

# intelimax<sup>lite</sup>4G

Lite 4G Serial Modem | MA-2060-4G

## M2M 4G LTE Serial Modem MA-2060-4G User Manual



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## CONTACT INFORMATION

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In keeping with RF Industries/Maxon's dedicated customer support policy, we encourage you to contact us.

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# RF EXPOSURE & ELECTRICAL SAFETY

## COMPLIANCE

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The use of this device in any other type of host configuration may not comply with the RF exposure requirements and should be avoided. During operation, a 20 cm separation distance should be maintained between the antenna, whether extended or retracted, and the user's/bystander's body (excluding hands, wrists, feet, and ankles) to ensure RF exposure compliance. The modem is not designed for, nor intended to be, used in applications within 20 cm (8 inches) of the body of the user. Continued compliance of the equipment relies upon it being used with an AS/NZS 60950.1 approved SELV power supply.

### Caution

Change or modification without the express consent of RF Industries Pty. Ltd. voids the user's authority to use the equipment. These limits are designed to provide reasonable protection against harmful interference in an appropriate installation. The modem is a transmitting device with similar output power to a mobile phone. This equipment generates, uses, and can radiate radio frequency energy and, if not used in accordance with instructions, can cause harmful radiation to radio communication. The modem is approved for use with the antenna: **ANT-SMA**. Unauthorized antennas, modifications, or attachments could impair call quality, damage the device, or result in violation of RF exposure regulations.

However, there is no guarantee that interference will not occur in a particular installation. If the equipment does cause harmful interference in radio and television reception, which can be determined by turning the equipment on and off, the user is encouraged to try to correct the interference by one or more of the following measures:

- Re-orient or relocate the receiving radio or TV antenna
- Increase the separation distance between the equipment and the receiver
- Contact RF Industries Maxon product Technical Support for assistance.

## General Safety

**RF Interference Issues:** Avoid possible radio frequency (RF) interference by carefully following safety guidelines below:

- Switch OFF the modem when in an aircraft. The use of cellular telephones in aircraft is illegal. It may endanger the operation of the aircraft and/or disrupt the cellular network. Failure to observe this instruction may lead to suspension or denial of cellular services to the offender, legal action, or both.
- Switch OFF the modem in the vicinity of gasoline or diesel fuel pumps or before filling a vehicle with fuel.
- Switch OFF the modem in hospitals and any other place where medical equipment may be in use.
- Respect restrictions on the use of radio equipment in fuel depots, chemical plants, or in areas of blasting operations.
- There may be a hazard associated with the operation of your Modem in the vicinity of inadequately protected personal medical devices such as hearing aids and pacemakers. Please consult the manufacturers of the medical device to determine if it is adequately protected.
- Operation of the modem in the vicinity of other electronic equipment may cause interference if the equipment is inadequately protected. Observe any warning signs and manufacturers' recommendations.
- The modem contains sensitive electronic circuitry. Do not expose the modem to any liquids, high temperatures or shock. The modem is not waterproof. Please keep it dry and store it in a cool, dry place.
- Only use original accessories or accessories that are authorized by the manufacturer. Using unauthorized accessories may affect your modem's performance, damage your modem and violate related national regulations.
- Always handle the modem with care. There are no user serviceable parts inside the modem. Unauthorised dismantling or repair of the modem will void the warranty.



\* The product needs to be supplied by a limited power source or the power supply provided. Otherwise, safety will not be ensured

\* Do not fixed the product in an open area where it is liable to lightning strike hazard.

## Vehicle Safety

- Do not use the modem while driving.
- Respect national regulations on the use of cellular telephones in vehicles. Road safety always comes first.
- If incorrectly installed in a vehicle, the operation of the modem could interfere with the correct functioning of vehicle electronics. To avoid such problems, be sure that the installation has been performed by qualified personnel.
- Verification of the protection of vehicle electronics should be part of the installation.

**Note:** The user is cautioned that changes or modifications not expressly approved by RF Industries could void the warranty.

## Potentially Unsafe Areas

**Posted Facilities:** Turn off this device in any facility or area when posted notices require you to do so.

**Blasting Areas:** Turn off your device where blasting is in progress. Observe restrictions and follow any regulations or rules.

**Potentially Explosive Atmospheres:** Turn off your device when you are in any area with a potentially explosive atmosphere. Obey all signs and instructions. Sparks in such areas could cause an explosion or fire, resulting in bodily injury or death.

Areas with a potentially explosive atmosphere are often but not always clearly marked. They include:

- Fuelling areas such as gas or petrol stations, or below deck on boats
- Transfer or storage facilities for fuel or chemicals
- Vehicles using liquefied petroleum gas, such as propane or butane
- Areas when the air contains chemicals or particles such as grain, dust or metal powders
- Avoid using the modem in areas that emit electromagnetic waves or enclosed metallic structures e.g. lifts.
- Any other area where you would normally be advised to turn off your engine

## REVISION HISTORY

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Level	Date	History
1.00	April 2017	Preliminary Release
1.10	July 2017	Updated on F/W upgraded process and Serial Port Settings

## DISCLAIMERS

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Life support – This product is not designed for use in life support appliances or systems where malfunction of these products can reasonably be expected to result in personal injury.

RF Industries customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify RF Industries for any damages resulting from such application.

Right to make change - RF Industries reserves the right to make changes, without notice, in the products, including circuits and software, described or contained herein in order to improve design and/or performance.

Some features outlined in this manual may require an updated firmware version and/or GUI version to work. Please contact RF Industries for more information.



# INTRODUCTION

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## Overview

IntelimaxLITE 4G is a unique and intelligent fusion of 4G LTE capabilities with advanced functionality of a modem/router in a smart and compact design.

## IntelimaxLITE 4G Features

### General Features

- FDD-LTE CAT1 Wireless Module (10.2Mbps downlink, 5.2Mbps uplink)
- 3G UMTS Fallback
- Packet Switched Data
- RS232 and RS485 (as separate model)
- 2 Way SMS
- Inbuilt TCP/IP, UDP/IP STACK
- AT over IP
- Remote / local user interface
- Remote SMS diagnostics & reset
- Programmable periodic reset and other watchdog features
- Save and restore modem configuration from a file
- One customer profile configuration
- FOTA - Firmware upgrade over the air
- Two External antennas to maximise cellular connectivity
- External LED to show Network and Connection status
- Rugged plastic casing for industrial use

### Frequency Bands

- FDD-LTE CAT1 700MHz(B28), 850MHz(B5), 900MHz(B8), 1800MHz(B3)
- UMTS/HSPA+ 850MHz(B5), 900MHz(B8), 2100MHz(B1)

### Data Speeds

- LTE CAT1: UL 5.2Mbps max. / DL 10.2Mbps max.
- HSPA+: UL 5.76 Mbps max. / DL 7.2 Mbps max.

### Connections

- Serial Connection over RJ45
- USB Connection
- SIM Card Holder
- Antenna connector: SMA female x 2

### LED Lights

- Power / RSSI
- Data

### Operating Systems

- Windows XP/ Vista / 7 / 8 / 10

### Power Source

- DC Input Voltage Range: 5 to 48 VDC with  $\pm 10\%$  tolerance
- Idle Current: 20mA @ 12V
- Maximum Current: 220mA @ 12V

### Dimensions

- 80mm x 55mm x 26mm (without side brackets and antenna)

### Mounting

- Side mounting brackets

### Environmental Specifications

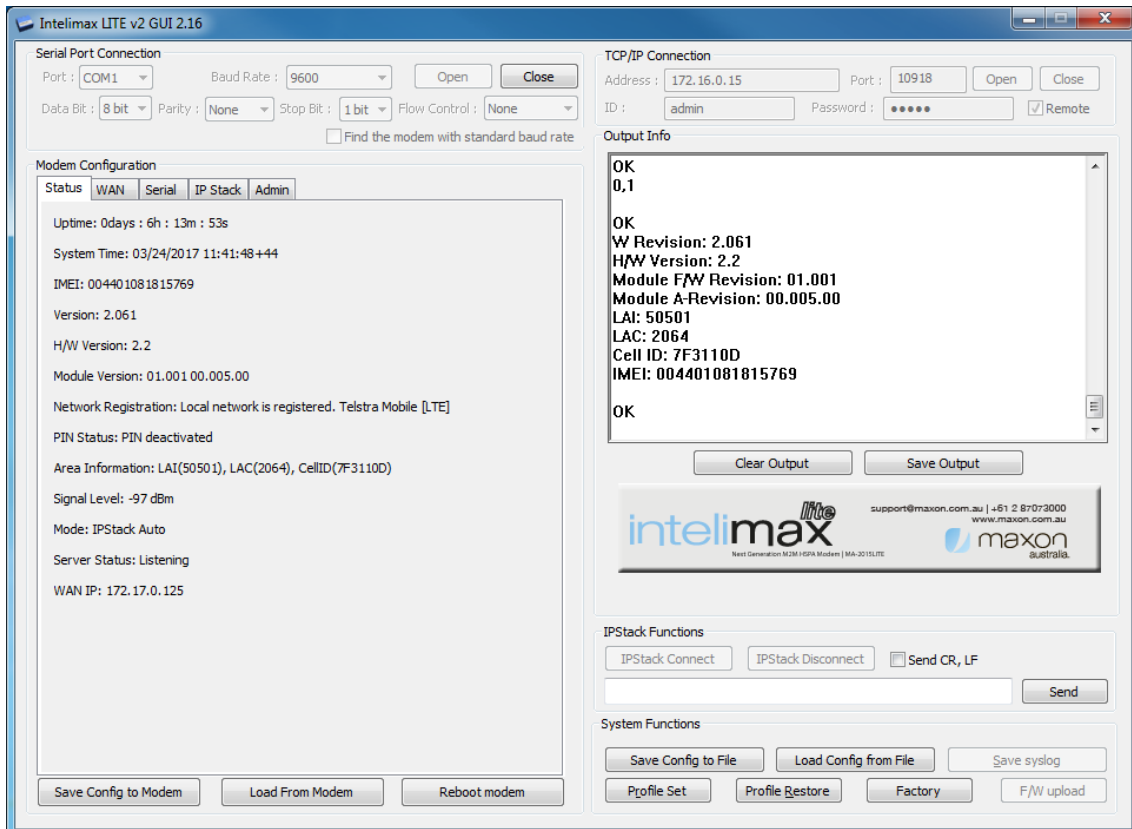
- Normal Operation Temperature -30 to 85°C
- Extreme Operation Temperature -40 to 85°C
- Storage temperature range -40 to 85°C

### **Approvals / Compliance**

- RCM (both modem and module)
- FCC (module only)
- GCF (module only)
- PTCRB (module only)
- CE (module only)
- RoHS (both modem and module)
- Carrier Approvals\* - (Please contact RF Industries for more information)

## INTELI MAX LITE 4G SET UP

IntelimaxLITE 4G serial modem supports a Windows GUI, where by you can configure the modem via serial connection or remotely via the WAN IP.



After connecting to the modem using the GUI, users can check modem status and configure WAN, IP Stack, and Admin settings.

## CONNECTING THE INTELIMAXLITE 4G

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### Powering the Modem

The IntelimaxLITE 4G can be supplied power through either the RJ45 socket or the USB connector. Please note that there must be a gap of at least three (3) seconds between two successive power reconnections of the modem, otherwise the modem may not power on. If powering down the modem at a regular interval, then always apply the AT+STTD command to put the modem into the appropriate state to shutdown power including performing house-keeping duties and deregistering from the network.

### Bootup Process

It will need about 30 ~ 45 seconds for modem to bootup. In IP modes, an "INTELIMAX READY" message is sent via serial port, indicating that the modem is fully booted and ready. Please allow another 1 second before talking to modem.

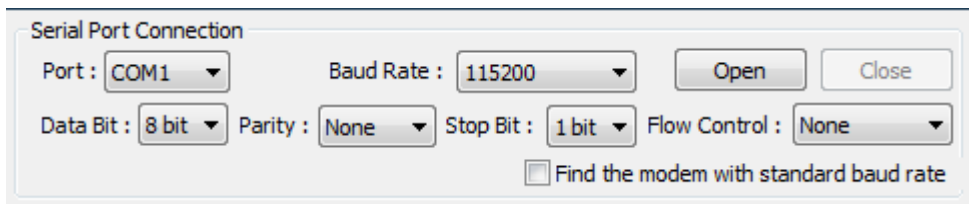
In Serial Modem Mode, no "INTELIMAX READY" message will be sent so please wait for the time required for bootup.

### Serial Connection

Serial connection can be via either the RS232 interface on RJ45 port or a dedicated virtual serial port over USB.

An RJ45 to DB9 (Female) cable is required when using serial port over RJ45 on IntelimaxLITE. User also need to ensure proper serial port settings, such as COM port number on your PC, baud rate, data frame, and flow control, are used. By default, the connection settings are:

Baud Rate: 115200  
Data bit: 8 bit  
Parity: None  
Stop bit: 1 bit  
Flow control: None



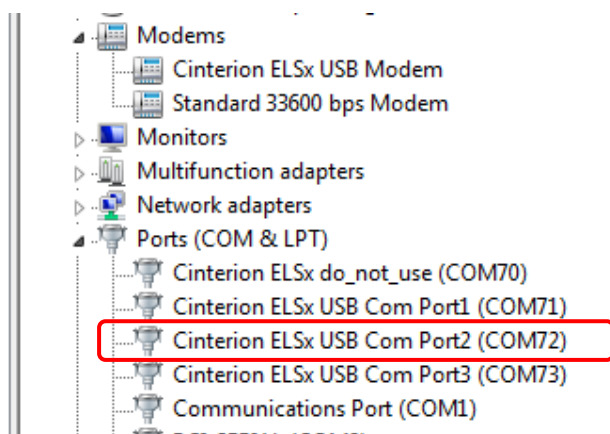
Once the serial port is properly set, click the open button and the IntelimaxLITE GUI will connect to the modem via the selected COM port.

If the baud rate of the modem is unknown, the GUI is able to find the right value by checking "Find the modem with standard baud rate". Please note that this is only for baud rate. GUI software cannot find the correct data frame and flow control settings by itself.

When using the virtual serial port over USB, the modem needs to be connected to PC via mini USB port first. Serial port over RJ45 can be connected after or just left unconnected if not required. After the modem is connected to PC via USB port, download the drivers from the link below

[http://support.maxon.com.au/download/IntelimaxLITE-4G%20-%20MA-2060-4G/Drivers/windows\\_els.zip](http://support.maxon.com.au/download/IntelimaxLITE-4G%20-%20MA-2060-4G/Drivers/windows_els.zip)

Go to Device manager and manually update the drivers until you get several virtual serial ports on your computer (if the USB driver of Cinterion Module has been properly installed). By opening Device Manager under Windows, these ports can be found in "Ports (COM&LPT)" as shown below.



Among those Cinterion ELSx USB Com Ports, the Port2 is dedicated for GUI configuration. Please use the port number associated with the port under Windows (for example, COM72 as shown the picture) for the GUI to connect to modem. Other serial settings will have no effect when using the USB port.

**IMPORTANT:**

1. **There will be about 30 seconds delay for USB COM to function properly after modem gets powered.**
2. **The USB COM port has to be closed before modem is re-connected to PC via USB. Otherwise, the USB port will not operating properly. This applies to any software that opens the modem's USB COM ports.**
3. **If the correct information is not displayed via USB COM Port 2 the modem may have to be rebooted.**

## WAN Connection

The GUI can connect to the modem remotely via WAN IP. This can be achieved when the modem is in an IP mode and connected to the cellular WAN with an IP address that allows in-bound TCP connection. The modem IP address can be retrieved by sending the following SMS to the modem: **INTELIMAX.PARK.WANIP** (or using the AT command **AT\$\$WAN**).

To connect to the modem, put the modem IP address and port number (always 10918) under TCP/IP Connection and tick the "Remote" option, then click the "Open" button.

TCP/IP Connection

Address : 123.209.235.223 Port : 10918

ID : admin Password : ●●●●●●  Remote

Logon credentials are required for a remote connection. By default, the username and password are both admin and are configurable in the GUI on the admin tab.

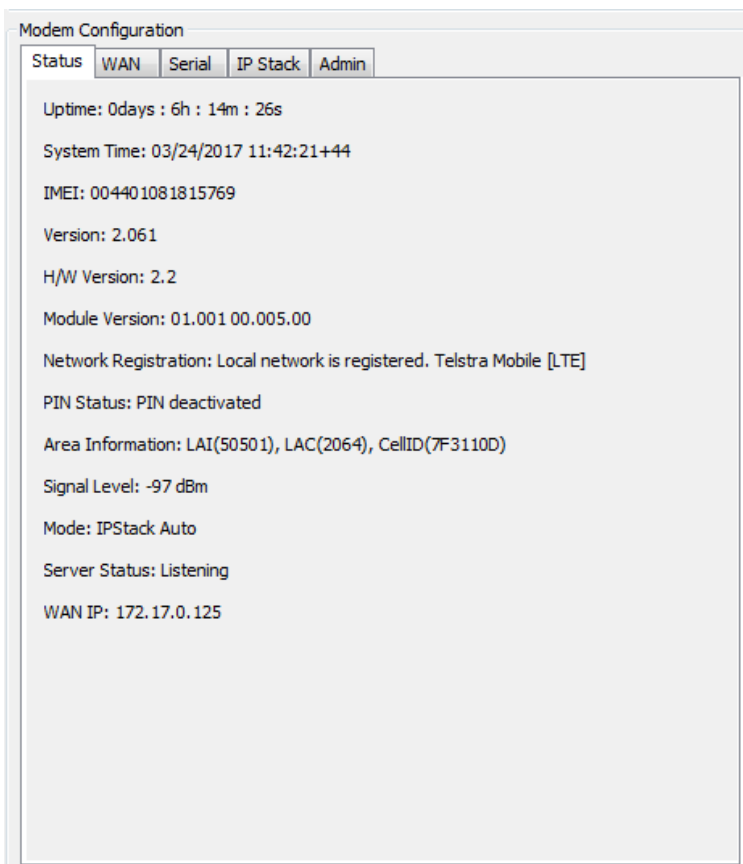


# Modem Configuration

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## Modem Status

The modem status page displays modem information such as network registration and WAN connectivity status.



Information displayed on the Status page:

Up time:	Elapsed time since modem last reboot (soft or hard)
System time:	Date and Time acquired from Cellular Network
IMEI:	IMEI number of the IntelimaxLITE 4G
Version:	Firmware version number
H/W Version:	Product's board release version
Module Version:	Cellular engine's firmware version

Network registration:	Shows registration status, carrier, and radio
PIN Status:	Status of the SIM pin setting (display only)
Area information:	LAI, LAC, Cell ID
Signal Level:	Current signal strength in dBm
Mode:	Operating mode of IntelimaxLITE 4G, IP or Serial Modem. In serial modem mode, it will also display whether modem is in connected call
Server status:	Will display whether the modem is in listening or connected states
WAN IP:	IP address assigned by carrier

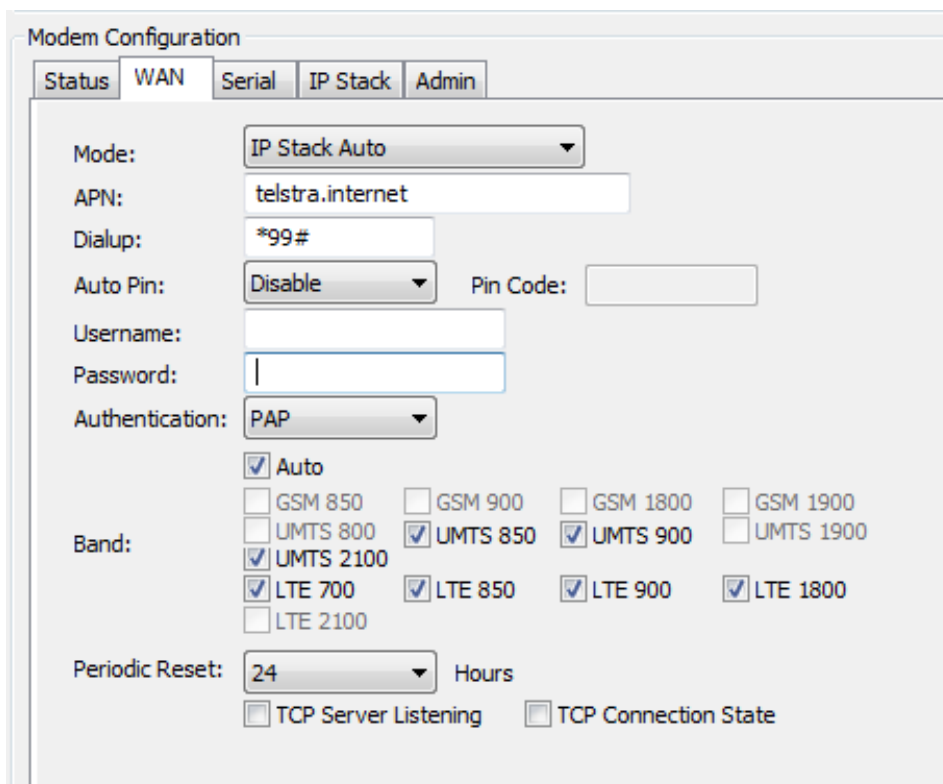
## WAN Configuration

The WAN configuration page is used to configure how the modem will connect to the Cellular network. Please select the correct operation mode as this will decide if the modem will automatically connect to the network on power up (AUTO), be prompted to connect via AT commands (MANUAL), or work as a serial modem.

The IntelimaxLITE 4G supports 3 operating modes:

1. IP Stack Auto (Modem connects to the cellular networks and acquires an IP address and then runs the IP STACK server or client mode)
2. IP Stack Manual (Modem waits for user to send AT commands before connecting to the cellular networks and acquiring an IP address)
3. Serial Modem (Pass through mode – connects to the 4G module in the modem)

Please note, Outstation mode listed in the GUI is for IntelimaxLITE 3G modems only and not supported by IntelimaxLITE 4G modems.



The screenshot displays the 'Modem Configuration' window with the 'WAN' tab selected. The configuration fields are as follows:

- Mode:** IP Stack Auto (dropdown menu)
- APN:** telstra.internet (text input)
- Dialup:** \*99# (text input)
- Auto Pin:** Disable (dropdown menu) and **Pin Code:** (empty text input)
- Username:** (empty text input)
- Password:** (empty text input)
- Authentication:** PAP (dropdown menu)
- Band:** A grid of radio buttons for various cellular bands:
  - Auto
  - GSM 850,  GSM 900,  GSM 1800,  GSM 1900
  - UMTS 800,  UMTS 850,  UMTS 900,  UMTS 1900
  - UMTS 2100
  - LTE 700,  LTE 850,  LTE 900,  LTE 1800
  - LTE 2100
- Periodic Reset:** 24 (dropdown menu) Hours
- TCP Server Listening,  TCP Connection State

The WAN tab allows configuring the following features (only APN and authentication type are needed in serial modem mode):

- APN and dialup string
- Username and password for IP WAN

Please note that, for security reasons, the password saved to the modem cannot be read back and displayed. Instead, the password field will only show “●●●” and the password in the modem will not be changed unless the content of the field is modified.

- Auto pin settings (Not available, always disabled)
- Network authentication information
- Band
  - At least one LTE band and one UMTS band must be selected
  - The modem has to be power cycled after any band change
  - It is recommended to use Auto Band

**Note: Please take extra precautions in changing bands, as improper band settings may cause modem malfunctioning.**

- Periodic reset
  - IntelimaxLITE will periodically do an internal reboot as per the hours set and conditions defined below
  - In Serial Modem mode, modem will wait until there are no active call
  - TCP Server Listening – For TCP Server mode. If checked, modem will wait until there are no TCP connections
  - TCP Connection State – For TCP Client mode. If checked, modem will wait until there are no TCP connections

**Invalid PPP password characters list:**

“(double quotation mark)

’(quotation mark)

?(question mark)

)(bracket)

@(at sign)

;(semi colon)

| (pipe sign)

l(upper case l)

### *IP Stack Auto Mode*

When using IP STACK Auto mode the modem will automatically initiate WAN and socket connection and behave as an IP Serial modem. The modem will packetise all incoming data via the serial port and transfer to the remote and vice versa.

The IntelimaxLITE IP Stack can be configured as a Server or a Client. In Server mode, the IntelimaxLITE will act as a socket server listening on a specific TCP/UDP port and waiting for an incoming client socket connection. As soon as the client drops the socket connection, the IntelimaxLITE will go back to socket listening mode as per the IP stack configuration. When in client mode the IntelimaxLITE will try to establish a socket connection to a preconfigured server IP address name and port number. The client mode also supports a secondary server IP address just in case the primary server cannot be reached.

### *IP Stack Manual Mode*

With IP Stack manual mode, the modem doesn't initiate the PPP connection. The modem will rely on the host device connected via serial to send the PPP initiation commands.

The AT command to Start the PPP session and open a socket are AT\$\$IPCTOP and AT\$\$IPCTOS. The AT commands to close the socket and PPP session are AT\$\$IPCTCS and AT\$\$IPCTCP.

The IntelimaxLITE 4G supports \$\$ AT commands for IP Stack Manual connections which are detailed in the section "Extended / IntelimaxLITE Specific AT Command Set".

### *Serial Modem Mode*

When configured in this mode, the modem will work as a pass-through modem, meaning that the serial port directly connects to the 4G module inside the modem and the connection is completely controlled by the end device. In this mode, the modem can support packet switched data (PSD) call (ATD\*99# or ATD\*99\*\*\*1# etc.).

Set of AT commands used (standard Hayes AT commands are also supported):

ATD(T)\*99# or ATD(T)\*99\*\*\*1#      Dial the Data number  
+++                    Escape command to enter online command mode  
ATO                    Return to data mode from online command mode  
AT+CGATT=0      Drops the PSD data call in online command mode  
AT&D                Set the DTR line mode  
AT&C                Set the DCD line mode

To make a proper PPP dial up connection from the modem, the following commands must be issued before starting the connection:

AT+CGDCONT=1,"IP","apn"      Set the access point name (APN).

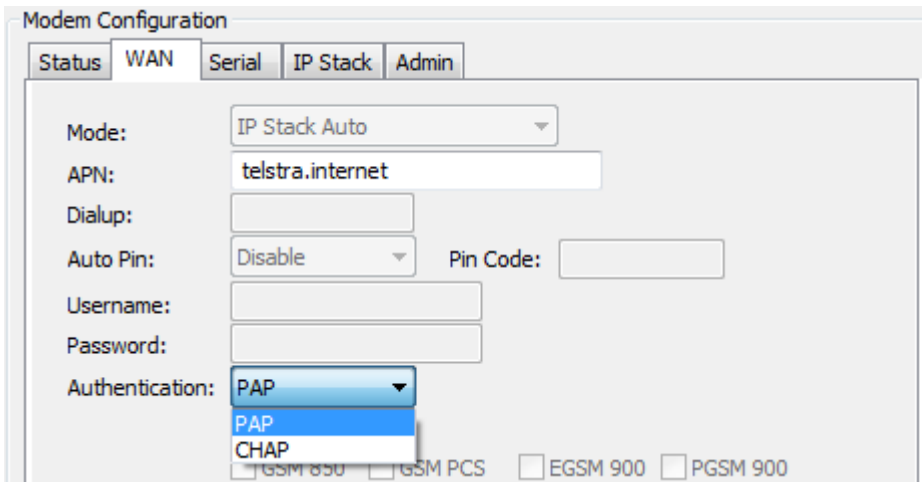
AT^SGAUTH=1,auth\_type,"",""

Set the Authentication. auth\_type can be: 0 - NONE, 1 - PAP, 2 - CHAP.

"NONE" is not recommended to use for authentication. Unique userid and password do not have to be configured for each modem, just the authentication type, for non-authenticated APNs PAP authentication should be configured. For example:

- If using a non-authenticated APN (such as telstra.extranet) then configure  
AT^SGAUTH=1,1,"","".
- If using an authenticated APN (such as telstra.corp) then configure the appropriate authentication type, for PAP: AT^SGAUTH=1,1,"","" for CHAP:  
AT^SGAUTH=1,2,"","".

These settings can be configured on the modem in serial modem mode using the GUI connected to the modem via the serial interface. In this style of connection, a reduced configuration is available (as noted below), the authentication type setting here will replicate the configuration of the AT^SGAUTH setting, please see the screenshot below.



The selection will be sent through to the GUI (via physical rather than USB serial connection) using the above mentioned `AT^SGAUTH=1,x,"", ""` command.

**Please note that, the serial port configuration, such as baud rate, flow control, data framing, and modem control settings such as ECHO, &C, and &D, will be different from the other two IP modes and are unable to be configured via the GUI but the serial port only. Users can use AT commands over the serial port to make changes if required. Please also use AT&W to save the changes being made.**

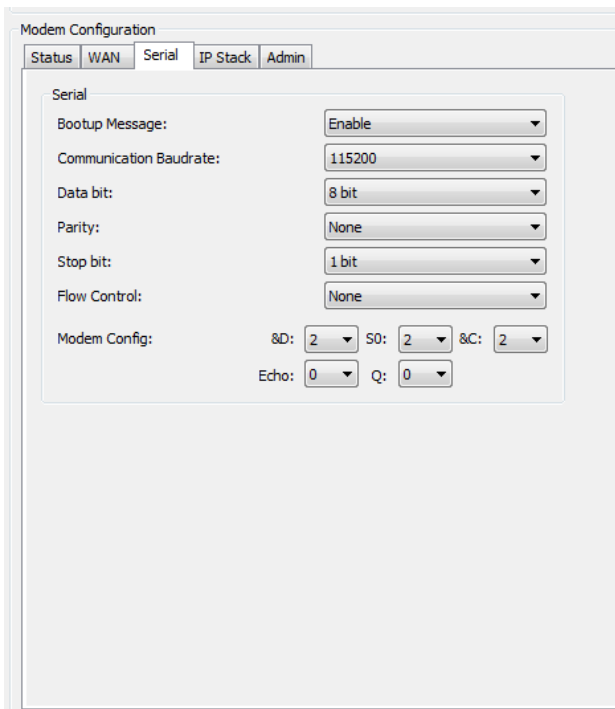
The default settings of the serial port in Serial Modem Mode are **115200, 8N1** and **RTS/CTS**. The AT commands for changing the serial port settings are:

- AT+IPR - baud rate. Supports 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200
- AT\Qn - flow control. Supports no flow control (n=0) and RTS/CTS (n=3)
- AT+ICF - data framing
  - 7 bits, even parity, 1 stop bit (AT+ICF=5,1)
  - 7 bits, odd parity, 1 stop bit (AT+ICF=5,0)
  - 8 bits, even parity, 1 stop bit (AT+ICF=2,1)
  - 8 bits, no parity, 1 stop bit (AT+ICF=3)
  - 8 bits, odd parity, 1 stop bit (AT+ICF=2,0)
  - 8 bits, no parity, 2 stop bits (AT+ICF=1)

Please also be aware that, the extended/IntelimaxLITE specific AT command Set (\$\$ commands) are not supported in Serial Modem mode.

## Serial Configuration

The serial configuration tab is used to configure all serial settings for the modem. Please note that this configuration does not apply to the serial port settings under Serial Modem mode.



### Serial Port Setup

Serial port setup includes the following:

- Baud rate (supports 1200, 2400, 4800, 9600, 19200, 38400, 57600 and 115200)
- Data Bit (8 or 7 bits)
- Stop bit (1 or 2 bits)
- Parity (None, Even, and Odd)
- Flow Control (None, RTS/CTS)

The serial port speed setup should be set to match the host (connected via serial port) configuration. With certain applications, there may be a need to fabricate a custom serial cable to work between the host and the IntelimaxLITE. The custom serial cable depends on the equipment requirements and settings.



### *Modem Config*

These are the AT commands that will be applied to modem after power up or reboot. For detailed information on these commands, please refer to "Extended/Modem Specific AT Command Set".

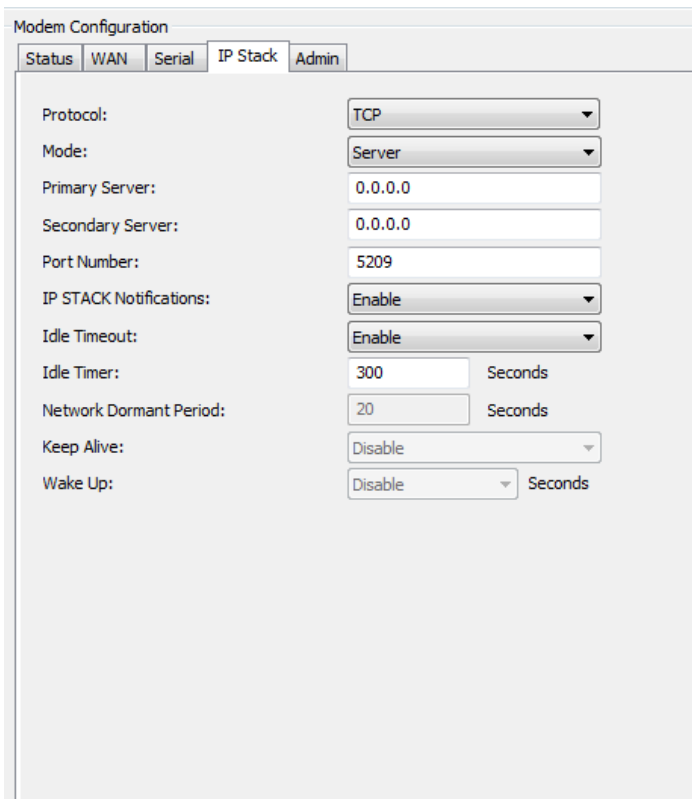
Since Circuit-Switched Data Call is no longer supported by IntelimaxLITE 4G modem, Auto answer setting S0 has no effect.

### *Boot up Message*

The Intelimax boot up message "INTELIMAX READY" is a message that the modem sends to the host via serial port upon boot up. Using this option the user can disable or enable this message. Not applicable in serial mode.

## IP Stack Configuration

IP stack configuration page is used to setup modem IP STACK settings such as port number and IP address and connection timeouts.



The screenshot shows the 'Modem Configuration' window with the 'IP Stack' tab selected. The settings are as follows:

Setting	Value
Protocol:	TCP
Mode:	Server
Primary Server:	0.0.0.0
Secondary Server:	0.0.0.0
Port Number:	5209
IP STACK Notifications:	Enable
Idle Timeout:	Enable
Idle Timer:	300 Seconds
Network Dormant Period:	20 Seconds
Keep Alive:	Disable
Wake Up:	Disable Seconds

### Protocol

The IP Stack supports TCP and UDP, depending on your application requirement you can choose between TCP and UDP communications.

### Mode

The IntelimaxLITE 4G supports two IP Stack operation modes:

**Server mode:** In Server mode the modem will establish a PPP connection and listen on a predefined port for incoming client requests.

**Client mode:** the modem will initiate a PPP connection and try to connect to the Primary server. If the connection to the server fails after 10 minutes of trying, it will try

the Secondary server, if the connection to the secondary server also fails after 10 minutes, the modem will drop the PPP connection, reboot and start all over again. Please use valid server IP addresses. Inaccessible IP addresses could cause extended retry timeout for the modem client service.

### *Primary Server*

Define the IP Address or DNS address of the primary server the IntelimaxLITE will try to connect to in Client mode, in server mode please leave this field as default.

### *Secondary Server*

Define the IP Address or DNS name of the secondary server the IntelimaxLITE will try to connect to in Client mode, in server mode please leave this field as default.

### *Port Number*

Define the TCP or UDP Port number, this port will be used in the server (listening port) and client (remote port) mode.

### *IP STACK Notifications*

IP Stack notification by default sent out on the serial port to the connected host. With some applications, this may cause issues with data transfer and using this option the user can disable or enable the notification messages.

### *Idle Timeout / Idle Timer*

Enabling the idle Timeout and setting an Idle Timer, will set the IntelimaxLITE to constantly check the IP STACK connection status. If the socket connection stays idle for the defined period of time, it will close the socket connection and retry depending on the setup.

### *UDP Session Control*

To enhance the reliability of UDP IP Stack communication, the IntelimaxLITE has configuration options for users to have more control over the UDP activity and data communication. The user can enable or disable keep alive in conjunction with the Network Dormant Period or alternatively specify Wake up time in seconds. Not supported on initial firmware release 2.06.

**Network Dormant Period:** By default the network puts the modem in dormant or standby mode within 20 seconds of no data activity.

**Keep Alive:** This sends a dummy UDP packet prior to modem going dormant and this is based on the Network Dormant Period, Usually this packet will be sent only if the modem doesn't send any data over the wireless network for the Network Dormant period. Enabling this could lead to additional delays in data transfer due to modem sending a dummy packet first to initialize the UDP connection with remote site.

**Wake Up:** The wake up feature will send dummy UDP packets prior to actual data, this wakes up the communication channel and guarantees sending the complete UDP data packet to the receiving end.

## Admin Settings

The screenshot shows the 'Admin' tab of the 'Modem Configuration' interface. It contains three sections: 'Login' with fields for 'Username' (admin) and 'Password' (masked with dots); 'Syslog' with dropdowns for 'System logs' (Enable) and 'Remote Syslog' (Disable), and an 'IP address' field (0.0.0.0:3333); and 'Administrators' with three empty input fields labeled 'Number 1:', 'Number 2:', and 'Number 3:'.

### Device login

- Username and Password used for GUI and AT over IP. By default, the username and password are "admin/admin".

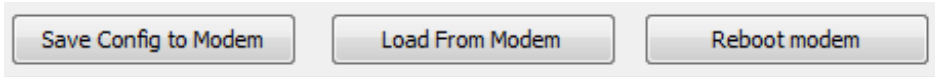
### System log

- Enable/disable saving the system logs in the internal memory
- Enable/disable the remote log function that sends the system log to a remote UDP server
- Enter the IP address and port number of the remote UDP server using the format of x.x.x.x;port. The default port number is 3333. If no port number is defined, the modem will keep the port already saved in the configuration.

### Administrators

- Allow up to three administrator phone numbers
- Administrators phone numbers in international format +61412 345 678
- When added, only these phone numbers can be used for IntelimaxLITE specific SMS commands, such as RSSI and Reboot

## Save and Apply Configurations



### *Save Config to Modem*

When the modem configuration is changed via the GUI, users have to click the button to save the changes so that they will not be lost after reboot. It is recommended that users do a save on every change made as the GUI reloads the status every 15 seconds.

### *Load from Modem*

In addition to periodical reload, users can also use this button to load the modem status and configuration manually.

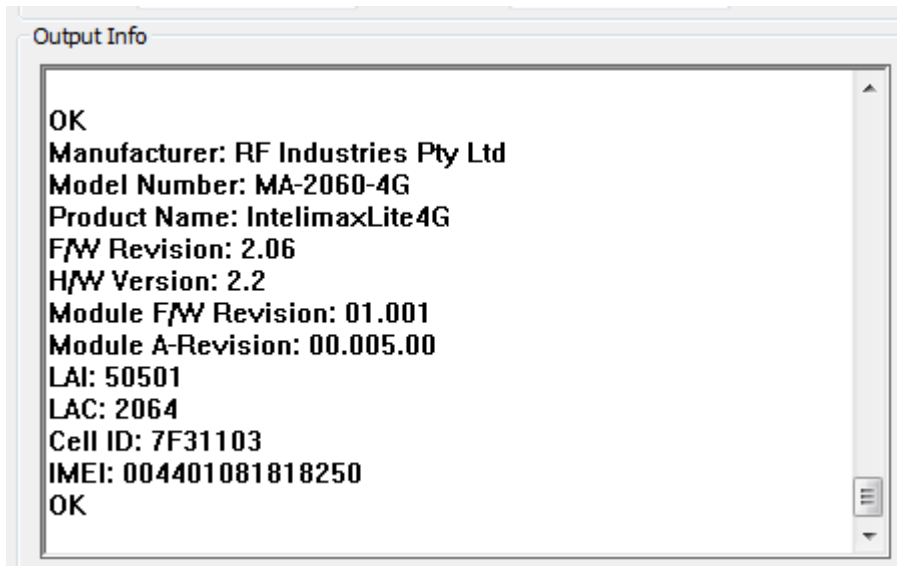
### *Reboot Modem*

By clicking the button, the modem will reboot.

Reboot is required in most cases for the configuration changes to take effect.

## System Information and Functions

### *Output Info*

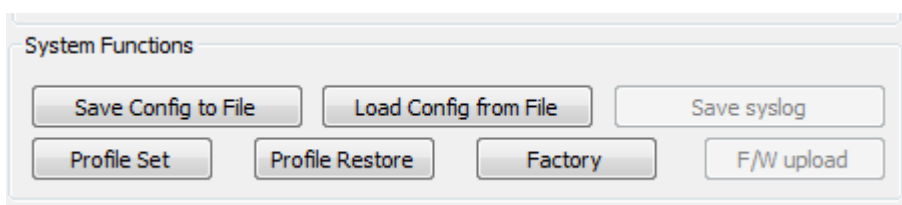


The Output Information provides connection information to the IntelimaxLITE over either COM port or IP WAN. The output information can be cleared or saved to a text file by the provided two buttons.

### *IP Stack Functions*

This function is not available in IntelimaxLite 4G Modem.

### *System Functions*



### **Save Config to File**

Save modem configuration to an encrypted file for future use. Please pay extra attention to the passwords in the configuration. Because the password saved in the modem cannot be read back, they cannot be saved to a configuration file. If the user wants to save a modem's configuration to a file for future use, the user can load the configuration from the modem and re-enter the password in the password fields and then save the configuration to a file.

### **Load Config from File**

Load modem configuration from a saved file.

### **Profile Set**

The IntelimaxLITE 4G supports one saved customer profile so that users can later re-use the configuration. By clicking "Set Profile", modem will save the current modem configuration to a Profile stored internally.

### **Profile Restore**

Restore the saved Profile to the modem. After clicking this button, the modem will load the internally saved profile and reboot for the configuration to take effect. Profile restore can also be done by holding modem reset button for more than 5 seconds but less than 20 seconds. Both LED will blinking for a short time indicating the reset button is pressed more than 5 seconds.

### **Save Syslog**

The function is to download the debug log from the modem. It is only available when GUI connects to the modem via IP WAN.

### **F/W Upload**

The function is to start FOTA (Firmware Over The Air). Please refer to Firmware Upgrade Section for more details.

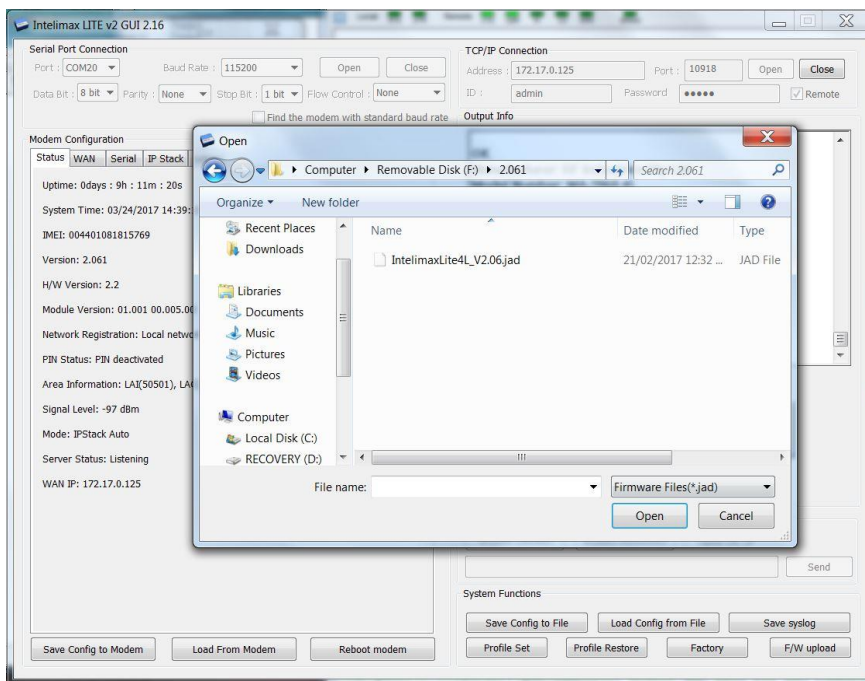


## Firmware Upgrade

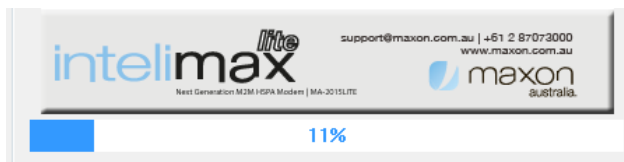
IntelimaxLITE 4G supports firmware upgrade either locally or remotely. A .jad file along with a .jve file is required for the firmware upgrade.

### Remote firmware upgrade (FOTA)

Remote firmware upgrade is achievable via the GUI using a remote connection to the IntelimaxLITE 4G when connected in an IP mode. The modem WAN IP address can be obtained with the SMS INTELIMAX.PARK.WANIP.



To Upgrade the IntelimaxLITE's firmware, click the 'F/W Upload' button and select the firmware file with the .jad suffix and open the file, the uploading screen will then appear and showing the progress:



Do not remove IntelimaxLITE's cable or turn off the power while upgrading. The process will usually take 3~4 minutes depending on network conditions.

If the firmware uploading process fails due to network disruption, please allow at least 10 minutes before doing another try since the modem will need to get out of the previous failed process.

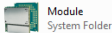
## Local firmware upgrade

Local firmware upgrades can be achieved by following the steps below. You will only need to do step 1, 3, and 4 once on the same PC.

1. Install Cinterion MES software.
2. Connect modem to PC using USB port and the modem will get power via USB.
3. Install Cinterion ELS61 module USB driver if required.

After the USB driver is properly installed, the EHS6 USB will enumerate 3 USB Com ports and a modem port. Ensure that these ports are below 100 by using the Windows Device Manager. If not, then modify by right clicking 'Properties', 'Port Settings', 'Advanced', then select one of the new 'COM Port Number' then apply all the settings by clicking 'OK'.

4. Open the Windows Explorer, click on 'Computer', and under the 'Other' tab.

The module drive  should be present. Right click on the 'Module', and select 'Properties', choose the COM port associated with the Cinterion ELSx USB Modem, as listed under Device Manager, then click 'Apply'

5. Once the module drive is configured properly, the module drive can be opened by double clicking the module icon and then the A drive. You are able to see a few files in the drive.
6. You can now copy the provided .jad and .jve files to the module drive, as normal under Windows Explorer.
7. After the files are copied, close the Windows Explorer window and then disconnect the modem from USB port.
8. After 3 seconds, re-power the modem by USB cable. The modem will automatically perform firmware upgrade when new firmware files are found in the module drive. The upgrade process will take 2~3 minutes with one automatic reboot by modem itself. Do not remove IntelimaxLITE's cable or turn off the power while upgrading.

## Recovery Mode

If any errors happen during firmware upgrade process, such as corrupted firmware file or damage during file transferring, the modem will be going to recovery mode and runs recovery firmware. A firmware revision 1.00 will indicate that the modem is running recovery firmware.

By running recovery firmware, the modem will be able to redo firmware upgrade by using the correct firmware file locally or remotely, as described in the previous section.

## System Recovery

Although it is rare, there may be a chance of failure during the firmware upgrade process, either locally or remotely. IntelimaxLITE 4G has an in-built recovery mechanism so that the modem can run a recovery firmware in case of a failed firmware upgrade. The recovery firmware image is stored locally and operates very similar to the normal firmware, and will use the modem configuration that is active before the firmware upgrade.

To check whether the modem is running on recovery firmware, use the GUI to connect to the modem (locally or remotely) at least 5 minutes after firmware upgrade (it will take a few minutes for the modem to recover from a failed upgrade process). If the firmware version shown in the GUI is 1.0.X, the modem is running recovery firmware.

You can do normal firmware upgrade when modem is running the recovery firmware and a successful upgrade process will restore the modem back to running the normal firmware. If the modem keeps on running the recovery firmware after more than two firmware upgrade attempts, please contact RFI/Maxon support.

## SMS COMMANDS

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The IntelimaxLITE 4G supports SMS commands for remotely checking modem status and changing certain configurations. The commands can be sent when the modem is locally in SMS text mode only (as opposed to PDU mode) and all commands have to be upper case letters.

### SMS Commands in IP Stack Modes

Following SMS commands can be used to change the APN, ID, Password, Authentication and even reboot the IntelimaxLITE 4G. After changing the APN, ID, Password, Authentication, the IntelimaxLITE will send a confirmation SMS after applying the changes.

- Change APN (e.g. telstra.extranet)  
**SMS Syntax:** INTELIMAX.PARK.APN telstra.extranet
- Change Username, Password and Authentication (e.g. Username: [maxon@maxon.com.au](mailto:maxon@maxon.com.au), Password: maxon, Authentication: chap)  
**SMS Syntax:** INTELIMAX.PARK.AUTH [maxon@maxon.com.au](mailto:maxon@maxon.com.au):maxon:chap
- Check WAN Settings and IP address  
**SMS Syntax:** INTELIMAX.PARK.WANIP

### SMS Commands in All Modes

The Reboot and RSSI SMS commands can be used to reboot the modem in all modes. When in Serial Modem Mode, \$\$STEALTHSMS=1 is required for the commands to work.

- Reboot Intelimax

**SMS Syntax:** INTELIMAX.PARK.REBOOT

- RSSI Info

**SMS Syntax:** INTELIMAX.PARK.RSSI

- Change mode via SMS

The Modem mode can be changed by remote SMS using the CHGMODE command:

**SMS Syntax:** INTELIMAX.PARK.CHGMODE n

n :     1 – IPStack Auto  
          2 – IPStack Manual  
          4 – Serial Modem

**IMPORTANT:**

Modem firmware requires +CNMI=2,1 settings for getting notified when new SMS is available. Due to cellular module's behaviour on +CNMI command, any +CNMI write command via the modem serial port would break the modem SMS command function and the change cannot be saved if modem reboots. So please be cautious in using the AT+CNMI write command over the serial port. Please see AT\$\$\$STEALTHSMS command for more information.

## LED FUNCTIONALITY

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The Power/RSSI LEDs will be ON when powered, and both PWR/RSSI and DATA LEDs will blink for a short time under following scenarios:

1. After boot up
2. Reset button is held for more than 5 seconds, and
3. Reset button is held for more than 20 seconds

During normal operation, the PWR/RSSI and DATA LEDs will show the status as per the tables below:

Signal Strength	PWR/RSSI LED
SIGNAL > -84dBm	SOLID ON
-89dBm < SIGNAL ≤ -84dBm	800ms ON 200ms OFF
-96dBm < SIGNAL ≤ -89dBm	600ms ON 400ms OFF
-101dBm < SIGNAL ≤ -96dBm	400ms ON 600ms OFF
SIGNAL ≤ -101dBm	200ms ON 800ms OFF
SIM Not Registered	400ms ON 600ms OFF

Connection Status	Data LED
IP STACK IDLE SERIAL MODEM IDLE	OFF
IP STACK ONLINE SERIAL MODEM CONNECTED	1s ON 1s OFF

# MODEM DEBUGGING

---

## Local Connection Checking

In order to verify that the modem is operating correctly locally, follow the below steps:

1. Check that modem Power LED is either solid on or mostly on. The better the signal strength the more time the Power LED will stay on.
2. In Serial Modem mode:
  - a. Connect to modem with GUI via RS232 interface and check the registration and signal strength of the modem. The status page will show whether the modem is currently registered as well as showing the signal level in dBm, which should be better than -93dBm.
  - b. Trigger a IP connection through the modem (IP or PPP) and ensure that the data light will correctly blinking to indicate data transfer through modem.
3. In IP Stack Auto mode:
  - a. Connect to modem with GUI via RS232 interface and check the registration and signal strength of the modem. The status page will show whether the modem is currently registered as well as showing the signal level in dBm, good levels are better than -81dBm.
  - b. Ensure that the modem has a data connection which should be automatically set up by the modem. If the data LED is blinking then this connection has been established.
4. In both modes:
  - a. Connect to the modem using the USB interface and install the EHS6 module drivers if required.
  - b. Open Windows device manager, check which COM port is matched to ELSx USB COM Port2 and open a terminal connection to the COM port.
  - c. Once connected you can check the following via AT commands:
    - i. AT+CSQ to check signal strength is better than -81 dBm
    - ii. AT+CREG to check that the modem is registered, the response should be +CREG: 0,1.



## Remote Connection Checking

In order to verify that the modem is correctly operating when the modem is remotely located, please follow the below steps:

1. In IP Stack modes:
  - Open the GUI with an IP connection to the modem and log in.
    - i. Check that the settings are correct for the equipment that you are wanting to connect to, including the serial baud rate, etc.
    - ii. Check that the signal strength is of a good level, better than -81 dBm.
2. In IP or Serial modem mode, send diagnostic SMS commands to the modem as below:
  - a. Check RSSI: By sending INTELIMAX.PARK.RSSI to the modem, the modem will respond with the RSSI which should be better than -81dBm.
  - b. Check APN and WAN connection using: INTELIMAX.PARK.WANIP. The response is: "IP:<IP.IP.IP.IP>,APN:<APN>,ID:<ID>,PW:<PW>,Auth:<PAP,CHAP,BOTH>,Reg:<0,1>,Sig:<CSQ>"
  - c. If the above commands give improper information, then reboot the modem using: INTELIMAX.PARK.REBOOT

**Note: in Serial modem mode, \$\$STEALTHSMS has to be "1" for modem to respond SMS command. Refer to the SMS COMMANDS for details.**

## EXTENDED / INTELIMAXLITE SPECIFIC AT COMMAND SET (IP STACK MODES)

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### Device Information

**ATI**

Manufacturer: RF Industries Pty Ltd

Model Number: MA-2060-4G

Product Name: IntelimaxLite4G

F/W Revision: 2.06

H/W Version: 2.0

Module F/W Revision: 01.001

Module A-Revision: 00.005.00

LAI: 50501

LAC: 0151

Cell ID: 0EA1CA8

IMEI: 357042060021269

OK

**AT+CGMI**

RF Industries Pty Ltd

**AT+CGMR – Firmware version**

+CGMR: 2.06

**AT+CGSN – IMEI number**

357042060021269

### WAN extension function

**AT\$\$WANSE?**

\$\$WANSE:

PINGCHECK:Enable,0,0,0.0.0.0,

BACKOFF:Disable,0,0,0,0

OK

**Parameters**

\$\$WANSE: X,X,X,X,X,X

0,1 PINGCHECK,BACKOFF

0,1 Disable/Enable both expansion PINGCHECK and BACKOFF

1~60 Interval of PINGCHECK/40~59 Seconds of 1st retrial interval of BACKOFF

1~60 Fail count of PINGCHECK/2~10 Minutes of 1st retrial duration of BACKOFF

IP address of 1st server of PINGCHECK/10~59 Minutes of 2nd retrial interval of BACKOFF

IP address of 2nd server of PINGCHECK/2~10 Hours of 2nd retrial duration of BACKOFF

OK

**Note: IntelimaxLITE 4G does not support PING CHECK and BACKOFF. This command is only for query.**

## WAN authentication

**AT\$\$WANSA?**

\$\$WANSA: 1,telstra.extranet,0,,, \*99#,0,,0,0,0,0,00:00,0

OK

**Parameters**

\$\$WANSA: X,X,X,X,X,X,X,X,X,X,X,X,X,X,X,X

1,2,3,4 IPStack Auto/Manual/Outstation/Serial mode

Access Point Domain Name

0,1,2 NONE/PAP/CHAP

Username

Password (Masked by "\*\*\*\*" when query)

Dialup number

0,1 Auto PIN Disable/Enable (Not supported)

PIN code (Not supported)

0 ~ 26 Hours of Periodic reset

0,1 Disable/Enable Reset (TCP Server Listening) – Server – If enabled will wait until client drops connection

0,1 Disable/Enable Reset (TCP Connected State) – Client – If enabled will wait until Intelimax client drops connection to a server or server drops connection

0,1 Disable/Enable Reset at scheduled Time (Not supported)

HH:MM for Reset at scheduled Time (Not supported)

Battery Level for Module Deregistration (12.3 volts ON, 11.9 volts OFF) (Not supported)

OK

**Note:** The Dialup Number cannot be left blank.

## IP Stack setting

### AT\$\$WANSI?

\$\$WANSI: 1,1,1,0,0.0.0.0,0.0.0.0,30000,1,300,20,0,0

OK

### Parameters

\$\$WANSI: X,X,X,X,X,X,X,X,X,X,X

1,2 None/Server/Client

0,1 Disable/Enable Notify Boot Message

0,1 Disable/Enable Notify IPStack Message

0,1 TCP/UDP

xxx.xxx.xxx.xxx Primary IPAddress

xxx.xxx.xxx.xxx Secondary IPAddress

0 ~ 65535 Port Number

0,1 Disable/Enable Idle Timeout

1 ~ 3600 Seconds Idle Timeout

5 ~ 60 Seconds Network Dormant Period UDP (Not supported)

0,1 Disable/Enable UDP Keep Alive (Not supported)

0,1,2 ~ 60 Disable/Handshake/Seconds UDP Wake Up (Not supported)

OK

## System

### AT\$\$SYSTS?

\$\$SYSTS:

admin,\*\*\*,Enable,Enable,192.168.0.50:3333,+61427933241,+61427933242,+61427933243

OK

### Parameters

\$\$\$SYSTS: X,X,X,X,X,X,X,X,X,X

UserName

Password (Masked by "\*\*\*\*" when query)

0,1 Syslog Disable/Enable

0,1 Remote syslog Disable/Enable

Remote syslog server address:port

Phone number of Administrator

Phone number of Administrator

Phone number of Administrator

OK

## Serial (UART) port

### AT\$\$\$SPORT?

\$\$\$SPORT: 115200,8,N,1,None,0,1

OK

### Parameters

\$\$\$SPORT: X,X,X,X,X,X,X,X

1200,2400,4800,9600,19200,38400,57600,115200 Baud rate

8 Data bits

N None Parity

1 Stop bits

None, Hardware Flow control

0 Don't Care

0,1 Half, Full Duplex (RS485 Option Only)

OK

## Engine Band

### AT\$\$\$BAND?

\$\$\$BAND: 40000000

OK

### Parameters

\$\$BAND:

40: UMTS I 2100

400: UMTS V 850

1000: UMTS VIII 900

10000: LTE III 1800

40000: LTE VIII 900

100000: LTE V 850

200000: LTE XXVIII 700

40000000: AUTO

OK

#### Examples:

UMTS 850/2100

LTE 700/1800

AT\$\$BAND=210440

\$\$BAND: 00210440

OK

**Note:** At least one LTE and one UMTS band must be selected. If no band is selected in GSM or WCDMA, UMTS 2100 or LTE 1800 will be automatically added. **The modem has to be power cycled after band change.**

### Check WAN IP address

**AT\$\$WAN**

\$\$WAN: 123.209.0.204

OK

### Signal Strength

**AT+CSQ?**

+CSQ: 17,99

OK

Open PPP connection

**AT\$\$IPCTOP**

Close PPP connection

**AT\$\$IPCTCP**

Open TCP/UDP Socket

**AT\$\$IPCTOS**

Close TCP/UDP Socket

**AT\$\$IPCTCS**

Change Remote Server IP address

**AT\$\$IPCTRIP=0,ip,ad,dr,ess,<port>**

**Example:** AT\$\$IPCTRIP=0,123,456,789,01,30000

Change client/server mode

**AT\$\$IPCFL=4,<0,1> where 0 for server, 1 for client**

**Example:** AT\$\$IPCFL=4,0 sets modem to server mode

Change modem mode

**AT\$\$CHGMODE=<num>**

1 – IP Stack Auto

2 – IP Stack Manual

4 –Serial Modem

AT\$\$CHGMODE=1

OK

## Change Periodic Reset Settings

**AT\$\$RESET=<num>**

<num>

OK

<num>: 0 ~ 26 hours. Periodic Reset is disabled if "0".

## Modem Reboot

**AT\$\$RESET**

OK

## Factory Reset

**AT\$\$FACTORY**

AT\$\$FACTORY

OK

## AT over IP Authentication

**AT\$\$UNLOCK**

This command is only required for AT over IP access. User can send AT command to the modem via TCP connection and the command is to add a level of security over the remote access to the modem. The port dedicated to the modem AT over IP function is 10918. The modem GUI software uses the same way to communication with modem via TCP. To unlock the AT over IP access, use the following command:

AT\$\$UNLOCK=userid;password

AT Command Set is accessible now!

OK



By default, both the userid and password is admin.

## SMS Command Interception (Serial Modem Mode Only)

### **AT\$\$\$STEALTHSMS**

The SMS commands that supported by IntelimaxLITE 4G Modem requires the modem in TEXT mode (+CMGF=1) and processing incoming SMSs. This, however, can prevent SMS URCs being delivered to the serial port. The \$\$\$STEALTHSMS command is to tell the modem whether to intercept the incoming SMS or not. The command is valid in Serial Modem Mode (Mode 4) and can only be used via USB Com Port 5. In IP modes or Outstation mode, the modem will always in SMS Text Mode and deliver +CMTI message to the serial port.

If STEALTHSMS is disabled, the Modem SMS commands will be unavailable. User can configure the Modem SMS URCs behaviours as required via SMS AT commands such as AT+CNMI, AT+CSMS, etc.

```
AT$$$STEALTHSMS?
```

```
$$$STEALTHSMS: 0
```

```
OK
```

```
AT$$$STEALTHSMS=0 – disable modem interception of SMS messages
```

```
OK
```

```
AT$$$STEALTHSMS=1 – modem to intercept SMS message
```

```
OK
```

## Prepare modem for hard shutdown

### **AT\$\$RTD**

This function is highly recommended when using the modem with an external controlled power supply. If the modem is going to have its power dropped regularly this AT command allows for the processor to perform housekeeping duties to ensure that the shutdown process does not damage the modem or internal cellular module.

```
AT$$RTD
```

```
$$RTD: 1
```

```
OK
```

The modem will shut itself down in about three (3) seconds after receiving the command and is then ready for cutting of the power. Please note that, if the modem is powered off after issuing the AT\$\$RTD command, please leave the modem unpowered for at least 3 seconds before re-applying the power.

The command is only valid when in IP. If using the modem in serial modem mode, please deregister the modem from the network using the following commands before removing the power:

```
AT+CGATT=0
```

```
AT+COPS=2
```

```
AT+CFUN=4
```

## EXTENDED / MODEM SPECIFIC AT COMMAND SET

---

### Modem Config

Parameter	Description
[E0]	Do not echo command set in command state or online command state.
E1	Echo command set in command state or online command state.
[Q0]	Return result codes.
Q1	Do not return result codes.
[&C0]	DCD line always ON.
&C1	DCD line is ON during a circuit switched call. In IP Stack mode, the behaviour is like &C0.
&C2	DCD line is normally ON and will toggle OFF for 1 second when the circuit switched call is disconnected. In IP Stack mode, the behaviour is like &C0.
&C3	DCD line is normally OFF and will be ON when modem has successfully established a PPP Data (packet switched) call (only applies to IP STACK mode). In Outstation mode, the behaviour is like &C0.
&C4	DCD line is normally OFF and will be ON when modem has successfully established a PPP Data call and opened a socket connection with remote client/server (only applies to IP STACK mode). In Outstation mode, the behaviour is like &C0.
[&D0]	Ignore DTR line signal.
&D1	Enter online command state following ON-to-OFF transition of DTR line while retaining the data connection.
&D2	ON-to-OFF transition of DTR line will disconnect the data connection (only applies to Serial Modem mode) and change to command mode. During OFF state of the DTR line, the auto-answer function (see S0) is disabled. In IP Stack mode, the behaviour is like &D1.

**Note:**

1. [ ] indicates default value.
2. The settings of &C2 has no effect in Serial Modem mode and DCD line will remain OFF.
3. The settings of &C3 and &C4 are not supported in Serial Modem mode.

## Save & Reboot

AT&W

Saves current settings to non-volatile memory

AT+CFUN=1,1

Reboot the modem

## Single SMS AT command

**This command is NOT available in Serial Modem Mode**

**AT+MMC SMSMO <Phone number> <message><CR>**

Example: AT+MMC SMSMO 0400123456 Boiler Temperature Too High!<CR>

Maximum length of message is 160 characters.

Some characters are not supported: \, [, ], ^, ~, `