MAESTRO M100 SERIES 2013
SMARTPACK USER MANUAL

VERSION 3
FOR APPLICATION 097G

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Chapter 1

Introduction

Maestro SmartPack is a set of software solutions for Maestro 100 modem. Bundled functions added to increase the utility range of various industrial and automated applications, such as:

- Automatic and self-recovery TCP/UDP socket connection
- AT command driven TCP/UDP socket connection
- Ping Service
- Dynamic DNS
- Input/Output and Analog[1] triggered AT command
- Email sending (SMTP)
- Remote AT command through SMS and TCP Terminal
- Call screening
- Modem status check and monitoring
- Remote program updating
- “Command String” programming scripts
- Socket data sending
- GPS control commands[2]

User can configure and use the above features by following this document.

Target Users

This document is designed for system integrators or experienced hardware installers who are comfortable with all aspects of IP based networking and have an understanding of serial based technologies such as dial-up modems, AT commands and legacy data collection devices.

General behavior

Otherwise noted, each following command (AT+COMMAND) detailed in the user manual will reply as below:

OK Valid parameter string. Command is acknowledge.

ERROR Otherwise.

AT+COMMAND? Display the status of the current configuration.

AT+COMMAND=? Display the format and possible values of the command.

[1] Analog input only available on M1002G
[2] GPS only available on M1003GXT

1.1 SmartPack version command

AT+VAFV

Display the revision details of the SmartPack installed on Maestro modem

Syntax: AT+VAFV

Response: <model>_SMARTPACK_<revision>_<module>_<firmware>_<date>

Defined Values:

<model> is the modem type, either:

M1002G for the GPRS/EDGE version.
M1002GLITE for the GPRS/EDGE lite version.
M1003G for the WCDMA version.
M1003GXT for the WCDMA version with GPS antenna and USB connection.

<revision> is the version number of the SmartPack installed.

<module> is the Sierra Wireless module name.

<firmware> is the Sierra Wireless firmware required for this version of the SmartPack.

<date> is the build date of this version of the SmartPack.

Example:

Command	Response
AT+VAFV	M1002G_SMARTPACK_097e_SL6087_R746_250413 OK
AT+VAFV	ERROR Note: SmartPack has not been properly loaded or installed.

Note:

- To verify the Sierra Wireless firmware version loaded in the modem please enter the command ATI3, for more details on all the common AT commands available, please look in the Chapter 28.
- Be sure when updating the SmartPack that the required Sierra Wireless firmware is the correct one, otherwise the SmartPack application may crash or have wrong behavior.

1.2 Erasing the SmartPack application

If you need to erase the SmartPack application please follow the commands listed in table 1.1.

Command	Response	Function
AT+WOPEN=0	OK	Stop the application, modem will reset
AT+WOPEN=3	OK	Erase configuration memory
AT+WOPEN=4	OK	Erase flash memory, modem will reset
AT&F	OK	Factory default

Table 1.1: Erase Application

1.3 Switch between WipSoft and SmartPack

AT+SPMODE

Enable user to switch to standard Sierra Wireless WipSoft if the SmartPack commands are not required.

Syntax: AT+SPMODE=<mode>

Response: OK

Defined Values:

<mode> defines the application which runs on top of OpenAT:

0	SmartPack will run normally (Default value)
1	WipSoft will run and SmartPack commands are deactivated.

Example:

Command	Response
AT+SPMODE?	+SPMODE: 0 OK
AT+SPMODE=1	OK Note: WipSoft is activated and unit will reboot once
AT+SPMODE=0	OK Note: SmartPack is activated and unit will reboot once

Note:

– Command cannot be send remotely.

1.4 Reset SmartPack settings to default value

AT+SPRESET

Enable user to revert all SmartPack settings to default value in one command.

Syntax: AT+SPRESET

Response: OK

Example:

Command	Response
AT+SPRESET	OK Note: All SmartPack settings are reverted back to default and unit will reboot once.

Note:

– All core firmware settings will not be modified. I.e. baudrate (+IPR) or flow control of serial port (+IFC) won't be changed.

– Command cannot be send remotely.

1.5 Debug command for IP communication

AT+IPDEBUG

Configure embedded TCP/IP stack debug message to be sent out or not

Syntax: AT+IPDEBUG=<port>

Response: OK

Defined Values:

<port> defines the output port of debug message:

0	disable debug message (default),
1	debug message on main serial port,
2	(reserved),
3	debug message on USB COM port (M100 3G).

Example:

Command	Response
AT+IPDEBUG=1	OK Note: Enable the debug message on main serial port.
AT+IPDEBUG=3	OK Note: Enable the debug message on USB COM port
AT+IPDEBUG=0	OK Note: Disable the debug message

Note:

- After changing this setting, unit should be restarted prior to seeing the debug message.
- Debug message will only be sent when the port is in command mode.
- Command cannot be send remotely.

Chapter 2

GPRS and TCP/UDP parameters setup

Describes how to setup GPRS and TCP/UDP parameters to use the Automatic and AT command driven TCP/UDP connection, PING service, Dynamic DNS support.

2.1 GPRS Network Parameters

Following parameters are needed for GPRS connection:

- Access point name (APN)
- User name
- Password

Those parameters have to be set using the AT+IPGPRS command. Please contact your network operator if you need any assistance with those parameters.

2.1.1 GPRS network parameters

AT+IPGPRS

To setup GPRS network parameters for the TCP/UDP connection.

Syntax: AT+IPGPRS=<Cid>,<APN>,<UN>,<PW>

Response: +IPGPRS: <Cid>,<APN>,<UN>,<PW>

Defined Values:

<Cid> PDP context identifier. To use with TCP/UDP connection feature this value must be set to 1.

<APN> access point name of the GPRS network. Max 100 characters.

<UN> user name to access the GPRS service. Max 50 characters.

<PW> password used to access the GPRS service. Max 50 characters.

Example:

Command	Response
AT+IPGPRS?	+IPGPRS: 1,””,””,”” OK
AT+IPGPRS=1	OK Note: set Cid value to 1.
AT+IPGPRS=1,internet	OK Note: set the PDP value to 1 and APN to “internet”.
AT+IPGPRS=?	+IPGPRS: (1-4),(100),(50),(50) OK

2.1.2 Activating GPRS connection

AT+CGATT

Standard AT command to attach or detach to GPRS network. For more details please refer to the AT command guide.

Syntax: AT+CGATT=<state>

Response: +CGATT: <state>

Defined Values:

<state>

0	detached from GPRS.
1	attached to GPRS.

Example:

Command	Response
AT+CGATT?	+CGATT: 0 OK
AT+CGATT=1	OK Note: connection attached to GPRS.
AT+CGATT=0	OK Note: connection detached from GPRS.
AT+CGATT=?	+CGATT: (0-2) OK

Note: Before connecting to GPRS by this command make sure you have finished the following first:

1. Entered APN settings by AT+IPGPRS command refer to 2.1.1.
2. After modem power up, wait about 20 seconds before initiating a GPRS connection.

AT+IPCONNECT

To activate or deactivate GPRS connection. Once connection is started you can perform TCP/UDP connection, IPPING and other features of the SmartPack.

Syntax: AT+IPCONNECT=<Bearer>,<Connect>

Response: +IPCONNECT: <Bearer>,<Connect>

Defined Values:

<Bearer>

0	using GSM Bearer (**Note: Please do NOT use this setting**).
1	using GPRS Bearer.

<Connect>

0	to stop connection.
1	to start connection.

Example:

Command	Response
AT+IPCONNECT=1,1	OK Note: Activating GPRS connection success.
AT+IPCONNECT=1,1	+CME ERROR: 3 Note: Activating GPRS connection fail.
AT+IPCONNECT=1,0	OK Note: Deactivating GPRS connection success.
AT+IPCONNECT?	+IPCONNECT: 1,0 OK
AT+IPCONNECT=?	+IPCONNECT: (0-1),(0-1) OK

Note: Before connecting to GPRS make sure to:

1. Enter APN settings by AT+IPGPRS command detailed in Section 2.1.1 on page 15.
2. It is suggested, after modem power up, to wait for about 20 seconds before initiating a GPRS connection.

2.2 TCP/UDP Parameters Setup

The following commands need to be set to use automatic or AT command driven TCP/UDP connection:

- AT+IPTCP
- AT+IPUDP
- AT+IPBUFF

2.2.1 TCP socket parameters

AT+IPTCP

To specify TCP socket parameters to be used by automatic or AT command driven TCP connection, detailed in the Chapter 3.

Syntax: AT+IPTCP=<port>,<mode>,<address>,<TCPTxDelay>

Response: +IPTCP: <port>,<mode>,<address>,<TCPTxDelay>

Defined Values:

<port> port number to be used for the TCP socket connection. Default value is 0. Valid range is 0 to 65535.

<mode> mode of TCP operation. Default value is “S”.

“S” Server (Listening) mode. Maestro modem will open a listening TCP connection socket on the specified <port>. TCP connection will be active upon getting socket connection request from an allowed remote TCP peer specified in <address>.

“C” Client (Caller) mode. Maestro modem will request a TCP connection to the server TCP socket with the specified <address> and <port>.

Note: This parameter is used by AutoTCP connection only, see Chapter 3 for more details.

<address> IP address of the TCP socket. Default value is empty. Legal values are 32-bit in dotted-decimal notation (i.e. xxx.xxx.xxx.xxx) or alphanumeric ASCII URL string up to 120 characters (only if DNS is available on the GPRS network).

Note: In “Server” (Listening) mode the modem will only accept TCP connection requested with the IP address mask specified in the <address> field. If set to “255.255.255.255” the modem will accept ANY request.

<TCPTxDelay> delay introduced before sending a TCP frame that has not been entirely filled with user data. Default value is 0.

0 TCP frame will be sent as soon as possible after the reception of a single character value from the host.

1 a delay will be introduced before the sending of a TCP frame.

Example:

Command	Response
AT+IPTCP?	+IPTCP: 0,"S","",0,0 OK
AT+IPTCP=23	OK Note: set the TCP port to 23.
AT+IPTCP=23,”C”,”202.144.111.222”,0	OK Note: set the modem to connect as TCP socket Client (caller) mode to target address “202.144.111.222” on port 23.
AT+IPTCP=23,”S”,”255.255.255.255”,0	OK Note: set the modem to wait for TCP socket connection request (Server mode) with any calling IP address allowed, port 23.
AT+IPTCP=?	+IPTCP: (0-65535),("C","S"),(120),(0-1) OK

2.2.2 UDP socket parameters

AT+IPUDP

To specify UDP socket parameters to be used by automatic or AT command driven UDP connection, detailed in the Chapter 3.

Syntax: AT+IPUDP=<port>,<mode>,<address>,<UDPTxDelay>

Response: +IPUDP: <port>,<mode>,<address>,<UDPTxDelay>

Defined Values:

<port> port number to be used for the UDP socket connection. Default value is 0. Valid range is 0 to 65535.

<mode> mode of UDP operation. Default value is “S”.

“S” Server (Listening) mode. Maestro modem will open a listening UDP connection socket on the specified <port>. UDP connection will be active upon getting socket connection request from an allowed remote UDP peer specified in <address>.

“C” Client (Caller) mode. Maestro modem will request a UDP connection to the server UDP socket with the specified <address> and <port>.

Note: This parameter is used by AutoUDP connection only, see Chapter 3 for more details.

<address> IP address of the UDP socket. Default value is empty. Legal values are 32-bit in dotted-decimal notation (i.e. xxx.xxx.xxx.xxx) or alphanumeric ASCII URL string up to 120 characters (only if DNS is available on the GPRS network).

Note: In “Server” (Listening) mode the modem will only accept UDP connection requested with the IP address mask specified in the <address> field. If set to “255.255.255.255” the modem will accept ANY request.

<UDPTxDelay> delay introduced before sending a UDP frame that has not been entirely filled with user data. Default value is 0.

0	UDP frame will be sent as soon as possible after the reception of a single character value from the host.
1	a delay will be introduced before the sending of a UDP frame.

Example:

Command	Response
AT+IPUDP?	+IPUDP: 0,"S","",0 OK
AT+IPUDP=23	OK Note: set the UDP port to 23.
AT+IPUDP=23,”C”,”202.144.111.222”,0	OK Note: set the modem to connect UDP socket Client (Caller) mode to target address 202.144.111.222 on port 23.
AT+IPUDP=23,”S”,”255.255.255.255”,0	OK Note: set the modem to wait for UDP socket connection request (Server mode) with any calling IP address allowed, port 23.
AT+IPUDP=?	+IPUDP: (0-65535),("C","S"),(120),(0-1) OK

2.2.3 Socket buffer parameters

AT+IPBUFF

To specify the number of bytes of payload data, from remote peer, buffered inside the modem when using automatic or AT command driven TCP/UDP connection.

- If the quantity of buffered data reaches this value, the whole buffered data will be sent out to the serial port.
- If the data from remote is large enough at one time, only a multiple of this value will be sent out to the serial port remaining data will be kept inside buffer.

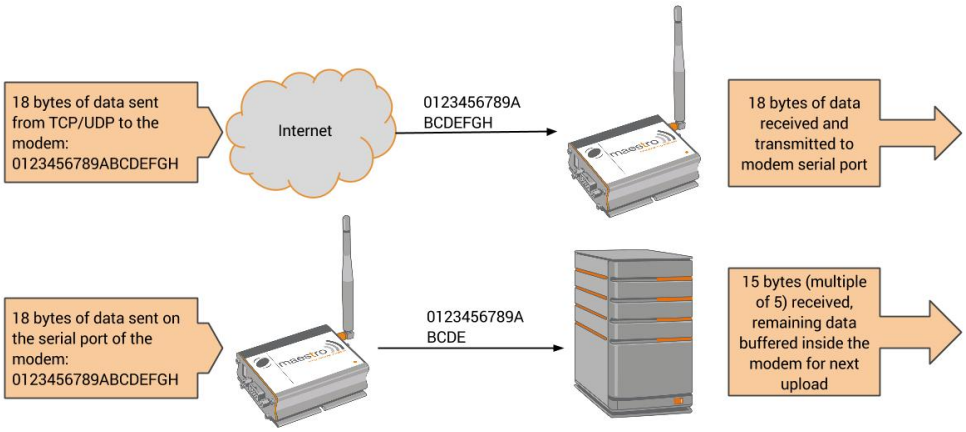

Figure 2.2.1: “AT+IPBUFF=15” example

Syntax: AT+IPBUFF=<buff>

Response: +IPBUFF: <buff>

Defined Values:

<buff> the number of bytes of data to be buffered. Default value is 0 (i.e. no buffering). Valid range is 0 to 100.

Example:

Command	Response
AT+IPBUFF=?	+IPBUFF: (0-100) OK
AT+IPBUFF?	+IPBUFF: 0 OK
AT+IPBUFF=5	OK Note: Set IPBUFF value to 5.

Note:

– If the TCP or UDP socket connection is broken, buffered data will be lost.

2.3 Extra TCP/UDP Parameters Setup

Set additional parameters for the TCP/UDP connection, including “keep alive” packet, maximum packet size, TTL and periodic ping action to monitor the Internet connection status.

AT+IPOPT

Syntax: AT+IPOPT=<CMDType>,<parameter>[,<action>,<con_str>]

Response: +IPOPT: <CMDType>,<parameter>[,<action>,<con_str>]

Defined Values:

<CMDType>

1 “keep alive” packet feature:
<parameter>=0 feature is disabled.
<parameter>=1 and a TCP socket connected, every 7200 seconds (2 hours) an empty “keep alive packet will be sent out from the modem to avoid socket being closed because of idle timeout.

2 <parameter> is the maximum size of the outgoing packet. The size can be set from 1 to 1500, default value is 1500.

3 <parameter> is the TTL value of the socket connection. The value can be set from 1 to 255. Default value is 128.

4 <parameter> is the period in second of calling +IPPING feature, after GPRS connected. Default value is 0. If +IPPING gives ERROR, modem will try to reconnect to GPRS.

5 <parameter> is the data to be sent on first connection. Data is in hexadecimal format, maximum length is 120 characters. Default is 0.

<action> To specify the action will be taken if a set of ping action fail:

0 do nothing (default).

1 disconnect GPRS (+IPCONNECT=1,0).

2 reset Maestro modem.

<con_str> To specify a set of data to be sent over the TCP/UDP channel to the remote peer when first connection is established. Data is entered in Hexadecimal format (01 to FF). Maximum 60 bytes of data can be set.

Example:

Command	Response
AT+IPOPT?	+IPOPT: 1, 0 +IPOPT: 2, 1500 +IPOPT: 3, 128 +IPOPT: 4, 0, 0 +IPOPT: 5, “” OK
AT+IPOPT =1,1	OK Note: enable the keep alive packet feature.
AT+IPOPT=2,512	OK Note: set the size of maximum packet that to be sent to 512 bytes.
AT+IPOPT=3,128	OK Note: set TTL to 128.
AT+IPOPT=4,60,1	OK Note: enable Ping action every 60 seconds, if ping fail then disconnect GPRS.
AT+IPOPT=5,”48454C4C4F”	OK Note: to send "HELLO" to remote peer when connection is established
AT+IPOPT=?	+IPOPT: (1-4),(0-65535)[,(0-2)] OK

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Chapter 3

Automatic and self-recovery TCP/UDP connection

The Auto TCP/UDP connection feature is defined for accessing serial devices over the Internet. Modem can be configured to connect, after power up, to a remote TCP/UDP socket (Client mode) or to wait for the TCP/UDP socket connection request from remote peer (Server mode).

If the socket connection is unsuccessful or disconnected it will repeat the connection request and back to waiting stage. This make remote peer can access serial device connected to Maestro modem.

The socket can be set to be disconnected after a period of unconditional connection or zero data traffic.

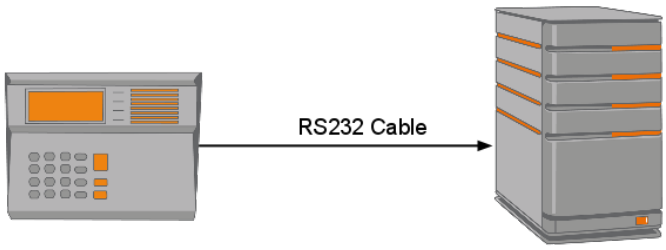


Figure 3.0.1: Direct Serial Connection

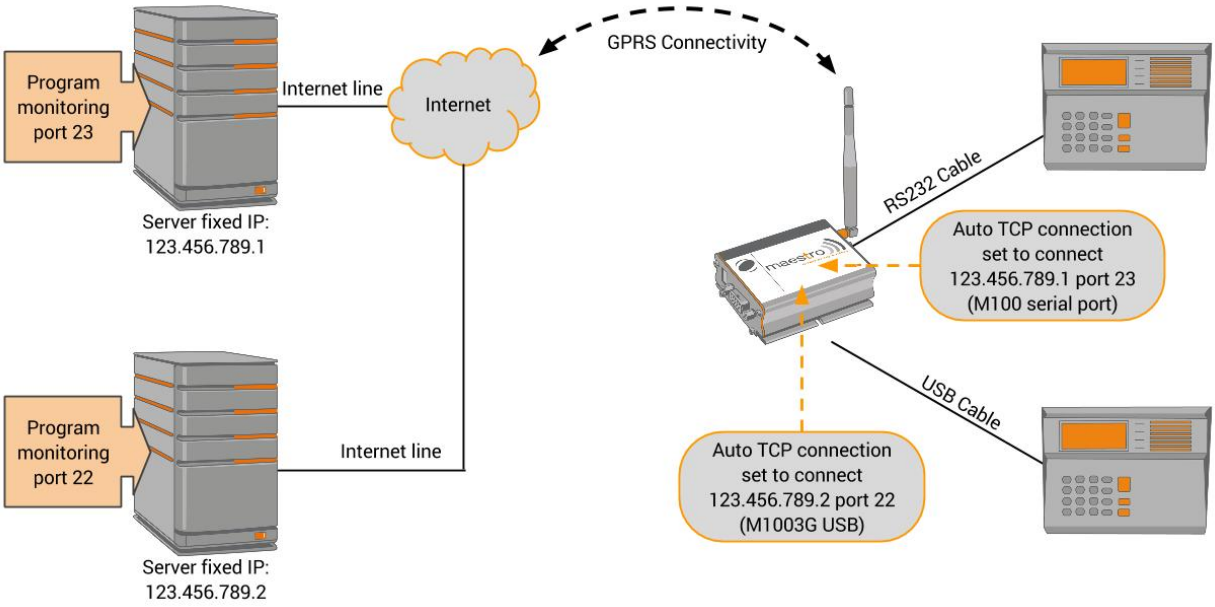
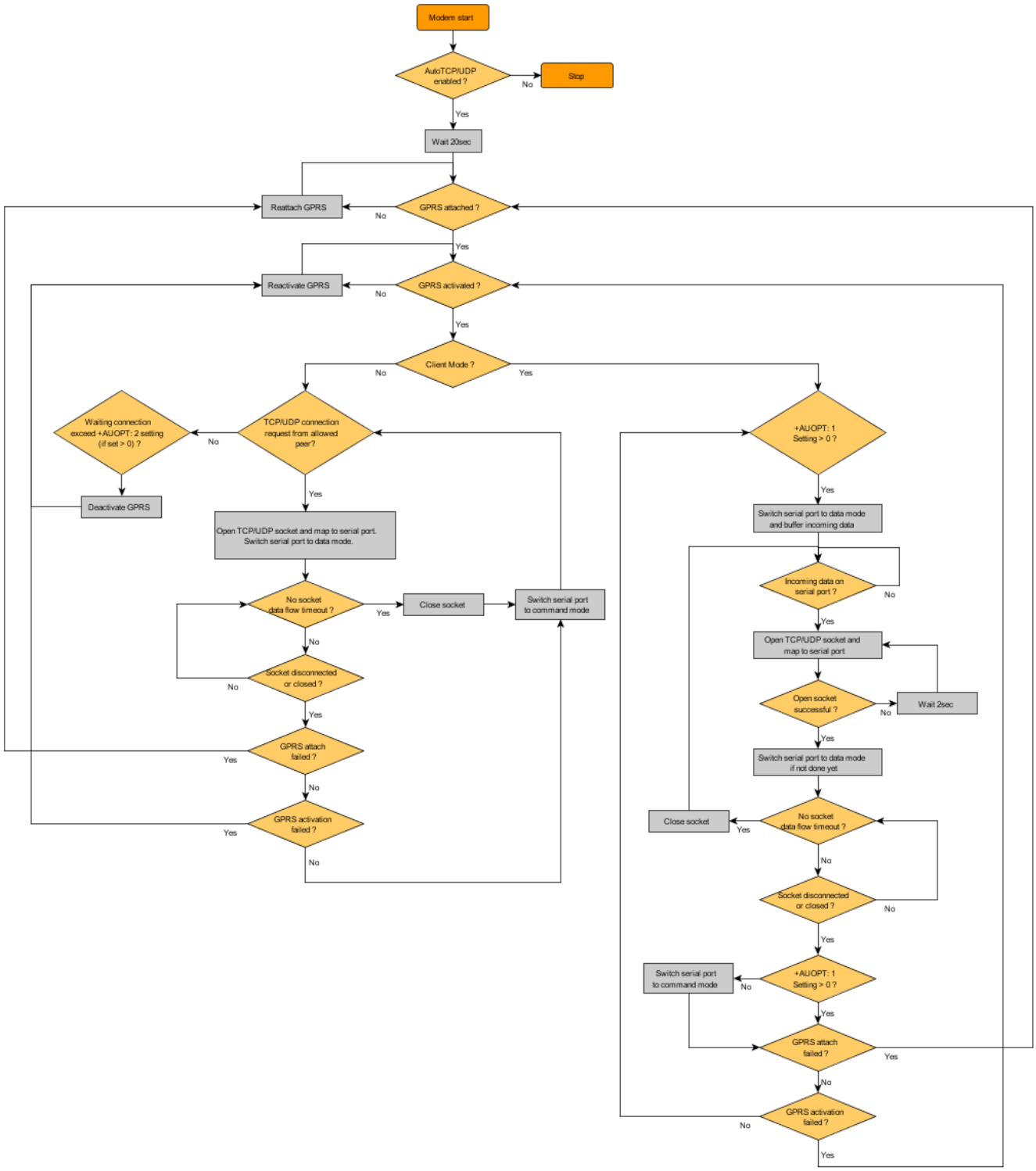


Figure 3.0.2: Example of Automatic Connection(s) over GPRS

3.1 Flow diagram of Auto TCP/UDP connection function



3.2 AT commands for Auto TCP/UDP connection

3.2.1 Automatic TCP connection

AT+AUTOTCP

This command controls the modem to start TCP socket connection automatically.

Two socket connections can be established at the same time, mapping to the main UART or USB UART in case of the M1003G.

Before using AT+AUTOTCP TCP and GPRS settings MUST be setup properly using AT+IPTCP and AT+IPGPRS command respectively. See section 2.2.1 and 2.1.1 for more details.

Syntax: AT+AUTOTCP=<mode>

Response: +AUTOTCP: <mode>

Defined Values:

<mode>

0	disable auto TCP (for main UART and USB UART).
1	enable auto TCP mapped to main UART, disable auto TCP mapped to USB UART.
2	enable auto TCP mapped to USB UART, disable auto TCP mapped to main UART.
3	enable auto TCP on both main and USB UART.

Example:

Command	Response
AT+AUTOTCP=0	OK Note : disable AutoTCP.
AT+AUTOTCP=1	OK Note: enable AutoTCP.
AT+AUTOTCP?	+AUTOTCP: 1 OK
AT+AUTOTCP=?	+AUTOTCP: (0-3) OK

Note:

- Before enabling Auto TCP, the GPRS settings MUST be properly configure by AT+IPGPRS command and TCP settings by AT+IPTCP command, see section 2.2.1 and 2.1.1 for more details.
- USB UART is only available on the M1003G model.
- ONLY GPRS PDP context # 1 will be used. Please setup +IPGPRS settings with <Cid>=1 .
- Once AutoTCP is enabled, it will start the TCP socket connection automatically after 20 seconds.
- Once the TCP connection is established successfully, the serial port will go to data mode, all data entered to the serial port will be sent to remote TCP peer. No more AT commands will be accepted.
- In TCP connected data mode, the DSR and DCD signals of the serial port will go to high.
- If the TCP connection is broken the modem will try to reconnect automatically. During re-connection period serial port will go back to command mode, and DSR/DCD signal back to low.
- The setting will be saved, and after power off, the AUTOTCP will be restarted with the 20 seconds delay after power up.

– To stop auto TCP connection, you need to enter the command AT+AUTOTCP=0 by either

  - 1: within 20 seconds after power up,
  - 2: during reconnection (serial port back to command mode),
  - or 3: by SMS (see chapter 10)

– Auto TCP connection is exclusive to other TCP/UDP feature. See chapter 22.

– The AutoTCP for UART1 and UART2 uses the corresponding TCP peer setting of AT+IPTCP command.

3.2.2 Automatic UDP connection

AT+AUTOUDP

This command controls the modem to start UDP connection automatically.

Two socket connections can be established at the same time, mapping to the main UART or USB UART in case of the M1003G.

Before using AT+AUTOUDP, UDP and GPRS settings MUST be setup properly using AT+IPUDP and AT+IPGPRS command respectively. See section 2.2.2 and 2.1.1 for more details.

Syntax: AT+AUTOUDP=<mode>

Response: +AUTOUDP: <mode>

Defined Values:

<mode>

0	disable auto UDP (for main UART and USB UART).
1	enable auto UDP mapped to main UART, disable auto UDP mapped to USB UART.
2	enable auto UDP mapped to USB UART, disable auto UDP mapped to main UART.
3	enable auto UDP on both main and USB UART.

Example:

Command	Response
AT+AUTOUDP=0	OK Note : disable AutoUDP.
AT+AUTOUDP=1	OK Note: enable AutoUDP.
AT+ AUTOUDP?	+AUTOUDP : 1 OK
AT+AUTOUDP=?	+AUTOUDP : (0-1) OK

Note:

– Before enabling Auto UDP, GPRS settings MUST be properly set by AT+IPGPRS command and UDP settings by AT+IPUDP command, see section 2.2.2 and 2.1.1 for more details.

– USB UART is only available on the M1003G model.

– ONLY GPRS PDP context # 1 will be used. Please setup +IPGPRS settings with <Cid>=1.

– Once AutoUDP is enabled, it will start the UDP socket connection automatically after 20 seconds.

- Once the UDP connection is established successfully, the serial port will go to data mode, all data entered to the serial port will be sent to remote UDP peer. No more AT commands will be accepted then.
- In UDP connected data mode, the DSR and DCD signals of the serial port will go to high.
- If the UDP connection is broken the modem will try to reconnect automatically. During re-connection period serial port will go back to command mode, and DSR/DCD signal back to low.
- The setting will be saved, and after power off, the AUTOUDP will be restarted with the 20 seconds delay after power up.
- To stop auto UDP connection, you need to enter the command AT+AUTOUDP=0 by
  - 1: within 20 seconds after power up,
  - 2: during reconnection (serial port back to command mode),
  - or 3: by SMS (see chapter 10).
- The AutoUDP for UART1 and UART2 uses the corresponding TCP peer setting of AT+IPUDP command.
- Auto TCP connection is exclusive to other TCP/UDP feature. See chapter 22.
- Due to the nature of UDP socket connection, AT+AUTOUDP=0 may not be able to disconnect. in this case you may send command AT+IPCONNECT=1,0 to disconnect GPRS connection.

3.2.3 Buffering time

AT+AUFCM

This command controls the buffering time of TCP/UDP data sent to remote peer. Data coming towards UART will be buffered for a “delay” period before being sent out.

Syntax: AT+AUFCM=<delay>

Response: +AUFCM: <delay>

Defined Values:

<delay> Delay units between sending buffered data to TCP/UDP peer. The actual delay time is calculated by the value of <delay> times 18.5 ms. So if <delay> is equal to 2 that means data will be sent to remote peer every 37ms (or immediately if internal buffer is full). Increasing this value can make the data packet size bigger especially when data flow is slow, thus reducing overhead. Default value: 2. Possible value: 1 to 255.

Example:

Command	Response
AT+AUFCM=2	OK Note: set the +AUFCM value to 2.
AT+ AUFCM?	+AUFCM: 2 OK
AT+AUFCM=?	+AUFCM: (1-255) OK

Note:

- If the value is set too high the maximum data transfer speed may be decreased.

3.2.4 Optional parameters

AT+AUOPT

This command lets user to set option parameters to control socket connection. There are three option parameters:

1. Socket idle period: period of connected socket with zero data traffic, socket will be closed when timeout.
2. Server idle period: period of connected socket with zero data traffic, GPRS will be deactivated and reactivated when timeout.
3. Socket connect period: period of maximum allowed connection time, socket will be closed when timeout.

Option	Applicable mode	Serial port behavior if option enabled
1	Client / Server	As client: in data mode all the time, data are buffered. As server: in data mode when socket is connected, in command mode when socket is not connected (data not buffered).
2	Server	n/a
3	Client / Server	Depends on <option> #1 setting.

Syntax: AT+AUOPT=<option>,<val>

Response: +AUOPT: <option>,<val>

Defined Values:

<option>

1 socket idle period (for client and server mode). After Auto TCP/UDP socket is connected, if there is no data transport in both direction for the time longer than the <val> (in minutes) of this <option> the socket will be disconnected. Please read notes below when using it with TCP client mode.

2 server idle period (for server mode only). If the unit set as a server have stayed in listening mode for the time longer than the <val> (in minutes) of this <option> the GPRS PDP context will be deactivated and then reactivated, and server listening modem will be resumed. This is to prevent GPRS network closing of GPRS because of zero data flow after some period.

3 socket connect period (for client and server mode). If a Auto TCP/UDP socket stays connected for longer longer than the <val> (in minutes) of this <option> the socket will be disconnected.

<val> Value of the corresponding. Unit is in minute. Default value is 0 (connection control disabled). Valid range is 0 to 65535.

Example:

Command	Response
AT+AUOPT=1,5	OK Note: set the socket idle period to value to 5 (min).
AT+AUOPT=2,720	OK Note: set the server idle period to value to 720 (min).
AT+AUOPT=3,15	OK Note: set the socket connect period to value to 5 (min).
AT+AUOPT=1,0	OK Note: set the socket idle period to value to 0 (disable).
AT+ AUOPT?	+AUOPT: 1,5 +AUOPT: 2,15 +AUOPT: 3,750 OK
AT+AUOPT=?	+AUOPT: (1-3),(0-65535)

Note:

- When <option> #1 is enabled with client mode, the serial port of the modem will be changed into data mode without waiting socket connection. And once data enter to serial port data will be buffered and then start connecting remote TCP server. This option is good when remote TCP server is not good for keeping socket all the time.
- New entered option values will become valid only after Auto TCP/UDP is disabled then re-enabled.
- When socket for TCP Terminal is connected GPRS deactivation by <option> #2 timeout will be deferred..

Chapter 4

AT command driven TCP/UDP connection

This feature let user to make a TCP or UDP connection upon the AT+OTCP or AT+OUDP command. This socket connection feature does support DLE/ETX character coding.

Make sure you have made the GPRS connection by AT+IPCONNECT command before making socket connection (see Chapter 23).

4.1 Closing connection command

AT+DLEMODE

When performing the AT command driven TCP or UDP socket connection, the attached host has the choice to code or not the ETX character. When DLEMODE is set to 0, no specific process is needed on ETX character. Meaning that it is not possible for a host to request an end of connection or to receive a clear indication of end of connection from the TCP/IP stack.

When DLEMODE is set to 1, the ETX character is activated to request or indicate an end of connection. ETX characters that belong to the payload data must be sent by the host on the serial port preceded by a DLE character. Similarly ETX characters received by the TCP/IP stack from the Internet are sent to the host through the serial port preceded by a DLE character.

“ETX” character is 0x03.

“DLE” character is 0x10.

Syntax: AT+DLEMODE=<mode>

Response: +DLEMODE: <mode>

Defined Values:

<mode>

1	enable DLEMODE.
0	disable DLEMODE (Default setting).

Example:

Command	Response
AT+DLEMODE=0	OK
AT+DLEMODE=1	OK
AT+DLEMODE?	+DLEMODE: 1 OK
AT+DLEMODE=?	+DLEMODE: (0-1)

Note:

– DLEMODE is not available for automatic TCP/UDP connection.

4.2 Opening TCP connection

AT+OTCP

This command is sent by the attached host to open a TCP connection to the TCP server specified by the AT+IPCTP command.

If socket connection is made successfully it will response CONNECT 115200 and the serial port will go to data mode, meaning that all data entered on the serial port will be sent to remote TCP/UDP peer.

If socket connection is unsuccessful or socket is disconnected afterward the modem will send out NO CARRIER message and back to command mode.

Syntax: AT+OTCP

Response: CONNECT 115200

Example:

Command	Response
AT+OTCP	CONNECT 115200 Note : TCP connection made successfully.
AT+OTCP	+CME ERROR 3 Note: fail, either IPCONNECT is not ready or socket service is used already.
AT+OTCP	NO CARRIER Note: possibly remote server no response.

Note:

- AT+OTCP connection is exclusive to other TCP feature. See chapter 22.

- If TCP connection is unsuccessful or broken after connection the GPRS connection will also be disconnected. (+IPCONNECT: 1,0). Enter AT+IPCONNECT=1,1 to reconnect GPRS before entering AT+OTCP.

4.3 Opening UDP connection

AT+OUDP

This command is sent by the attached host to open a UDP connection to the UDP server specified by the AT+IPUDP command.

If socket connection is made successfully it will response CONNECT 115200 and the serial port will go to data mode, meaning that all data entered to the serial port will be sent to remote UDP peer.

If socket connection is unsuccessful or socket is disconnected afterward the modem will send out NO CARRIER message and back to command mode.

Syntax: AT+OUDP

Response: CONNECT 115200

Example:

Command	Response
AT+OUDP	CONNECT 115200 Note: UDP connection made successfully.
AT+OUDP	+CME ERROR 3 Note: fail, either IPCONNECT is not ready or socket service is used already.
AT+OUDP	NO CARRIER Note: possibly remote server no response.

Note:

- AT+OUDP connection is exclusive to other TCP/UDP feature. See chapter 22.
- If UDP connection is unsuccessful or broken, after connection, the GPRS connection will also be disconnected. (+IPCONNECT: 1,0). Enter AT+IPCONNECT=1,1 to reconnect GPRS before entering AT+OUDP.
- Due to the nature of UDP socket connection, sending ETX characters (when DLEMODE is 1) may not be able to make disconnection.

Chapter 5

Ping service

This feature is to make a ping (ICMP Echo Request) to a specified IP address and get back the echo result. Ping service can also be called by IPCONNECT as a tool to check Internet connection. See AT+IPOPT command in section 2.3 for details.

5.1 Setting up and executing ping command

AT+IPPING

Syntax: AT+IPPING=<mode>,<address>,<nb>,<delay>,<timeout>

Response: +IPPING : <address>, time=<echo time>

Defined Values:

<mode>

0,1	reserved.
2	configure ping address and parameters below.

<address> IP address of the target to be pinged. Must be in form of dot-decimal notation (xxx.xxx.xxx.xxx).

<nb> numbers of ping trials for each ping action. E.g. if the value is 3 will ping the target for 3 times. Default value is 3. Valid range is 1 to 10.
(When used with IPCONNECT check the ping is assumed fail if all ping trials fail.)

<delay> time in second between each ping trial. Default value is 3. Valid range is 1 to 10.

<timeout> time in second before ping is timed out. Default value is 10. Valid range is 1 to 255.

Example:

Command	Response
AT+IPPING=2,”210.103.11.18”,3,1,15	OK Note : configure ping target (210.103.11.18), 3 ping trials total, 1 second between each trial, timeout limit 15
AT+IPPING	+IPPING : “210.103.11.18”, time=562ms +IPPING : “210.103.11.18”, time=662ms +IPPING : “210.103.11.18”, time=762ms OK Note: execute ping action (no argument)
AT+IPPING=?	+IPPING: (0-2)[,(15),(1-10),(1-10),(1-60)] OK Note : possible arguments
AT+IPPING?	+IPPING: ”210.103.11.18”, 3, 1, 15 OK Note: display current status

Note:

- Ping target must be in dot-decimal notation format, URL format is not supported.
- Before making command driven ping action (AT+IPPING w/o argument) make sure GPRS is connected (+IP-CONNECT: 1,1) and ping target and parameters are set properly.

Chapter 6

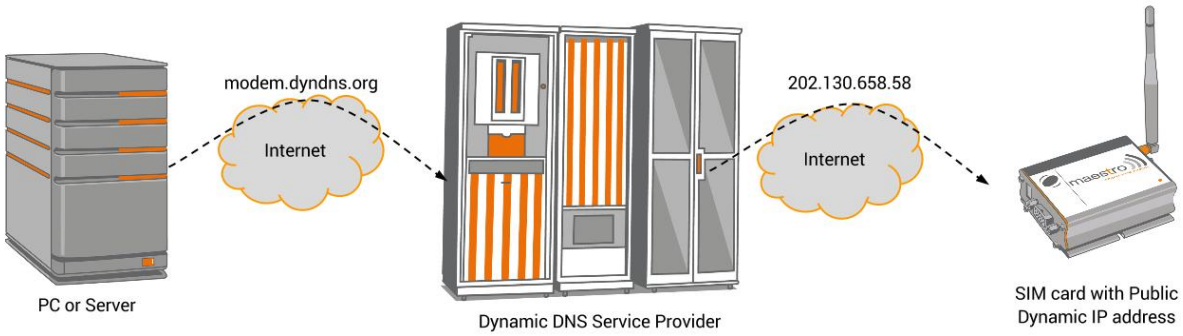
Dynamic DNS

To use this feature, we are strongly suggesting to get a special GPRS plan from your network operator, with the following features:

1. *network will assign a true public IP address to the modem upon GPRS activations, and*
2. *that GPRS connection allows incoming access from public Internet to the modem.*

This feature lets the Maestro modem to log in Dynamic DNS service providers[1], update the host name with Maestro modem current IP address. So user can access modem with preregistered host name. User can use this function together with "TCP Terminal" (see section 7.2) and can use Telnet to access modem and send AT command over Internet.

6.1 Description of operation



1. User need to create an account on DDNS service providers and register a host name. Following providers are tested working correctly: `www.dyndns.com`, `www.no-ip.com`
2. Use AT+IPDDNSSERV command to enter DDNS update server URL and port number. Use AT+IPDDNSACCT to enter own account login, password and host name.
3. When IPCONNECT is ready, use AT+IPDDNSUPD command to update the above host name with modem's current IP address.
4. User can also use AT+IPDDNSUPD command to configure automatic DDNS update upon each time of IPCONNECT established

[1] *Maestro Wireless Solution Ltd does not have affinity with any Dynamic DNS service providers. Maestro Wireless Solution Ltd does not guarantee any service provided by DDNS service providers and not liable to any loss or damage caused by such service.*

6.2 Dynamic DNS server

AT+IPDDNSSERV

Syntax: AT+IPDDNSSERV=<serv_url>,<serv_port>

Response: +IPDDNSSERV: <serv_url>,<serv_port>

Defined Values:

<serv_url> URL of the update server. For example “members.dyndns.org” for www.dyndns.com. Check with your DDNS service provider for correct name.

<serv_port> port number of the update server. For example 80 or 8080 for www.dyndns.com. Check with your DDNS service provider for correct port number.

Example:

Command	Response
AT+IPDDNSSERV=”members.dyndns.org”,80	OK Note: enter DDNS service provider’s update server information.
AT+IPDDNSSERV?	+IPDDNSSERV: ”members.dyndns.org”,80 OK
AT+IPDDNSSERV=?	+IPDDNSSERV: (64),(0-65535) OK

6.3 Dynamic DNS account

AT+IPDDNSACCT

Syntax: AT+IPDDNSACCT=<hostname>,<login>,<psswd>

Response: OK

Defined Values:

<hostname> Host name to be associated with modem’s IP address. Host name should be registered in an DDNS account. Maximum length is 64 characters.

<login> Login user name of the DDNS service account. Maximum length is 32 characters.

<psswd> Login password of the DDNS service account. Maximum length is 32 characters.

Example:

Command	Response
AT+IPDDNSACCT=”12345678.dyndns.org”, ”maestro”,”maestro”	OK Note: enter DDNS account and host name info
AT+IPDDNSACCT?	+IPDDNSACCT: ”12345678.dyndns.org”, ”maestro”,”maestro” OK
AT+IPDDNSACCT=?	+IPDDNSACCT: (64),(32),(32) OK

6.4 Updating Dynamic DNS information

AT+IPDDNSUPD

Syntax:

AT+IPDDNSUPD

AT+IPDDNSUPD=<auto_upd>

Response:

OK

+IPDDNSUPD: <result>, <ret_code>

Defined Values:

<auto_upd>

0	disable automatic DDNS update.
1	enable automatic DDNS update (see notes for details).

<result> result of DDNS update process. Related to the return code of DDNS update server. If <result> is 1 or 2 the update is assumed successful.

<ret_code> return code of DDNS update server.

Example:

Command	Response
AT+IPDDNSUPD=1	OK Note: enable automatic DDNS update.
AT+IPDDNSUPD=0	OK Note: disable automatic DDNS update.
AT+IPDDNSUPD	+IPDDNSUPD: 1, “good 203.111.111.111” OK Note: perform DDNS update, successful.
AT+IPDDNSUPD	+IPDDNSUPD: 3, “badauth” OK Note: perform DDNS update, unsuccessful.
AT+IPDDNSUPD?	+IPDDNSUPD: 3, “badauth” OK Note: automatic DDNS update disabled result of last DDNS update since power up.
AT+IPDDNSUPD=?	+ IPDDNSUPD: (0-1) OK

Table 6.1 list the relationship between <result> and <ret_code>. Visit Website of DDNS service providers for the explanation of return code.

Result	1	2	3	4	5	
Ret_code	good	no_chg	badauth	donator	notfqdgn	
Result	6	7	8	9	10	11
Ret_code	nohost	numhost	abuse	badagent	dnserr	911

Table 6.1: Relation between result and ret_code

Note:

- If the DDNS update process fails because of failure to get server response the <result> maybe a negative value, contact Maestro Wireless to get more details.
- If automatic DDNS update enabled, modem will detect GPRS connection and start DDNS update once connection is established. If update fails, it will retries 3 times maximum. User can enter AT+IPDDNSUPD? to check the result of last update result.

Chapter 7

TCP terminal

To use this feature, we are strongly suggesting to get a special GPRS plan from your network operator, with the following features:

- *network will assign a public IP address to the modem upon GPRS activation,*
- *GPRS connection allows incoming access from public Internet to the modem.*

This feature enables sending AT commands to the modem remotely through a TCP channel. User can use Telnet type terminal to connect to the modem and control it by sending AT commands.

7.1 Description of the Operation

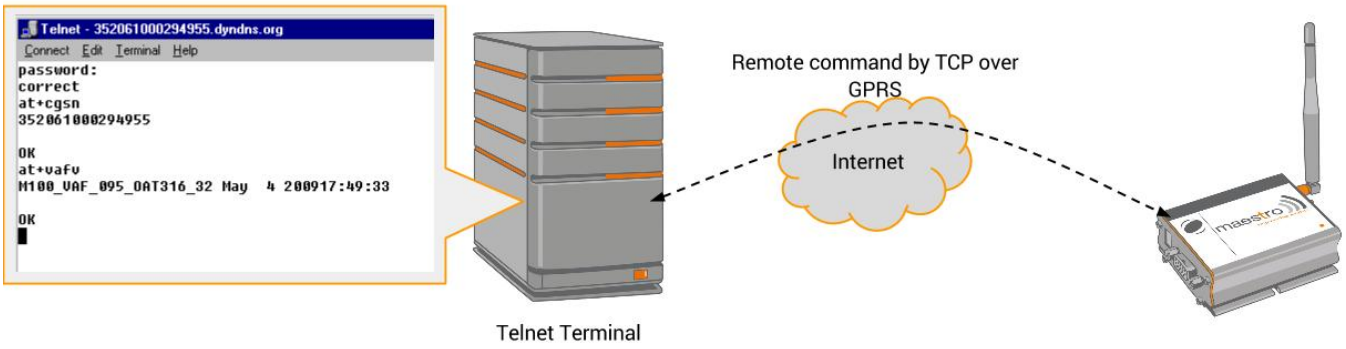


Figure 7.1.1: Example of TCP Terminal using Telnet

1. Uses AT+TCPTERM command to configure password port for the TCP terminal, and enable TCP terminal function.
2. After about 20 seconds modem will connect to the Internet automatically. And then will wait for connection on the TCP port specified.
3. User from Internet can use Telnet application to connect the port sets for TCP terminal. User need to know the IP address of the modem. Or with the aid of Dynamic DNS (Chapter 6) user can use the host name associated to the modem.
4. Once connected modem will prompt for a password. If password is correctly entered, user can send AT command to the modem.

7.2 TCP Remote Terminal

AT+TCPTERM

Syntax: AT+TCPTERM =<mode>[,<psswd>,<port>,<timeout>]

Response: +TCPTERM =<stat>,<psswd>,<port>,<timeout>

Defined Values:

<mode>

0	disable TCP Terminal.
1	enable TCP Terminal.
2	configure TCP Terminal parameters.

<psswd> login password for TCP Terminal. When user opens the modem TCP Terminal port it will prompt for a password. User need to enter the password set with this parameter. User has 3 retries to enter correct password. If password is correct user can enter AT command otherwise TCP connection will be closed. Password consists of 1 to 16 alphanumeric characters. Default is “000000” (6 zeros).

<port> port number of TCP Terminal. Please do not set to the same value of port number in +IPTCP and +IPUDP command. Default is 23. Valid value is 1 to 65535.

<timeout> maximum time in second TCP terminal will wait for an entry after TCP terminal opened. If no data received in this period the connection will be closed. Default is 30. Valid value is 1 to 65535.

Example:

Command	Response
AT+TCPTERM=2,”123456”,23,30	OK Note: configure TCP Terminal, password: 123456, port: 23, timeout: 30(secs).
AT +TCPTERM=1	OK Note: enable TCP terminal.
AT+TCPTERM=0	OK Note: disable TCP terminal.
AT+TCPTERM?	+TCPTERM: 1,”123456”,23,30
AT+TCPTERM=?	+TCPTERM: (0-2),(16),(1-65535),(1-65535) OK

Note:

- If TCP terminal is enabled the modem will connect to GPRS (+IPCONNECT=1,1) about 15 seconds after power up.
- Only one TCP terminal connection can be made at a time. Any further connection requested will be refused.
- Not all AT commands could be executed. If not allowed command is entered “command not allowed” message will be returned.
- Command echo feature is always enabled (except entering password).
- Unsolicited codes like “RING”, “+CMTI”, etc... will not be displayed on TCP terminal.
- Never send ‘interactive’ AT command by TCP Terminal, e.g. AT+CMGS, as it cannot return the prompt to the sender for second input.
- Always think twice before you send AT command. For example if you send AT+CPOF it will turn off the modem, and you need to go to access the modem to reset it.

Chapter 8

E-mail sending (SMTP) service

Be sure to have access to a SMTP server before using this feature. Network providers may have a dedicated SMTP server, please verify connection details and availability with them first.

Modem is able to send an email via a SMTP server. Parameters like server name, address of sender and recipient, email subject and email content need to be specified before sending an email, either by AT commands, or while using Command String email service (See Chapter 20 for more details about Command String services).

8.1 Description of the Operation

1. Enter the following information by AT commands[1]:
   (a) SMTP server information (address, port, login)
   (b) Email addresses of sender and recipient(s)
   (c) Email subject
   (d) Email content
2. Make IP connection (see Chapter 2).
3. Use AT+EMSEND command to send out email (see Section 8.6).
4. An email can contain:
   (a) Maximum up to 1024 (pre-saved) + 128 (command line additional) characters,
   (b) Three group of recipient: "TO", "CC" and "BCC". Each group can have up to 64 characters of email address(es),
   (c) Subject up to 128 characters, from a choice 10 pre-saved subject record.

8.2 SMTP server

AT+IPSMTP

Command to setup SMTP server parameters.

Syntax: AT+IPSMTP=<port>,<auth>,<server>,<id>,<pwd>

Response: +IPSMTP: <port>,<auth>,<server>,<id>,<pwd>

Defined Values:

<port> port number of the SMTP server. Default value is 25.

<auth> authentication type used for authentication:

0 no authentication required (default),

[1] Required information for a minimal email are: SMTP server, sender address and one recipient address

	1	authentication with no encryption,
	2	authentication used with encrypted user name/password in MIME64 during AUTH LOGIN phase.

<server> IP address of SMTP server (in xxx.xxx.xxx.xxx format) or an alpha numeric string format (e.g. smtp.server.com). Maximum 120 characters. Note: if alpha numeric string format is used, make sure the GPRS network has proper DNS service available.

<id> login name of the user. Maximum 64 characters.

<pwd> password for the user. Maximum 64 characters.

Example:

Command	Response
AT+IPSMTP=25,1,”smtp.network.com”,”login”,”pssd”	OK Note : setup SMTP parameter (using authentication with no encryption).
AT+IPSMTP=25,0,”smtp.network.com”	OK Note : setup SMTP parameter (no authentication).
AT+IPSMTP?	+IPSMTP: 25,0,”smtp.network.com”,””,”” OK
AT+IPSMTP=?	+IPSMTP: (0-65535),(0-2),(120),(64),(64) OK

8.3 Email address

AT+EMADDR

To save, read and delete email addresses of sender, recipient, CC recipient and BCC recipient.

Syntax: AT+EMADDR=<oper>,<id>,<address>

Response: +EMADDR : <oper>,<id>,<address>

Defined Values:

<oper> type of operation:

0	store email address to flash,
1	read email address from flash,
2	erase email address from flash.

<id> identification number (id) of the email address. Valid value is 0 to 50.

0	id of the sender address (mandatory),
1-50	id of recipient email address.

<address> email address to be stored.

Example:

Command	Response
AT+ EMADDR=0,0,”a@abc.com”	OK Note: store email address id #0 (sender address).
AT+ EMADDR=0,1,”b@abc.com”	OK Note: store email address id #1.
AT+ EMADDR=1,1	+EMADDR: 1, "b@abc.com" Note: read stored address id #1.
AT+ EMADDR=2,1	OK Note: erase email address id #1.
AT+ EMADDR=?	+EMADDR: (0-2),(0-50),(64) OK

Note:

- The program will NOT check if the address is in valid format or not.
- Email address stored with <id>=0 can only be used as of the sender address, not recipient.
- For each <id> you can save more than one email address, separated by comma, e.g. *AT+EMADDR=0,1,"me@a.com, you@a.com, him@a.com"*. But each address list limited to 64 characters.

8.4 Email subject

AT+EMSUBJ

To save, read and delete email subject (title).

Syntax: AT+EMSUBJ=<oper>,<id>,<subj>

Response: +EMSUBJ : <id>,<subj>

Defined Values:

<oper> type of operation:

0	store email subject to flash.
1	read email subject from flash.
2	erase email subject from flash.

<id> identification number (id) of the email subject. Valid value is 1 to 10.

<subj> email subject to be stored. Maximum 128 characters for each subject.

Example:

Command	Response
AT+ EMSUBJ=0,1,”This is subj #1”	OK Note: store email subject #1.
AT+ EMSUBJ=1,1	+EMSUBJ: 1, "This is subj #1" Note: read stored email subject with id #1.
AT+ EMSUBJ=2,1	OK Note: erase email subject with id #1.
AT+ EMSUBJ=?	+EMSUBJ: (0-2),(1-10),(128) OK

Note: It is recommend to use only alpha-numeric characters (ASCII value 32 to 127) for email subject content.

8.5 Email body

AT+EMBODY

To save, read and delete pre-saved email body (content). Up to 3 email bodies with 1024 characters max can be stored. The <id> field is the id number of the email body to be stored.

To save email body, first enter AT+EMBODY=0,<id> then <ENTER> and wait for "> " prompt. Then simply type email body content, <Ctrl-Z> (ASCII 26) to finish. This command can be aborted using the <ESC> (ASCII 27) character when entering text.

Syntax:

AT+EMBODY= <oper>,<id>
text is entered <Ctrl-Z / ESC>

Response:

+EMBODY : <id>,<len>
OK

+EMBODY : <id>
Email body entered
OK

Defined Values:

<oper> type of operation:

0	store email body to flash.
1	read email body from flash.
2	erase email body from flash.

<id> identification number (id) of the email body. Valid value is 1 to 3.

<len> length (number of characters) of the email body stored.

Example:

Command	Response
AT+ EMBODY=0,1 *This is email body #1*<Ctrl-Z>	> Note: enter email body with id #1. +EMBODY: 1,21 OK Note: successful stored 21 characters as email body with id #1.
AT+ EMBODY=0,1 *This is email* <ESC> Note: press <ESC> to abort email body entry.	> OK Note: abort to store email body with id #1.
AT+ EMBODY=1,1	+EMBODY: 1 This is email body #1 OK Note: read stored email body with id #1.
AT+ EMBODY=2,1	OK Note: erase email body with id #1.
AT+ EMBODY=?	+EMBODY: (0-2),(1-3) OK

Note:

- As a standard SMTP type email, the body should contain alpha-numeric characters only.
- Each email body can contain up to 1024 characters. If data entered goes over 1024 characters, only the first 1024 characters will be saved.
- On saving email body to a same <id> old body will be over written.

8.6 Sending an email

AT+EMSEND

To send an email with pre-saved email subject (using *AT+EMSUBJ* command, section 8.4); pre-saved email body (content) (using *AT+EMBODY* command, section 8.5), plus an additional email body to pre-saved email address(es) (using *AT+EMADDR* command, section 8.3). Maximum three group of recipient: "TO", "CC" and "BCC"; can be sent for a single email.

GPRS connection (*+IPCONNECT=1,1* see section 2.1.2) must to be made and SMTP parameters have to be entered properly before sending email otherwise will return *+CME ERROR: 3*. When finishing a result code will be returned. Result code "0" means email transferred success, otherwise there is error. See following for more explanation.

Syntax: AT+EMSEND= <to_id>,<cc_id>,<bcc_id>,<subj_id>,<body_id>,<add_body>

Response: +EMSEND: <result>

Defined Values:

<to_id> identification number (id) of the email address(es) that as a normal email recipient. Valid value is 0 to 50. ('0' or missing parameter means no recipient for this email)

<cc_id> identification number (id) of the email address(es) that as a "carbon copy" (cc) email recipient. Valid value is 0 to 50. ('0' or missing parameter means no cc recipient for this email)

<cc_id> identification number (id) of the email address(es) that as a "blind carbon copy" (cc) email recipient. Valid value is 0 to 50. ('0' or missing parameter means no recipient for this email).

<subj_id> Identification number (id) of the email subject. Valid value is 0 to 10. ('0' or missing parameter means no subject for this email).

<body_id> identification number (id) of the email body (content). Valid value is 0 to 3. ('0' or missing parameter means no saved body will be used for this email).

<add_body> additional email body (content) to be sent. Maximum 128 characters can be sent. <add_body> will be added just after body indicated by <body_id> (if any).

<id> identification number (id) of the email body. Valid value is 1 to 3.

<result> result code of the email sending process:

0	email sending successful.
-1	reserved (Contact Maestro Wireless).
-2	reserved (Contact Maestro Wireless).
-3	SMTP setup fail (Check *+IPSMTP* parameters).
-4	cannot resolve SMTP server/ server not found (Check *+IPSMTP* parameters).
-5	connect SMTP server timeout (Retry later).
-99	other error (Contact Maestro Wireless).
4xx–5xx	SMTP protocol reply code (Check SMTP document (RFC 821) for explanation).

Example:

Command	Response
AT+ EMSEND=1	+EMSEND: 0 OK Note: minimum email (no subject and body) successfully sent email to email address stored id #1.
AT+ EMSEND=0,0,2	+EMSEND: 0 OK Note: minimum email (no subject and body) successfully sent email to email address stored id #1 as “bcc” recipient.
AT+ EMSEND=1,2,3,1,1,”extra”	+EMSEND: 0 OK Note: email with subject stored with <id>=1; body stored with <id>=1 and additional body “extra” is sent to: Address with id# 1 as recipient, Address with id# 2 as cc recipient, Address with id# 3 as bcc recipient.
AT+ EMSEND=1,2,3,1,1,”extra”	+CME ERROR:3 Note: email sending fail (possible reason: GPRS not connected).
AT+EMSEND=?	+EMSEND: [(1-50),(1-50),(1-50),(1-10),(1-4),(128)] OK

Note:

- As a standard SMTP type email, the body should contain alpha-numeric characters only.
- A "minimum" email contains at least sender’s email address and one recipient address. Subject and body can be left empty.
- When one email is being sent you cannot send another email. To put a queue of emails please use Command String "EM" (email sending) service, see Chapter 18.0.1.

Chapter 9

TCP Socket Communication Service

Similar to email sending service, this feature lets the modem sending raw TCP message, up to 256 bytes, to a TCP server. Useful for M2M communication client to send data to server without any kind of protocol overhead. It can be also used with Command String for sending status of plug-in board.

The socket communication service is one way only. Data sent in the direction from server to modem during connection is discarded.

9.1 Description of the Operation

1. Enter the following information by AT commands (see following sections):
   (a) TCP server information (address, port, retry).
   (b) TCP message content.
2. Make IP connection (see Chapter 2).
3. Use AT+SCSEND command to send out message, or a message can contain maximum up to 128 (pre-stored) + 128 (command line additional) characters.

9.2 TCP socket

AT+SCHOST

This command is to set TCP server parameters.

Syntax: AT+SCHOST= <oper>,<id>[,<address>,<port>,<retry>,<delay>,<type>]

Response: +SCHOST: <id>,<address>,<port>,<retry>,<delay>,<type>

Defined Values:

<oper> type of operation:

0	enter host settings.
1	read host settings.
2	erase entered host settings.

<id> identification number of the host setting to be accessed. Valid value is 1 to 10.

<server> IP address of host (in xxx.xxx.xxx.xxx format) or an alpha numeric string format (e.g. myhost.com). Maximum 120 characters. Note: if alpha numeric string format is used, make sure the GPRS network has proper DNS service available.

<port> port number of the host server. Valid range is 1 to 65535.

<retry> number of retry after the first connection unsuccessful. Each retry will be delayed according to <delay> parameter. Default value is 0 (no retry). Valid range is 0 to 10.

<delay> time of delay before the next connection retry, in minute. Default value is 1. Valid range is 1 to 60.

<type> type of server connection:

0	TCP (default),
1	UDP.

Example:

Command	Response
AT+SCHOST=0,1,"myhost.com",23,2,10,0	OK Note : setup host TCP "myhost.com" with id #1, <port>=23,<retry>=2 ,<delay>=10.
AT+SCHOST=1,1	+SCHOST: 1,"myhost.com",23,2,10 OK Note: display host setting with id #1.
AT+SCHOST=2,1	OK Note: erase host setting with id #1.
AT+SCHOST=?	+SCHOST: (0-2),(1-10),(128),(1-65535),(0-10),(1-60),(0-1) OK

9.3 TCP socket message

AT+SCMESS

To save, read and delete socket communication message. Up to 3 messages with 1024 characters max can be stored.

The <id> field is the id number of the message to be stored. To save message body, first enter AT+SCMESS=0,<id> then <ENTER> and wait for "> " prompt. Then simply type content, <Ctrl-Z> (ASCII 26) to finish.

This command can be aborted using the <ESC> (ASCII 27) character when entering text.

Syntax:

AT+SCMESS= <oper>,<id>,<mess>
text is entered <Ctrl-Z / ESC>

Response:

+SCMESS: <id>
message entered
OK

Defined Values:

<oper> type of operation:

0	enter message body.
1	read saved message.
2	erase saved message.

<id> identification number (id) of the message. Valid value is 1 to 3.

Example:

Command	Response
AT+SCMESS=0,1 This is message #1<Ctrl-Z> Note: enter message body with <id>=1.	> +SCMESS: 1,18 OK Note: successful stored 18 characters as message with <id>=1.
AT+ SCMESS=0,1 This is email <ESC> Note: press <ESC> to abort message entry.	> OK Note: abort to store message with <id>=1.
AT+SCMESS=1,1	+SCMESS: 1 This is message body #1 OK Note: read stored message with <id>=1.
AT+SCMESS=2,1	OK Note: erase message body with <id>=1.
AT+SCMESS=?	+SCMESS: (0-2),(1-3)

Note:

- Each message can contain up to 128 characters. All characters entered after 128^{ht} will be discarded.
- On entering message to a same <id> old message will be over written.

9.4 Sending a TCP socket message

AT+SCSEND

To send a message to a pre-saved TCP host with or without one pre-saved message content, plus additional message entered on command line. A minimum of 1 byte message needs to be sent otherwise it will send an error.

GPRS connection (*+IPCONNECT=1,1*) must to be made and host parameters have to be entered properly before sending otherwise will return *+CME ERROR: 3*.

When finishing a result code will be returned. Result code "0" means message transferred success, otherwise there is error.

Syntax: AT+SCSEND= <to_id>,<mess_id>,<add_mess>

Response: +SCSEND : <result>

Defined Values:

<to_id> identification number (id) host entered using AT+SCHOST command. Valid value is 1 to 50.

<mess_id> identification number (id) of the saved message. Valid value is 1 to 3.

<add_mess> additional message to be sent. Maximum 128 characters can be sent. <add_body> will be added just after message indicated by <mess_id> (if available).

<result> result code of the email sending process:

0	message sending successful.
-1	reserved (contact Maestro Wireless support).
-2	reserved (contact Maestro Wireless support).
-3	host setup fail (check +SCHOST parameters).
-4	cannot resolve host server / host not found (check +SCHOST parameters).

-5	connect host server timeout (retry later).
-99	other error (contact Maestro Wireless support).

Example:

Command	Response
AT+SCSEND=1,0,”A”	+SCSEND: 0 OK Note: minimum message(1 character) successfully sent to host address stored <id>=1.
AT+SCSEND=1,1,”extra”	+ SCSEND: 0 OK Note: message content saved with <id>=1; and additional message “extra” is sent to: host <id>=1.
AT+SCSEND=1,1,”extra”	+CME ERROR: 3 Note: message sending fail (possible reason: IP not connected).
AT+SCSEND=1,1,”extra”	+EMSEND: -4 OK Message sending fail (cannot find host).
AT+SCSEND=?	+SCSEND: (1-10),(1-3)[,{128}] OK

Note:

- A "minimum" message should contain at least one byte (character) either from saved or additional message.
- If saving message to a same <id>, old message will be over written.

Chapter 10

Remote AT command by SMS

This feature is to control the modem to interpret AT command from incoming SMS, executing it, and return the result to sender by SMS.

The user can enable the modem to receive AT command by incoming SMS.

10.1 Description of the operation

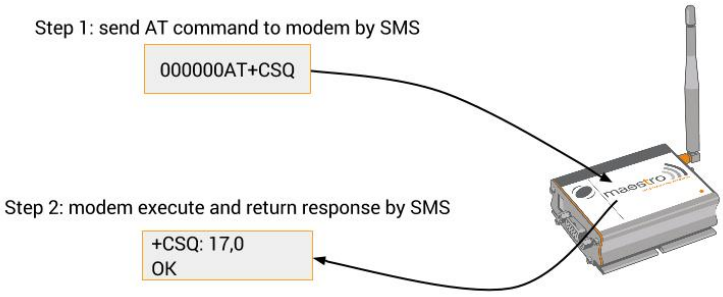


Figure 10.1.1: Example of remote AT command by SMS

1. When enabled, the modem will treat the incoming SMS as a source of AT command only if all of the following conditions (a, b and c) are fulfilled:
   (a) The content of SMS sent to the modem is using standard 7-bit GSM data decoding scheme,
   (b) The first 6 characters of the SMS content matches the <key> parameter set by AT+SMSAT command (default key is “000000”),
   (c) The 7th and 8th characters of the SMS content is “AT” (in capital letters).
2. If SMSAT is enabled, the modem will read each incoming SMS, if the conditions mentioned in 1 are matched the message will be executed, even it is an invalid AT command.
3. When using SMSAT feature, only +CNMI:x,1,x,x,x setting could be used (i.e. incoming message will be stored in SIM card).
4. The maximum length of the AT command is limited by length of SMS, i.e. 160-6 = 154 characters.
5. When the SMS AT command is executed, all intermediate and final responses will be buffered recorded, then return to the sender’s phone number in one single SMS.
6. If response(s) of the AT command is (are) more than 160 characters, only the first 160 characters will be returned.
7. In case the modem cannot get terminal response within 26 seconds, the modem will then abort the command, and return intermediate responses (if present).
8. If the SMSAT feature is enabled, all incoming SMS, either with valid AT command or not, will be erased. This is to prevent SIM card memory from fully filled; such the modem will not receive new SMS.

10.2 Remote AT command by SMS

AT+SMSAT

Syntax: AT+SMSAT=<mode>(,<key>)

Response: +SMSAT: <mode>,<key>

Defined Values:

<mode> is the configuration mode:

0	disable remote AT command by SMS.
1	enable remote AT command by SMS.
2	change the value of the <key>.

<key> is a 6-digit numeric character key from 000000 to 999999. Only incoming SMS with the first 6 characters matching with this key will be treated as a valid source of remote AT command.

Example:

Command	Response
AT+SMSAT=0	OK Note: disable remote AT command by SMS
AT+SMSAT=1	OK Note: enable remote AT command by SMS
AT+SMSAT?	+SMSAT: 1, “000000” OK
AT+SMSAT=2,123456	OK Note: set the <key> value
AT+SMSAT =?	+SMSAT: (0-2),(6) OK

Note:

– After changing the <type> value the modem will reset immediately.

10.3 Limitation and caution when using remote AT command

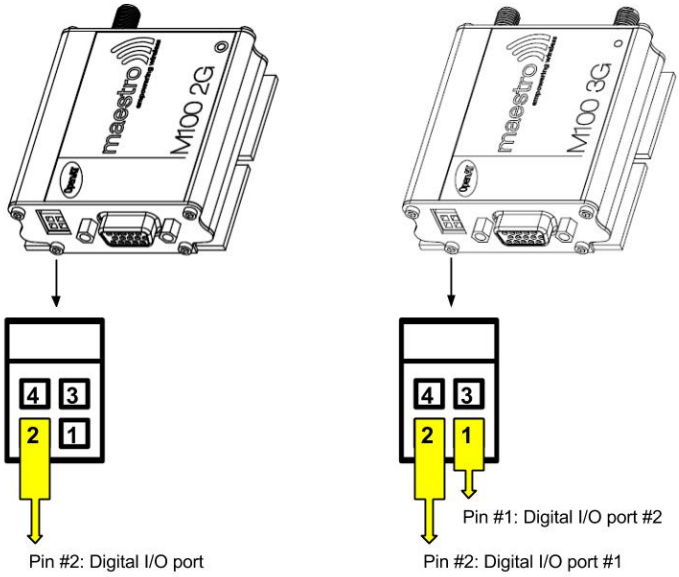
This feature will not ‘judge’ the result of executing the command, so care has to be taken not to enter improper command that make the modem becoming out of control:

1. Never send ‘interactive’ AT command by SMS, e.g. AT+CMGS=... This feature cannot return the prompt to the sender for second input
2. Always wait for the return SMS with AT responses before you send another SMS AT command.
3. It could be in some case (e.g. network failure) the modem cannot return response SMS. The modem will try sending response SMS for three times max. If still not successful it will abort.
4. Always think twice before you send AT command by SMS. For example, if you send AT+CPOF it will turn off the modem, and you need to go on site to access the modem to reset it.
5. Some AT commands can’t be sent over SMS. See Chapter 26.

Chapter 11

Input/Output port control

M100 3G is equipped with two I/O ports on the power connector. Each port is connected to an input and output pin inside.



The SmartPack supports I/O port function with two sets of AT commands:

1. I/O board control commands (originally from Heritage modem I/O expansion plug-in): +IOBR, +IOBW, +IOBOR. Those commands control the two I/O ports functions both input and output.
2. I/O port triggered AT commands (AT+IOAT, originally from earlier M100/M100evo). This command use the I/O port #1 as a sensor. If the input matches the condition a specified AT command will be executed.

Both commands can be used at the same time. And some settings are shared by both (see below).

11.1 Relationship between input and output of I/O ports

Please refer to M100 3G user guide for the electrical connection method for input or output applications.

Each port is connected to an input and output pin inside modem. However an external DC voltage signal MUST be applied in order to use I/O ports. Output pin can be set to On (1) or Off (0) by AT command. Input pin can be read by AT command as either high (1) or low (0).

Following table list the relationship between external DC input, input and output pin:

External DC input	High	Low	High	Low
Output setting	1	0	0	1
Input reading	1	1	0	1

11.2 I/O control AT command

11.2.1 Read digital input status

AT+IOBR

Read the value of one or all input pins on I/O ports.

Syntax: AT+IOBR[=<pin>]

Response:

+IOBR: <val><val>

+IOBR: <pin>,<val>

Defined Values:

<pin> id of the digital input read. Valid value is from 1 to 2. If <pin> entry is omitted all input pins will be read.

<val> current value of the digital input:

1 input is high.

0 input reading is low

Example:

Command	Response
AT+IOBR	+IOBR: 00 OK Note: read all digital input status.
AT+IOBR=1	+IOBR: 1,0 OK Note: read the value of input pin #1.
AT+IOBR=?	+IOBR[: (1-2)] OK

Note:

- When command is entered without <pin> entry, the response shows the value of input pins in a series of 0 or 1, from left (pin #1) to right (pin#2).

11.2.2 Set digital output status

AT+IOBW

Set (write) the value of one or all digital outputs pins on I/O ports.

Syntax:

AT+IOBW=<pin>,<val>

AT+IOBW=<val><val>

Response:

+IOBOR: <pin>,<val>

+IOBOR: <val>,<val>

Defined Values:

<pin> id of the digital output to be read. Valid value is 1 or 2.

<val> current value of the digital output:

0 output is OFF, opened.

1 output is ON, closed (shorted).

Example:

Command	Response
AT+IOBW=11	OK Note: set all output to value “1”.
AT+IOBW=01	OK Note: set output #1 to “0”, and #2 to “1”.
AT+IOBW=2,0	OK Note: set output #2 to “0”, other outputs are not changed.
AT+IOBW=?	+IOBW: (“00”-”11”,1-2) [,(0-1)] OK

Note:

- To set all output value in one command, enter the AT+IOBW with a set of 2 digits. (only 0 or 1 is allowed)
- The output state will be set to default after on-off or software reset.

11.2.3 Read digital output status

AT+IOBOR

Read the value of one or all output pins on I/O ports.

Syntax: AT+IOBOR[=<pin>]

Response:

+IOBOR: <val><val>

+IOBOR: <pin>,<val>

Defined Values:

<pin> id of the digital output read. Valid value is from 1 to 2. If <pin> entry is omitted all output pins will be read.

<val> current value of the digital output:

0 output is OFF, opened.

1 output is ON, closed (shorted).

Example:

Command	Response
AT+IOBOR	+IOBOR: 00 OK Note: read all digital outputs status.
AT+IOBOR=1	+IOBOR: 1,0 OK Note: read the value of output pin #1.
AT+IOBOR=?	+IOBOR[: (1-2)] OK

Note:

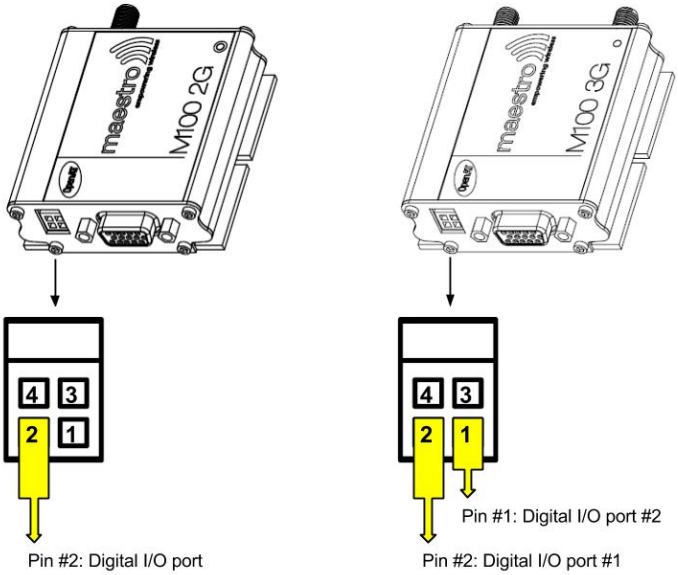
– When command is entered without <pin> entry, the response shows the value of output pins in a series of 0 or 1, from left (pin #1) to right (pin#2).

Chapter 12

Input/Output triggered AT command

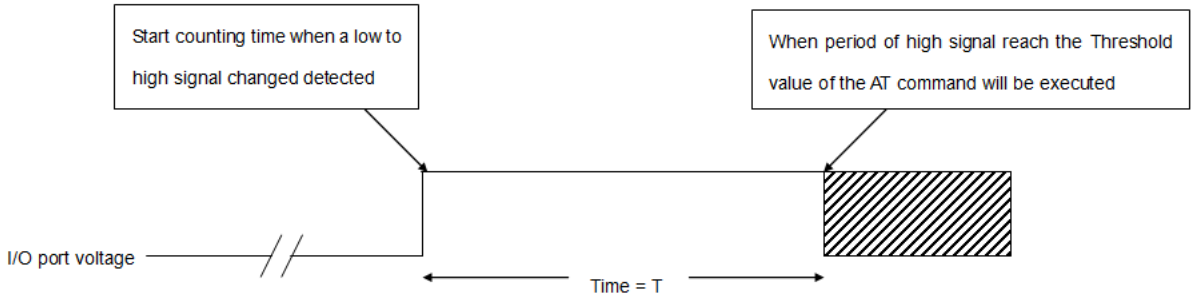
This feature uses the Input/Output port as a trigger to execute an AT command when the specified condition is met.

12.1 Description of the operation

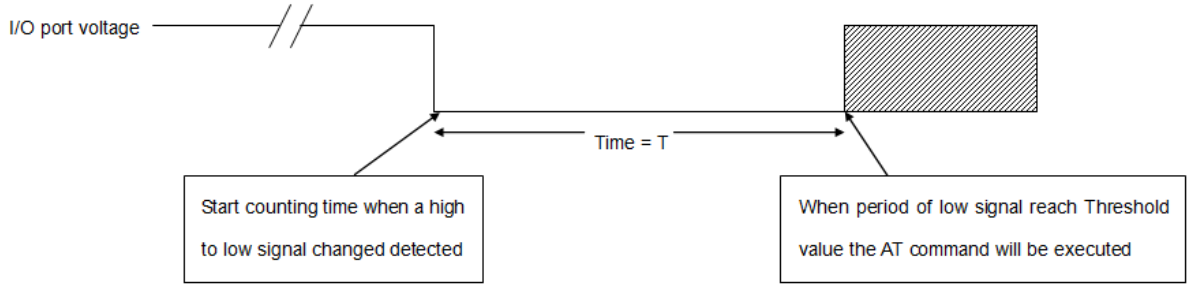


1. When the I/O port is connected to battery negative side:
   (a) switch closed: logic level low
   (b) switch open: logic level high
2. The specified AT command will be executed.

When set as low-to-high triggering:



When set as high-to-low triggering:



12.2 Activating I/O triggered AT command

AT+IOAT

Syntax: AT+IOAT=<mode>(,<dir>,<threshold>,<cmd>)

Response: +IOAT: <mode>,<dir>,<threshold>,<cmd>

Defined Values:

<mode> is the configuration mode:

0	disable I/O triggered AT command.
1	enable I/O triggered AT command.
2	configure I/O triggered AT command parameters.

<dir> is the triggering condition

0	configure as low-to-high condition
1	configure as high-to-low condition

<threshold> is the time required, after the condition is reached, before triggering the AT command. Unit is hundred of millisecond from 0 to 50.

<cmd> is the AT command to be executed when the condition and threshold are met. Maximum length of the AT command is 128 characters.

Example:

Command	Response
AT+IOAT=0	OK Note: disable I/O triggered AT command
AT+IOAT=1	OK Note: enable I/O triggered AT command
AT+IOAT?	+IOAT: 1,1,10,“” OK
AT+IOAT=2,1,10,”AT+IPR=115200”	OK Note: set I/O triggered AT command parameters to trigger the specified AT command after 1 second from low-to-high.
AT+IOAT=?	+IOAT: (0-2),(0-1),(1-50),(128) OK

Note:

- The I/O port is limited to drain maximum 10mA of current. Do not over voltage the I/O port.
- Use only cable/metal contact designed for Molex MicroFit connector.
- The application will NOT check the command <cmd> entered. It will execute the command even if the command is invalid.
- When triggered, the command will not output any response to the external serial port.
- Do not enter “interactive” command (i.e *+CMGS*, *+WDWL*,...), otherwise the application will be stuck waiting for user input.
- If +IOAT is enable, no other AT command can control the I/O port.
- Switching below 100ms cannot be detected by the modem.

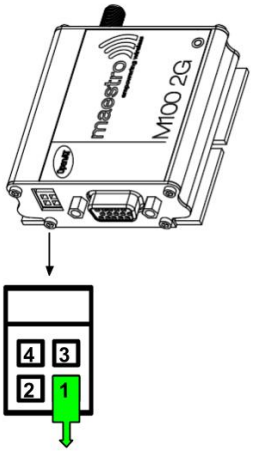
Chapter 13

Analog Input triggered AT command

Note: Available only on M100 2G !

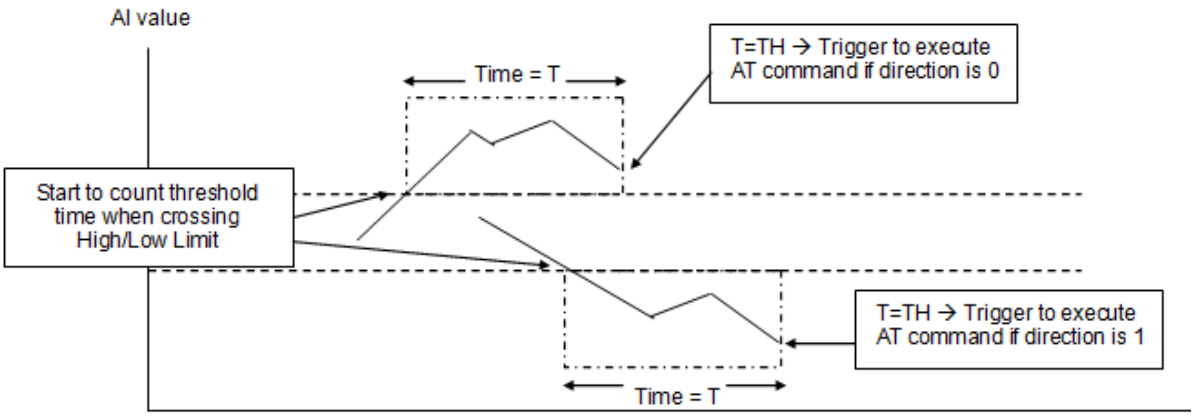
This feature uses the Analog Input port as a trigger to execute an AT command when the specified condition is met.

13.1 Description of the operation



Pin #1: Analog input

1. Connect an external analog voltage of maximum 5V.
2. Every 100ms the analog value is checked, it will trigger if:
   (a) it exceeds high limit (low-to-high trigger)
   (b) it goes below low limit (high-to-low trigger)
3. The specified AT command will be executed.



13.2 Activating analog triggered AT command

AT+ADCAT

Syntax: AT+ADCAT=<mode>(,<dir>,<threshold>,<command>)

Response: +ADCAT: <mode>,<dir>,<threshold>,<command>

Defined Values:

<mode> is the configuration mode:

0	disable analog triggered AT command,
1	enable analog triggered AT command,
2	configure analog triggered AT command parameters.

<dir> is the triggering condition

0	configure as low-to-high condition,
1	configure as high-to-low condition.

<threshold> is the time required, after the condition is reached, before triggering the AT command. Unit is hundred of millisecond from 0 to 50.

<cmd> is the AT command to be executed when the condition and threshold are met. Maximum length of the AT command is 128 characters.

Example:

Command	Response
AT+ADCAT=0	OK Note: disable analog triggered AT command.
AT+ADCAT=1	OK Note: enable analog triggered AT command.
AT+ADCAT?	+ADCAT: 1,1,10,“” OK
AT+ADCAT=2,1,10,”AT+IPR=115200”	OK Note: set analog triggered AT command parameters to trigger the specified AT command after 1 second from low-to-high.
AT+ADCAT=?	+ADCAT: (0-2),(0-1),(1-50),(128) OK

Note:

- The analog port is limited to 5V maximum.
- Use only cable/metal contact designed for Molex MicroFit connector.
- The application will NOT check the command <cmd> entered. It will execute the command even if the command is invalid.
- When triggered, the command will not output any response to the external serial port.
- Do not enter “interactive” command (i.e *+CMGS*, *+WDWL*,...), otherwise the application will be stuck waiting for user input.
- If +ADCAT is enable, no other AT command can control the analog port.

13.3 Editing high and low analog levels

AT+ADCATLMT

To set high and low limit of Analog triggered AT command. These two values will be “synchronized” with the HL and LL of the AI Command String service (see Chapter 20.9). Editing these values will at the same time change the corresponding Command String values.

Syntax: AT+ADCATLMT=<lowLimit>,<highLimit>

Response: +ADCATLMT: <lowLimit>,<highLimit>

Defined Values:

<lowLimit> low limit of Analog voltage, unit is mV. Range from 0 to 5000, default value is 1000.

<highLimit> high limit of Analog voltage, unit is mV. Range from 0 to 5000, default value is 2500.

Example:

Command	Response
AT+ADCATLMT=0,1000	OK Note: set low limit to 0V, and high limit to 1V.
AT+ADCATLMT?	+ADCATLMT: 0,1000 OK
AT+ADCATLMT=?	+ADCATLMT: (0-5000),(0-5000) OK

Chapter 14

Call screening

This feature enables modem to reject incoming call, if the phone number does not match one of the entries of authorized phone number list. Unauthorized incoming call will be hanged up within one ring.

Up to 10 authorized phone numbers can be stored. Each number can be as long as characters Waiting call can also be rejected.

14.1 Enabling call screening

AT+CSRN

This command is to enable or disable call screening feature.

Syntax: AT+CSRN=<mode>

Response: +CSRN: <mode>

Defined Values:

<mode>

0	disable call screening
1	enable call screening

Example:

Command	Response
AT+CSRN=0	OK Note: disable call screening
AT+CSRN=1	OK Note: enable call screening
AT+CSRN?	+CSRN: 1 OK
AT+CSRN=?	+CSRN: (0-1) OK

Note:

- To use call screening make sure caller ID service is enabled otherwise all incoming call will be rejected.
- To apply call screening to waiting call please first enable call waiting indication by command AT+CCWA=1,1.
- Rejected incoming will not be diverted to voice mail.

14.2 Authorized phone number list

AT+CSNW

This command is to enter authorized phone number.

Syntax: AT+CSNW=<id>,<num>

Response: OK

Defined Values:

<id> location of the authorized phone number to be stored. Valid range is from 1 to 10.

<num> authorized phone number. First digit can be “+”, others must be numeric digits. Maximum length is 20.

Example:

Command	Response
AT+CSNW=1,”12345678”	OK Note: enter authorized number to location 1.
AT+CSNW=11,”12345678”	+CME ERROR: 3 Note: location out of range.
AT+CSNW=3,”1qaaa”	+CME ERROR: 3 Note: non-numeric characters not allowed.
AT+CSNW=?	+CSRN: (1-10),(20) OK

Note:

- Enter phone number exactly same as the incoming one, especially if entering International phone number. Use AT+CLIP command to check incoming call number first.
- Enter empty phone number in the <num> field will erase the record of that location.

14.3 Reading authorized phone number list

AT+CSNR

This command is to read authorized phone number entered.

Syntax: AT+CSNR=<id1>(,<id2>)

Response: +CSNR: <id>,<num>

Defined Values:

<id1> beginning location of the authorized phone number to be read. Valid range is from 1 to 10.

<id2> ending location of the authorized phone number to be read. Valid range is from 1 to 10.

Example:

Command	Response
AT+CSNR=1	+CSNR: 1, “12345678” OK Note: display authorized number in location 1.
AT+CSNR=1,8	+CSNR: 1, “12345678” +CSNR: 3, “123456” +CSNR: 6, “12345678”M +CSNR: 8, “12345678” OK Note: display authorized number in from location 1 to 8.
AT+CSNR=?	+CSNR: (1-10)[,(1-10)] OK

14.4 Erasing authorized phone number list

AT+CSND

This command is to erase authorized phone number entered.

Syntax: AT+CSND=<id1>(,<id2>)

Response: +CSNR: <id>,<num>. . . .

Defined Values:

<id1> beginning location of the authorized phone number to be erased. Valid range is from 1 to 10.

<id2> ending location of the authorized phone number to be erased. Valid range is from 1 to 10.

Example:

Command	Response
AT+CSND=1	OK Note: erase authorized number in location 1.
AT+CSNR=1,8	OK Note: erase authorized number in from location 1 to 8.
AT+CSND=?	+CSND=(1-10)[,(1-10)] OK

Chapter 15

Modem status check and monitoring

The modem status check and monitoring feature can check the status of the modem in either “one shot” or periodic mode. Modem will also report checked result by SMS, if the result is beyond preset limit, and reset automatically if losing network connection.

Following items will be checked:

- network registration (periodic mode only, triggering reset),
- ROM test,
- signal strength (can trigger reporting),
- IP address of modem (only when GPRS connection activated).

15.1 Modem status check and monitoring

AT+TMODE

This command is to perform and setup modem status check and monitoring feature.

Syntax: AT+TMODE (=<mode>(,<para>))

Response: +TMODE: <test1>,<test2>. . . .

Defined Values:

<mode>

0	disable periodic mode check
1	enable periodic mode check
2	to set the number in <para> field as telephone number for periodic mode check reporting.
3	to set the number in <para> field as network signal trigger level for periodic mode check reporting. Range from 1-31.
4	to set the <para> field as input voltage trigger level for remote reporting. Range 0-5000.

Example:

Command	Response
AT+TMODE	+TMODE: 1, 15, “10.111.222.33”, 3814 OK Note : execute status check (“one shot” mode)
AT+TMODE=?	+TMODE: (0-4),(20) OK
AT+TMODE?	+TMODE: 1, “1234567”, 10, 3500 OK Note: display current setting

Command	Response
AT+TMODE=0	OK Note: disable periodic mode check
AT+TMODE=1	OK Note: enable periodic mode check
AT+TMODE=2,1234567	OK Note: set telephone number for periodic mode reporting
AT+TMODE=3,10	OK Note: set network signal trigger level for remote reporting
AT+TMODE=4,3450	OK Note: set input voltage trigger level for remote reporting

15.2 Operation of modem status check and monitoring

"One Shot" mode

When user enters AT+TMODE command the modem will perform a single check and will send back the result like this, see more details in the Table 15.2: *+TMODE: 1, 15, "10.111.222.33", 3814*

Check item	Result field #	Result	Remark
ROM data check sum	1	0 fail 1 pass	
Network signal strength	2	Range from 1-32 (or 99)	Same as AT+CSQ
Modem IP address	3	In xxx.xxx.xxx.xxx format	Only shown when GPRS session is activated
Input voltage	4	Voltage to the modem's internal module (times 1000)	Not for end customer use.

Table 15.2: "One shot" TMODE details

"Periodic" mode

When user enters AT+TMODE=1 command the modem will perform periodic check every minute:

1. it will check if the modem is registered to the network; if the modem is not registered to the network it will increase a counter by one. If the counter reach 5 (i.e. not registered for consecutive 5 minutes) the modem will reset.
2. if the modem is registered to the network, the counter will be reset to 0 and perform check same as "one shot" mode.
3. if the result of the network signal strength is lower than the setting of AT+TMODE=3,x the test result will be sent over SMS to the telephone number set by AT+TMODE=2,xxxxxxx (max number of digit is 20).
4. if the result of the input voltage is lower than the setting of AT+TMODE=4,x the test result will be sent over SMS to the telephone number set by AT+TMODE=2,xxxxxxx.
5. if 3 consecutive check failed (i.e. 3 SMS sent) then the periodic mode check will be disable automatically.

Chapter 16

Automatic PIN entry

The automatic PIN entry feature lets user to save a PIN code into the modem. When the modem detects a PIN (PIN1) enabled SIM on starting, it will use the saved PIN code to unlock it. To prevent further PIN blocking user can set minimum PIN remaining attempt number as a prerequisite for the automatic PIN entry operation.

16.1 Automatic PIN entry

AT+AUTOPIN

This command is to configure and enable/disable automatic PIN Entry feature

Syntax: AT+AUTOPIN=<mode> [,<pin>,<remain>,<unso>]

Response: +AUTOPIN: <mode>,<pin>,<remain>,<unso>

Defined Values:

<mode> default value is 0.

0	disable automatic PIN entry.
1	enable automatic PIN entry.
2	configure parameters.

<pin> four digit PIN code for automatic PIN entry. Default value is "0000".

<remain> minimum value of PIN remaining attempt number. If PIN remaining attempt number is less than the value of <remain>, automatic PIN entry will not operate. Valid value is 1 to 3. Default value is 3.

<unso> default value is 0.

0	no unsolicited message.
1	unsolicited message +AUTOPIN: <pin_remain> will be displayed if <remain> is larger than PIN remaining attempt number.

Example:

Command	Response
AT+AUTOPIN=1	OK Note: enable automatic PIN entry.
AT+AUTOPIN=0	OK Note: disable automatic PIN entry.
AT+AUTOPIN?	+AUTOPIN: 1, “1234”, 3, 0 OK Note: display current setting.
AT+AUTOPIN=?	+AUTOPIN: (0-2),(4),(1-3),(0-1) OK
AT+AUTOPIN=2,”8888”,3,0	OK Note: set saved PIN as “8888”, PIN remaining attempt number as 3, disable unsolicited message.
AT+AUTOPIN=1 AT+AUTOPIN=2„2,1 AT+CFUN=1	OK OK Note: enable automatic PIN entry and unsolicited message and set PIN remaining attempt number to 2. OK +AUTOPIN: 1 Note: after reset PIN remaining attempt number is 1, automatic PIN entry aborted and display unsolicited message.

Note:

- Be VERY careful on using this feature as normally a SIM card has only a maximum of 3 PIN entry attempts. Further incorrect attempt will lead to the card become SIM locked and need PUK to unlocked it.
- This feature is only for SIM card that is PIN1 enabled. It will not work for PIN2 or PUK locked SIM card.
- The automatic PIN entry operation will be performed only after power up or restart. Enabling AUTOPIN after power up will not make it operate immediately.
- The AT+AUTOPIN command cannot be entered remotely (SMS, TCP Terminal). It can only be operated via serial port.
- The AT+AUTOPIN command is not password protected. Be cautious of saved PIN entry read by other people.

Chapter 17

Remote application update

By using this feature, user can download the new version of Maestro modem application from a FTP server and upgrade his modem. By combining remote AT command by SMS feature user can control the modem to complete the application downloading and updating process remotely.

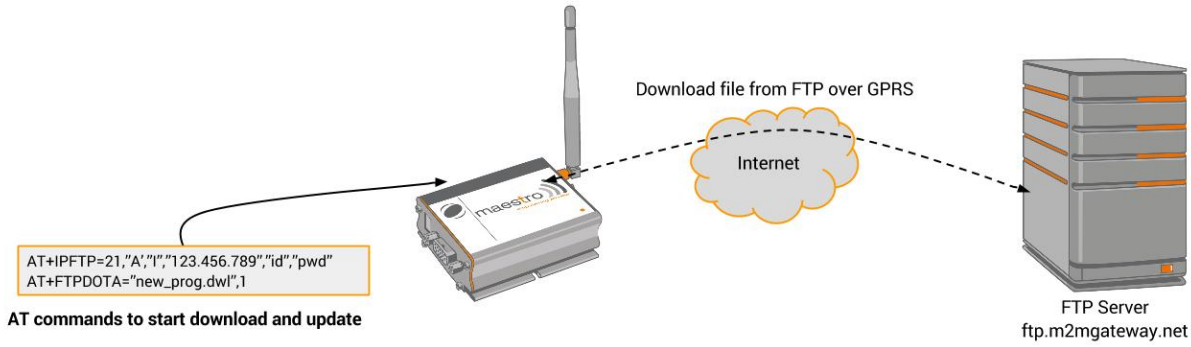


Figure 17.0.1: Remote application update example

To perform the whole application update process, several AT commands have to be sent:

1. AT+IPGPRS to set network parameters (APN),
2. AT+IPFTP to set FTP server parameters (name, user id, password),
3. AT+FTPDOTA to set file name and FTP path and start downloading*,
4. AT+ADINSTALL to install the downloaded new application*.

*Note: by adding one extra parameter after step 3 complete, step 4 will be executed automatically. See following sections for details.

17.1 FTP server

AT+IPFTP

This command is to set FTP server parameters.

Syntax: AT+IPFTP =<port>,<type>,<mode>,<server>,<id>,<pwd>

Response: +IPFTP: <port>,<type>,<mode>,<server>,<id>,<pwd>

Defined Values:

<port> port number of the FTP server. Default value is 21.

<type> translation of carriage return, valid values are:

I	image (no translation, default),
A	ASCII,
E	EBCDIC.

<mode> passive or active mode valid values are:

P	passive (default),
A	active.

<server> IP address of FTP server (in xxx.xxx.xxx.xxx format) or an alpha numeric string format (e.g. ftp.server.com). Maximum 120 characters.
Note: if alpha numeric string format is used, make sure the GPRS network has proper DNS service available.

<id> login name of the user. Maximum 64 characters.

<pwd> password for the user. Maximum 64 characters.

Example:

Command	Response
AT+IPFTP= 21,”I”,”A”,”201.123.222.222”,”user-id”,”pwd”	OK Note : setup FTP parameter.
AT+IPFTP=?	+IPFTP: (0-65535), (“A”,”I”,”E”),(“P”,”A”),(120),(64),(64) OK
AT+IPFTP?	+IPFTP: 21,”I”,”A”,”201.222.222.222”,”user-id”,”pwd” OK

17.2 Starting remote application download

AT+FTPDOTA

This command is to inform the modem the file name and FTP path. The modem will login to the FTP server; download the update file, and optionally execute the update process.

Syntax: AT+FTPDOTA =<filename>[,<path>],[,<update>]

Response:

+FTPDOTA : 0, <filename>, <filesize>
+FTPDOTA : <result>
+ADINSTALL : <adinstall result>

Defined Values:

<filename> file name of the file to be downloaded. Maximum 128 characters.

<path> path (directory) name where the file is placed. Maximum 128 characters. If <path> is omitted, program will try to download from FTP’s root (entry) directory.

<update> if a third parameter ‘1’ is entered, the program will execute the AT+ADINSTALL command if the download process is successful. This is useful for sending update commands over SMS, so that one SMS is saved in this case. See next section for the details of AT+ADINSTALL command.

<result> result code of the downloading process:

0	download successful,
-1	SIM card problem (check SIM card and PIN),
-2	internal memory problem (try reset modem),
-3	FTP connection fail (check network signal, check FTP status, check FTP address),
-4	reserved,
-5	download file size not same as FTP reported (retry downloading),
-6	not enough space for downloading (contact Maestro Wireless),
-7	file format incorrect (check file for downloading),
-8	error writing flash (contact Maestro Wireless),
4xx–5xx	FTP protocol return code (check FTP document (RFC 959) for explanation).

Example:

Command	Response
AT+FTPDOTA=”update.dwl”	+FTPDOTA: 0, update.dwl, 17000 OK Note: download “update.dwl” file from FTP root directory, file size is 17000 bytes.
AT+FTPDOTA=”update1.dwl,”sub”	+FTPDOTA: 0, update.dwl, 17001 OK Note: download “update1.dwl” file from FTP “sub” directory, file size is 17001 bytes.
AT+FTPDOTA=”update1.dwl,”sub”,1	+ADINSTALL: 2 M100_VAF_094d_OAT316_32 Nov 11 200718:01:42 Note: download “update1.dwl” file from FTP “sub” directory, and perform program update successfully.
AT+FTPDOTA?	+FTPDOTA: update.dwl, 17001 OK Note: check downloaded file ready for update.
AT+FTPDOTA?	+FTPDOTA: OK Note: no downloaded file.
AT+FTPDOTA=”update1.dwl”	+FTPDOTA: -3 OK Note: error on downloading file (FTP open fail).
AT+FTPDOTA=?	+FTPDOTA: (128)[,(128)] OK

17.3 Installing new application

AT+ADINSTALL

This command performs the program update process. File downloaded by AT+FTPDOTA command will replace the existing modem application. Modem will restart and then result and version will be displayed.

Syntax: AT+ADINSTALL

Response: +ADINSTALL: <result>,<ver>

Defined Values:

<result> if other result code please contact Maestro Wireless Solutions:

2	update process successful,
3	update process unsuccessful (original program will be loaded back).

<ver> version number of existing running SmartPack.

Example:

Command	Response
AT+ADINSTALL	+ADINSTALL: 2, modem_090b_OAT422a_32 Feb 26 200811:42:36 Note: update successful, show existing program version.
AT+ADINSTALL	+ADINSTALL: 3, modem_090a_OAT422a_32 Jan 26 200811:42:36 Note : update unsuccessful, show existing program version.
AT+ADINSTALL	+CME ERROR: 3 Note: update unsuccessful, no update file available.

17.4 Notes and cautions to be taken

- This feature is ONLY for updating new SmartPack application on the modem. Do not use it for downloading other things. Always contact Maestro Wireless or distributor for correct update file and information.
- If you want to perform update for modem at remote site by AT command over SMS, make sure the feature is enabled by command AT+SMSAT=1 is entered.
- Make sure you have setup GPRS settings by AT+IPGPRS command. When entering AT+FTPDOTA command the program will make GPRS connection automatically if not connected before.
- It is recommended to stop other SmartPack such as Auto TCP/UDP connection during program downloading and updating.
- Depending on the file size and network condition the download time could be a few minutes up to 30 minutes. Be patient to wait for response after entering AT+FTPDOTA command.
- Do not use “~” character on file path because it cannot be transferred correctly over SMS.
- No resume function on FTP downloading. The whole file has to be downloaded at one time otherwise the downloaded data will be discarded.

Chapter 18

Command string - Introduction

“Command String” is a set of programmable scripts for Maestro modem. User can input sets of Command String to control various kinds of “Service”. Unlike AT command, Command String can be stored inside modem and can be executed upon output of certain services.

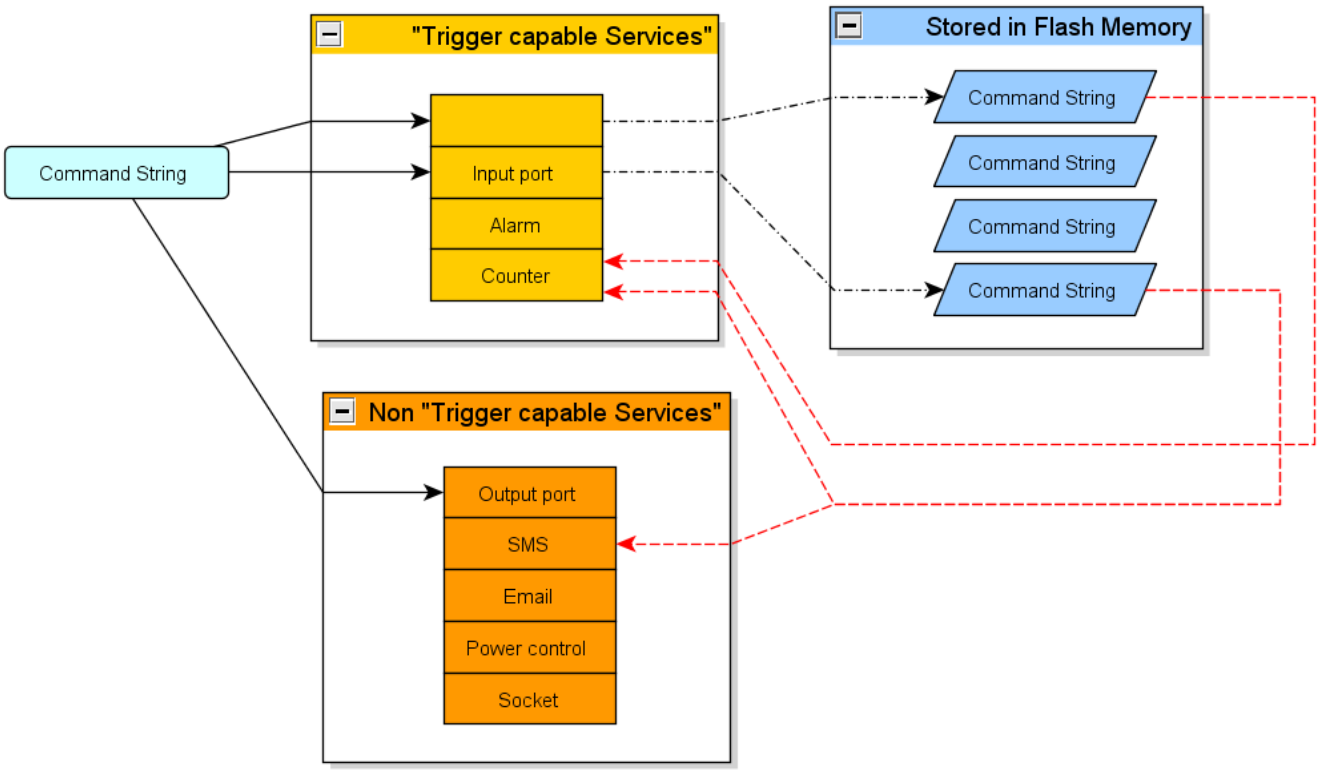


Figure 18.0.1: Command String service concept

“Command String” and “Service” operation mechanism:

1. Use AT command to enter preset Command String.
2. Command strings can be executed upon power up or directly by AT commands.
3. Executed Command String will drive some Services to be done (e.g. sending SMS or setting output pins).
4. Executed Command String can also configure and control some Services that have “trigger” capability.
5. These Services, when a certain predefined condition is matched (e.g. timer reach zero) can “trigger” a stored Command String.
6. Execute stored Command String to control Services again.

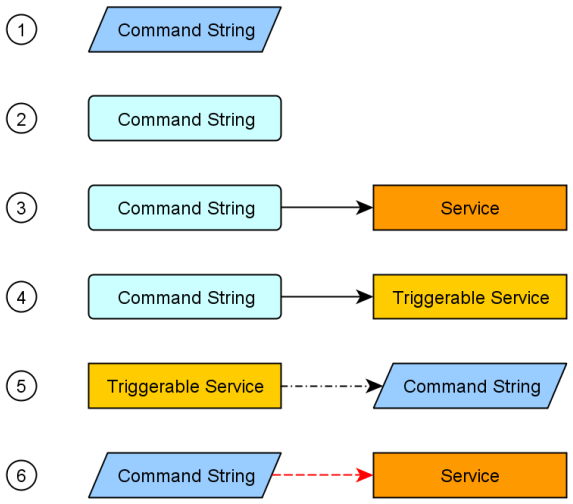


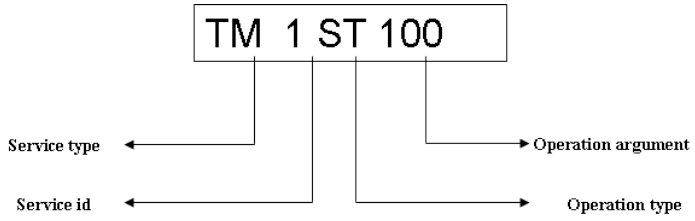
Figure 18.0.2: Command String operation mechanism

Chapter 19

Command string - How to use ?

19.1 Command string format

A single Command String is a text string composed with four fields, for example:



Each field is separated by a space (ASCII value 32).

19.1.1 Service type

The Service field is two capital characters indicating the type of Service to be chosen, please refer to the Table 19.2 for details.

Field entry	AL	CT	TM	IP*	OP*	SM	EM	PS	AI*	PC*	SC
Service	alarm	counter	countdown	input	output	SMS	email	power	analog	pulse	socket
See section	20.1	20.2	20.3	20.4	20.5	20.6	20.7	20.8	20.9	**??**	20.10

*Services need optional I/O plug-in board.

Table 19.2: Service type list

19.1.2 Service id

Each type of Service there has more than one unit; e.g. there are 4 pulse counters available so the id range is 1 to 4.

19.1.3 Operation type and Operation argument

For each type of Service there are few kinds of operations; e.g. “TM 1 ST 100” means to set the value or countdown timer #1 to 100 seconds. See further chapters for the explanation of each service.

19.2 Concatenating Command String

You can concatenate Command String update 128 bytes long totally (including space). They will be executed sequentially. However, if one Command String is incorrect or invalid execution will be stopped and successive Command String will not be executed.

For example:

TM␣1␣ST␣100␣TM␣1␣TR␣99␣TM␣1␣SW␣1

- First String “TM 1 ST 100” will be executed
- Second String “TM 1 TR 99” will not be executed because “99” is out of range
- Third String “TM 1 SW 1” is correct but will not be executed because execution is stopped on 2nd String

19.3 Executing a Command String

AT+CSTR

This command is used to execute a Command String directly linked to a specific service.

Syntax: AT+CSTR=<string>

Response: OK

Defined Values:

<string> Command String.

Example:

Command	Response
AT+ CSTR=”TM 1 ST 3”	OK Note: entire Command String executed successfully.
AT+ CSTR=”TM 1 ST 3 TM 30 ST 4”	+CME ERROR: 3 Note: one Command String cannot be executed.

Note:

- When there is error in between concatenated Command String +CME ERROR: 3 will be returned.

19.4 Editing a stored Command String

AT+CSTRSET

This command is used to store, read and delete Command String. It can also used to execute stored Command String.

Syntax: AT+CSTRSET= <oper>,<id>[,<string>]

Response: +CSTRSET : <type>pin

Defined Values: OK

<oper> define type of operation:

0 store Command String to flash,
1 read Command String from flash,
2 erase Command String from flash,

3 execute Command String stored in flash.

<id> Identification number (id) of the Command String. Valid value is 1 to 50, and 80; i.e. up to 51 Command Strings can be stored. Command String with id = 80 will be executed on boot when modem power up.

<string> Command String.

Example:

Command	Response
AT+ CSTRSET=0,1,"TM 1 ST 3"	OK Note: store Command String with id = 1.
AT+ CSTRSET=0,99,"TM 1 ST 3"	+CME ERROR: 3 Note: id out of range.
AT+CSTRSET=1,1	+CSTRSET: 1, "TM1 ST 3" Note: read stored Command String id 1.
AT+CSTRSET=3,1	OK Note: execute stored Command String id 1.
AT+CSTRSET=2,1	OK Note: erase Command String id 1 from flash memory.
AT+CSTRSET=3,1	+CME ERROR: 3 Note: id 1 is empty.
AT+CSTRSET=?	+CSTRSET: (0-3),(1-50,START_CS_ID),(20)| OK

Note:

- Each Command String is limited to 128 bytes.
- The program will NOT check if the input Command String is valid or not.

Chapter 20

Command string - Services - Syntax and explanation

“Service” is a kind of function or tool that can be used by Command String. There are two kinds of services:

- **Trigger capable:**
  When a certain predefined condition is matched (e.g. timer reach zero) “trigger” a stored Command String. These services include: alarm, counter, input port, and countdown timer.
- **Non-Trigger capable:**
  Can only perform job when called by Command String. These Services include: output port, SMS.

20.1 Alarm Service

Alarm is used to execute a Command String when the real-time clock of the Maestro modem meets the set time of the alarm.

To use an alarm, it is required to set the real-time clock of the modem properly, see AT+CCLK in AT command manual. Maximum of alarms which can be used is 5.

1st field Service type	**2nd field** Service id	**3rd field** Operation type	**4th field** Operation argument	Explanation
AL	(1 to 5)	ST	09/10/10,12:00:00	Set alarm date/time yy/mm/dd,hh:mm:ss format
		ST	0	Cancel preset
		TR	(1 to 50) 0	Set Command String to be run, 0 to cancel setting

Example: Set alarm #1 to execute Command String #20 at 01OCT2008,01:00:00.

```
AL␣1␣TR␣1␣AL␣1␣ST␣08/10/01,01:00:00
```

Example: Cancel #1 Alarm setting.

```
AL␣1␣ST␣0
```

Example: Cancel #1 Alarm executing Command String.

```
AL␣1␣TR␣0
```

Note:

- The Alarm date time input MUST to fulfill the following requirements:
  - In yy/mm/dd,hh:mm:ss format, program will also check if input date/time is valid or not.
  - At least 4 minutes later than current modem’s real-time clock time (check by AT+CCLK command).
- Do not concatenate after ST operation; set time operation should be at the last part of Command String.

- After alarm time, the ST setting of that Alarm will be lost.
- This service will make use of Maestro modem internal alarm command (AT+CALA) so please avoid using AT+CALA command by yourself when alarm service is used.
- If the modem is restarted, date time setting of each alarm will be checked against real-time clock time. If time is passed the setting will be canceled.
- Alarm Service is “one-shot” type. There is no periodic alarm like “daily” or “weekly”.

20.2 Counter Service

Counter is used to execute a Command String when a counter value equals a preset value. There are total of 5 counters.

1st field Service type	**2nd field** Service id	**3rd field** Operation type	**4th field** Operation argument	Explanation
CT	(1 to 5)	DE	1 to 255	Decrement the value of counter with argument value
		IN	1 to 255	Increment the value of counter with argument value
		RS	0	Reset the counter value to zero
		ST	-32768 to 3767	Set the “trigger” value; If counter value equal this value, it will execute TR
		TR	(1 to 50) 0	Set Command String to be run, 0 to cancel setting

Example: Set counter #1 to execute Command String #10 if counter value equals 100.

```
CT␣1␣ST␣100␣CT␣1␣TR␣10
```

Example: Increase counter #1 value by 20.

```
CT␣1␣IN␣20
```

Example: Reset counter #1 value to 0.

```
CT␣1␣RS␣0
```

Note:

- Initial Counter and trigger values are zero.
- The Counter is recorded by a signed 16 bit register, if the Counter value is 32767 and you increase it by 1, the value will change to -32768.
- There is no limit on no. of times of triggering. E.g. If you first set trigger value to 2 and reset Counter to 0, then you increment counter by 2, then decrement by 2 and increment by 2 again. Then the associated Command String will be executed twice.

20.3 Countdown Timer Service

Countdown timer is used execute a Command String when the timer value reach zero. Counting period is 1 second. There are total of 10 Countdown Timers.

1st field Service type	**2nd field** Service id	**3rd field** Operation type	**4th field** Operation argument	Explanation
TM	(1 to 5)	ST	1 to 2147483647	Initial value of Countdown Timer (in seconds)
		SW	0 to 1	Start (1) or Stop (0) Timer
		TR	(1 to 50) 0	Set Command String to be run, 0 to cancel setting

Example: Set countdown timer #1 to execute Command String #10 and start 600 seconds countdown.

```
TM␣1␣ST␣600␣TM␣1␣SW␣1␣TM␣1␣TR␣10
```

Example: Stop countdown timer #1.

```
TM␣1␣SW␣0
```

Example: Cancel countdown timer #1 to trigger Command String.

```
TM␣1␣TR␣0
```

Note:

- When the countdown timer expires (reach 0) it will stop automatically (SW 0).
- If two or more timers expire at the same timer, timer with smaller id has higher priority, i.e. Command String related to that timer will be executed first.
- These are not precision timers, if the modem is busy (e.g. with network communication). The execution time may be delayed.

20.4 Input Port Service

Input port Service can use the signal of I/O board's input ports to control the execution of Command String.

You can control the change of single or multiple input port signals as a condition to trigger Command String execution.

1st field Service type	**2nd field** Service id	**3rd field** Operation type	**4th field** Operation argument	Explanation
IP	1 or 2[1]	DR	0 to 1	Direction of I/P signal change to trigger
		TH	1 to 255	Duration of the I/P state to trigger, unit in 0.1s
		TR	(1 to 50) 0	Set Command String to be run, 0 to cancel setting

Example: Configure input port #1 with detection "high to low" and threshold value 0.1s, and trigger Command String #5 if signal condition match.

```
IP␣1␣DR␣1␣IP␣1␣TH␣1␣IP␣1␣TR␣5
```

Example: Configure input port #4 is high and port#6 is low and threshold value 0.1s, and trigger Command String #5 if signal condition match.

```
IP␣101␣DR␣8␣IP␣101␣MS␣40␣IP␣101␣TH␣1␣IP␣101␣TR␣5
```

Example: Cancel input port#1 to trigger Command String.

IP␣1␣TR␣0

Note:

– An optional I/O plug-in board is needed to plug to Maestro modem for using this Service. Contact Maestro Wireless Solutions for information.

Input Port operation mechanism (single I/P triggering)

The Input Port will give out a high or low signal depending on the input voltage to the port.

The Command String can check the change of Input port Signal (operation “DR”):

– IP 1 DR 0 - detect a low-to-high input voltage change.

– IP 1 DR 1 - detect a high-to-low input voltage change.

To prevent transient noise signal, a threshold value can be set (operation “TH”). This is the time period required for the detected state to trigger Command String execution. Unit is in 1 millisecond. Valid value from 1 to 50 (0.1 sec to 5 sec).

E.g. TH 10 - threshold value is 1 sec.

E.g. When set as low-to-high triggering and threshold 1 second: IP 1 DR 0 IP 1 TH 10 IP 1 TR 5.

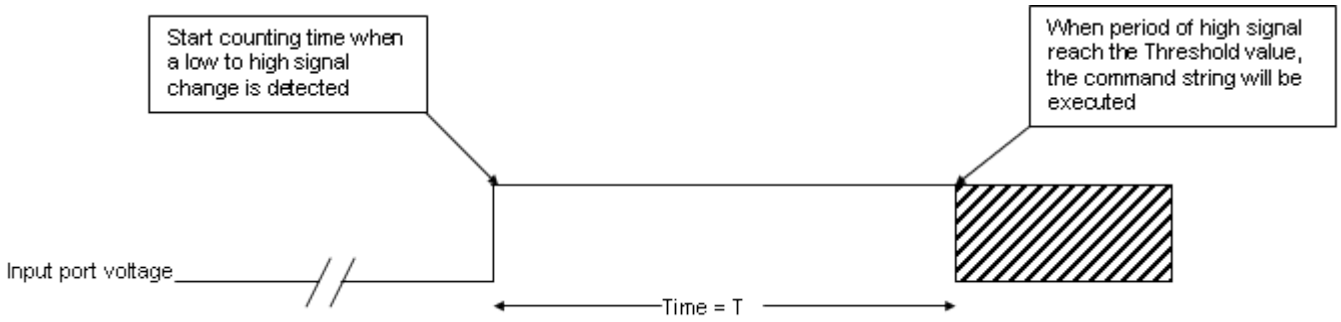


Figure 20.4.1: When T=1second the Command String #5 will be executed

E.g. when set as high-to-low triggering and threshold 1 sec IP 1 DR 1 IP 1 TH 10 IP 1 TR 5

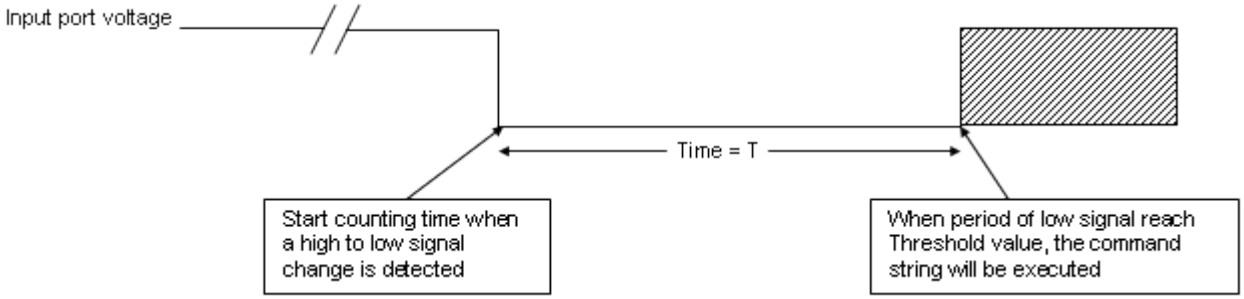


Figure 20.4.2: When T=1second the Command String #5 will be executed

20.5 Output Port Service

Output port Service can control the state of the output pin of I/O ports Command String.

You can control the change of single or multiple input port signals as a condition to trigger Command String execution.

1st field Service type	**2nd field** Service id	**3rd field** Operation type	**4th field** Operation argument	Explanation
OP	1 or 2[2]	SW	0 to 1	State of the output pin

Example: Set the output pin of I/O port #1 to “ON” (1)

```
OP␣1␣SW␣1
```

20.6 SMS Service

This service is used to send out a SMS to phone number recorded in the first 10 phone book records in SIM card.

1st field Service type	**2nd field** Service id	**3rd field** Operation type	**4th field** Operation argument	Explanation
SM	(1 to 10)	SN	(SMS content)	Send out the SMS to phone number inside SIM card
			%CTn %IP %OP %TMn %AI %PC	“%” to indicate “variable” options in SMS content

Example: Send a message “ALERT” to phone number store in SIM phone book #1.

```
SM␣1␣SN␣ALERT
```

Example: Send a message “Counter#2_value_is_20" to phone number store in SIM phone book #1.

```
SM␣1␣SN␣Counter#2_value_is_%CT2
```

Using variable option within SMS content

In the SMS content field you can use “%” and Service type to insert the current value of Service into the SMS content:

Variable	%CTn	%TMn	%IP	%OP	%AI	%PC
Description	Current value of counter id#n	Current value of timer id#n	Current I/P ports’ summing value	Current O/P ports’ summing value (calculation same as %IP)	Current AI ports values	Current pulse counters values
Range of ‘n’	1 to 5	1 to 10	(See Chap 18.4.c for calculation)	(See Chap 18.4.c for calculation)	See Note below (5)	See Note below (6)

Invalid Service name or Id will be ignored.

Note:

1. Due to modem/SIM initialization it is recommended to send SMS 30 seconds after power up.

2. Only send SMS with “normal” characters. If SMS content has character with ASCII value outside the range between 11 and 127, the SMS may not be sent properly.

3. In case of sending SMS failure (e.g. network problem) the program will delay 0.5 second and try to resend the SMS. If the second time retry (i.e. 3 times total) fails this SMS delivery will be aborted.

4. The maximum length of the SMS content is limited by the maximum length of Command String (128 bytes). The more of Command Strings, the less of SMS length.

5. "%AI" is replaced by the 4 AI’s value In the format:
<ai1>,<ai2>,<ai3>,<ai4>
Each ai value is up to 4 decimal places. If AI reading fails values will become "error" instead.

6. "%PC" is replaced by the four pulse counters values In the format:
<pc1>,<st1>,<pc2>,<st2>,<pc3>,<st3>,<pc4>,<st4>
where <pcx> - pulse counter value of the counter x
where <stx> - status of the counter x If pulse counter reading fails values will become "-1,0".

20.7 Email Sending Service

This service is used to send out an Email to one or more email saved address, with saved email subject and saved plus variable email content. Please read Chapter 9 for entering email address, subject and body. Up to 10 set of groups (service type EM, id 1 to 10) can be set with different combinations of "elements": recipient (to, cc, bcc), subject and body.

1st field Service type	**2nd field** Service id	**3rd field** Operation type	**4th field** Operation argument	Explanation
EM	(1 to 10)	TO	(0-50)	id of recipient email address (see Chapter 9.2b) 0: no recipient
		CC	(0-50)	id of “cc” recipient email address (see Chapter 9.2b) 0: no cc recipient
		BC	(0-50)	id of “bcc”recipient email address (see Chapter 9.2b) 0: no bcc recipient
		SU	(0-10)	id of email subject (see Chapter 9.2c) 0 : no subject
		BD	(0-3)	id of email body (see Chapter 9.2c) 0: no body
		SN	(additional content)	Send out the email with above setting plus additional content
			%CTn %IP %OP %TMn %AI %PC	“%” to indicate “variable” options in message content

Example: Setting up EM set #1 with elements: recipient #1, cc #3, bcc #4, subject #1, content #2.

```
EM␣1␣TO␣1␣EM␣1␣CC␣3␣EM␣1␣BC␣4␣EM␣1␣SU␣1␣EM␣1␣BD␣1␣1␣SN␣ALERT
```

Example: Sending email EM set#1 with additional content "HELLO_WORLD".

```
EM␣1␣SN␣HELLO_WORLD␣1␣SN␣ALERT
```

Example: Setting up EM set #2 with elements: recipient bcc #3, no subject and content only "0", and send out immediately.

```
EM␣2␣BC␣3␣EM␣2␣SN␣0␣1␣SN␣ALERT
```

Example: Send an email EM set #1 with content “Counter#2_value_is_20".

```
EM␣1␣SN␣Counter#2_value_is_%CT2␣␣1␣SN␣ALERT
```

Using variable option within email content

In the email body field you can use “%” and Service type to insert the current value of Service into the email additional content:

Variable	%CTn	%TMn	%IP	%OP	%AI	%PC
Description	Current value of counter id#n	Current value of timer id#n	Current I/P ports’ summing value	Current O/P ports’ summing value (calculation same as %IP)	Current AI ports values	Current pulse counters values
Range of ‘n’	1 to 5	1 to 10	(See Chap 18.4.c for calculation)	(See Chap 18.4.c for calculation)	See Note below (5)	See Note below (6)

Invalid Service name or Id will be ignored.

Note:

1. To use Email Sending Service make sure all parameters has been setup properly first: - APN (+IPGPRS) - SMTP server (+IPSMTP) - Sender and recipient address (+EMADDR) - Subject (+EMSUBJ) - Body (+EMBODY) It is strongly suggested you have tested the email sending function by using AT+EMSEND command to send test emails first before using EM Command Sting.

2. If Operation argument of TO, CC, BC, SU and BD is set to 0(default), the associated Email set will not contain that element.

3. A minimum email contains one recipient (either TO, CC or BC) and one character of additional email content.

4. Unlike AT+EMSEND command, sending email use EM service will automatically making GPRS connection (+IPCONNECT=1,1).

5. In case email sending is unsuccessful due to any reason, the same email will be resent for max 2 more times. If all retries are fail that Email will be aborted.

6. When using EM service maximum 10 emails can be put on sending queue, further Email sending requests will be aborted. Buffered email queue is volatile and will be lost If modem Is power off or reset. Also when there is EM service in queue AT+EMSEND command will not be allowed.

7. "%AI" is replaced by the 4 AI’s value In the format:
<ai1>,<ai2>,<ai3>,<ai4>
Each analog input value is up to 4 decimal places. If AI reading fails values will become "error" instead.

8. "%PC" is replaced by the four pulse counters values In the format:
<pc1>,<st1>,<pc2>,<st2>,<pc3>,<st3>,<pc4>,<st4>
where <pcx> - pulse counter value of the counter x
where <stx> - status of the counter x If pulse counter reading fails values will become "-1,0".

20.8 Device Power Control Service

By using Device Power Control Service user can control on/off state of certain component of the modem, in order to save power consumption. A single Service id field can be set to control four parts of the modem.

1st field Service type	**2nd field** Service id	**3rd field** Operation type	**4th field** Operation argument	Explanation
PW	(0 to 15)	0	0	Service Id to decide components' on/off state

Example: Enable low clock mode and disable LED's.

```
PW␣3␣0␣0
```

Example: Enable low clock mode; disable LED's, UART and unregistered from network.

```
PW␣15␣0␣0
```

The value of Service id is the sum of the values each of which is related to a particular device power control operation:

Value	Function	Remark
1	Turn off LED's	except network status LED
2	Enable power down mode (W32K mode)	Same as AT+W32K=1 command
4	Unregistered from network ("Flight mode")	Same as AT+COPS=2 command
5	Turn off UART	COM port will not get any data

The larger the id value of PW, the more power saving of the modem. For example user can set e.g. the modem to register to network only once per day, sending out SMS, then unregistered.

Note:

- BE VERY CAREFUL to use with id #8 (Turn off UART). This will make modem Com port switched off and cannot accept AT command. NEVER program the modem to enable this once power up.
- Although "Operation type" and "Operation argument" fields are ignored, "dummy" entries are needed for consistent Command String Syntax. Use may write "PW" Command String like this ("0" as dummy entry):

  ```
  PW␣15␣0␣0
  ```

- Refer to AT command manual for the details of power down (W32K) mode.
- It is recommended to use "PW" service some time after power on. So user can have time to change setting.
- Each time when "PW" Command String is executed. Refer to AT command manual for the details of power down (W32K) mode.
- Refer to AT command manual for the details of power down (W32K) mode.
- This device power control setting is not saved by itself, so each time when power on the status should be 0 (without any "PW" Command String executed).

20.9 Analog input Service

Analog input Service can use the signal of analog input to control the execution of Command String.

1st field Service type	**2nd field** Service id	**3rd field** Operation type	**4th field** Operation argument	Explanation
AI	1 to 4	TP	1 to 3	Trigger type of AI value change to trigger
		TH	1 to 255	Duration of the AI state to trigger, unit in 1s
		HL	-6000 to 6000	High limit of AI to trigger (units mA or mV)
		LL	-6000 to 6000	Low limit of AI to trigger (unit: mA or mV)
		TR	(1 to 50) 0	Set Command String to be run, 0 to cancel setting

Example: Configure AI#1 trigger condition that value is either higher than the high limit (3000) or lower than low limit (1000) and threshold value 1s, and trigger Command String #5 if signal condition match.

```
AI␣1␣TP␣3␣AI␣1␣TH␣1␣AI␣1␣HL␣3000␣AI␣1␣LL␣1000␣AI␣1␣TR␣5
```

Example: Configure AI#3 trigger condition that value is higher than the high limit (1000) threshold value 2s, and trigger Command String #1 if signal condition match.

```
AI␣3␣TP␣1␣AI␣3␣TH␣2␣AI␣3␣HL␣1000␣AI␣3␣TR␣2
```

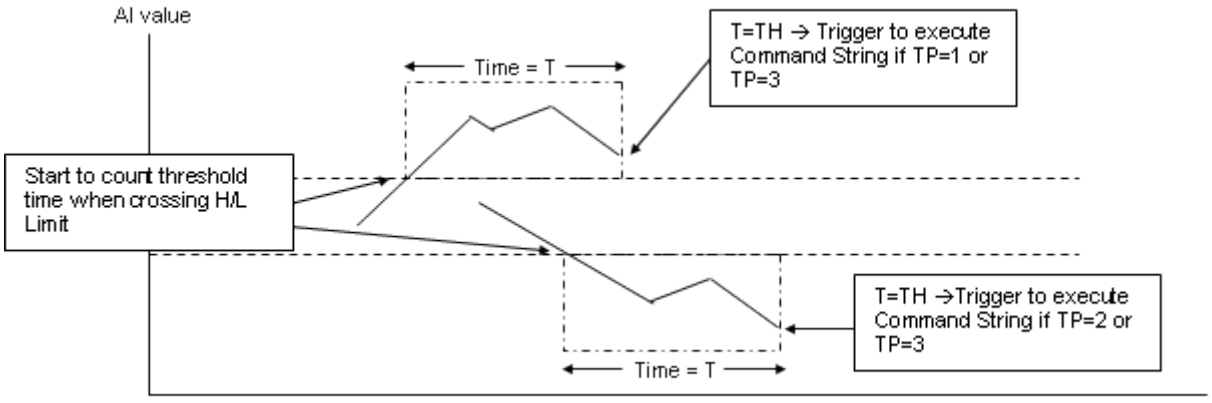
Example: Cancel AI#1 to trigger Command String.

```
AI␣1␣TR␣0
```

Analog input operation mechanism

The Analog Input Service will keep checking the AI once every one second. Depending on Trigger Type (TP) set, the service will trigger executing Command String if condition fulfilled:

Trigger Type **TP**	AI value change from lower than to higher than **HL** value	AI value change from higher than to lower than **LL** value
1	Trigger	-
2	-	Trigger
3	Trigger	Trigger



Note:

- Please read Pulse Counter Plug-in board manual carefully before setup.
- The Service cannot detect AI value change period less than 1s. If the AI value change is less than 1 second this feature will not be able to detect accurately.

20.10 Socket Communication Service

This service is used to send out a message Email to one saved TCP host, with saved message content plus variable message. Please read Chapter 10 for entering host address and parameters, Up to 10 set of groups (service type SC, id 1 to 10) can be set with different combinations of "elements": host , message content.

1st field Service type	**2nd field** Service id	**3rd field** Operation type	**4th field** Operation argument	Explanation
SC	(1 to 10)	TO	(1-10)	Id of host address (see Chapter 10.2a)
		BD	(0-3)	Id of email body (see Chapter 10.2b) 0: no body
		SN	(additional content)	Send out the message with above setting plus additional content
			%CTn %IP %TMn %AI	"%" to indicate "variable" options in message content

Example: Setting up SC set #1 with elements: host #1, content #2.

```
SC␣1␣TO␣1␣SC␣1␣BD␣1
```

Example: Sending socket communication message SC set#1 with additional content "HELLO_WORLD".

```
SC␣1␣SN␣HELLO_WORLD
```

Example: Setting up SC set #2 with message "0", and send out immediately.

```
SC␣2␣BD␣0␣SC␣2␣SN␣0
```

Example: Send a message SC #1 "Counter#2_value_is_20" (report counter # value).

```
SC␣1␣SN␣Counter#2_value_is_%CT2
```

Using "variable" options within additional email content

In the SC message additional content field you can use "%" and Service type to insert the current value of Service into the additional content:

Variable	%CTn	%TMn	%IP	%AI
Description	Current value of counter id#n	Current value of timer id#n	Current I/P ports' summing value	Current AI ports values
Range of 'n'	1 to 5	1 to 10	(See Chap 18.4.c for calculation)	See Note below (5)

Invalid Service name or Id will be ignored.

Note:

1. To use Socket Communication Service make sure all parameters has been setup properly first:
   (a) APN (+IPGPRS)
   (b) host server (+SCHOST)
   (c) pre-saved message (+SCMESS) (if needed)

(d) It is strongly suggested you have tested the socket communication function by using AT+SCSEND command to send test emails first before using SC Command Sting.

2. When using SC service maximum 10 messages can be put on sending queue, further message sending requests will be aborted. Buffered message queue is volatile and will be lost If modem Is powered off or reset. Also when there is SC service in queue AT+SCSEND command will not be allowed.

Chapter 21

Command string - Reading status of services

21.1 Command for reading current information of Services

AT+CSTRSTAT

To read current parameter or status of a particular service.

Syntax: AT+CSTRSTAT=”<type> <id>”

Response: OK

Defined Values:

<type> define type of Service:

AL	Alarm
CT	Counter
TM	Countdown timer
IP	Input port
PW	Device power control
EM	Email
AI	Analog input
OP	Output port

<id> service id

Example:

Command	Response
AT+CSTSTAT=”AL 1”	AL 1 : ST 01/01/01,12:00:00 TR 2 OK Note: read current setting of Alarm #1
AT+CSTRSTAT=”TM 10”	TM 10: CV 66 SW 1 TR 20 OK Note: read current info of countdown timer #10
AT+CSTRSTAT=”IP 9”	+CME ERROR: 3 Note: id out of range

21.1.1 Reading Alarm Service

Enter AT+CSTRSTAT=“AL 1” will get Alarm #1 info:

AL 1	:	ST 01/01/01,12:00:00	TR 3
a		**b**	**c**

a. Service id.

b. Date time set (space if not set).

c. Command String id to be executed if trigger (0 if not to trigger).

21.1.2 Reading Counter Service

Enter AT+CSTRSTAT=“CT 1” will get Counter #1 info:

AL 1	:	ST 01/01/01,12:00:00	TR 3
a		**b**	**c**

a. Service id.

b. Current value of the timer.

c. Timer is running (1) or stop (0).

d. Command String id to be executed if trigger (0 if not to trigger).

21.1.3 Reading Countdown Timer Service

Enter AT+CSTRSTAT=“TM 1” will get Countdown Timer #1 info:

TM 1	:	CW 90	SW 0	TR 3
a		**b**	**c**	**d**

a. Service id.

b. Current value of the timer.

c. Timer is running (1) or stop (0).

d. Command String id to be executed if trigger (0 if not to trigger).

21.1.4 Reading Input Pin Service

Reading Enter AT+CSTRSTAT=“IP 1” will get Input Port #1 info:

IP 1	:	MS 1	DR 0	TH 5	TR 3
a		**b**	**c**	**d**	**e**

a. Service id.

b. Mask value (valid for multiple I/P trigger).

c. Direction of detection.

d. Threshold value of the detection.

e. Command String id to be executed if trigger (0 if not to trigger).

21.1.5 Reading Device Power Control Service

Enter AT+CSTRSTAT=“PW 1” will get device power control info:

PW 0
a

a. Current Service id (mode).

21.1.6 Reading Email Sending Service

Reading Enter AT+CSTRSTAT=“EM 1” will get email set #1 info:

EM 1	:	TO 1	CC 0	BC 5	SU 3	BD 1
a		**b**	**c**	**d**	**e**	**f**

a. Service id.

b. id of TO recipient.

c. id of CC recipient.

d. id of BC recipient.

e. id of email subject.

f. id of email body.

21.1.7 Reading Analog Input Service

Reading Enter AT+CSTRSTAT=“AI 1” will get analog input port #1 info:

AI 1	:	TP 1	HL 100	LL 10	TH 5	TR 1	CV 30
a		**b**	**c**	**d**	**e**	**f**	**g**

a. Service id.

b. Trigger type (1-3).

c. High limit (mV or mA).

d. Low limit (mV or mA).

e. Threshold value (second).

f. Command String id to be executed if trigger (0 if not to trigger).

g. Current value (mV or mA).

21.1.8 Reading Output Port Service

Reading Enter AT+CSTRSTAT=“OP 1” will get output port #1 info:

OP 1	:	SW 1
a		**b**

a. Service id.

b. Current state set.

Chapter 22

Questions and answers

AutoTCP/UDP

Q. Can I specify <server> by URL (e.g. xxxxxxx.com) rather than IP address?

A. Yes, but only if your GPRS network have proper DNS service. You cannot specify your own DNS server

Q. If I enabled AutoTCP or AutoUDP, how can I stop it?

A. You need to enter the command AT+AUTOTCP=0 or AUTOUDP=0 by either 1: within 20 seconds after power up, or 2: during reconnection (serial port back to command mode), or 3: by SMS (see Chapter 6)

AT command driven TCP/UDP connection

Q. Why I see three “OK” coming after entering AT+IPCONNECT=1,1 command?

A. The Software Tools program is issuing internal AT command for GPRS setup, so extra “OK” responses will be seen.

Q. After the TCP/UDP connection is stopped I wan to enter AT+OTCP or AT+OUDP to reconnect but I get message “+CME ERROR: 3”. Why?

A. After TCP/UDP socket connection the GPRS connection session will also be disconnected. So please enter AT+IPCONNECT=1,1 to reconnect GPRS first.

Remote AT command by SMS

Q. Can I send any AT command by SMS to control other features described in this document?

A. Yes. Please refer to Chapter 19.

Command String Feature

Q. Are the status of Services settings and status will be saved when power is cut?

A. All Services status will be saved into non-volatile memory, so e.g. like Countdown timer will resume counting when power recover. But all Output Ports will be set to logic 0 when power up.

Q. Can I check the status out Output Ports?

A. Yes. You can use AT+CSTRSTAT command to check

Q. What should be noted with the execution priority of concatenated Command String?

A. During executing concatenated Command String, if the 1st part of the CS leading to another no. of the CS to be triggered, then the triggered CS will be executed first, e.g. “CT 1 IN 1 CT 1 DE 1”
If the first CS (counter #1 increment by 1) will let the Counter#1 to trigger CS #2, then CS #2 will be executed BEFORE executing “CT 1 DE 1”

Chapter 23

Example of modem software setup and operation

To setup automatic TCP connection from modem to server

SIM card APN is “internet”; Server IP address is 61.167.60.1; Server port is 23.

- Enter APN information:
  AT+IPGPRS=1,”internet”
  OK
- Setup TCP server parameters:
  AT+IPCTP = 23,”C”,”61.167.60.1”
  OK
- Enable automatic TCP connection:
  AT+AUTOTCP=1
  OK
- TCP connection will start after 20 seconds.

To setup automatic TCP connection from server to modem

SIM card APN is “internet”; Connection IP format is 255.255.255.255; Connection port is 23.

- Enter APN information:
  AT+IPGPRS=1,”internet”
  OK
- Setup TCP server parameters:
  AT+IPCTP = 23,”S”,”255.255.255.255”
  OK
- Enable automatic TCP connection:
  AT+AUTOTCP=1
  OK
- TCP socket on modem will start after 20 seconds.

To setup AT command driven TCP connection

SIM card APN is “internet”; Server IP address is 61.167.60.1; Server port is 23.

- Enter APN information:
  AT+IPGPRS=1,”internet”
  OK

- Setup TCP server parameters:
  AT+IPCTP = 23,"C","61.167.60.1"
  OK

- Enable "DLE" character to close connection:
  AT+DLEMODE=1
  OK

- Attach to GPRS:
  AT+CGATT=1
  OK

- Connect to GPRS:
  AT+IPCONNECT=1,1
  OK

- Open TCP connection:
  AT+OTCP
  CONNECT 115200

- TCP connection is now available and can be close by the "DLE" character.

To setup periodic ping

SIM card APN is "internet"; Ping IP address is 8.8.8.8;

- Enter APN information:
  AT+IPGPRS=1,"internet"
  OK

- Configure IPPING with 3 retry, 2 seconds delay between retries, and a maximum timeout of 15 seconds:
  AT+IPPING = 2,"61.167.60.1", 3,2,15
  OK

- Perform a ping every 1800 seconds, if ping fail disconnect GPRS:
  AT+IPOPT=4,1800,1
  OK

To setup TCP Terminal and Dynamic DNS automatic update

SIM card APN is "internet"; Dynamic DNS provider is DynDNS; TCP Terminal port is 1024;

- Enter APN information:
  AT+IPGPRS=1,"internet"
  OK

- Set Dynamic DNS server:
  AT+IPDDNSSERV="members.dyndns.org",80
  OK

- Set DynDNS account details:
  AT+IPDDNSACCT="mymodem.dyndns.org","mylogin","mypsswd"
  OK

- Enable automatic Dynamic DNS update
  AT+IPDDNSUPD=1
  OK

– Specify TCP Terminal port, password, with a 30 seconds timeout:
  AT+TCPTERM=2,”mypsswd”,1024,30
  OK

– Enable TCP Terminal:
  AT+TCPTERM=1
  OK

To perform a remote application update using remote SMS command

Be sure to have enabled the remote SMS access (SMSAT) on modem first.

FTP address is 61.93.240.149, directory is “modem”, file name is “update092i.dwl”, login is maestro, password is dota.

– Send SMS to the modem to specify APN information:
  000000AT+IPGPRS=1,”internet”
  Modem will send SMS back with: OK

– Send SMS to the modem to setup the FTP server access information:
  000000AT+IPFTP=21,”I”,”A”,”61.93.240.149”,”maestro”,”dota”
  Modem will send SMS back with: OK

– Send SMS to launch new application download and update:
  000000AT+FTPDOTA=”update092i.dwl”,”modem”,1
  Modem will send SMS back with:
  +ADINSTALL: 2
  modem_092i_OATS221_2687_22 MAY 11 15:02:18

Input port signal to send SMS w/Command String

To set if input port #1 has a low-to-high signal and last for 0.5 seconds, then send a SMS to phone book number 1 with input pins status message. Services used: IP#1.

– Set CS2: send SMS to phone #1 with input port #1 status message.
  AT+CSTRSET=0,2,”SM 1 SN PIN_1_HIGH_IP_STATUS:_%IP”

– Input port #1 low-to-high, 50mS threshold, trigger CS2.
  AT+CSTR=”IP 1 DR 0 IP 1 TH 5 IP 1 TR 2”

Input port signal to send e-mail w/Command String

To set if input port #2 has a low-to-high signal and last for 0.5 seconds, then send an already configured e-mail with input pins status message. Services used: EM#1, IP#2.

– Enter APN information:
  AT+IPGPRS=1,”internet”

– Setup SMTP server:
  AT+IPSMTP=25,0,”smtp.network.com”
  Setup sender address:
  AT+EMADDR=0,0,”me@network.com”
  Setup recipient address:
  AT+EMADDR=0,1,”to_1@network.com , to_2@network.com”
  Setup cc recipients addresses:
  AT+EMADDR=0,2,”cc_1@network.com , cc_2@network.com”

Setup bcc recipients addresses:
AT+EMADDR=0,3,”bcc_1@network.com , bcc_2@network.com”
Setup e-mail subject:
AT+EMSUBJ=0,1,”Email subj #1”

– Set EM#1 using TO#1, CC#2, BCC#3, Subject#1:
AT+CSTR=”EM 1 TO 1 EM 1 CC 2 EM 1 BC 3 EM 1 SU 1”

– Set CS3: Send out email using EM#1 settings with input port #2 status in message content.
AT+CSTRSET=0,3,”EM 1 SN PIN_2_HIGH_IP_STATUS:_%IP”

– Set input port #2 low-to-high, 50mS threshold, trigger CS
AT+CSTR=”IP 1 DR 0 IP 1 TH 5 IP 1 TR 3”

Analog input alarm by SMS w/Command String

To set if analog input port #1 value exceed 1V and last for 2 seconds, then send a SMS to phone book number 1 with an alert message. Service used: AI #1, SM#1.

– Set CS2 : send SMS to phone #1 with content “AI_1_over_1000mV”
AT+CSTRSET=0,2,”SM 1 SN AI_1_over_1000mV

– Set AI#1 exceed HL trigger, HL=1000mV, 50mS threshold, trigger CS2
AT+CSTR=”AI 1 TP 1 AI 1 HL 1000 AI 1 TH 2 AI 1 TR 2”

Chapter 24

Command string - Quick reference

ALARM “AL”		
Service Id	Operation Type	Argument and Explanation
1 to 5	ST	yy/mm/dd,hh:mm:ss(Date time, 0 to cancel)
	TR	0 to 50 (CS to trigger, 0 to cancel)

COUNTER “CT”		
Service Id	Operation Type	Argument and Explanation
1 to 5	DE	1 to 255 (Decrement)
	IN	1 to 255 (Increment)
	RS	0 (Reset)
	ST	-32768 to 32768 (value to trigger
	TR	0 to 50 (CS to trigger, 0 to cancel)

COUNTDOWN TIMER “TM”		
Service Id	Operation Type	Argument and Explanation
1 to 10	ST	1 to 2147483647 (Timer initial value)
	SW	0 to 1 (stop or start timer)
	TR	1 to 50 (CS to trigger, 0 to cancel)

INPUT PORT “IP”		
Service Id	Operation Type	Argument and Explanation
1	DR	0 to 1
	TH	1 to 255 (Duration state to trigger unit in 0.1s)
	TR	1 to 50 (CS to trigger, 0 to cancel)

SMS “SM”		
Service Id	Operation Type	Argument and Explanation
1 to 10	SN	(SMS CONTENT) (variable : %CTn counter value %IP input port value %TMn countdown timer value)

EMAIL “EM”		
Service Id	Operation Type	Argument and Explanation
1 to 10	TO	0-50 (recipient id, 0 to cancel)
	CC	0-50 (cc recipient id, 0 to cancel)
	BCC	0-50 (bcc recipient id, 0 to cancel)
	SU	0-10 (subject id, 0 to cancel)
	BD	0-3 (body/content id, 0 to cancel)
	SN	(additional email content) (variable : %CTn counter value %IP input port value %TMn countdown timer value)

DEVICE POWER CONTROL “PW”		
Service Id	Operation Type	Argument and Explanation
0 to 15	1 (dummy)	1 (dummy)

ANALOG INPUT “AI”		
Service Id	Operation Type	Argument and Explanation
1 to 4	TP	1 to 3 (Trigger type: higher than HL, lower than LL, or both)
	TH	1 to 255 (Threshold TP trigger unit in second)
	HL	-6000 to 6000 (High limit unit in mV or mA)
	LL	-6000 to 6000 (Low limit unit in mV or mA)
	TR	0 to 50 (CS to trigger, 0 to cancel)
GPS “GP”		
Service Id	Operation Type	Argument and Explanation
0 to 2	TR	1 to 50 (CS to trigger, 0 to cancel)
OUTPUT PORT “OP”		
Service Id	Operation Type	Argument and Explanation
0 to 2	SW	0 to 1 (Current state set)

Chapter 25

GPS on the M100 3G XT

The M100 3G incorporates GPSOne functionality. User can use GPS AT commands in this chapter to control GPS function.

Before using GPS function please read M100 3G user manual for setting up GPS antenna.

25.1 Controlling GPS

AT+GPSSTART

Syntax: AT+GPSSTART=<state>,<start_type>,<agps>

Response: +GPSSTART: <state>,<start_type>,<agps>

Defined Values:

<state> GPS initialization state to be set:

- "OFF" is released.
- "STOP" is on (initialized) but not running.
- "START" is on and running in normal mode. (default)
- "IDLE" is on but in standby mode.
- "HIBERNATE" is on but in hibernate mode.
- "DEEP" is on but in deep sleep mode.

<start_type> GPS starting mode:

- "HOT" hot start (default)
- "WARM" warm start
- "COLD" cold start
- "FACTCOLD" factory cold start

<agps> enable AGPS feature:

- "AGPSON" enable AGPS
- "AGPSOFF" disable AGPS (default)

Example:

Command	Response
AT+GPSSTART	OK Note: start GPS with default settings.
AT+GPSSTART="START","WARM","AGPSON"	OK Note: start GPS with a warm start and AGPS on.

Command	Response
AT+GPSSTART=”STOP”	OK Note: stop GPS engine.
AT+GPSSTART=”OFF”	OK Note: turn off the GPS.
AT+GPSSTART=”IDLE”	OK Note: turn on the GPS and leave it to idle.
AT+GPSSTART?	+GPSSTART: “STOP”,”HOT”,”AGPSOFF”
AT+GPSSTART=?	+GPSSTART: (“OFF”, “STOP”, ”START”, ”IDLE”, ”HIBERNATE”, ”DEEP”),(“HOT”, ”WARM”, ”COLD”, ”FACTCOLD”),(“AGPSON”, ”AGPSOFF”)

Note:

- Sate of GPS can be set to another directly, e.g. when the GPS is originally in “OFF” state, the command AT+GPSSTART=”IDLE” will first start the GPS and then put it to IDLE state.
- All parameters are saved and will be set on next power up.

AT+GPSSTOP

To stop the GPS function (put it to initialized mode).

Syntax: AT+GPSSTOP

Response: OK

Example:

Command	Response
AT+GPSSTOP	OK Note: stops GPS, equivalent to AT+GPSSTART=”OFF”

AT+GPSOFF

To switch off the GPS function.

Syntax: AT+GPSOFF

Response: OK

Example:

Command	Response
AT+GPSOFF	OK Note: releases GPS, equivalent to AT+GPSSTART=”OFF”

AT+AGPS

To set the AGPS function and check AGPS download details.

Syntax: AT+AGPS=<agps>

Response: +AGPS: <agps>[,<ee-period>]

Defined Values:

<agps> enable AGPS feature:

1	enable AGPS
0	disable AGPS (default)

<ee-period> will display valid period of EE data, if successfully downloaded. Format is “YY/MM/DD,hh:mm:ss”, “YY/MM/DD,hh:mm:ss” time from start to end.

Example:

Command	Response
AT+AGPS=1	OK Note: enable, equivalent to AT+GPSSTART=„”AGPSON”
AT+AGPS=0	OK Note: disable, equivalent to AT+GPSSTART=„”AGPSOFF”
AT+AGPS?	+AGPS: 1, “13/05/28,06:00:00”, “13/06/28,06:00:00” OK
AT+AGPS=?	+AGPS: (0-1) OK

AT+NMEA

To set the output of NMEA messages to desired com port

Syntax: AT+NMEA=<port>

Response: +NMEA: <port>

Defined Values:

<port> output port for NMEA data stream:

2	enable NMEA output on USB COM port.
1	enable NMEA output on Serial port.
0	disable output (default).

Example:

Command	Response
AT+NMEA=1	OK
AT+NMEA?	+NMEA: 1 OK
AT+NMEA=?	+NMEA: (0-2) OK

Note:

– NMEA output is available only when GPS is set to “START” state.

- NMEA output can only be sent to one port at a time.
- If the UART or USB is switched to data mode for GPRS or TCP data transmission, NMEA messages will not be output.

AT+GPSPOS

To get the last position information.

Syntax: AT+GPSPOS

Response: +GPSPOS: <fix>, <time>, <date>, <latitude>, <longitude>,<altitude>, <hdop>, <speed>, <course>, <nb-sat>

Defined Values:

<fix> value of the GPS fix.

0	Invalid fix
1	2D fix
2	3D fix
-1	No valid position available

<time> Time of fix. Format: hhmmss, ranges of values: hh (hour) 00 to 23, mm (minute) 00 to 59, ss (second) 00 to 59. Example: 225454 means 22:54:54 UTC.

<date> Date of fix. Format: ddmmyy, ranges of values: dd (day) 01 to 31, mm (month) 01 to 12, yy (year) 2000 to 2099. Example: 191194 means November 19th of 1994.

<latitude> Format: ddmm.mmmm(N/S), ranges of values: dd (degree) 00 to 90, mm.mmmm (minute) 00,0000 to 59.9999, (N/S) North or South. Example: latitude of the fix -4916.45N means 49 degree 16.45 min North.

<longitude> Format: dddmm.mmmm(E/W), ranges of values: dd (degree) 00 to 180, mm.mmmm (minute) 00,0000 to 59.9999, (E/W) East or West. Example: longitude of the fix -12.311.12W means 123 degree 11.12 min West.

<altitude> Format: mmmm.m in meter.

<hdop> Horizontal dilution of position. Format: xxx.xx.

<speed> Speed over ground ssss.s, in kilometers per hour.

<course> dddmm.mmmm in degree, minute, ranges of values: ddd (degree) 000 to 360 mm.mmmm (minute) 00.0000 to 59.9999.

<nbsat> nn number of satellites in view, range from 1 to 16.

Example:

Command	Response
AT+GPSPOS	+GPSPOS: 1, 225454, 192294, 4916.45N, 12311.12W, 111.1, 0.9, 25.5, 180.0, 06 OK
AT+GPSPOS	+GPSPOS: -1,,,,,,,,,0 OK Note: No valid fix

AT+GPSINFO

To request some unsolicited indication for GPS and AGPS events (+GPSINFO and +APGS unsolicited messages). See Section 25.2 for details.

Syntax: AT+GPSINFO=<mode>

Response: +GPSINFO: <mode>

Defined Values:

<mode>

1	enable +GPSINFO and +APGS unsolicited messages.
0	disable +GPSINFO and +APGS unsolicited messages. Default value.

Example:

Command	Response
AT+GPSINFO=1	OK Note: enable +GPSINFO and +APGS unsolicited messages.
AT+GPSINFO=0	OK Note: disable +GPSINFO and +APGS unsolicited messages.
AT+GPSINFO?	+GPSINFO: 0 OK
AT+GPSINFO=?	+GPSINFO: (0-1) OK

25.2 GPS Information unsolicited messages

When +GPSINFO is set to 1, following unsolicited message will come out upon GPS events as described below.

Syntax:

+GPSINFO:<event>

+AGPS: <event>[,opt]

+GPSINFO event	Explanation
0	GPS fix has been lost.
1	GPS fix has changed to an estimated position
2	GPS fix has changed to 2-Dimensional position
3	GPS fix has changed to 3-Dimensional position
4	GPS fix has changed to invalid position

+AGPS event	Explanation
0	Error during EE download
4	EE download started
5	EE download stopped (after AT+AGPS=0)
6	EE download completed (successful)
7	EE download aborted (server access problem)
8	EE download data time stamp display, <opt> will show <ee-period>, as detailed in 25.1

Note:

- The state of GPS can be set from one to the other directly, e.g. when the GPS is originally in “OFF” state, the command AT+GPSSTART=”IDLE” will first start the GPS and then put it to IDLE state.
- All parameters are saved and will be set on next restart/power up.
- The AGPS function uses GPRS/3G data connectivity. It uses internal stacks to download EE information from dedicated server. To make it work the user should :
  - Setup the correct APN to the first PDP context entry by AT+CGDCONT command.
  - DO NOT use GPRS resource at the beginning. The AGPS will take over the GPRS to download EE information.
- The AGPS function is disabled when GPS is in "OFF" state. If you need to download EE, data the state of GPS must to set to "STOP" or higher.

25.3 Notes on AGPS

AGPS function uses GPRS/3G data connectivity. It uses internal stacks to download EE information from dedicated server.

AGPS requirement and setup

To perform AGPS function do the following:

1. Power on the modem with a valid SIM card and data service enabled.
2. Enter APN by using command AT+CGDCONT.
3. Do NOT use any SmartPack function which needs data service.
4. Switch on the GPS by AT+GPSSTART command.
5. Enter AT+AGPS=1.

Once AGPS download is successful you can use command AT+AGPS? to check the <ee-period> (see 25.1).

Example of AGPS operation

```
AT+CGDCONT=1,"IP","INTERNET"
OK
AT+GPSSTART
OK
AT+GPSINFO=1
OK
AT+AGPS=1
OK
+AGPS: 4
+AGPS: 6
+AGPS: 8,"13/05/29,03:00:00","13/06/05,03:00:00"
```

25.4 Command string GPS service

The GPS service is used to trigger a Command String when there is a GPS event. Make sure the GPS functionality is switch on.

There are three GPS events:

Id	event
0	From a 2D fix or 3D fix to a no fix
1	From a no fix to a 2D fix
2	From a no fix or 2D fix to 3D fix

25.4.1 Socket Communication Service Command String Syntax and explanation

1st field Service type	**2nd field** Service id	**3rd field** Operation type	**4th field** Operation argument	**Explanation**
GP	(1 to 3)	TR	(1-50) 0	Set Command String to be run, 0 to cancel setting

Example: When a 2D or 3D fix trigger Command String #10

`GP␣1␣TR␣10␣GP␣2␣TR␣10`

Invalid Service name or Id will be ignored.

25.4.2 Reading GPS service status

Enter AT+CSTRSTAT=“GP 1” will get GPS service #1 info:

GP 1	:	TR 1
a		**b**

a. Service id.

b. Command String id to be executed if trigger (0 if not to trigger).

25.4.3 GPS info for EM, SC and SM service

In EM, SC and SM service the message content may contain %GP variable for GPS information. The variable format is “%GPn” where:

Variable(n)	Explanation
0	UTC Date in ddmmyy format (empty when no fix)
1	UTC Time in hhmmss format (empty when no fix)
2	Latitude in ddmm.mmmmN/S format (empty when no fix)
3	Longitude in dddmm.mmmmE/W format (empty when no fix)
4	Altitude in m.mm format (empty when no fix)

5 Speed in m.mm format (zero when no fix)

6 Direction in dddmm.mmm format (zero when no fix)

Example: To send a SMS with date, time, Latitude and Longitude:

```
SM␣1␣SN␣DATE_%GP0__TIME_%GP1__LAT_%GP2__LON_%GP3
```

Chapter 26

Know issues

The modem SmartPack will affect certain other AT commands operation. Please note.

Mutually exclusive TCP/UDP functions

Following functions are exclusive to each other, i.e. if either is enabled others could not be then:

- AT+AUTOTCP=1
- AT+AUTOUDP=1
- AT+OTCP
- AT+OUDP

Sending commands over SMS

You can use the remote AT command by SMS feature to send modem Software AT commands mentioned in this document except the followings:

- AT+OTCP
- AT+OUDP
- AT+IPCONNECT
- AT+EMBODY
- AT+SCMESS
- AT+AUTOPIN
- AT+SPRESET
- AT+SPMODE

Chapter 27

SmartPack change log

Version 097g, on firmware R750

- Added SPMODE command to switch from SmartPack to WipSoft
- Added SPRESET command to reset all SmartPack settings to default. Can't be entered remotely.
- Added IPDEBUG command to display TCP/IP stack debug message.
- Fixed signal LED that sometimes won't flash even when network registration is OK
- Fixed Command String Input pin 2 triggering issue
- Fixed remote AutoTCP/UDP data not forwarded to serial port if socket is closed by remote peer within a very short period

Chapter 28

Related documents

28.1 Related documents

Following documents are available on Maestro Wireless Solutions website: `http://www.maestro-wireless.com`.

- How to upgrade a modem in five easy steps
- Application Note - Automatic connections

M100 2G:

- Quick Start Guide
- AT commands guide for Open AT Firmware

M100 3G:

- Quick Start Guide
- AT commands guide for Open AT Firmware
- Standard AT command list
- Extended AT command list
- Location AT command list

28.2 Related software

Following software are available on Maestro Wireless Solutions website: `http://www.maestro-wireless.com`.

- Maestro Configuration Software
- M100 3G XT USB Drivers