



M110 USER MANUAL

MAESTRO WIRELESS

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0.1 Safety Precautions

0.1.1 General Precautions

- The modem generates radio frequency (RF) power. When using the modem care must be taken on safety issues related to RF interference as well as regulations of RF equipment.
- Do not use the modem in aircraft, hospitals, petrol stations or in places where using GSM products is prohibited.
- Be sure that the modem will not be interfering with nearby equipment. For example: pacemakers or medical equipment. The antenna of the modem should be away from computers, office equipment, home appliances, etc...
- An external antenna must be connected to the modem for proper operation. Only used approved antennas with the modem. Please contact authorized dealer on finding an approved antenna.
- Always keep the antenna with minimum safety distance of 26.6cm or more from human body.
- Do not put the antenna inside metallic box, containers, etc.

0.1.2 Protecting your modem

To ensure error-free usage, please install and operate your modem with care. Remember the following:

- Do not expose the modem to extreme conditions such as high humidity/temperatures, rain, direct sunlight, caustic/harsh chemicals, dust, or water.
- Do not try to disassemble or modify the modem. There is no user serviceable part inside and the warranty would be void.
- Do not drop, hit or shake the modem. Do not use the modem under extreme vibrating condition.
- Do not pull the antenna or power supply cable. Please attach or detach by holding the connector.
- Connect the modem only according to the instruction manual. Failure to do it will void the warranty.

Chapter 1

INTRODUCTION

The aim of this document is to provide users of Maestro M110 Modems running mPack, a detailed description of the commands supported by mPack and various configuration / operation modes in which M110 series Modems could be used.

1.1 M110 series supported by mPack

MODEL NAME	TERRITORIES OR OPERATOR(S)	CELLULAR BAND(S) TYPE	FALLBACK MODE	BAND(S)	GNSS	
M111	EMEA, Asia Pacific	2G	3/8	N/A	*	
	World excl. Japan & Korea		2/3/5/8			
M112	EMEA	NB-IoT	8	N/A	*	
			20			
			8/20			
	Asia Pacific		5			
World	28	1/3/5/8/20/28				
M113	Verizon Wireless	LTE-M1	13	N/A	*	
	AT&T Wireless, T-Mobile USA, Sprint		2/4/5/12			
	World	LTE-M1 / NB-IoT	2/3/4/5/8/12/13/20/28	2G	2/3/5/8	
M114	EMEA	LTE cat. 1	3/7/20	2G	3/8	
	AT&T Wireless, T-Mobile USA, Sprint		2/4/5/12	3G	2/5	
	Asia Pacific		3/8/28		1	
	NTT Docomo		1/19	*	N/A	
M115	EMEA, Asia Pacific	2G	1/8	3G	*	
	Japan		1/2/5/8			3/8
	World excl. Japan					2/3/5/8

* Please consult Maestro regarding the models shown in grey which are subject to MOQ and other considerations

** Uplink / Downlink maximum data rates – 3G: 5.76 / 7.2 Mbps; NB-IoT: 62.5 / 27.2 kbps; LTE-M1: 375 / 375 kbps; LTE cat. 1: 5 / 10 Mbps

Chapter 2

BASIC OPERATION

2.1 Modes of Operation

M110 running mPack can be operated in the following modes:

- PPP Dial up over RS232
- PPP Dial up over USB
- Generic AT commands over RS232
- Generic AT commands over USB
- mPack commands over RS232
- mPack commands over USB

Thanks to the wide range of operating modes, mPack transforms the M110 Modem into a versatile modem which is capable of providing data connectivity to serial devices in almost any situation be it an Intelligent connected serial device with full TCP/IP stack capable of PPP connection or an intelligent connected serial device capable of sending commands but without a TCP/IP stack or be it a non-intelligent connected serial device only pumping out data on serial port.

In addition, a function of mPack as listed below provides extra functionality and greatly improves the robustness of the wireless connected system.

- Automatic and self-recovery TCP/UDP socket connection
- AT command driven TCP/UDP socket connection
- Ping Service
- Network Watchdog
- Heart beat mechanism
- Input/output and Analog triggered AT command
- Remote AT command through SMS and TCP Terminal
- Remote program updating
- Socket data sending

2.2 Getting Started

Before putting the M110 in operation, it must be configured first. The configuration commands can be given to the modem over Serial port or by sending an SMS.

To send command over the serial port, please connect M110 to a computer over Serial port. Use standard software available on a WINDOWS PC (e.g. hyper terminal) to send serial commands to M110. SMS would have to be sent to the mobile number corresponding to the SIM card inserted in M110device. In either case, the commands are mPack AT commands as described below.

2.3 Default settings

The default settings of the UART and USB ports are as follows:

- Baudrate: 115200
- Character Framing: 8
- Parity: None
- Stop Bit: 1
- Flow Control: None

2.4 Basic Command Syntax

All commands starting with AT+ entailed in documents:

- u-blox-ATCommands_Manual_(UBX-13002752) for M111, M114, M115,
- SARA-N2_ATCommandsManual_UBX-16014887 for M112, and
- SARA-R4_ATCommandsManual_(UBX-17003787) for M113

All mPack commands start with AT# are the only ones covered in this document, e.g.

`AT#INFO`

Error codes for uBlox commands are as described in the uBlox AT command manual

Error codes for mPack commands are as follows:

- “ERROR BAD PARAMETER” for wrong parameters or out of range values
- “ERROR UNKNOWN COMMAND” for wrong command syntax

2.5 LED Status Indicator

The LED will indicate different status of the modem:

- For Orange LED:
 - OFF: No cellular connection
 - ON: Cellular connection
 - Blinking: Data transfer
- For Green LED:
 - OFF: No power
 - Slow blink: No signal or CSQ < 4,99
 - Fast blink: Bad CSQ < 9
 - ON: Good signal or CSQ > 10

Chapter 3

ADMINISTRATION COMMANDS

3.1 AT#INFO

Returns device information
ALLOWED: [exec-state-info](#)

AT#INFO

– (no arguments)

exec :

```
AT#INFO
#HW_version: M110Series-01V
#Cellular_Module:u-blox-SARA-U201-23.60
#Bootcode_version: mPack_boot_1.0_rc1_b2017112301
#SW_build: mpack_m110_2.1_rc0_2018022601ALPHA01
#FLASH ID: 0xef,0x4015
OK
```

state :

```
AT#INFO?
#HW_version: M110Series-01V
#Cellular_Module:u-blox-SARA-U201-23.60
#Bootcode_version: mPack_boot_1.0_rc1_b2017112301
#SW_build: mpack_m110_2.1_rc0_2018022601ALPHA01
#FLASH ID: 0xef,0x4015
OK
```

info :

```
AT#INFO=?
OK
```

3.2 AT#CONFIGDEL

Factory reset device configuration
ALLOWED: [exec](#)

Note:

– Device restarts after this command is executed

AT#CONFIGDEL

- (no arguments)

exec :

```
AT#CONFIGDEL
OK
```

3.3 AT#RESET

Software reset the M11X device
[ALLOWED: exec](#)

AT#RESET

- (no arguments)

exec :

```
AT#RESET
OK
```

3.4 AT#MRST

This command resets the M11x module after a programmed delay. The M11x module will reset cyclically until this mode is disabled.
[ALLOWED: exec-state-info](#)

AT#MRST=(mode),(delay)

- mode: timer reset mode
 - 0: disabled
 - 1: enabled
- delay: time set to reset the embedded module
 - range: "000:01" - "167:59" (format hhh:mm)
- remainTime: time before next reset
 - range: "000:01"- "167:59" (format hhh:mm)

exec :

```
AT#MRST=1, "100:00"
OK
```

state (1 minute after executing the exec command):

```
AT#MRST?
#MRST: 1,"100:00","099:59"
OK
```

info :

```
AT#MRST=?
OK
```

3.5 AT#NWRST

Controls reset of the modem in case of network failure conditions

ALLOWED: [exec-state-info](#)

Note:

- Network failure conditions are defined to be cases where registration to cellular/data network fails, or bad signal quality. Each time only one of the above network conditions are checked

AT#NWRST=(option),(timer),(counter)

- option: 0 to disable, 1 to enable, 2 to configure. Default disabled
- timer : 5-120 second interval at which network conditions are checked (different network conditions are checked each time). Default 5
- counter: 10-1000; count of consecutive network failures, after which the device will reset if option = 1. Default 10

exec :

```
AT#NWRST=1,10,18
OK
```

state :

```
AT#NWRST?
#NWRST: 1,10,18
OK
```

info :

```
AT#NWRST=?
#NWRST: (0-2),(5-120),(10-1000)
OK
```


Chapter 4

HARDWARE COMMANDS

4.1 AT#SERIAL

Configure the user-side UART baudrate, character-framing and flow control

ALLOWED: [exec-state-info](#)

Note:

- Bauds 300, 600 are not supported
- The character-framing of 7 data-bytes does work with current configuration, but unreliably.

AT#SERIAL=(baud),(charFraming),(flowCtrl)

- baud: one of (1200,2400,4800,9600,19200,38400,57600,115200)
- charFraming: one of ("8N1","8N2","9O1","9E1"). See also note above.
- flowCtrl
 - 0: disable
 - 1: enable

exec :

```
AT#SERIAL=115200,"8N1",0
OK
```

state :

```
AT#SERIAL?
#SERIAL: 115200,"8N1",0
OK
```

info :

```
AT#SERIAL=?
#SERIAL: (1200,2400,4800,9600,19200,38400,57600,115200),("8N1","8N2","9O1","9E1"),(0-1)
OK
```

4.2 AT#HFLW

Enable or disable hardware flow control

ALLOWED: [exec-state](#)

AT#HFLW=option

– option

- 0: disable flow control
- 1: enable flow control

exec :

```
AT#HFLW=1
OK
```

state :

```
AT#HFLW?
#HFLW: 1
OK
```

info :

```
AT#HFLW=?
ERROR
```

4.3 AT#SETRTC

Set (or stop) the real time clock
[ALLOWED: exec-state-info](#)

AT#SETRTC=(op),(value1),(value2),(value3)

– op:

- 0 = enter time, (value1,value2,value3) = (hh:mm:ss)
- 1 = enter date, (value1,value2,value3) = (YY:MM:DD)
- 2 = stop the RTC clock

exec :

```
AT#SETRTC=1,18,03,05
OK
```

state :

```
AT#SETRTC?
ERROR
```

info :

```
AT#SETRTC=?
#SETRTC: (0-2),((0-23)/(0-99)),((0-59)/(1-12)),((0-59)/(1-31))
OK
```

4.4 AT#GETRTC

Get the real time clock
[ALLOWED: exec-state-info](#)

exec :

```
AT#GETRTC
#GETRTC: 2018/03/05,16:50:48
OK
```

state :

```
AT#GETRTC?
ERROR
```

info :

```
AT#GETRTC=?
ERROR
```

4.5 AT#VIO

Command to configure Versatile I/O
[ALLOWED: exec-state-info](#)

AT#VIO=(channel),(mode)

- channel: 1 or 2
- mode:
 - "DI": digital input "
 - "DO": digital output
 - "AN": analogue input

exec :

```
AT#VIO=2,"DO"
OK
```

state :

```
AT#VIO?
#VIO: 1,"AN"
#VIO: 2,"DO"
OK
```

info :

```
AT#VIO=?
#VIO: (1,2),("DI","AN","DO")
OK
```

4.6 AT#VAMODE

Command to set current or voltage mode
[ALLOWED: exec-state-info](#)

AT#VAMODE=(channel),(AN_mode)

- channel: 1 or 2
- AN_mode: mode within Analogue
 - 0: voltage
 - 1: current mode

exec :

```
// Set channel 1 to current mode
AT#VAMODE=1,1
OK
```

state :

```
AT#VAMODE?
#VAMODE: 1,0
#VAMODE: 2,0
OK
```

info :

```
AT#VAMODE=?
#VAMODE: (1-2),(0-1)
OK
```

4.7 AT#RDIO

Command to read versatile I/O status
[ALLOWED: exec-info](#)

AT#RDIO=(channel)

- channel: 1 or 2
- mode:
 - "DI": digital input
 - "DO": digital output
 - "AN": analogue input
- status:
 - for mode = "DI" or "DO" : 0 or 1

- for mode = "AN" : voltage in mV or current in mA (which one depends on AT#VAMODE)

exec :

```
AT#RDIO=1
#RDIO: 1, "AN", 35
OK
```

state :

```
AT#RDIO?
ERROR
```

info :

```
AT#RDIO=?
#RDIO: (1-2)
OK
```

4.8 AT#OPSET

To control versatile I/O in output mode

[ALLOWED: exec-info](#)

Note:

- On Power up the device output state will be reset.
- Before setting the output value, the channel need to be configured as digital output first

AT#OPSET=(channel),(status)

- channel: 1 or 2
- status: 0 or 1

exec :

```
AT#OPSET=1, 1
OK
```

state :

```
AT#OPSET?
ERROR
```

info :

```
AT#OPSET=?
#OPSET: (1-2), (0-1)
OK
```

4.9 AT#LGPARA

Last gasp SMS configuration
[ALLOWED: exec-state-info](#)

AT#LGPARA=(mode),(mobileNum)

– mode:

- 0: Disable last gasp SMS
- 1: Enable last gasp SMS

– mobileNum: mobile number to which Last Gasp SMS is sent (argument only makes sense when mode is 1)

exec :

```
AT#LGPARA=2, "+919876543210"  
OK
```

state :

```
AT#LGPARA?  
#LGPARA: 0, "+919876543210"  
OK
```

info :

```
AT#LGPARA=?  
#LGPARA: (0-2), (10-29)  
OK
```

Chapter 5

CELLULAR COMMANDS

5.1 AT#IPCELLULAR

Configure cellular parameters for both the SIM slots: APN, username and password.

ALLOWED: [exec-state-info](#)

AT#IPTCP=(idx),(port),(mode),(ip)[,(delay)]

- slot: SIM slot (NOTE: slot 2 is only available on selected models)
- APN : Access Point Name
- username : username for cellular data access. If no username is needed, can omit the argument and mPack software will use a non-null but meaningless value when state is read
- password : password for cellular data access. If no password is needed, can omit the argument and mPack software will use a non-null but meaningless value when state is read
- CID : context ID. Please consult Maestro team on when to use this parameter and what value to use

exec :

```
AT#IPCELLULAR=1, "CMHK"
OK
```

state :

```
AT#IPCELLULAR?
#IPCELLULAR: 1,"internet","*","*",8
OK
```

info :

```
AT#IPCELLULAR=?
#IPCELLULAR: (1), (64), (25), (25), [(1-11)]
OK
```

5.2 AT#IPCONNECT

The 1st parameter in this command is only for format correspondence with the older SmartPack version

ALLOWED: [exec-state-info](#)

Note:

- The 1st parameter in this command is only for format correspondence with the older SmartPack version.

AT#IPCONNECT=(1),(mode)

– mode:

- 0: disconnect cellular data
- 1: connect cellular data

exec :

```
AT#IPCONNECT=1,1
OK
```

state :

```
AT#IPCONNECT?
#IPCONNECT: 1,1
OK
```

info :

```
AT#IPCONNECT=?
#IPCONNECT: (1),(0-1)
OK
```

5.3 AT#IPPING

IP PING configuration and action
[ALLOWED: exec-state-info](#)

AT#IPPING=(option),(address),(num),(interval),(timeout)

– option

- 0, 1: reserved
- 2: configure ping address and parameters

– address: IP address of the target to be pinged

– interval: time in second between each ping trial. Default value is 3. Valid range is 1 to 10.

– timeout: time in ms before ping is timed out. Default value is 10. Valid range is 5000 to 60000.

exec :

```
// destination can be reached
AT#IPPING=2,"8.8.8.8",4,10,5000
OK
AT#IPPING
(to be specified)

// destination cannot be reached
AT#IPPING=2,"non-existing-ip",4,10,5000
OK
AT#IPPING
(to be specified)
```


state :

```
AT#IPING?  
#IPING: "8.8.8.8",4,10,5000  
  
OK
```

info :

```
AT#IPING=?  
#IPING: (0-2),(120),(1-10),(1-10),(5000-60000)  
  
OK
```


Chapter 6

SOCKET COMMANDS

6.1 AT#IPTCP

Command to set TCP socket parameters

ALLOWED: exec-state-info

Note:

- Mode & IP address should be entered in quotes
- Currently only the "client" mode has been implemented
- The "delay" parameter is deprecated and has no effect (suggested not to use)

AT#IPTCP=(idx),(port),(mode),(ip)[,(delay)]

- idx
 - 1: UART port of modem
 - 2: USB port of modem
- port: number from 0 to 65535
- mode
 - "C": Modem as client to remote server
 - "S": Modem as server for remote client to connect
- ip: IP address of remote partner (IPv4 dotted notation)
- delay: (deprecated, no need to enter)

exec :

```
AT#IPTCP=1,50002,"C","162.242.170.48"
OK
```

state :

```
AT#IPTCP?
#IPTCP: 1,50002,"C","162.242.170.48",1
#IPTCP: 2,0,"C","",1
OK
```

info :

```
AT#IPTCP=?
#IPTCP: (1-2),(0-65535),("C","S"),(120),(0,1)
OK
```

6.2 AT#IPUDP

Command to set UDP socket parameters

ALLOWED: [exec-state-info](#)

Note:

- Mode & IP address should be entered in quotes
- Currently only the "client" mode has been implemented
- The "delay" parameter is deprecated and has no effect (suggested not to use)

AT#IPUDP=(idx),(port),(mode),(ip)[,(delay)]

- idx
 - 1: UART port of modem
 - 2: USB port of modem
- port: number from 0 to 65535
- mode
 - "C": Modem to connect to remote UDP server
 - "S": Modem waiting for remote UDP client to connect
- ip: IP address of remote partner (IPv4 dotted notation)
- delay: delay: (deprecated, no need to enter)

exec :

```
AT#IPUDP=1,50003,"C","162.242.170.47"  
OK
```

exec :

```
AT#IPUDP?  
#IPUDP: 1,50003,"C","162.242.170.47",1  
#IPUDP: 2,0,"C","",1  
  
OK
```

exec :

```
AT#IPUDP=?  
#IPUDP: (1-2),(0-65535),("C","S"),(120),(0,1)  
  
OK
```

6.3 AT#AUTOTCP

Command to Start Auto TCP functionality

ALLOWED: [exec-state-info](#)

AT#AUTOTCP=(mode)

- mode

- 0: AUTOTCP connection OFF
- 1: AUTOTCP connection ON

exec :

```
AT#AUTOTCP=0
OK
```

state :

```
AT#AUTOTCP?
#AUTOTCP: 0
OK
```

info :

```
AT#AUTOTCP=?
#AUTOTCP: (0,1)
OK
```

6.4 AT#AUTOUDP

Command to Start Auto UDP functionality
[ALLOWED: exec-state-info](#)

AT#AUTOUDP=(mode)

– mode

- 0: AUTOUDP connection OFF
- 1: AUTOUDP connection ON

exec :

```
AT#AUTOUDP=0
OK
```

state :

```
AT#AUTOUDP?
#AUTOUDP: 0
OK
```

info :

```
AT#AUTOUDP=?
#AUTOUDP: (0,1)
OK
```

6.5 AT#OTCP

On-demand TCP socket connection.
[ALLOWED: exec-state-info](#)

AT#OTCP=(mode)

– mode

- 0: TCP connection OFF
- 1: TCP connection ON

exec :

```
AT#OTCP=0
OK
```

state :

```
AT#OTCP?
#OTCP: 0

OK
```

info :

```
AT#OTCP=?
#OTCP: (0,1)

OK
```

6.6 AT#OUDP

On-demand UDP socket connection.
[ALLOWED: exec-state-info](#)

AT#OUDP=(mode)

– mode

- 0: UDP connection OFF
- 1: UDP connection ON

exec :

```
AT#OUDP=0
OK
```

state :

```
AT#OUDP?
#OUDP: 0

OK
```

info :

```
AT#OUDP=?
#OUDP: (0,1)

OK
```

6.7 AT#SCHOST

Configure, erase & read remote TCP server parameter
ALLOWED: [exec-state-info](#)

AT#SCHOST=(oper),(id)[,(server),(port),[(retry),(delay),(type)]]

- oper:
 - 0 = enter host setting
 - 1 = read host setting
 - 2 = erase host setting
- id: only 1 for now
- server: IP address of host (IPv4 or text notation)
- port: port number on host
- retry, delay, type: DEPRECATED. No settable

exec :

```
AT#SCHOST=0,1,"162.242.170.59",8888

OK
```

state :

```
AT#SCHOST=1,1
#SCHOST: 1,"162.242.170.59",8888,1,1,0

OK
```

info :

```
AT#SCHOST=?
(0-2),(1),(120),(0-65535),(0-10),(1-60),(0-1)

OK
```

6.8 AT#ILOPT

Optional IP socket parameters
ALLOWED: [exec-state-info](#)

Note:

- Some options are not yet implemented, and will be implemented stage by stage. Therefore, ERROR may be returned for some of the options

AT#IPOPT=(option),(value),[(action)/(string)]

– option:

- 1: Keep alive packet
- 2: Packet size
- 3: *(deprecated)*
- 4: Enable ping & configure ping period. When enabled, the modem will PING the address set by the AT#IPPING command, and will perform the specified action upon PING failure.
- 5: Data on first connection

– value

- for option 1 : 0-43200. Duration to send keep alive packet, in seconds; 0 disables the feature
- for option 2 : 0-1472. TCP Packet size; if 0, default size is used
- for option 4 : 1 - 65535. Time period of PING. If 0, then PING is disabled
- for option 5 : 0 to disable; 1 to enable data on first connection; 2 to edit the string to be sent

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

- 0: do nothing (default). If ping fails the timer will reload & no action will be taken.
- 1: reactivate data connection.
- 2: reset Maestro modem.

– string:

- for option 5 : maximum 120 hex characters and only even length

exec :

```
AT#IPOPT=1
OK
AT#IPOPT=5,2,"414243444546474849"
OK
```

state :

```
AT#IPOPT?
#IPOPT:
#IPOPT: 1,0
#IPOPT: 2,0
#IPOPT: 3,
#IPOPT: 4,0,0
#IPOPT: 5,0,"",1
OK
```

info :

```
AT#IPOPT=?
#IPOPT: (1-4),(0-60000)[,(0-1)]
OK
```


6.9 AT#AUOPT

Optional parameters for AUTOTCP/AUTOUDP connection

[ALLOWED: exec-state-info](#)

Note:

- Option 2 depends upon the availability of the server mode
- Some options are not yet implemented, and will be implemented stage by stage. Therefore, ERROR may be returned for some of the options

AT#AUOPT=(option),(value),(string)

– option:

- 1: Connection idle period
- 2: Server idle
- 3: Connection period
- 4: Connection prefix (only sent upon first connection)
- 5: Heartbeat packet
- 6: Serial prefix

– value:

- for option 1 : 0-43200. Duration of connection without data transfer, in seconds; 0 disables the feature
- for option 2 : 0-43200. Duration of SERVER without a connected remote client, in seconds; 0 disables the feature
- for option 3 : 0-43200. Duration of connection, in seconds; 0 disables the feature
- for option 4 : 0 to disable; 1 to enable connection prefix; 2 to edit the string to be sent
- for option 5 : 0-180. Period of inactivity after which the heartbeat packet is sent, in seconds
- for option 6: 0 to disable, 1 to enable (and hex byte follows as the next parameter)

– string:

- hexadecimal string (e.g. 0AFF) required. One byte for option 6; and up to 16 bytes for option 4

exec :

```
AT#AUOPT=1,3600
OK
AT#AUOPT=4,2,"4149"
OK
```

state :

```
AT#AUOPT?
#AUOPT: 1,3600
#AUOPT: 2,0
#AUOPT: 3,0
#AUOPT: 4,0,"4149"
#AUOPT: 5,0
#AUOPT: 6,0,"01"
OK
```

info :

```
AT#AUOPT=?
OK
```


Chapter 7

REMOTE CONTROL COMMANDS

7.1 AT#SMSAT

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.

Description of the operation:

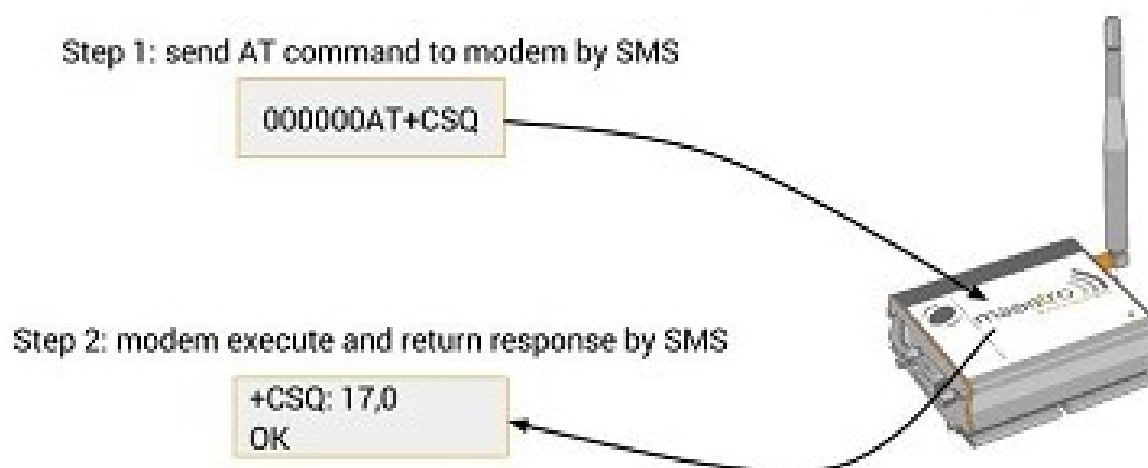


Figure 7.1.1: Example of remote AT command by SMS

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 Read Responses will be buffered recorded, then return to the sender's phone number in one single SMS.
6. If Read 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 Read Response within 26 seconds, the modem will then abort the command, and return intermediate Read 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.

Configure, enable and disable remote AT command by SMS

ALLOWED: [exec-state-info](#)

AT#SMSAT=(mode)[,(param)]

– mode

- 0: Disable SMSAT
- 1: Enable SMSAT
- 2: Change the password for SMSAT
- 3: Change the SMS response trigger

– param

- for mode=2 : password, 6 characters in quotes (quotes optional if password is purely numeric)
- for mode=3 : 0 to disable SMS response; 1 to enable SMS response
- (not needed for modes = 0 or 1)

exec :

```
AT#SMSAT=2,123456
OK
```

state :

```
AT#SMSAT?
#SMSAT: 0,"123456",0
OK
```

info :

```
AT#SMSAT=?
#SMSAT: #SMSAT: (0-2),((6)/(0-2))
OK
```

7.2 AT#TCPTERM

Parameter configuration for enabling configuration over cellular data network; and start/stop TCP Terminal for remote commands over TCP.

ALLOWED: [exec-state-info](#)

Note:

- Network watchdog ping is used by application when the device enters data mode

AT#IPTCP=(idx),(port),(mode),(ip)[,(delay)]

- mode:
 - 0: Disable TCP Terminal
 - 1: Enable TCP Terminal
 - 2: Configure password, port, timeout
- password: max 16 characters. Default "000000"
- port: port used on the modem for incoming TCP connection. Default 23
- timeout: specified in seconds. Default 30

exec :

```
AT#TCPTERM=2,"000000",23,30
OK
```

state :

```
AT#TCPTERM?
#TCPTERM: 0,"000000",23,30
OK
```

info :

```
AT#TCPTERM=?
#TCPTERM: (0-2),(16),(1-65535),(1-43200)
OK
```


Chapter 8

DOTA COMMANDS

8.1 AT#WEBUPDATE

Command to configure DOTA parameter & initiate HTTP DOTA for firmware update

ALLOWED: [exec-state-info](#)

Note:

- If only the filename is given, default IP and port are "updates.d2sphere.com" and 80 respectively
- If the filename is correct, the download starts immediately.

AT#WEBUPDATE=(filename)[,(port),(ip)]

- filename: up to 120 characters, in quotes
- port: port of the server on which the update file is stored (the default value is set by Maestro, see note above)
- ip: IP address of the server on which the update file is stored (the default value is set by Maestro, see note above)

exec :

```
AT#WEBUPDATE="/mpack/mpack_R0100.bin",80,"3.252.19.23"
OK
```

state :

```
AT#WEBUPDATE?
#WEBUPDATE: "/mpack/mpack_R0100.bin",80,"3.252.19.23"
OK
```

info :

```
AT#WEBUPDATE=?
#WEBUPDATE: (120),(0-65535),(120)
OK
```

8.2 AT#UPDATE

Controls the update process

ALLOWED: [exec-state](#)

AT#UPDATE=(value)

– option

- 0: stop the update process
- 1: stop the update process

exec :

```
AT#UPDATE=0  
OK
```

state :

```
AT#UPDATE?  
#UPDATE: 0  
  
OK
```

info :

```
AT#UPDATE=?  
ERROR
```


Chapter 9

D2SPHERE COMMANDS

9.1 AT#IPD2S

D2Sphere configuration command

ALLOWED: [exec-state-info](#)

Note:

- Device restarts after this exec command is accepted.

AT#IPD2S=(port),(IP-address),(delay)

- port: port on the D2sphere server
- IP-address: IP address of D2sphere server, in IPv4 dotted-notation
- delay: delay to start in seconds. Range 0-43200

exec :

```
AT#IPD2S=4444,"5.35.253.3",1000
OK
```

exec :

```
AT#IPD2S?
#IPD2S: 4444,"5.35.253.3",1000
OK
```

exec :

```
AT#IPD2S=?
#IPD2S: (0-65535),(120),(0-43200)
OK
```

9.2 AT#D2S

Enable or disable D2Sphere function

ALLOWED: [exec-state-info](#)

AT#D2S=(mode)

- mode

- 0: disable
- 1: enable

exec :

```
AT#D2S=1
OK
```

state :

```
AT#D2S?
#D2S: 1
OK
```

info :

```
AT#D2S=?
#D2S: (0,1)
OK
```

9.3 AT#DVNAME

Configure device name for D2Sphere
[ALLOWED: exec-state-info](#)

AT#DVNAME=(name)

- name: name of the device, in quotes

exec :

```
AT#DVNAME="M11x_001"
OK
```

state :

```
AT#DVNAME?
#DVNAME: "M11x_001"
OK
```

info :

```
AT#DVNAME=?
#DVNAME: (23)
OK
```

Chapter 10

TRIGGER COMMANDS

10.1 AT#DITRIG

Configure DI high low threshold parameter

ALLOWED: [exec-state-info](#)

AT#DITRIG=(pin_number),(min_val),(max_val),(debounce)

- pin_number: 1-2
- min_val: 0-32000, in mV
- max_val: 0-32000, in mV (must be >= min_val)
- debounce: 0-10 (in seconds)

exec :

```
AT#DITRIG=1,3000,11250,10
OK
```

state :

```
AT#DITRIG?
#DITRIG: 1,3000,11250,10
#DITRIG: 2,0,3200,0
OK
```

info :

```
AT#DITRIG=?
#DITRIG: (1,2)(0-32000),(0-32000),(0-10)
OK
```

10.2 AT#DITRIGENB

Enable DI trigger parameters

ALLOWED: [exec-state-info](#)

AT#DITRIGENB=(pin_number),(enb),(trigger_type)

- pin_number: 1-2

- enb:
 - 0: disable trigger
 - 1: specify timeout
- trigger_type:
 - 0: unused
 - 1: high-to-low transition trigger
 - 2: low-to-high transition trigger
 - 3: unused

exec :

```
AT#DITRIGENB=1,0,1
OK
```

state :

```
AT#DITRIGENB?
#DITRIGENB: 1,0,1
#DITRIGENB: 2,1,3
OK
```

info :

```
AT#DITRIGENB=?
#DITRIGENB: (1-2), (0-1), (0-3)
OK
```

10.3 AT#MSGPER

Configure Message ID and message strings associated with the 2 pins
[ALLOWED: exec-state-info](#)

AT##MSGPER=(pin_number),(interval),(count)

- pin_number: 1-2
- interval: how often messages are generated, in sec. Value 0-60000
- count: number of messages generated. Value 0-100

exec :

```
AT#MSGPER=2,10,3
OK
```

state :

```
AT#MSGPER?
#MSGPER: 1,0,0
#MSGPER: 2,10,3
OK
```

info :

```
AT#MSGPER=?
#MSGPER: (1-2),(0-60000),(0-100)

OK
```

10.4 AT#MSGSTR

Configure Message ID and message strings associated with the 2 pins.
[ALLOWED: exec-state-info](#)

AT#MSGSTR=(op),(msg_ID),(msg1),(msg2)

- op
 - 0: disable message string (not yet implemented)
 - 1: enable message string (not yet implemented)
 - 2: configure message string
- msg_ID: message ID
- msg1: concatenated with msg_ID for DI1
- msg2: concatenated with msg_ID for DI2

exec :

```
AT#MSGSTR=2,"Maestro","001","234"

OK
```

state :

```
AT#MSGSTR?
#MSGSTR: 2,"Maestro","001","234"

OK
```

info :

```
AT#MSGSTR=?
#MSGSTR: (0-2),(120),(5),(5)

OK
```


Chapter 11

APPLICATION NOTES

11.1 Cellular Setup Example

The AT#IPCELLULAR command is used to setup cellular network parameters. The configuration of the cellular network is done by setting the following parameters:

AT#IPCELLULAR=<SIM>,"<APN>","<Username>","<Password>"

where:

- SIM : 1 for bottom SIM, 2 for top SIM. Use 1 for mono-SIM models
- APN : Access Point Name
- Username : If omitted, the modem will supply a non-blank value when it is read
- Password : If omitted, the modem will supply a non-blank value when it is read

Examples:

Command	Response	Description
AT#IPCELLULAR=1,<APN>,"a","a"	OK	This command is used to set the cellular/data network by configuring the sim slot, APN, Username and Password
AT#IPCELLULAR?	#IPCELLULAR: SIM1: "internet","*","*",8 OK	This commands reads what is the current setting
AT#IPCELLULAR?	#IPCELLULAR: (1),(64),(25),(25),[(1-11)] OK	The command is used to give the valid range of all parameters

11.2 AutoTCP Client Setup Example

Note-1: AutoTCP should be disabled before changing any AT#IPCELLULAR and AT#IPTCP parameters

Note-2: AT#IPCELLULAR parameters must be set up correctly before AutoTCP can be used.

The AT#IPTCP command is used to setup TCP Client socket parameters:

AT#IPTCP=<UART/USB>,"<IP-port>","<Client/Socket>","<IP-address>"

where:

- UART/USB : 1 for UART; 2 for USB
- IP-port : port of the TCP Socket Server
- Client/Socket : Use "C" for modem as TCP client

– IP-address : IP address of TCP Socket server

Command	Response	Description
AT#IPTCP=?	#IPTCP : (1-2), (0-65535), ("C", "S"), (1200-115200) OK	This command is used to give the valid range of all parameters.
AT#IPTCP=1,50000,"C", "162.242.170.48"	OK	This command is used to set the IP address and port of the TCP Client Socket for UART.
AT#IPTCP?	#IPTCP : 1,50000,"C", "162.242.170.48", 1 #IPTCP: 2,0,"C", "", 1 OK	This command reads what is the current setting. Note an extra 5th parameter appears in the read response. This parameter is deprecated and can be ignored.

The AT#AUTOTCP command is used to enable or disable AutoTCP by :

AT#AUTOTCP=<enable/disable>

where:

– enable/disable : 1 to enable; 0 to disable

Command	Response	Description
AT#AUTOTCP=?	#AUTOTCP: (0,1) OK	This command is used to give the valid range of the parameter.
AT#AUTOTCP?	#AUTOTCP: 0 OK	This command checks the current status of AutoTCP.
AT#AUTOTCP=?	OK	This command turns on AutoTCP.

Notes: After enabling for client mode:

- "CONNECT" should appear on the UART/USB port of the modem approximately 20 seconds afterwards
- Thereafter, the port is turned into data mode, where no AT commands are accepted.
- Every byte sent in data mode goes to the remote peer
- If +++ is sent in data mode, preceded and followed by 1-second of no activity on the data channel, connection to the remote peer will be broken. "DISCONNECT" will be seen and the port will go back to AT command (where AT commands are expected)

11.3 AutoTCP Server Setup Example

Note-1: AutoTCP should be disabled before changing any AT#IPCELLULAR and AT#IPTCP parameters

Note-2 : AT#IPCELLULAR parameters must be set up correctly before AutoTCP can be used

The AT#IPTCP command is used to setup TCP Client socket parameters:

AT#IPTCP=<UART/USB>,"<IP-port>","<Client/Socket>","<IP-address>"

where:

- UART/USB : 1 for UART; 2 for USB
- IP-port : port on the modem for TCP Socket Server
- Client/Socket : Use "S" for modem as TCP server

- IP-address : IP address of TCP Socket client that is accepted for connection. (Note: "255.255.255.255" means all client connections are accepted)

Command	Response	Description
AT#IPTCP=1,6000,"S","255.255.255.255"	OK 255"	This command is used to set the port on the local modem and the client address of the TCP Server Socket for UART
AT#IPTCP?	#IPTCP: 1,6000,"S","255.255.255.255",1 #IPTCP: 2,0,"C","",1 OK	This command reads what is the current setting. Note an extra 5th parameter appears in the read response. This parameter is deprecated and can be ignored.

The AT#AUTOTCP command is used to enable or disable AutoTCP by :

AT#AUTOTCP=<enable/disable>

where:

- enable/disable : 1 to enable; 0 to disable

Notes: After enabling for server mode

- After at most 30 seconds, the modem is ready as server
- When external client connects to the modem, the serial/USB port is turned into data mode
- Every byte sent in data mode goes to the remote socket peer
- If +++ is sent in data mode, preceded and followed by 1-second of no activity on the data channel, connection to the remote peer will be broken. "DISCONNECT" will be seen and the port will go back to AT command (where AT commands are expected)

Command	Response	Description
(See table above)		

11.4 Flow diagram of Auto TCP/UDP Connection

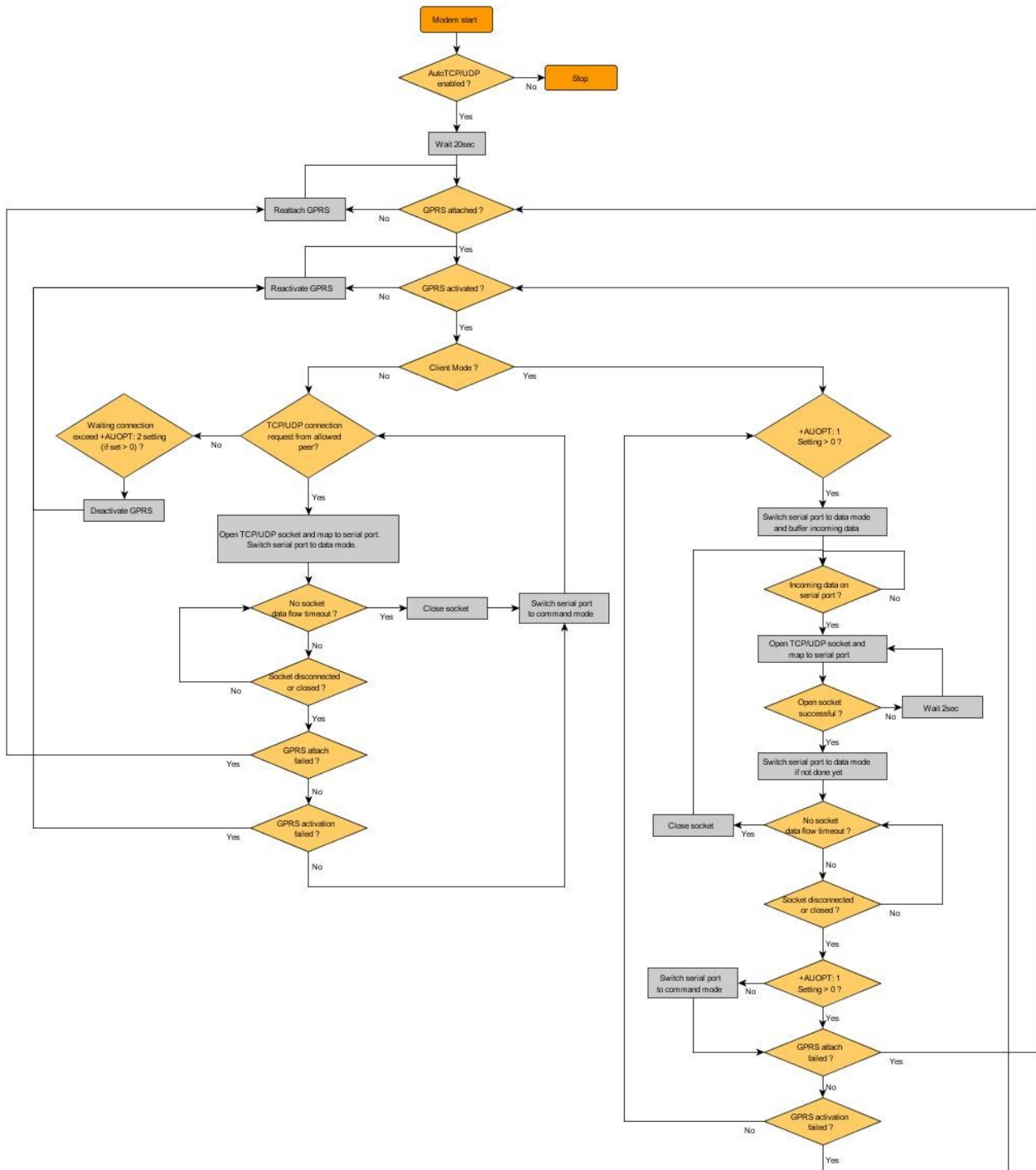


Figure 11.4.1: Auto TCP / UDP Flow Diagram

Chapter 12

TROUBLESHOOTING

12.1 The modem's LED does not light

- Check if the modem has been properly connected to a 5-32V power supply
- Check if the power connector is properly inserted
- Check the fuse in the power cord

12.2 The modem's GREEN LED blinks but does not become stable for a long time after power up

- Check if a valid SIM card has been properly inserted
- Check if the SIM card has been locked (refer to AT+CPIN command in AT command guide)
- Check if the external power has been properly connected to the modem
- Check if the network coverage is available

12.3 The modem does not respond to the terminal program

- Check if the RS232 cable has been properly connected
- Check if your program has proper settings. Factory setting of the UART port of the modem is:
 - 115200 bps
 - 8 data bits
 - 1 stop bit
 - no parity bit

Chapter 13

ABBREVIATIONS

(to be added)

==== END DOCUMENT ====