example: AT^SMSTO=6044111234 AT^SMSTO?

5.10.2 AT^SMSTEXT

Format: AT^SMSTEXT=<string> Where <string> is a character string, of up to 1024 characters.
AT^SMSTEXT? Queries the current setting of this parameter.
Description: This command is used to enter the text message of the SMS. Settings are not saved in non-volatile memory.
Example: AT^SMSTEXT=Hi this is a test message AT^SMSTEXT?

5.10.3 AT^SMSEND

Format: AT^SMSEND
Description: This command is used to SEND the previously setup SMS message. Put the modem in mode 2. If successful it will return “^SMSACK: 00001, 0, 000”. “001” indicates the message number, “0” indicates OK and “000” indicates no error codes.
Example: AT^SMSEND

5.11 Remote Access

5.11.1 AT^ICMP

Format: AT^ICMP=n Where: n enables or disables the modem’s response to an incoming ping: Enabled = 1, disabled = 0 (default).

AT^ICMP? Queries the current state of this command's setting.
Description: This command configures the modem to respond to incoming ping requests or to ignore them. Use AT&W to save this command to non-volatile memory.
Example: AT^ICMP=1 AT^ICMP?

5.11.2 AT^PASSWORD

Format: AT^PASSWORD=<string> Where <string> is a string of up to 128 ASCII characters. AT^PASSWORD? Queries the current password.
Description: This command is used to set the password for accessing the modem's embedded web pages and for accessing remote telnet AT commands. Default is Chameleon (case sensitive).
Example: AT^PASSWORD=secret AT^PASSWORD= (leave blank to disable the password) AT^PASSWORD?

5.11.3 AT^RMTWEB

Format: AT^RMTWEB=n Where n is used to configure remote access to the embedded web server: Enabled = 1; disabled = 0 (default). AT^RMTWEB? Queries the current status of remote web server access.
Description: This command is used to enable remote access to the embedded web server feature of the modem. If enabled it will be possible to access the modems embedded web pages by using the current IP address allocated to the modem by the CDMA network. Note that this feature should be used with caution since it will be possible to change the communication mode of the modem so making it inaccessible. Use AT&W to save this command to non-volatile memory.
Example: AT^RMTWEB=1 AT^RMTWEB?

5.11.4 AT^WEBPORT

Format:
AT^WEBPORT=n Where n is the port number to be used for the embedded web server. Range: decimal 0 to 65535.
AT^WEBPORT? Queries the current setting of the Web port.
Description:
This command configures the port that the modem's embedded web server can be accessed on. Default is port 80. Use AT&W to save this command to non-volatile memory.
Example:
AT^WEBPORT=80 AT^WEBPORT?

5.11.5 AT^RMTTELNET

Format:
AT^RMTTELNET=n Where n=0 disables the telnet feature, and n=1 enables it.
AT^RMTTELNET? Queries the current state of this command's setting.
Description:
This command configures the modem to respond to telnet AT commands sent to it over the wireless network. The modem must be connected to the network. Default is disabled (0). Use AT&W to save this command to non-volatile memory.
Example:
AT^RMTTELNET=1 AT^RMTTELNET?

5.11.6 AT^TELNETPORT

Format:
AT^TELNETPORT=n Where n is the port to be used for remote telnet feature. Range: decimal 0 to 65535.
AT^TELNETPORT? Queries the current setting of the Telnet port.
Description:
This command configures the port that the modem will respond to incoming telnet commands. Default is port 23. Use AT&W to save this command to non-volatile memory.
Example:
AT^TELNETPORT=23 AT^TELNETPORT?

5.11.7 AT^TELNETTIMEOUT

Format:
AT^TELNETTIMEOUT=nnn Where nnn is the timeout time in seconds, range 1 to 65535.
AT^TELNETTIMEOUT? Queries the current setting of the command.
Description:
This command is used to set the timeout period for a telnet session with no activity. Default is 60 seconds. Use AT&W to save this command to non-volatile memory.
Example:
AT^TELNETTIMEOUT=30 AT^TELNETTIMEOUT?

5.12 Diagnostics & Status**5.12.1 AT^SHOWMES**

Format:
AT^SHOWMES=m1,m2,m3,m4 Where m1-4 are the message types – 1 to 4 types may be entered.
Description:
This command is used to locally display up to 4 individual messages. See section 6 for a list and description of available messages. Read only.
Example:
AT^SHOWMES=82,03,116,117 AT^SHOWMES=82

5.12.2 AT^IPADR?

Format:
AT^IPADR?
Description:
This command returns the IP address allocated to the modem by the CDMA network. If the modem is not connected to the network then address 0.0.0.0 is returned. Read only.
Example:
AT^IPADR?

5.12.3 AT^SYSLOG

Format:
AT^SYSLOG=n

Where: n is the number of system log records to return.
AT^SYSLOG This will return the entire contents of the system log up to a maximum of 1024.
Description: This command provides a mechanism to retrieve the log of system events recorded by the modem. Log events include network connects and disconnects. Note that the system log is stored in volatile memory so it will be lost when power is cycled on the modem.
Example: AT^SYSLOG=10 AT^SYSLOG

5.12.4 AT^VER?

Format: AT^VER?
Description: This command returns the firmware and FPGA version information for the modem. Read only.
Example: AT^VER?

5.12.5 AT^RSSI?

Format: AT^RSSI?
Description: This command returns the current signal strength as seen by the modem. The result is given in dBm. Read only.
Example: AT^RSSI?

5.12.6 AT^TEMP?

Format: AT^TEMP?
Description: This command returns the current temperature internal to the modem. The result is given in degrees Celsius. Read only.
Example: AT^TEMP?

5.12.7 AT+CSQ?

Format: AT+CSQ?

Description:
This command will return the current received signal quality: +CSQ: aa, bb Where aa = the received signal strength range 0 to 31: 0 = poor, 31 = strong, 99 = no signal bb = FER (always = 99) Read only. Note that the modem must be in MODE 1 for this command to take effect.
Example:
AT+CSQ?

5.12.8 AT+CSS?

Format:
AT+CSS?
Description:
This command will return the current CDMA system information: +CSS: a, b, ccccc Where a = current band class: 1 for 800MHz Cellular, 2 for 1900MHz PCS b = band: A to F (if Z the modem is not registered) ccccc = System ID (SID): 99999 if the modem is not registered. Read only. Note that the modem must be in MODE 1 for this command to take effect.
Example:
AT+CSS?

5.12.9 AT+GSN

Format:
AT+GSN
Description:
This command is used to get the modems Electronic Serial Number (ESN). It is returned in hex notation: To convert to decimal convert the two first two digits to a 3 digit decimal (add leading zeros if necessary). Then convert the last 6 digits to an 8 digit decimal (add leading zeros if necessary). Read only. Note that the modem must be in MODE 1 for this command to take effect.
Example:
AT+GSN

5.12.10 AT+GMR

Format:
AT+GMR
Description:
This command returns the firmware version of the modem's wireless module and the PRL (Preferred Roaming List) loaded in the module. Read only. Note that the modem must be in MODE 1 for this command to take effect.
Example:
AT+GMR

6**Report Messages**

There are three formats of messages supported by the CTM-130/132 modem. These are NMEA, TAIP, and ULCP.

- The NMEA format is a standard as defined by the National Marine Electronics Association (NMEA) and uses ASCII characters. Refer to the NMEA 0183 reference for definition of the NMEA messages. This standard also allows for proprietary NMEA messages.
- The TAIP format is a proprietary format from Trimble Navigation. Two TAIP messages (LN and PV) are supported by the CTM-132 modem.
- The Uniden Log/Config protocol (ULCP) format is a standard that uses a message header of 8 bytes followed by binary data or an embedded NMEA message. If binary data is used the ULCP messages are more efficient on their use of bandwidth.

The CTM-130/132 modem supports remote sending of these messages as UDP packets over the wireless network to a defined IP:port address, locally to a host connected device, or as email messages using the SMTP protocol. Messages are embedded within the email body as simple ASCII strings.

6.1 Message Types

Up to 4 messages can be attached to GPS and I/O reports. They are referenced by their decimal ID.

Decimal ID	Message description
03	Modem ID, proprietary NMEA message
16	GPS NMEA GLL message
20	Digital Input States, proprietary NMEA message
21	Analog Input #1 status, proprietary NMEA message
22	Analog Input #2 status, proprietary NMEA message
23	Analog Input #3 status, proprietary NMEA message
24	Analog Input #4 status, proprietary NMEA message
25	Analog Input #5 status, proprietary NMEA message
26	Analog Input #6 status, proprietary NMEA message
30	Network status, proprietary NMEA message
80	GPS NMEA GGA message
82	GPS NMEA RMC message
84	GPS NMEA GSA message
85	GPS ULCP format binary position data
98	GPS ULCP format binary event data
100	GPS TAIP PV message
101	GPS TAIP LN message
112	GPS with Modem ID ULCP format binary event data
114	GPS with modem ID proprietary NMEA (based on RMC)
115	Google Maps proprietary NMEA message
116	Power status, proprietary NMEA message

117	CDMA network diagnostic report, proprietary NMEA message
118	GPS NMEA GSV message

6.2 Message Formats

6.2.1 NMEA Message Format

ASCII	Description
\$	Start character
ABC or PABC	Message type. Messages starting with P are non-standard proprietary.
<string>,<string>	Message body. Multiple strings are separated with commas.
*	Message terminator
hh	Message checksum
<CR><LF>	Carriage return, line feed

6.2.2 ULCP Message Format

Hex	Description
0xPP	Packet type – defines the message type.
0xSS	Sequence number – incremented for each message.
0xCC	Command type: 0x00 = Query 0x01 = Response to query 0x02 = Set 0x03 = response to set 0x06 = Event report
0x00	Async time – not used so set to 0x00
0x00	Error code – not used so set to 0x00
0xLL	Message length (number of bytes following the password)
0x0000	Password – default 0x0000
0xDD.....	Data – message body of length defined by message length above

6.2.3 TAIP Message Format

	ASCII character	Notes
Start character	>	
Message control	Q, S, F, D, or R	One character eg Q=Query, R=Report
Message type	XX	Two characters, eg PV
Message body	Defined by message	Upper case ASCII only
End character	<	

6.3 Email Report Format

The requested message is sent as text within the body of the email. Example:

```
-----
From: <Modem ID>@CTM13x [mailto: Modem ID>@CTM13x]
Sent: Wednesday, June 01, 2005 2:55 PM
To: your_name@your_domain
Subject: Wireless Report
```

```
$PCTM,-97dBm,16422,2,1,198.230.168.36*6B
$GPGLL,4921.1234,N,11234.1234,E,215513.04,A*13
-----
```

Note that this email cannot be replied to.

6.4 NMEA Messages

6.4.1 GPS NMEA GLL

This is a standard NMEA message containing GPS latitude and longitude information and time.

Message format is:

```
$GPGLL,lll.llll,a,yyyyy.yyyy,b,hhmmss.ss,v*hh<CR><LF>
```

Where:

- lll.llll is the position latitude in degrees, minutes and decimal minutes
- a is N(orth) or S(outh)
- yyyyy.yyyy is the position longitude in degrees, minutes and decimal minutes
- b is E(ast) or W(est)
- hhmmss.ss is the UTC time in hours, minutes, seconds, and decimal seconds
- v is the data validity flag: A = valid data, V = invalid data
- hh is the message checksum

This message is implemented as message type 16

6.4.2 GPS NMEA GGA

This is a standard NMEA message containing time, GPS latitude and longitude, date, course and satellite status information.

Message format is:

```
$GPGGA,hhmmss.ss,lll.llll,a,yyyyy.yyyy,b,c,d,ee.e,sffff,M,,M,,0000*hh<CR><LF>
```

Where:

- hhmmss.ss is the UTC time in hours, minutes, seconds, and decimal seconds
- lll.llll is the position latitude in degrees, minutes and decimal minutes
- a is N(orth) or S(outh)
- yyyyy.yyyy is the position longitude in degrees, minutes and decimal minutes
- b is E(ast) or W(est)
- c is the GPS quality: 0 = not valid; 1 = valid

d is the number of satellites in use (range 0 to 8)
 ee.e is the Horizontal Dilution of Precision (HDOP)
 s is sign + or – for altitude above or below mean sea level
 ffff is the altitude in metres
 hh is the message checksum

This message is implemented as message type 80

6.4.3 GPS NMEA RMC

This is a standard NMEA message containing time, GPS latitude and longitude, altitude, and speed information.

Message format is:

\$GPRMC,hhmmss.ss,v,llll.llll,a,yyyyy.yyyy,b,ccc.c,ddd.d,ddmmyy,,*hh<CR><LF>

Where: hhmmss.ss is the UTC time in hours, minutes, seconds, and decimal seconds
 v is the data validity flag: A = valid current data, B = valid stored data,
 V = invalid current data, W = invalid stored data
 llll.llll is the position latitude in degrees, minutes and decimal minutes
 a is N(orth) or S(outh)
 yyyyy.yyyy is the position longitude in degrees and decimal degrees
 b is E(ast) or W(est)
 ccc.c is the horizontal velocity in knots
 ddd.d is the heading in degrees (relative to true north)
 ddmmyy is the day, month and year
 hh is the message checksum

This message is implemented as message type 82

6.4.4 GPS NMEA GSA

This is a standard NMEA message containing GPS receiver mode, ID of satellites used in the fix, and Dilution of Precision (DOP) values.

Message format is:

\$GPGSA,a,b,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,p,h,h,v,v,*hh<CR><LF>

Where: a is the receiver mode: A = automatic; M = manual (select 2D or 3D)
 b is fix mode: 1 = fix not available; 2 = 2D; 3 = 3D.
 xx is the ID of each satellite used in the fix (unused are 00)
 p.p is the Percent DOP value
 h.h is the Horizontal DOP value
 v.v is the Vertical DOP value
 hh is the message checksum

This message is implemented as message type 84

6.4.5 GPS NMEA GSV

This is a standard NMEA message containing the number of satellites in view, their ID, elevation, azimuth, and SNR value. Up to four satellites can be contained in a single GSV string so up to three strings are possible to cover up to 12 satellites.

Message format is:

\$GPGSV,m,n,vv,i1,e1,a1,s1,i2,e2,a2,s2,i3,e3,a3,s3,i4,e4,a4,s4,*hh<CR><LF>

Where:

- m is the total number of GSV messages in this sequence: 1 to 3
- n is the sequence number of this message: 1, 2 or 3
- vv is the number of satellites in view
- i1-4 is the satellite ID
- e1-4 is the satellite elevation in degrees
- a1-4 is the satellite azimuth in degrees true
- s1 is the satellite SNR in dB
- hh is the message checksum

This message is implemented as message type 118

6.4.6 Digital Input NMEA

This is a proprietary NMEA message containing the digital state of the six inputs on the CTM-130/132 modem.

Message format is:

\$PIND,abcdef*hh<CR><LF>

Where abcdef is the current digital state of inputs 1 through 6: 0 = low; 1 = high
hh is the message checksum

This message is implemented as message type 20

6.4.7 Analog Input NMEA

This is a proprietary NMEA message containing the analog state of the specified input on the CTM-130/132 modem.

Message format is:

\$PINA,n,x.xx*hh<CR><LF>

Where n is the analog input number with range 1 through 6.
x.xx is the current analog value of input n in volts
hh is the message checksum

These messages are implemented as message types 21 through 26

6.4.8 Network Status NMEA

This is a proprietary NMEA message containing the current CDMA network status.

Message format is:

\$PCTM,-xxdBm,yyyyy,b,r,nnn.nnn.nnn.nnn*hh<CR><LF>

Where xxx is the current signal strength
yyyyy is the current System ID (SID)
b is the band class: 1 = 800MHz, 2 = 1900MHz
r is the registered flag: 0 = not registered, 1 = registered.
nnn.nnn.nnn.nnn is the modems assigned IP address.
hh is the message checksum

This message is implemented as message type 30.

Note that if used with Store and Forward the network status parameters will be invalid.

6.4.9 Modem ID NMEA

This is a proprietary NMEA message containing the modem's ESN and ID. Note that the default ID is the modem's ESN.

Message format is:

```
$PMID,xxxxxxxxxx,yyyyyyyyyy*hh<CR><LF>
```

Where xxxxxxxxxxxx is the modem's unique 11 digit ESN

yyyyyyyyyy is the modem's ID as set by the user (maximum 11 characters)

hh is the message checksum

This message is implemented as message type 03

6.4.10 GPS with Modem ID NMEA

This is a proprietary NMEA message based on the NMEA RMC message with the addition of altitude, number of satellites in use, and the modem's ID.

Message format is:

```
$PGPS,hhmmss.ss,v,llll.llll,a,yyyyy.yyyy,b,ccc.c,ddd.d,ddmmyy,seeee,f,ggggggggggg*hh<CR><LF>
```

Where: hhmmss.ss is the UTC time in hours, minutes, seconds, and decimal seconds

v is the data validity flag: A = valid current data, B = valid stored data,

V = invalid current data, W = invalid stored data

llll.llll is the position latitude in degrees, minutes and decimal minutes

a is N(orth) or S(outh)

yyyyy.yyyy is the position longitude in degrees and decimal degrees

b is E(ast) or W(est)

ccc.c is the horizontal velocity in knots

ddd.d is the heading in degrees (relative to true north)

ddmmyy is the day, month and year

s is sign + or - for altitude above or below mean sea level

eeee is the altitude in metres

f is the number of satellites in use (range 0 to 8)

ggggggggggg is the modems ID (padded with zeros at end if < 11 characters)

hh is the message checksum

This message is implemented as message type 114.

6.4.11 Google Maps KML message

This is a proprietary NMEA message very similar to the \$PGPS message above with the only difference being the format of the modem ID field.

Message format is:

```
$PKML,hhmmss.ss,v,llll.llll,a,yyyyy.yyyy,b,ccc.c,ddd.d,ddmmyy,seeee,f,ggggggggggg*hh<CR><LF>
```

Where: hhmmss.ss is the UTC time in hours, minutes, seconds, and decimal seconds

v is the data validity flag: A = valid current data, B = valid stored data,

V = invalid current data, W = invalid stored data

llll.llll is the position latitude in degrees, minutes and decimal minutes

a is N(orth) or S(outh)

yyyyy.yyyy is the position longitude in degrees and decimal degrees

b is E(ast) or W(est)
 ccc.c is the horizontal velocity in knots
 ddd.d is the heading in degrees (relative to true north)
 ddmmyy is the day, month and year
 s is sign + or – for altitude above or below mean sea level
 eeeee is the altitude in metres
 f is the number of satellites in use (range 0 to 8)
 ggggggggggg is the modem's ID (shortened if < 11 characters)
 hh is the message checksum

This message is implemented as message type 115.

6.4.12 Modem Power Status NMEA

This is a proprietary NMEA message providing the modem's current supply voltage (Vcc), standby signal/ignition status (on or off), and the internal temperature.

Message format is:

```
$PPWR,vv.vv,i,tt*hh<CR><LF>
```

Where vv.vv is the modem supply voltage in volts.
 i is the standby signal/ignition status: 0 = off; 1 = on.
 tt is the modem's internal temperature in degrees Celsius.
 hh is the message checksum

This message is implemented as message type 116.

6.4.13 CDMA network diagnostic report

This is a proprietary NMEA message containing CDMA network information to assist in network diagnostics.

Message format is:

```
$PRFI,a,rdBm,tdBm,b,c,f,ff%,e,s*hh<CR><LF>
```

Where a is the network System ID (SID)
 r is the current RSSI value
 t is the current TX power adjust value
 b is the band class: 1 = 800MHz; 2 = 1900MHz
 c is the current centre channel number
 f,ff is the Frame Error Rate (FER)
 e is the current Ec/Io value
 s is the current Slot Cycle Index (SCI)
 hh is the message checksum

This message is implemented as message type 117.

6.5 ULCP Messages

6.5.1 GPS ULCP Binary Position

Header: 0x55 0xSS 0x06 0x00 0x00 0x18 0x0000

Message body:

Hex	Description
4 bytes	Normalized latitude (RMC latitude x 100,000)
4 bytes	Normalized longitude (RMC longitude x 100,000)
2 bytes	Speed in knots
2 bytes	Heading
1 byte	GPS data validity: 0x"A" = valid; 0x"V" = invalid; 0x"B" = buffered valid; 0x"W" = buffered invalid.
1 byte	Number of satellites used for position fix
1 byte	Position type (from GGA message)
0x00	Digital input state (0= off, 1=on): bit 0 = input #1, bit 1 = input #2...bit 5 = input #6
2 bytes	Altitude in metres
2 bytes	Differential correction age (only valid if differential correction being used)
4 bytes	Time (based on number of seconds since 00:00:00 January 1 st 1970)

This message is implemented as message type 85

6.5.2 GPS ULCP Binary Event

Header: 0x62 0xSS 0x06 0x00 0x00 0x1c 0x0000

Message body:

Hex	Description
4 bytes	Normalized latitude (RMC latitude x 100,000)
4 bytes	Normalized longitude (RMC longitude x 100,000)
2 bytes	Speed in knots
2 bytes	Heading
1 byte	GPS data validity: 0x"A" = valid; 0x"V" = invalid
1 byte	Number of satellites used for position fix
1 byte	Position type (from GGA message)
0x00	Digital input state (0= off, 1=on): bit 0 = input #1, bit 1 = input #2...bit 5 = input #6
2 bytes	Altitude in metres
2 bytes	Differential correction age (only valid if differential correction being used)
4 bytes	Time (based on number of seconds since 00:00:00 January 1 st 1970)
0x0000	Not used
0x00	Event source: None
0x00	Event reason: None

This message is implemented as message type 98

6.5.3 GPS with Modem ID ULCP Binary Event

Header: 0x70 0xSS 0x06 0x00 0x00 0xNN 0x0000

Where NN is the message length range 0x1d to 0x27 - dependant on the Modem ID string length.

Message body:

Hex	Description
4 bytes	Normalized latitude (RMC latitude x 100,000)
4 bytes	Normalized longitude (RMC longitude x 100,000)
2 bytes	Speed in knots
2 bytes	Heading
1 byte	GPS data validity: 0x"A" = valid; 0x"V" = invalid
1 byte	Number of satellites used for position fix
1 byte	Position type (from GGA message)
0x00	Digital input state (0= off, 1=on): bit 0 = input #1, bit 1 = input #2...bit 5 = input #6
2 bytes	Altitude in metres
2 bytes	Differential correction age (only valid if differential correction being used)
4 bytes	Time (based on number of seconds since 00:00:00 January 1 st 1970)
0x0000	Not used
0x00	Event source: None
0x00	Event reason: None
1 to 11 bytes	Modem ID: ASCII string

This message is implemented as message type 112

6.6 TAIP Messages

6.6.1 TAIP PV

This is the standard TAIP PV response message of format:

>RPVAAAAASBBCCCCSDDDEEEEEFFFGGGHI<

Where AAAAA is the GPS time in seconds

S is + or -

SBBCCCC is the Latitude in degrees and decimal degrees

SDDDEEEEE is the Longitude in degrees and decimal degrees

FFF is the speed in mph

GGG is the heading in degrees

H is the fix mode: 0 = 2D, 1 = 3D, 9 = no fix available

I is the data age: 2 = <10sec, 1 = >10sec, 0 = not available

This message is implemented as message type 100

6.6.2 TAIP LN

This is the standard TAIP LN response message of format:

```
>RLNAAAAABBBSCCDDDDDDDDSEEEFFFFFFFSGGGGGGHHIIJSKKKLMMMNOO  
PPQQ.....PPQRRRRRRRRRRRT<
```

Where AAAAAABBB is the GPS time in seconds and decimal seconds

S is + or -

SCCDDDDDDDD is the Latitude in degrees and decimal degrees

SEEEFFFFFFF is the Longitude in degrees and decimal degrees

SGGGGGGHH is the altitude above mean sea level in feet and decimal feet

IIJ is the horizontal speed in mph and decimal mph

SKKKL is the vertical speed in mph and decimal mph

MMMN is the heading in degrees and decimal degrees

OO is the number of SVs (satellites) used

PP is the SV ID for each satellite used

QQ is the IODE for each satellite used

RRRRRRRRRR is not used

X is the fix mode: 0 = 2D, 1 = 3D, 9 = no fix available

T is the data age: 2 = <10sec, 1 = >10sec, 0 = not available

This message is implemented as message type 101

7**MODBUS Messages**

The CTM-130/132 modem can be used in MODBUS mode for SCADA applications. The MODBUS message format is defined by the MODBUS organization.

7.1 MODBUS Message Format

MODBUS uses a binary format expressed in hex. It is a Request/Response protocol with allowance for Report by Exception Responses from the slave device.

Parameter		Format
MODBUS ID	0xII	1 byte, range 1 to 247
Function code	0xFF	1 byte defined by MODBUS protocol
Data	0xNN.....0xNN	Variable size dependant on function code
Error check,	0xZZZZ	2 bytes CRC (not used in MODBUS TCP messages)

7.2 MODBUS Messages

The following MODBUS messages are supported by the CTM-130/132 for reading and setting of its I/O. Refer to the MODBUS application protocol specification for a complete description of these messages.

7.2.1 Read Digital Outputs

In MODBUS terms this is called “read coils” and has function code 0x01.

Request message:

0xII 0x01 0x00 0x00 0x00 0x04 0xZZ 0xZZ

Where 0xII is the modem’s assigned MODBUS ID
0xZZ 0xZZ is the CRC checksum for this message

Response message:

0xII 0x01 0x01 0xSS 0xZZ 0xZZ

Where 0xSS is the current state of the 4 digital outputs

Bit 0 represents output #1

Bit 1 represents output #2

Bit 2 represents output #3

Bit 3 represents output #4

7.2.2 Set Digital Output

In MODBUS terms this is called “write coil” and has function code 0x05.

Request message:

0xII 0x05 0x00 0xWW 0xSS 0x00 0xZZ 0xZZ

Where 0xII is the modem’s assigned MODBUS ID

0xWW is the output to be set: range 0x00 to 0x03 corresponding with outputs
1 through 4

0xSS is the output set state: 0x00 = off, 0xFF = on.

0xZZ 0xZZ is the CRC checksum for this message

Response:

0xII 0x05 0x00 0xWW 0xSS 0x00 0xZZ 0xZZ

Where 0xWW is the output set: range 0x00 to 0x03 corresponding with outputs
1 through 4

0xSS is the set state of the output: 0x00 = off, 0xFF = on.

7.2.3 Read Digital Inputs

In MODBUS terms this is called “read discrete inputs” and has function code 0x02.

Request message:

0xII 0x02 0x00 0x00 0x00 0x06 0xZZ 0xZZ

Where 0xII is the modem’s assigned MODBUS ID

0xZZ 0xZZ is the CRC checksum for this message

Response message:

0xII 0x02 0x01 0xSS 0xZZ 0xZZ

Where 0xSS is the current state of the 6 digital inputs

Bit 0 represents output #1

Bit 1 represents output #2

Bit 2 represents output #3

Bit 3 represents output #4

Bit 4 represents output #5

Bit 5 represents output #6

7.2.4 Read Analog Input

In MODBUS terms this is called “read input registers” and has function code 0x04.

Request message:

0xII 0x04 0xSS 0xSS 0xNN 0xNN 0xZZ 0xZZ

Where 0xII is the modem's assigned MODBUS ID
 0xSS 0xSS is the start address for reading registers
 0xNN 0xNN is the number of registers to read
 0xZZ 0xZZ is the CRC checksum for this message

Example – to read all the modem's six analog input values:

0xII 0x04 0x00 0x00 0x00 0x06 0xZZ 0xZZ

Response message:

0xII 0x04 0x0C 0xH1 0xL1 0xH2 0xL2 0xH3 0xL3 0xH4 0xL4 0xH5 0xL5 0xH6 0xL6
 0xZZ 0xZZ

Where 0xHn is the high byte for analog input n.
 0xLn is the low byte for analog input n

Reg. #	Register content	Notes
0 – 5	Analog input 1 to 6 values	Value in volts x 100
6	Modem supply Vcc	volts x 100
7	Modem RSSI value	signed integer – units dBm
8	Modem internal temperature	signed integer – units degress Celsius
9	GPS day & month	
10	GPS year	
11	GPS hours & minutes	
12	GPS seconds & GPS validity flag	Validity flag: A = valid; V = invalid
13 – 14	GPS Latitude	Floating point radian format. To convert to degrees multiply by 180/pi (negative numbers are South, positive are North)
15 – 16	GPS Longitude	Floating point radian format. To convert to degrees multiply by 180/pi (negative numbers are West, positive are East)
17	GPS speed	Value in m/sec x 10
18	GPS heading	Value 0 to 359 degrees (integer)

7.2.5 Error response

If the modem is not able to correctly respond to a request then it will send an error response. This error response has the format:

0xII 0x8N 0xXX 0xZZ 0xZZ

Where 0xII is the modem's assigned MODBUS ID

0x8N is the error code corresponding with the request:

0x81 is for read coils

0x82 is for read discrete inputs

0x84 is for read input registers

0x85 is for write coil

0xXX is the exception code: 0x01, 0x02, 0x03, or 0x04

0xZZ 0xZZ is the CRC checksum for this message

7.3 MODBUS TCP Messages

MODBUS TCP messages are identical to those used with standard MODBUS except that they drop the two byte CRC check sum at the end of every message.

Parameter		Format
MODBUS ID	0xNN	1 byte, range 1 to 247
Function code	0xNN	1 byte defined by MODBUS protocol
Data	0xNN.....0xNN	Variable size dependant on function code

8**Technical Support**

For information about your CDMA network account, please contact your Network Operator: have the ESN and telephone number of the modem available to provide on the call.

The Cypress Solutions website provides product support information including:

- Support bulletins
- Application notes
- Software tools
- Firmware upgrades

www.cypress.bc.ca

For advanced technical support on Chameleon products contact:

Cypress Solutions Service Support Group

1.877.985.2878

or 604.294.4465

9.00am to 5.00pm PST

support@cypress.bc.ca