NetComm

User Guide

4G LTE Cat M1/NB1 Industrial IoT Serial Modem

Doc No. UG01037

Important Notice

This device, like any wireless device, operates using radio signals which cannot guarantee the transmission and reception of data in all conditions. While the delay or loss of signal is rare, you should not rely solely on any wireless device for emergency communications or otherwise use the device in situations where the interruption of data connectivity could lead to death, personal injury, property damage, data loss, or other loss. NetComm Wireless accepts no responsibility for any loss or damage resulting from errors or delays in transmission or reception, or the failure of the NTC-100 to transmit or receive such data.

Safety and Hazards

Do not connect or disconnect cables or devices to or from the USB port, SIM card tray or the terminals of 10-pin Nano-Fit™ connector in hazardous locations such as those in which flammable gases or vapours may be present, but normally are confined within closed systems; are prevented from accumulating by adequate ventilation; or the location is adjacent to a location from which ignitable concentrations might occasionally be communicated.

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Note – This document is subject to change without notice.

Save our environment

When this equipment has reached the end of its useful life, it must be taken to a recycling centre and processed separately from domestic waste.

The cardboard box, the plastic contained in the packaging, and the parts that make up this device can be recycled in accordance with regionally established regulations. Never dispose of this electronic equipment along with domestic waste. You may be subject to penalties or sanctions under the law. Instead, ask for disposal instructions from your municipal government.

Please be responsible and protect our environment.

Document history

This guide includes the following alterations:

NetComm – NTC-100 4G LTE Cat M1/NB1 Industrial IoT Serial Modem

VER.	DOCUMENT DESCRIPTION	DATE
v1.0	Initial document release	24 July 2018

v1.1	• Added relevant Quectel AT command list
	• Added common scenario configurations for PPP and PAD mode
	• Added note to AT+APN command
	• Corrected NanoFit cable diagram
	• Correction to AT+PDP_TYPE options
	• Correction to AT+SMS_PASSWORD command
	• Corrections to
	  ○ *FAQs*
	  ○ *Application firmware upgrade Over the Air from HTTP/S server using SMS*
	  ○ *Application firmware upgrade Over the Air from an HTTP/S server using Customized AT command*
	  ○ *Module firmware upgrade Over the Air from an HTTP/S server using SMS*
		25 September 2018

v1.2	• Updated for MR1
	  ○ Updated *get status* SMS command description
	  ○ Added AT+LOGIN AT command description
	  ○ Updated AT+SERVER command description
	  ○ Updated *set server* SMS command
	  ○ Updated the *Configuring PAD mode with SMS* and *Configuring PAD mode with AT commands* sections
	  ○ Added AT+ALL_CONFIG? command description
	  ○ Added DCD pin control commands
	  ○ Added LWM2M section
	  ○ Updated *Configuring PPP mode with AT commands* section
	  ○ Updated LED indicators section
	  ○ Updated Reset button description
	  ○ Updated FAQs
	  ○ Updated filename used in the firmware upgrade descriptions
	  ○ Corrected various AT and SMS commands related to FTP
		30 April 2019

v1.3	• Updated the pin map table of the NanoFit header	10th September 2019
v1.4	• Reorganised and added quick start content	10th November 2019
v1.5	• Corrected device dimensions	27th March 2020
v1.6	• Updated "execute" SMS commands • Added Modem configuration binaries section • Added supported LWM2M objects	28th April 2020
v1.7	• Updated the "Updating the application firmware – via local PC" section	9th June 2020

VER.	DOCUMENT DESCRIPTION	DATE
v1.8	• Updated AT and SMS command list	16th June 2020
v1.9	• Added note re Quectel Wireless Ethernet adaptor to be disabled	9th October 2020
v1.10	• Added FAQ re network connection with multi APN configuration	22nd October 2020
v1.11	• Removed IPv6 references	24th March 2021
v1.12	• Added note to OTA update procedure to warn that application firmware must be updated before module firmware.	19th July 2021

Table i. - Document revision history

NetComm

Contents

Introduction

This document details the process of configuring the NTC-100 device via a terminal emulation program (such as PuTTY) as well as mounting and deployment advice.

It also contains a comprehensive list of both AT and SMS commands.

Target users

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

Prerequisites

A computer with a terminal emulation program (such as PuTTY), a serial port, an appropriate power supply and a device to connect to the NTC-100 modem after configuration has been completed.

A SIM card in 2FF format is required for cellular connection.

Notation

The following symbols are used in this user guide:

Note – The following note provides useful information.

Important – The following note requires attention.

Warning – The following note provides a warning.

Safety and product care

The NTC-100 offers a hardened industrial enclosure making it suitable for a variety of remote deployment locations.

With reference to the unpacking, installation, use and maintenance of your electronic device, the following basic guidelines are recommended:

- Installation, configuration and disassembly should be performed by trained personnel only.
- Do not use or install this product near water to avoid fire or shock hazard. Avoid exposing the equipment to rain or damp areas.
- Do not use or install this product in extremely hot or cold areas. Ensure that the device is installed in an area where the temperature is within the supported operating temperature range (-30°C to 70°C).
- Arrange any cables in a manner such that they are not likely to be stepped on or have items placed on them.
- Ensure that the voltage and rated current of the power source match the requirements of the device. Do not connect the device to an inappropriate power source.
- Use only a clean, dry cloth to wipe the device. Never apply chemical cleaners on the device.

WARNING

Disconnect the power line from the device before servicing.

Transport and handling

When transporting the NTC-100, we recommend using the original packaging. This ensures the product will not be damaged.

Important – In the event that the product needs to be returned, ensure it is securely packaged with appropriate padding to prevent damage during courier transport.

Product introduction

Product features

The NTC-100 is a rugged 4G LTE Cat M1/NB1 Industrial IoT Serial Modem that enables wireless data communications. It comes equipped with RS232/RS422/RS485 serial data connectivity for real-time monitoring and control of machines in remote locations.

Connect legacy equipment

Avoid the cost of replacing or upgrading existing assets that run critical processes. The cost-effective NTC-100 sends data to any IP enabled device using RS232/RS422/RS485 serial data. Ideal for SCADA use in areas such as manufacturing, utilities, construction and agriculture, the NTC-100 enables the remote collection, monitoring and control across a wide range of IoT applications.

Network and service flexibility

Featuring a multi-mode data module, the NTC-100 supports remote deployments and allows you to choose between a variety of Cat M1/NB1 IoT networks.

Universal installation

Deploy IoT applications in any environment with access to a wide input voltage range, extreme temperature tolerance (-30˚C to 70˚C) and a lockable SIM tray.

For easy installation, the compact NTC-100 also includes a DIN rail and flexible wall mount options including a removable mounting bracket.

Software highlights

Take advantage of the device's capacity to:

- Transparently transfer serial port traffic over the Internet via TCP or UDP using the built-in Packet Assembler and Disassembler (PAD) functionality
- Configure a periodic reboot to ensure the modem is always accessible
- Connect to a DynDNS account to update the NTC-100's IP address when not using a static IP address.

SMS control

Reduce onsite visits and save costs using advanced diagnostics and control via SMS to query status information and settings, execute commands and configure settings.

Package contents

The NTC-100 package includes:

- 1 x NTC-100 serial modem
- 1 x Y-cable (Nano-Fit to DE-9 and DC power input)
- 1 x DIN rail mounting bracket
- 1 x Torx screw
- 1 x Quick start guide

If any of these items are missing or damaged, please contact NetComm Support immediately by visiting the NetComm Support website at: http://support.netcommwireless.com/

Accessories

Additional cables are available for purchase separately. Contact your NetComm Wireless sales representative to order additional cables. Refer to the table below for the product codes.

ACCESSORY NAME	PRODUCT CODE
Y-Cable (DE-9 female to 10-pin Nano-Fit + DC5521 female)	MCBL-00004
90 Degree 8P8C to Nano-Fit cable	MCBL-00039
225mm RJ45 to Nano-Fit cable	MCBL-00040

Physical dimensions and indicators

Physical dimensions

Below are the physical dimensions of the NTC-100 as well as the physical dimensions of the mounting bracket which can be used to attach the NTC-100 to a Type-O DIN Rail or to provide a wall / ceiling mount.

Figure 1 – NTC-100 Dimensions

NTC-100 DIMENSIONS	
Length	84 mm
Width	50 mm
Depth	21 mm
Weight	55 grams *(approximately, without mounting bracket and antenna)*

Table 1 – NTC-100 Dimensions

NTC-100 MOUNTING BRACKET DIMENSIONS	
Length	69 mm
Width	61 mm
Depth	11 mm
Weight	9 grams

Table 2 – NTC-100 Mounting Bracket Dimensions

Physical interfaces

The following interfaces are available on the NTC-100:

#	INTERFACE	FUNCTION
1	10-pin Nano-Fit™ connector	Provides a serial interface via a standard Windows modem for AT command communication and dial-up networking. The serial modem may also be powered from this interface using the Y-cable. Refer to the Technical Data section of this manual for more information.
2	Micro USB 2.0 port	Provides a serial interface via a virtual COM port for AT command communication and dial-up networking. Requires that the Quectel driver is installed. The NTC-100 may be powered from the Micro USB 2.0 port.
3	Reset button	The reset button is multifunctional and can be used to: • Reboot device, • Rollback to recovery firmware, or • Reset the device to factory default settings **Reboot** Press and hold the reset button for less than 5 seconds to reboot the device in normal mode. The Status LED flashes green while the button is depressed. When the button is released, the Status LED flashes green for 5 more seconds and then the device reboots. **Rollback** Press and hold the reset button for between 5 and 15 seconds to rollback to recovery firmware. The Status LED flashes amber while the button is depressed. When the button is released, the Status LED flashes amber for 5 more seconds then the device reboots into recovery firmware. Once you rollback to recovery firmware, the current firmware will be erased. **Reset to factory default settings** Press and hold the reset button for between 15 and 20 seconds to reset the device to factory default settings. The Status LED flashes red while the button is depressed. When the button is released, the Status LED flashes red for 5 more seconds then the device reboots with factory default settings.
4	SIM card slot	Push-push SIM connector compatible with 2FF format SIM cards.
5	Cellular antenna socket	SMA Female connector for use with a suitable LTE antenna.

Table 3 - Interfaces

Note – The driver required for the Micro USB virtual COM port is available from the NTC-100 Product Support page at: https://support.netcommwireless.com/product/ntc-100#Drivers

LED indicators

The NTC-100 serial modem uses two LEDs to display the current system and connection status.

LED INDICATOR	STATUS	DESCRIPTION
Status	Off	The power is off.
	Flashing Red	Device error.
	Flashing Green	The NTC-100 is powering up or not connected to the network.
	Solid Green	The NTC-100 is powered up and connected to network.
Network	Off	No signal.
	Intermittently Red (on 30 seconds, off 30 seconds)	No SIM detected.
	Blinking Red (displays red once every 2 seconds)	SIM detected but not connected, e.g. SIM is PIN locked.
	Blinking Red, Amber or Green	Registered to network with poor (red), medium (amber) or strong (green) signal strength.
	Flashing Red, Amber or Green	Data being transferred with poor (red), medium (amber) or strong (green) signal strength.

Table 4 - LED indicators

Note – The term "blinking" means that the LED turns on for 2 seconds and then off for 0.5 seconds. The term "flashing" means the LED turns on for 100ms and off for 100ms.

Signal strength

The table below provides more detail on the signal strength indicated by the colour of the network LED.

NETWORK LED	GSM	"CAT-M1" OR "CAT-NB1"
Green	RSSI > -87 dBm	RSRP (value 2) > -90 dBm
Amber	-87 dBm >= RSSI > -93 dBm	-90 dBm ≥ RSRP > -100 dBm
Red	-93 dBm >= RSSI > -109 dBm	-120 dBm < RSRP ≤ -100 dBm
Off	RSSI < = -109 dBm or no sync to signal	RSRP ≤ -120 dBm or no sync to signal

Table 5 - Signal strength

Mounting the device

The NTC-100 can be mounted on the wall or a DIN rail by using the mounting bracket. The mounting bracket is made from polyamide, which is a flexible material.

DIN rail mounting

The NTC-100 serial modem mounting bracket has been designed to fit a TS 35 Type-O DIN rail with a 25mm core.

Bend the mounting bracket at the bend line so that the ridges are able to 'hold' onto the DIN rail edges as per the diagram below. Alternatively, if the end of the DIN rail is open, you can slide the bracket on to the rail. You also have the option of securing the mounting bracket further by screwing it into place on the rail.

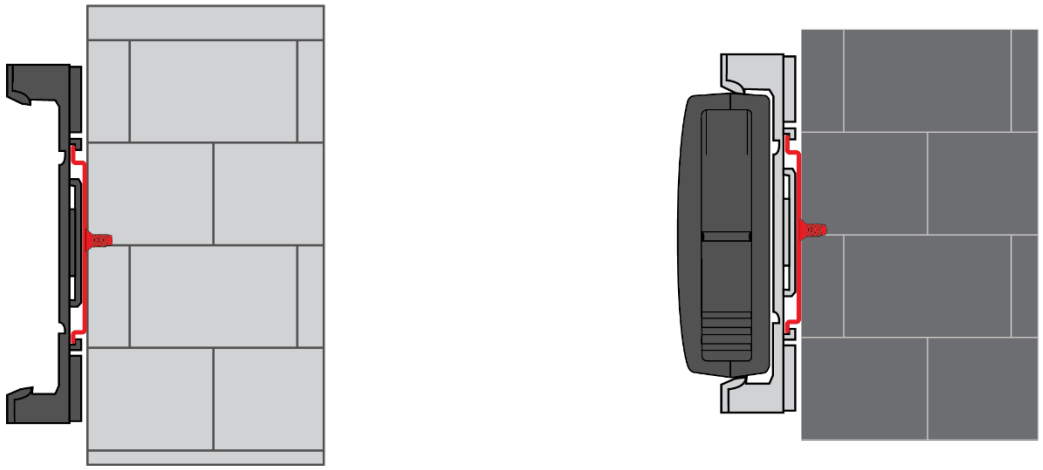


Figure 2 – DIN rail mounting

Wall mounting

Select the location where you would like to attach the NTC-100 serial modem. Attach the mounting bracket to the chosen wall or ceiling by using the 3 screw holes (screws not included).

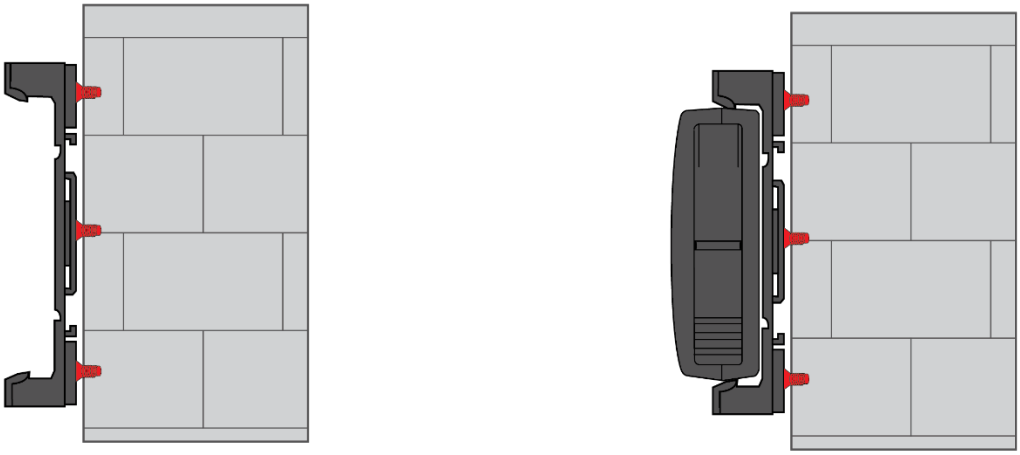
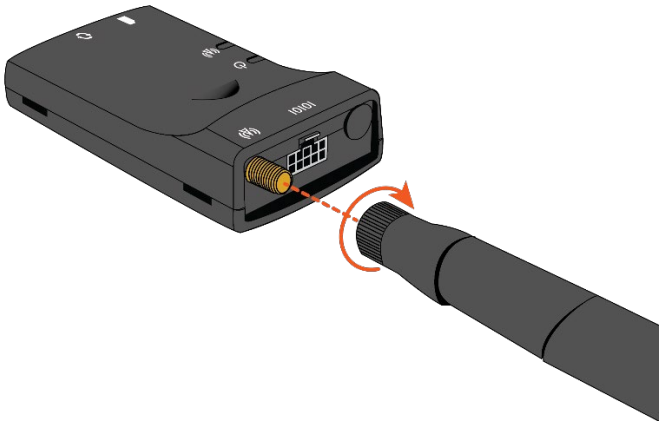


Figure 3 – Wall mounting

Hardware installation

Connecting the antenna

Connect the antenna to the SMA connector on the NTC-100 serial modem by placing it on the SMA connector and turning it in a clockwise direction.



Inserting the SIM card

Warning – Ensure that the NTC-100 is not connected to the power cable before proceeding.

1 Lift the cover from the right side.

This reveals the Micro USB 2.0 port and the reset button.

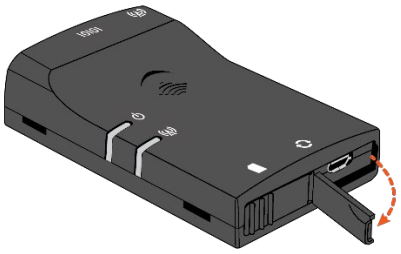


Figure 4 – Opening the side panel

2 Slide the cover to the right to reveal the SIM card slot.

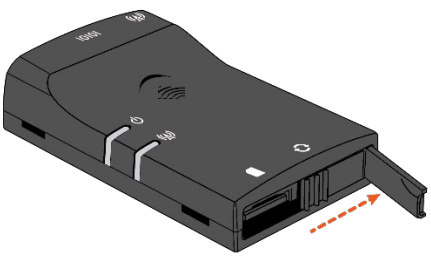


Figure 5 – Revealing the SIM card slot

3 Insert the SIM card into the slot with the gold SIM conductor pins facing down.

Push the SIM card in until it locks in place.

To remove the SIM card, push it in again and it will unlock.

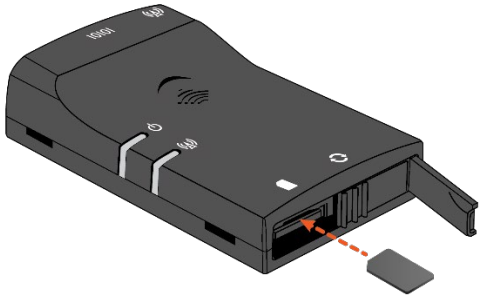


Figure 6 - Inserting a SIM card into the NTC-100 SIM card slot

Important – If the SIM card is locked, you can unlock the inserted card by entering its PIN number using the following Quectel AT command via the serial port: **AT+CPIN**

For more information, go to **AT+CPIN Enter PIN** on page 75 in the ***Quectel AT command list*** section of this guide.

4 Slide the cover back to the left and then push the right side closed.

5 To lock the protective cover, fasten the provided Torx screw into the hole below the SIM card slot on the bottom of the device using a T6 Torx driver.

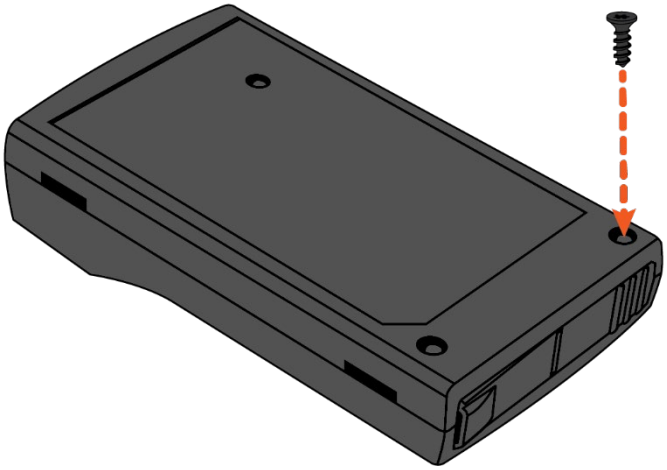


Figure 7 – Securing the SIM card slot

Connecting the data/power cables

The NTC-100 serial modem may be connected and powered by:

- The 10-pin power/data connector using the included Y-cable

OR

- The built-in 5V Micro USB socket (USB cable not included)

Connect via Y-Cable

Powering the NTC-100 via Y-cable

The included Y-cable features a breakout cable providing a DC Jack which can be used to connect to a PC via its serial port for serial connectivity, terminal emulation, firmware installation or for establishing a PPP internet connection.

Important – It is not possible to use the mini-USB and Serial connection concurrently.
Make sure that any mini-USB cable is disconnected before connecting the Y-cable's Serial plug into your PC's Serial port.

1 Connect the 10-pin plug into the 10-pin connector on the NTC-100 serial modem.

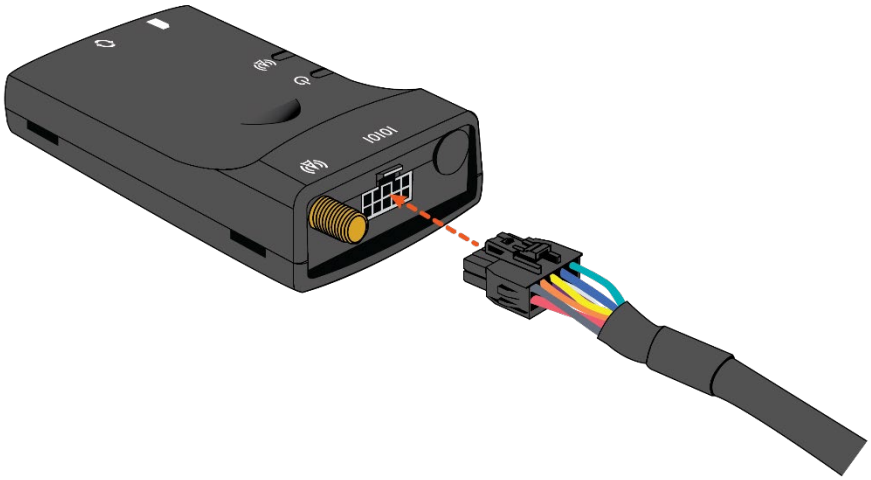
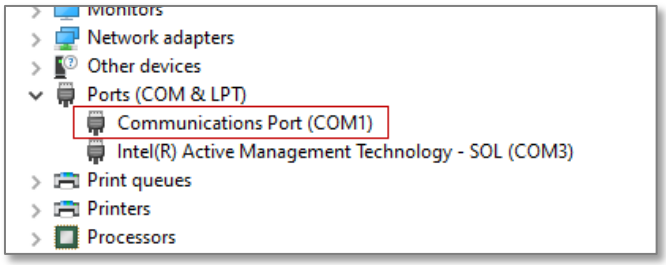


Figure 8 – Powering the NTC-100 serial modem via Y-cable

2 Connect the Serial plug to a Serial port on your device (e.g. computer) and then connect a 5-36V power source to the DC Jack to power the unit.

3 After powering up, the NTC-100 serial modem is ready to establish a serial communication link. To do this you must first confirm the Coms Port number.

4 In Windows open the **Control Panel** and then **Device Manager**. The available communications **Ports** will be displayed.



Take note of the available COM port (normally it will be COM1).

5 For further instructions on setting up the internet connection see the **Device Mangement** section of this guide.

Connect to PC via Serial Port (Terminal emulator)

To establish a connection with a PC's serial port using the Y-cable, you will have to configure the serial port connection details so that the PC can communicate with the NTC-100.

Important – From the Serial interface, you can access all AT commands. From the USB port you can access USB only AT commands.

1 If you are using a Windows PC ensure that it has terminal emulator software such as PuTTY installed.

If the PC has the Linux operating system, you can use its command terminal to connect the serial port.

2 Connect the NTC-100 to the PC's serial port using the Y cable and then connect a 5-36V power source to the DC Jack to power the NTC-100 unit.

3 Open the terminal emulator (for these examples we used PuTTY) to its **Configuration** dialog where you can create a new connection to the NTC-100.

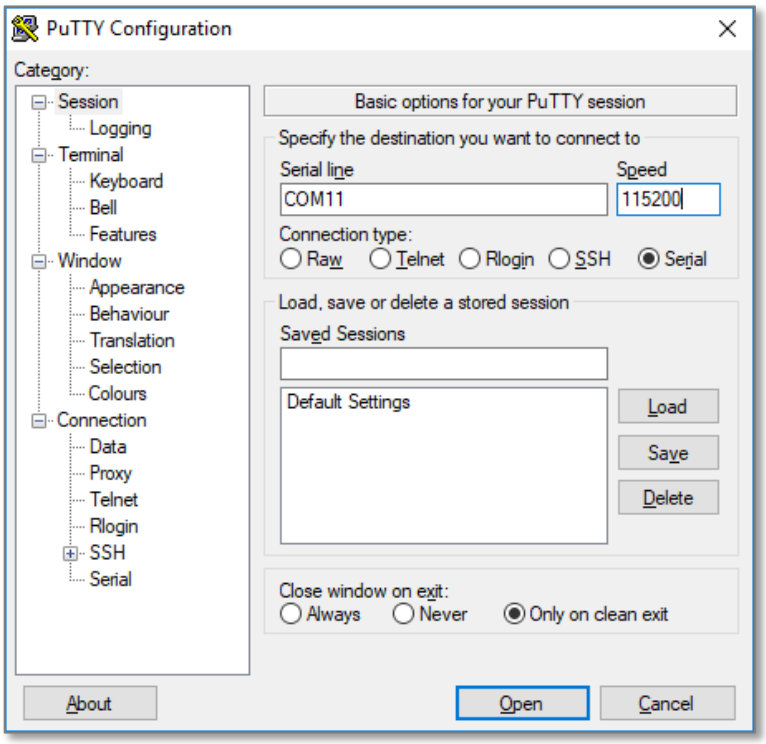
4 In the **Session** tab make the following entries:

a In the **Serial line** field, enter the COM port number assigned to the connected serial port (refer to the previous section). Note that this number can change so you should check before entering it.

b Set the bitrate **Speed** to 115200.

c Select the **Connection type** as ⊙ **Serial**.

All other settings can remain as shown in the graphic on the right.



5 Click the **Open** button to open the terminal emulator application.

6 In the terminal window that appears, type any character. A login prompt appears.

a At the **USERNAME:** prompt type **`root`** then press **Enter**.

b At the **PASSWORD:** prompt, type **admin** then press **Enter**.

c Type **AT**. If the NTC-100 serial modem is connected, it replies with **OK**.

If you are using another terminal emulator and are required to enter more serial options, the following table lists the correct settings:

SERIAL OPTIONS	
Port	As assigned by your system. Refer to Device Manager on Windows.
Baud rate	115200
Data bits	8
Parity	None
Stop bits	1

Table 6 – Serial Options

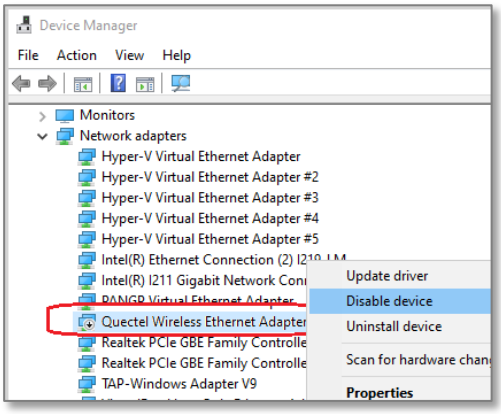
Using a terminal emulator such as PuTTY, the NTC-100 can be configured to perform customised operations.

If you are unable to type **at** and receive a response, check that you have selected the correct COM port for the NTC-100. Alternatively, try to open a connection using a physical COM port with a DE-9 serial/power adapter cable attached.

Connect via USB cable

The NTC-100 features a USB port which can optionally be used for serial connectivity, terminal emulation, firmware installation or for debugging.

The USB port enumerates a number of endpoints after the USB port driver is installed.



Important – After plugging in the USB cable, to avoid conflict with the application IP connection process ensure that the 'Quectel Wireless Ethernet adapter' is disabled in the Windows Device Manager:

1. Navigate to **Device Manager > Network adapters.**
2. Right click **Quectel Wireless Ethernet Adapter** in the list.
3. Select **Disable device** from the popup menu.

Limited AT command utility

Note that the NTC-100's ability to process AT commands via the USB connection is very limited. From the USB port you can access only Quechtel module AT commands (see *Quectel AT command list* on page 69 for a small selection of these types of commands). You cannot apply custom application AT commands (see *AT command line list* on page 46 for a comprehensive list of theses commands) via the USB cable.

As a consequence, we recommend that all setup and configuration tasks be performed using the Y-cable and the full range of the NTC-100's custom application AT commands.

Powering the NTC-100 via 5V Micro USB socket

Important – It is not possible to use the mini-USB and Serial connection concurrently.
Make sure any open connection on the Serial port is disabled before connecting via the mini-USB cable.

1 Connect a standard USB Type A to USB Micro Type B cable (not included) between the NTC-100 serial modem and a powered USB port on your device (e.g. computer).

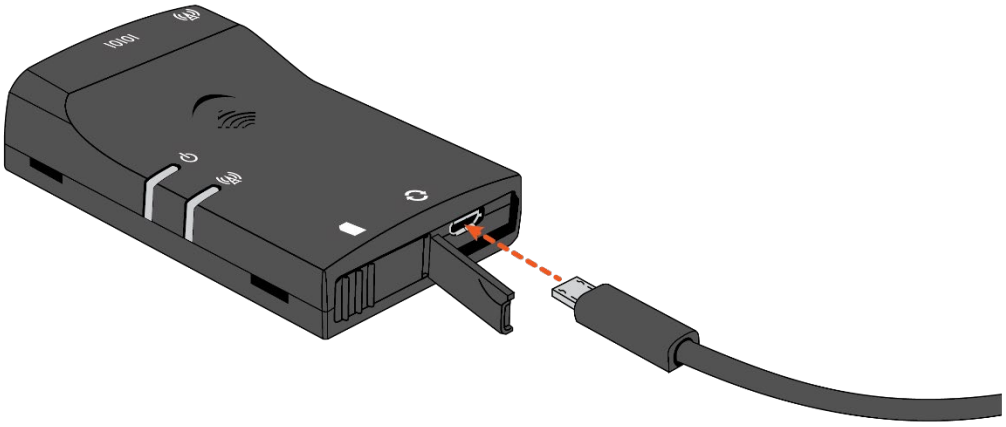


Figure 9 – Inserting the USB cable

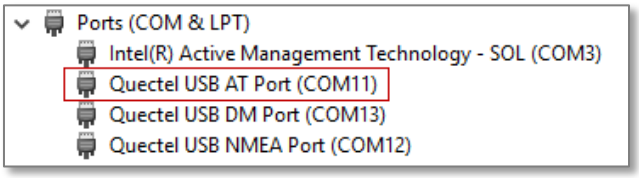
The USB cable provides the NTC-100 serial modem with both power and an emulated serial port input for USB port communication.

Important – For USB port communication, you must install a driver compatible with the NTC-100 serial modem's embedded Quectel BG96 cellular module.

- The Windows drivers are available from the NTC-100 serial modem product page on the NetComm Wireless website (https://www.netcommwireless.com/product/ntc-100) or from the Quectel website.
- After the download has completed, install the driver by double-clicking on the downloaded file and following the installer prompts.

2 In Windows open the **Control Panel** and then **Device Manager.**

The NTC-100 serial modem appears under **Ports** with three Quectel USB entries.



The COM port used for each port is displayed in brackets next to each port type. For terminal access, take note of the COM port assigned to the **Quectel USB AT Port.**

In the screenshot example above, the terminal access port is COM11.

Enable limited AT command access via USB

The USB connection provides power to the NTC-100 and serial connection to a PC through which Quectel module AT commands can be sent to the NTC-100.

The following steps are required to configure a terminal emulator such as PuTTY for use with the USB cable.

1 Connect a standard USB Type A to USB Micro Type B cable (not included) between the NTC-100 serial modem and a powered USB port on your device (e.g. computer).

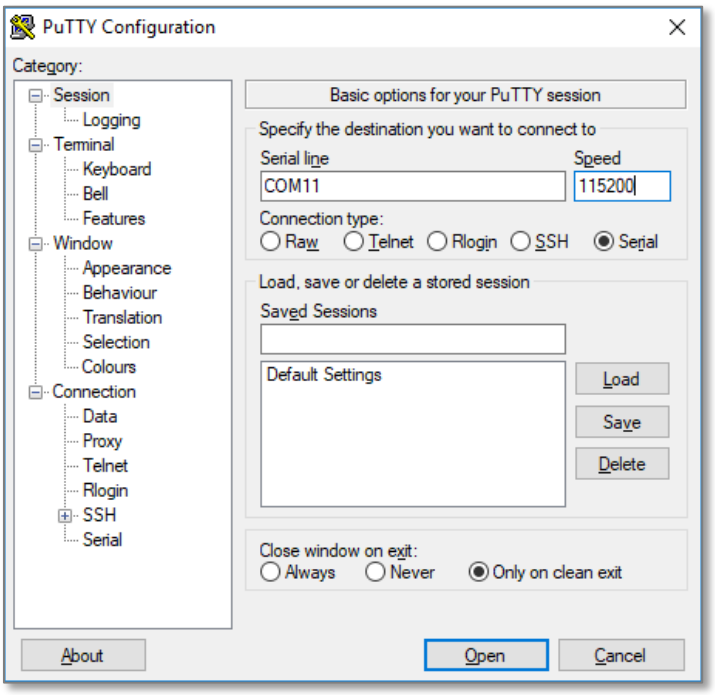
2 Install the correct USB driver and check the AT Port number (see previous section for detailed instructions).

3 Open the terminal emulator (for these examples we used PuTTY) to its **Configuration** dialog where you can create a new connection to the NTC-100. In the **Session** tab make the following entries:

   a Enter the COM port assigned to the connected serial port (the *Connecting the data/power cables* section, above, explained how to check the port assigned to the NTC-100) into the **Serial line** text.

   b Set the bitrate **Speed** to 115200.

   c Select the **Connection type** as ⊙ **Serial**.



All other settings can remain as shown in the above graphic.

4 Click the **Open** button to open the terminal emulator application.

5 In the terminal window that appears, type **AT**.

6 If the NTC-100 serial modem is connected, it replies with **OK**.

Important – When using the USB port connection you can **only** enter Quectel module AT commands. You cannot use the NTC-100 custom AT commands via the USB port connection.

Device management

You can communicate with the NTC-100 via three methods:

- SMS enabled device
- Serial Port (Terminal emulator)
- LWM2M remote server

SMS

SMS commands can be sent from a mobile phones to the device's SIM number in order to manage the NTC-100.

Types of SMS commands

The NTC-100 employs three types of SMS commands:

- execute
- get
- set

Please refer to the *SMS command list* section for lists of SMS commands grouped by command type.

Password enabled SMS commands

For security reasons, by default NTC-100 SMS commands are password-enabled with the password: 1234

All SMS command messages must be prefixed with the correct password and without a space between the password and the command.

For example, type in **`1234get status`** for the command 'get status' and SMS password is 1234.

For more information, go the *SMS command list* section at page SMS command list 34.

AT commands via terminal emulator

Using a terminal emulator such as PuTTY you can send AT commands to the NTC-100.

The NTC-100 has a number of custom AT commands that have been developed by NetComm to assist in common deployments of the NTC-100. See the *AT command line list* section of this manual beginning on page 46 for a comprehensive list of theses commands.

The module manufacturer, Quectel, also has a wide range of AT commands a small number of which have been included in this manual in the *Quectel AT command list* section beginnning on page 69.

We recommend using the Y-cable to send both custom AT commands and Quectel module AT commands. The NTC-100's ability to process AT commands via the USB connection is limited to only Quectel module AT commands.

For more information, go the *Quectel AT command list* section at page 46.

LWM2M

The Lightweight M2M (LWM2M) feature allows you to read, write and save most of the AT command configurations of the NTC-100 from a remote LWM2M server. Please refer to the LWM2M section for more details.

Note – For local firmware upgrade and advanced QXDM log, USB port has to be used.

Common operations

Configuring APN

Configuring APN with AT command

```
at+apn=telstra.extranet
at+save=1
at+cfun=1,1
```

Configuring APN with SMS command

```
1234set apn=telstra.extranet
1234execute save
1234execute reboot
```

Configuring APN with Username/Password CHAP/PAP authentication with AT command

```
at+apn=telstra.corp
at+user_pass=username,password
at+auth_type=3
at+save=1
at+cfun=1,1
```

Configuring APN with Username/Password CHAP/PAP authentication with SMS command

```
1234set apn=telstra.corp
1234set pdpauth=username,password
1234set auth_type=3
1234execute save
1234execute reboot
```

Configuring Cat M1 or Cat NB1

To read current mode: **at+qcfg="iotopmode"**

Configure LTE network mode **at+qcfg="iotopmode",<mode>**

Example:

AT+QCFG="iotopmode",0 >> locks to Cat M1 only

AT+QCFG="iotopmode",1 >> locks to Cat NB1 only

AT+QCFG="iotopmode",2 >> locks to Cat M1 or Cat NB1

Device operation mode

The NTC-100 comes pre-loaded with a NetComm Wireless custom application. This application allows the NTC-100 to operate in different modes, providing additional functionality and support for a number of terminal commands specific to this application.

These commands can be used locally via the serial interface to send or receive serial data to or from TCP/UDP servers (typically another NTC-100) using EGPRS/Cat M1/Cat NB1 connections.

The syntax for using the commands in the command line and over SMS differ slightly and are detailed in the following sections.

Important – Installing another custom application will cause the NetComm Wireless custom application to cease functioning as only one custom application may be used at a time

The NTC-100 has two modes:

MODE	DESCRIPTION
PAD/IP mode	In this mode, the NTC-100 acts as a Serial/IP gateway device converting asynchronous serial data to IP data across the cellular network. The NTC-100 can be configured as a TCP Client, TCP Server, UDP client or UDP server.
PPP mode	In this mode, a Dumb Terminal Emulator (DTE) can get an IP address from the Serial Interface. A PPP connection can be established between the DTE and the NTC-100.

Table 7 - NTC-100 modes

PAD Mode

In this mode, the NTC-100 acts as a Serial-IP gateway. The downstream device's asynchronous serial data from the serial interface is converted by the NTC-100 to IP packets before they are sent across the cellular IP network to the remote destination and vice-versa.

In PAD mode the NTC-100 establishes a TCP or UDP connection to the remote end. The NTC-100 can be configured as a TCP Client, TCP Server, UDP Client or UDP server.

The NTC-100 modem has four PAD modes available:

NUMBER	MODE	DESCRIPTION
0	Disabled	In this mode, the Serial to TCP gateway function is disabled and the NTC-100 is in **configuration mode**. This is the default mode.
1	TCP Client	The NTC-100 acts as a TCP client and transfers TCP data between the serial and IP connections.
2	TCP Server	The NTC-100 acts as a TCP server and accepts incoming IP connections and transfers data between serial and IP connections.
3	UDP Client	The NTC-100 acts as a UDP client and transfers UDP data between the serial and IP connections.
4	UDP Server	The NTC-100 acts as a UDP server and transfers UDP data between the serial and IP connections.

Table 8 - NTC-100 PAD modes

Upon powering up, the application gets an IP address from the network, subscribes to the SMS service and sets up customized AT commands.

By default, the device boots up in **PAD=0** mode which is also a configuration mode.

To log in to this mode, the default username is **root** and password is **admin**.

The device can be set to PAD modes (TCP Client, TCP server, UDP Client, UDP Server mode) or PPP mode. If the configuration is saved, the NTC-100 will start in the configured mode upon next boot.

The application can switch to any of these modes by AT command or remotely through SMS. The serial port can be initialized while GSM/GPRS registration is in progress.

Default Parameters

If the flash configuration area is empty, the default parameters are loaded. The default parameters are as follows:

Serial Port

- Baud Rate: 115200
- Data Bits: 8
- Parity: none
- Stop Bit: 1
- Serial Mode: RS232

PDP profile

- APN: telstra.internet
- User:
- Password:

Server configuration

- Server:
- Port: 1516

The NTC-100 default PAD mode is with PAD=0.

Example PAD implementation

Below is an example in which the NTC-100 is configured as a TCP server to provide an internet connection between a utility meter and remote client software.

After this configuration, the remote client software can read and write to the downstream device via the serial connection to the NTC-100.

Configuring PAD mode with AT commands

1 Query the current modem mode.

at+modem_mode?

If it is not 1, configure **at+modem_mode=1**

2 Configure the APN

at+apn=telstra.extranet

3 Configure the NTC-100 as TCP server in PAD mode

at+pad=2

4 Save the configuration

at+save=1

5 Power cycle the NTC-100

at+cfun=1,1

6 Log in again and check for a WAN IP address on the NTC-100

at+local_ip?

7 Configure Local IP address as Server and TCP port

at+server=,1516

[Note: for versions older than v2.9.1, local IP address should also be configured as server IP address]

8 Save the server configuration

at+save=1

The NTC-100 is ready to accept a connection from a remote TCP Client.

Configuring PAD mode with SMS

1 Query the current modem mode.

1234get modem_mode

If it is not 1, configure **1234set modem_mode=1**

2 Configure the APN

1234set=telstra.extranet

3 Configure the NTC-100 as a TCP server in PAD mode

1234set pad=2

4 Save configuration

1234execute save

5 Power cycle the NTC-100

1234execute reboot

6 Log in again and check for a WAN IP address on the NTC-100

1234get status

7 Configure a TCP server listening port

1234set server=,1516

[Note: for versions older than v2.9.1, local IP address should also be configured as server IP address]

8 Save the server configuration

1234execute save

The NTC-100 is ready to accept a connection from a remote TCP Client.

PPP Mode

In this mode, a Dumb Terminal Emulator (DTE) can get an IP address from the downstream device via the NTC-100's serial interface.

A PPP connection can be established between the DTE and the NTC-100.

In PPP mode the NTC-100 acts as a PPP server and the downstream device connected via serial should have a PPP client feature. The NTC-100 accepts PPP dial in from the downstream device and the downstream device receives an IP address from the network.

In PPP mode, a DTE can dial the NTC-100 with an AT dialling command and create a PPP connection between the DTE and the NTC-100. An IP address will be assigned to the DTE and it can talk to remote servers.

Below is the configuration example in which NTC-100 is configured in PPP mode.

Configuring PPP mode with SMS commands

1 Query the current modem mode.

1234get modem_mode

If it is not **0**, configure **1234set modem_mode=0**

2 Save the configuration

1234execute save

3 Power cycle the NTC-100

1234execute reboot

Configuring PPP mode with AT commands

1 Query current modem mode.

at+cgatt=0

at+modem_mode?

If it is not **0**, configure **at+modem_mode=0**

2 Configure the APN

at+cgdcont=1,"IP","telstra.internet"

3 Save the configuration

at+save=1

4 Power cycle the NTC-100

at+cfun=1,1

The NTC-100 is ready to accept PPP dial-in from a DTE connected to it.

If the DTE dials with the same APN configured above, the modem forwards the same IP to the DTE.

Important – In PPP Mode, the application does not get an IP address; thus, IP services such as LWM2M, ping watchdog, and firmware upgrade do not work in PPP mode.
In order to use these services you must change the modem to PAD mode.

Read current device status

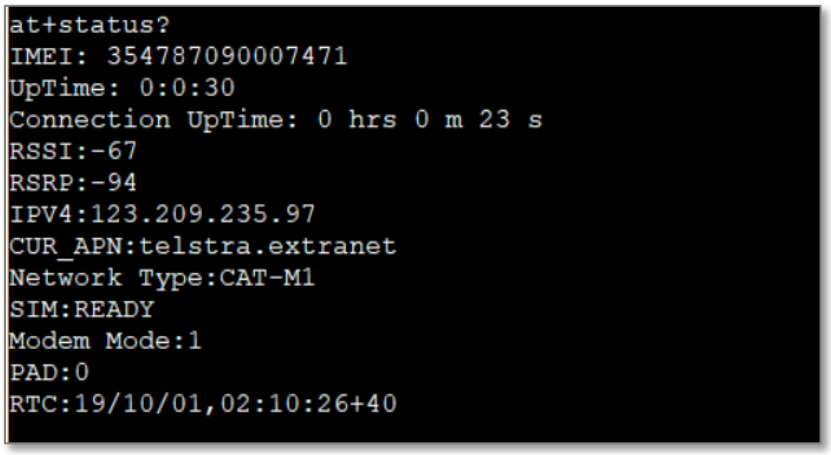
You can retrieve simple status information about the device, including the IMEI, device up time, connection up time, RSSI, RSRP (signal strength), IPv4 address and APN of the NTC-100.

This command can be used to check that the SIM is functioning correctly, device is registered to the network and that an IP address is received.

Enter the command as shown below, depending on your chosen access method.

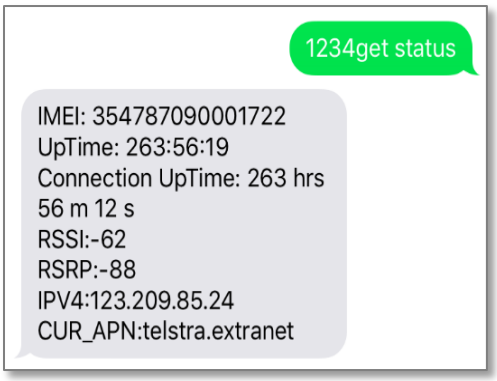
AT command (terminal)

Type the AT command '**at+status?**' into a terminal emulator such as PuTTY:



SMS command (mobile phone)

Type the SMS command '**1234get status**' into an SMS messaging service (note that this command includes the NTC-100's SMS password '**1234**' as its prefix):



SMS command list

The NTC-100 can be configured through the serial port with AT commands or remotely through SMS messages.

In order to use SMS commands, the **AT+SMS_DIAGNOSTICS=1** command must be issued through the AT command port. Note that this setting is enabled by default.

SMS commands can be sent from the mobile phones to the device SIM number in order to manage the NTC-100.

When "**set**" and "**execute**" SMS commands are received, the NTC-100 sends an acknowledgment reply message when the command has been implemented.

Password enabled SMS commands

For security reasons, by default NTC-100 SMS commands are password-enabled with the password: **1234**

All NTC-100 SMS command messages must be prefixed with the correct password and without a space between the password and the command. For example, type in **1234get status** for the command '**get status**' and the SMS password is '**1234**'.

You can change the password to any one to six character password by using the SMS command '**set smspassword**' (see page 43).

You can also use the custom AT command **AT+SMS_PASSWORD** command to change the SMS password via the serial port. Three other AT commands are also able to interact with the SMS functionality: **AT+SMS, AT+SMS ACK** and **AT+SMS_DIAGNOSTICS** See page 64 for more information on these four AT commands.

Types of SMS commands

There are three types of SMS commands:

- execute
- get
- set

The following is a list of SMS commands that may be used, along with a description of their usage:

SMS 'execute' commands

execute clear

Instructs the NTC-100 to erase all stored SMS messages.

execute factory_reset

Instructs the NTC-100 to reset to factory default settings, as per the "**AT+FACTORY_RESET**" terminal command.

execute ftp_config_download

Downloads the current configuration from the currently configured FTP server.

execute ftp_config_upload

Uploads the current configuration to the currently configured FTP server.

execute ftp_default_config_download

This command instructs the NTC-100 to download the default configuration from the currently configured FTP server.

execute ftp_default_config_upload

This command instructs the NTC-100 to upload the default configuration to the currently configured FTP server.

execute log_clear

Instructs the NTC-100 to clear the log file.

execute log_dump

Retrieves the logs locally from Quectel's QEFS explorer.

After executing the **`execute log_dump`** command, open the QEFS explorer tool and copy LogFileDump.txt from the datatx/LogFiles directory to your PC.

execute pdpcycle

Instructs the NTC-100 to stop the current PDP session and reconnect it.

execute reboot

Instructs the NTC-100 to perform a reboot immediately.

execute save

Instructs the NTC-100 to save the current settings to on-board flash memory.

execute save_config_default

Instructs the NTC-100 to save the current configuration as the default configuration.

execute web_config_download

Instructs the NTC-100 to download the current config file from the currently configured HTTP/S server.

execute web_default_config_download

Instructs the NTC-100 to download the default configuration from the currently configured HTTP(S) server.

SMS 'get' commands

get apn

The NTC-100 sends an SMS reply with the currently configured APN.

get apn_sep

Retrieves the currently configured separation character used when specifying multiple APNs using the "**`set apn+`**" command.

get ccid

The NTC-100 replies with the SIM CCID value.

get daily_sms_limit

Retrieves the currently configured daily SMS limit.

get dcd

The NTC-100 sends the current configuration of the DCD parameter.

get enable_lwm2m

Retrieves the status of the LWM2M feature.

get fail_count

Retrieves the fail count for the ping watchdog.

get force_reconnect

The NTC-100 replies with the enabled status of the force_reconnect command and the force_reconnect period.

get force_reset

The NTC-100 replies with the current FORCE_RESET period, i.e. the periodic reset frequency.

get ftp_active_port_range

Retrieves the port range of the FTP server when it is set to active mode.

get ftp_mode

Retrieves the mode that the FTP server is currently running in, i.e. active or passive.

get ftp_para

This command retrieves the configured FTP settings on the NTC-100.

get hw_version

The NTC-100 replies with the hardware version of the board.

get imei

Retrieves the IMEI of the NTC-100.

get log_enabled

Retrieves the status of the logging feature.

get lwm2m_bootstrap

Reads the LWM2M server configuration.

get lwm2m_endpoint

Reads an LWM2M endpoint. The endpoint name reported by the LWM2M client uses the IMEI URN format

get modem_mode

The NTC-100 replies with the currently configured modem mode (IP/PAD mode or PPP).

get pdp_type

The NTC-100 replies with the currently configured packet data protocol type for PDP context 1.

get ping_acc_timer

Retrieves the accelerated periodic ping timer for the ping watchdog.

get ping_ip1

Retrieves the first destination IP address for the ping watchdog.

get ping_ip2

Retrieves the second destination IP address for the ping watchdog.

get ping_timer

Retrieves the periodic ping timer for the ping watchdog.

get ping_watchdog

Retrieves the **ping_watchdog** status.

get ping=[domain name / IP address]

Instructs the NTC-100 to send a ping to a remote host and display ping replies.

For example: **get ping=www.google.com**

get serial_on_start

The NTC-100 replies with the current SERIAL_ON_START flag.

get settings

The NTC-100 replies with the following information:

```
APN: testAPN
PDP: testuser@domain.com.au, test
SERVER: 10.1.193.11,1516
PAD: 1
BAUD: 115200
DYN_ENABLE: 1
DYN_HOST: testuser.dyndns.org
NON_REBOOT: 1
```

get status

The NTC-100 sends an SMS reply with the following information:

```
IMEI:xxxxx
UpTime:xx:xx:xx
Connection UpTime:xx:xx:xx
RSSI:xxx
RSRP:xxx
IPV4:xxx.xxx.xxx.xxx
Cur_APN:xxxxxxx
```

get version

The NTC-100 replies with the version of the application firmware and module firmware.

get web_file

Retrieves the file name for the module/application firmware OTA upgrade.

get web_host

Retrieves the HTTP/S server for module/application firmware OTA upgrade.

get web_pass

Retrieves the password if authentication is implemented on the HTTP/S Server for application firmware OTA upgrade.

get web_path

Retrieves the file path on the HTTP/S Server for the module/application firmware OTA upgrade.

get web_port

Retrieves the HTTP/S port for the module/application firmware OTA upgrade.

get web_retry

Retrieves the retry attempt setting if HTTP/S OTA fails.

get web_user

Retrieves the username if authentication is implemented on the HTTP/S Server for application firmware OTA upgrade.

SMS 'set' commands

set apn_sep

Configures the separation character to use when specifying multiple APNs using the "**set apn+**" command.

The characters that may be used as separators are |, [,], and /.

set apn+=xxxxx

This command is the same as **set apn=xxxxx**, but does not overwrite the existing APNs. Instead, APNs are appended to the existing list.

set apn=xxxxx

Sets the APN used to connect to the PDP session. The new APN will take effect after performing the "**execute save**" and "**execute pdpcycle**" command.

This new APN won't be saved to on-board flash memory unless the "**execute save**" command is issued.

Multiple APNs can be entered using the apn_sep character (see the **get apn_sep** command). The NTC-100 will attempt to connect to the APNs in the order specified.

set at=xxxx

This command allows you to run your own AT commands via SMS. For example, **<password>set at=at+cfun=1,1**.

set auth_type=x

Sets the authentication type when a username and password is set for the APN.

Valid options are *0* (None), *1* (PAP), *2* (CHAP), *3* (PAP or CHAP).

set baud=xxx

Sets the baud rate to be used by the NTC-100.

Valid baud rate values are "300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400".

set daily_sms_limit=xxx

Sets the daily limit of SMS messages that the NTC-100 will send. This value is reset every 24 hours and when the NTC-100 is rebooted.

The valid range of SMS messages to send is 5 to 255.

set dcd=x

Configures DCD parameter.

set dyn_enable=0,1

When this value is set to 1, the NTC-100 automatically updates the IP address from the dynamic DNS host.

When this value is set to 0, the dynamic DNS feature is disabled.

set dyn_host=xxx

Sets the Dynamic DNS hostname.

set dyn_pass=xxx

Sets the Dynamic DNS password.

set dyn_user=xxx

Sets the Dynamic DNS username.

set enable_lwm2m=0,1

Enables or disables the LWM2M feature. When this value is set to 0, the LWM2M feature is disabled.

When this value is set to 1, the LWM2M feature is enabled.

set fail_count

Configures the fail count for the ping watchdog.

set force_reconnect=xxx

This command sets the period in seconds to wait before attempting to reconnecting to the TCP server.

When set to 0, the NTC-100 will not attempt to reconnect to the TCP server.

set force_reset=xxxxx

Sets the FORCE_RESET period in minutes. Valid intervals are 2 – 65535 minutes. Setting this value to 0 disables the forced reset function.

set ftp_active_port_range=<min>,<max>

Sets the port range of the FTP server when it is in active mode.

set ftp_file=xxx

This command specifies the filename of the firmware stored on the FTP server used to perform a firmware upgrade, configuration file upload/download or log upload.

set ftp_host=xxx

This command specifies the hostname or IP address of the FTP server.

set ftp_mode=0 or 1

Sets the mode of the FTP server where 0 is active and 1 is passive.

The default setting is passive (1).

set ftp_pass=xxx

This command specifies the password of the account on the FTP server.

set ftp_path=xxx

This command specifies the path to the firmware file stored on the FTP server.

set ftp_retry=xxx

This command specifies the number of times to attempt an FTP connection.

The default setting is 4 and the maximum is 255.

set ftp_user=xxx

This command specifies the username of the account on the FTP server.

set ipv4_mtu

Sets the maximum transmission unit (MTU) of the IPv4 protocol.

Valid values are between *1000* and *1460*. The default value is *1460*.

set log_enabled=x

Sets the logging feature on (1) or off (0). The default setting is (0) off.

set log_upload=1

Uploads the log file to the currently configured FTP host.

set modem_mode=x

Sets the modem mode. Valid options are *0* (PPP) or *1* (IP mode)

set no_whitelist=x

Removes a number or numbers from the whitelist.

set non_reboot=0,1

When set to 0, the NTC-100 will not reboot when PAD mode is changed.

When set to 1, the NTC-100 when PAD mode is changed.

set pad=0,1,2,3,4

Sets the NTC-100 mode of operation where "0" is "PAD disabled mode", "1" is "TCP client mode", "2" is "TCP server mode", "3" is "UDP client mode" and "4" is "UDP server mode".

set pdp_type=xxx

Sets the packet data protocol type for PDP context 1. Valid options are: *IPV4, PPP*

set pdpauth=<username>,<password>

Sets the username and password used for authentication to the PDP session.

set ping_acc_timer

Configures the accelerated periodic ping timer for the ping watchdog.

set ping_ip1

Configures the first destination IP address for the ping watchdog.

set ping_ip2

Configures the second destination IP address for the ping watchdog.

set ping_timer

Configures the periodic ping timer for the ping watchdog.

set ping_watchdog=0,1

Enables/disables the ping watchdog feature.

set reply_cmd_error=x

When set to **1**, the NTC-100 replies to incorrect commands with an SMS error message.

When set to **0**, the NTC-100 does not send any error replies.

Note that if the password is incorrect, no error message is sent, regardless of the state of this setting.

Also, the **AT+SMS_ACK** option must be enabled for this to work.

set serial_mode

Sets the mode of the serial port.

Valid options are *RS232, RS422, RS485*. The default mode is RS232.

set serial_on_start=0,1

When this value is set to 1, the NTC-100 enables the serial port in data mode when the unit boots up.

When this value is set to 0, the NTC-100 will not start the serial port in data mode on boot.

set server=[ip address/hostname],port

Sets the server IP address or hostname and port that the NTC-100 will use when operating in TCP/UDP client mode. In TCP/UDP Server mode, this sets the port number only.

```
Set server=123.123.12.34,9999
set server=,9999
```

set sms=XXXXXXXXXX,"message content"

Instructs the NTC-100 to send an SMS to a mobile phone number. For example:

```
1234set sms=0412345678,"This is a test message"
```

set smspassword=XXXXXX

Sets the SMS password required as a prefix for all SMS commands.

NTC-100 SMS Passwords have the following characteristics:

- can be comprised of alphanumeric or special characters

- letters of the alphabet are case-sensitive
- can be from one to six characters in length (see **Warning** below for zero character passwords)
- spaces can be included between characters but this is not recommended.
- default password is '1234'

Warning – If this set command is not specified, that is if the password is left blank – **`set smspassword=`** – no password will be required before SMS commands and your device's SMS password security will be disabled.
For security reasons we strongly recommend that you always use the NTC-100's password protection functionality.

set web_file

Configures the file name for the module/application firmware OTA upgrade or configuration files download.

set web_host

Configures the HTTP/S server for the module/application firmware OTA upgrade or configuration files download.

set web_pass

Configures the password if authentication is implemented on the HTTP/S server.

Note – Username/password authentication can be implemented on the HTTP/S server only for application firmware OTA, but not for Module firmware.

set web_path

Configures the file path on the HTTP/S Server for the module/application firmware OTA upgrade or configuration files download.

set web_port

Configures the HTTP/S port for the module/application firmware OTA upgrade or configuration files download.

set web_retry

Configures the retry attempt if HTTP/S OTA fails.

set web_upload=1,2

Triggers a firmware upgrade from an HTTP/S server.

For example:

To perform an HTTP/S OTA for the application firmware:

```
set web_upload=1
```

To perform an HTTP/S OTA for the module firmware:

```
set web_upload=2
```

set web_user

Configures the username if authentication is implemented on the HTTP/S server.

Note – Username/password authentication can be implemented in HTTP/S server only for application firmware OTA, but not for module firmware..

set whitelist=+XXXXXXXXXXX

Adds the number entered into a whitelist of numbers that are allowed to execute commands on the NTC-100. For example, *set whitelist=+61412345678* adds the mobile number 0412345678 to the whitelist. When this command is executed, no other numbers may execute commands.

SMS miscellaneous commands

serv=xxxx

This command sets a full set of FTP parameters allowing the NTC-100 to download and run a firmware upgrade with a single command. Use the following format:

```
1234serv=<hostname>;f=<firmware_filename>;p=<path_name>;u=<username>;p=<password>
```

Upload

Issuing the upload command instructs the NTC-100 to begin the firmware upgrade process. Note that this is a case sensitive command and must begin with a capital "U".

AT command line list

AT commands are entered through a terminal emulator such as PuTTY in Windows and are entered directly via the terminal on a Linux machine.

Note – AT commands are NOT case-sensitive.

Commands can often require a sequence of AT commands and always need to be saved (AT+SAVE=1) if the setting is required in the future. In addition, often the NTC-100 will have to be rebooted (AT+CFUN=1,1) for the sequence to take effect.

Configuring Ping Watchdog (example)

The following command set configures the ping watchdog to ping destination_host with 3 ping packets in interval of 600 seconds.

```
at+ping_ip1=Destination_host

at+ping_timer=600

at+ping_acc_timer=300

at+fail_count=10

at+ping_watchdog=1

at+save=1
```

If the ping response is not received, it reduces its ping interval to 300 seconds and the device eventually reboots when the count of failed ping packet reaches 10.

The following is a complete list of commands for the NetComm Wireless custom application.

Important – These commands can only be accessed through a Terminal Emulator via the Serial port in configuration mode (AT+PAD=0).

AT+ALL

Description:	Displays a list of all supported AT commands.
Usage:	To display all AT commands, enter: **AT+ALL?**

AT+ALL_CONFIG?

Description:	Displays all current configuration in the Serial Port terminal.
Usage:	To display all AT commands, enter: **AT+ALL_CONFIG?**

AT+APN

Description: Sets the Access Point Name (APN) used to connect to the broadband network.
The default setting is *telstra.internet*.
Note: Confirm that **at+qcfg="pdp/duplicatechk"** returns **0**
If it returns **1**, change it to **0** with command **at+qcfg="pdp/duplicatechk",0**

Usage 1: To set the APN

AT+APN=xxxx

where 'xxxx' is the APN that you wish to use.

Usage 2: To retrieve the currently configured APN

AT+APN?

Example: To set the APN to 'testAPN' enter

AT+APN=testAPN

AT+APN_SEP

Description: Sets the separation character to use when specifying multiple APNs using the AT+APN command. Valid characters are "|", "/" , "[" , "]". The default is "|".

Usage 1: To set the APN separator:

AT+APN_SEP=x

where 'x' is an option listed below.

Usage 2: To retrieve the currently configured APN

AT+APN_SEP?

Options: |, /, [,]

Example: To set the APN separator to /, enter

AT+APN_SEP=/

AT+AUTH_TYPE

Description: This command is used to set authentication type when a username and password are configured for an APN.

Usage 1: To set the authentication type, enter:

AT+AUTH_TYPE=x

Where 'x' is an option number.

Usage 2: To retrieve the currently configured authentication type, enter:

AT+AUTH_TYPE?

Usage 3: To display the authentication options, enter:

AT+AUTH_TYPE=?

Options:

0 None *(default)*
1 PAP
2 CHAP
3 PAP or CHAP

Example: To set the authentication type to PAP, enter:

AT+AUTH_TYPE=1

AT+CFUN

Description: This is a standard AT command which resets the device.

Usage: To reset the device

AT+CFUN=1,1

AT+CHAR_TIMEOUT

Description: By default, data received from the serial interface is not buffered. This can be changed to a value up to 65535 seconds, expressed as a factor of 100ms. After this delay, data will be sent out regardless of end of line input.

Usage 1: To configure the character timeout

AT+CHAR_TIMEOUT=xxx

where 'x' is an integer to be multiplied by 100ms between 0 and 255.

Usage 2: To retrieve the currently configured character timeout value

AT+CHAR_TIMEOUT?

Help: **AT+CHAR_TIMEOUT=?**

Options:
0 disable (always use delimiters instead)
1 – 255* 100ms

Example: To configure the character timeout to 1 second, enter

AT+CHAR_TIMEOUT=10

AT+DAILY_SMS_LIMIT

Description: This command is used to set a maximum number of SMS messages that the NTC-100 may send each day. When the maximum number of sent messages is reached in a day, the NTC-100 processes any commands sent to it but will not send any SMS messages to the sender. A day begins from the moment the feature is enabled, however, the limit is set to its original value if the module is rebooted using **AT+CFUN=1,1** or **AT+FORCE_RESET=XXX**.
The valid range of daily SMS messages is 5 to 255.

Usage: **AT+DAILY_SMS_LIMIT=XXX**

where 'x' is an integer between 5 and 255.

Example: To set a maximum daily limit of SMS messages to 100, enter:

AT+DAILY_SMS_LIMIT=100

AT+DCD

Description: Controls DCD pin behaviour in RS232 Serial mode

Usage 1: To set DCD

AT+DCD=x

Usage 2: To retrieve current configuration

AT+DCD?

Usage 3: To display DCD options

AT+DCD=?

Options:
0 assert DCD only when PDP is connected [Default]
1 always assert DCD
2 assert DCD only when TCP/UDP is connected

Example: To always assert DCD pin

AT+DNS=1

AT+DNS

Description: Retrieves the NTC-100's allocated DNS address.

Usage: **AT+DNS?**

Example: To retrieve the DNS address of the NTC-100, enter

AT+DNS?

AT+DYN_ENABLE

Description: Instructs the NTC-100 to enable updating its IP address to the configured Dynamic DNS server.

Usage: **AT+DYN_ENABLE=x**

where 'x' is an option number

Help: **AT+DYN_ENABLE=?**

Options: 0 disable (default)
1 enable

Example: To set the NTC-100 to enable star updates to the Dynamic IP address table, enter

AT+DYN_ENABLE=1

AT+DYN_HOST

Description: Instructs the NTC-100 to use the supplied hostname to perform an IP address update.
Note: The only dynamic DNS service supported at this time is www.dyndns.org

Usage: **AT+DYN_HOST=XXXX**

where "XXXX" is the hostname of the dynamic DNS service.

Example: To instruct the NTC-100 to use '**testuser.dyndns.org**' as the dynamic DNS hostname to perform an IP address update, enter

AT+DYN_HOST=testuser.dyndns.org

AT+DYN_PASS

Description: Configures the password for the dynamic DNS service.

Usage: **AT+DYN_PASS=XXX**

Example: To set the dynamic DNS service username to 'testpass1', enter

AT+DYN_PASS=testpass1

AT+DYN_USER

Description: Configures the username for the dynamic DNS service.

Usage: **AT+DYN_USER=XXX**

Example: To set the dynamic DNS service username to '**testuser**', enter

AT+DYN_USER=testuser

AT+ENABLE_LWM2M

Description: Enables or disables the LWM2M feature.

Usage: **AT+ENABLE_LWM2M=x**

Options: 0 – Disable (Default)
1 – Enable

Example: To enable LWM2M, enter
AT+ENABLE_LWM2M=1

AT+ENABLE_LWM2M?

Description: Reads the status of the LWM2M feature.

Usage: **AT+ENABLE_LWM2M?**

Example: To see if LWM2M is enabled, enter
AT+ENABLE_LWM2M?

AT+EOL

Description: Send this command to delimit data received from the serial port. The default setting is 0x0D,0x0A.

Usage: **AT+EOL=xx,yy**

where 'xx' is the hexadecimal code for the carriage return character and 'yy' is the hexadecimal code of the line feed character.

Help: **AT+EOL=?**

Example: To configure the carriage return and line feed characters to 'D' and 'A', enter
AT+EOL=0x0D,0x0A

AT+FACTORY_RESET

Description: Resets the NTC-100 to factory default settings. The NTC-100 automatically reboots after this command is entered.

Usage: **AT+FACTORY_RESET=1**

Help: **AT+FACTORY_RESET=?**

AT+FAIL_COUNT

Description: This command configures fail count for ping watchdog.

Usage: **AT+FAIL_COUNT=[1-65535]**

Example: The default setting is 1. To set it to 5:
AT+FAIL_COUNT=5

AT+FORCE_RECONNECT

Description: This command enables or disables the TCP reconnect function and can be used to set the reconnect period. The difference between **AT+FORCE_RECONNECT** and **AT+TCP_TIMEOUT** is that **AT+FORCE_RECONNECT** is intended for use in situations where the TCP server is down and the NTC-100's TCP client is unaware of it. The TCP client assumes the server is still operational and hence does not reconnect. Using **AT+FORCE_RECONNECT**, you can force the TCP client to connect. The **AT+TCP_TIMEOUT** command is used for situations where the TCP client can't make a connection to the server and you want to tell it to try to connect then wait for an interval before retrying.

Usage: To force the TCP client to reconnect, enter:

AT+FORCE_RECONNECT=x

Where 'x' is an integer in seconds. When 'x' is 0, the force reconnect function is disabled. The default value is 0.

Example: To set the NTC-100 to reconnect the TCP client after waiting 10 minutes, enter:

AT+FORCE_RECONNECT=600

AT+FORCE_RESET

Description: Sets the period for which the NTC-100 will automatically reset (reboot).

Usage 1: To set the force reset period

AT+FORCE_RESET=xxxxx

where 'x' is an integer between 2 and 65535 minutes.

Usage 2: To retrieve the currently configured force reset period

AT+FORCE_RESET?

Help: **AT+FORCE_RESET=?**

Options: 0 no reset
2 - 65535 minutes between a forced reset

Example: To set the NTC-100 to reboot every 60 minutes, enter

AT+FORCE_RESET=60

AT+FTP_ACTIVE_PORT_RANGE

Description: This command sets the port range to use when the FTP is set to active mode.

Usage: **AT+FTP_ACTIVE_PORT_RANGE=<min>,<max>**

where '**<min>**' is the first port number in the range and <max> is the last port number in the range that you wish to specify. The default port range if no range is specified and FTP is in active mode is 6000-7000.

Example: To configure the FTP filename as NTC100.bin.signed, enter:

AT+FTP_FILE=NTC100.bin.signed

AT+FTP_CONFIG_DOWNLOAD=1

Description: This command instructs the NTC-100 to download the current config file from the currently configured FTP server.

Usage: **AT+FTP_CONFIG_DOWNLOAD=1**

Example: To download the current config file from the currently configured FTP server, enter:

AT+FTP_CONFIG_DOWNLOAD=1

AT+FTP_CONFIG_UPLOAD=1

Description: This command instructs the NTC-100 to upload the current config file to the currently configured FTP server.

Usage: **AT+FTP_CONFIG_UPLOAD=1**

Example: To upload the current config file to the currently configured FTP server, enter:

AT+FTP_CONFIG_UPLOAD=1

AT+FTP_DEFAULT_CONFIG_DOWNLOAD=1

Description: This command downloads the default configuration from the currently configured FTP server.

Usage: **AT+FTP_DEFAULT_CONFIG_DOWNLOAD=1**

Example: To download the current configuration from the currently configured FTP server, enter:

AT+FTP_DEFAULT_CONFIG_DOWNLOAD=1

AT+FTP_DEFAULT_CONFIG_UPLOAD=1

Description: This command uploads the default configuration to the currently configured FTP host.

Usage: **AT+FTP_DEFAULT_CONFIG_UPLOAD=1**

Example: To upload the current configuration to the currently configured FTP server, enter:

AT+FTP_DEFAULT_CONFIG_UPLOAD=1

AT+FTP_FILE

Description: This command sets the filename hosted on an FTP server during firmware upgrade or configuration files download.

Usage: **AT+FTP_FILE=xxx**

where 'xxx' is a string containing the filename that is stored on the FTP server.

Example: To configure the FTP filename as NTC100.bin.signed, enter:

AT+FTP_FILE=NTC100.bin.signed

AT+FTP_HOST

Description: This command sets the FTP Server Hostname/IP address used to perform an application firmware upgrade, current or default config files upload/download or log upload.

Usage 1: **AT+FTP_HOST=xxx**

where 'xxx' is a string containing the IP address or domain name of the FTP server.

Example: To configure the FTP hostname as 123.456.789.0, enter:

AT+FTP_HOST=123.456.789.0

AT+FTP_MODE

Description: This command sets passive or active FTP mode.

Usage 1: **AT+FTP_MODE=x**

Options: 0 – Active mode
1 – Passive mode (Default)

Example: To set the FTP to operate in passive mode enter:
AT+FTP_MODE=1

AT+FTP_PARA

Description: This command is used to retrieve the configured FTP settings on the modem.

Usage: **AT+FTP_PARA?**

Example: To retrieve the configured FTP settings on the NTC-100, enter:
AT+FTP_PARA?

AT+FTP_PASS

Description: This command sets the password of the account used to access the FTP server.

Usage: **AT+FTP_PASS=xxx**

where '**xxx**' is a string containing the password of the account on the FTP server.

Example: To configure the FTP password as "**password123**", enter:
AT+FTP_PASS=password123

AT+FTP_PATH

Description: This command sets the path to the file on the FTP server.

Usage: **AT+FTP_PATH=xxx**

where 'xxx' is a string containing the path.

Example: To configure the FTP path as /firmware/NTC-100, enter:
AT+FTP_PATH=firmware/NTC-100/

AT+FTP_RETRY

Description: This command is used to set the number of times the NTC-100 will retry an FTP connection.

Usage 1: **AT+FTP_RETRY=XXX**

Where 'xxx' is an integer between 0 and 255.

Usage 2: **AT+FTP_RETRY?**

Example: To set the maximum number of FTP retries to 5, enter:
AT+FTP_RETRY=5

AT+FTP_UPLOAD=1

Description: This command is used to trigger the NTC-100 to contact the FTP server using the details provided by the AT+FTP_HOST, AT+FTP_FILE, AT+FTP_PATH, AT_FTP_USER and AT+FTP_PASS commands and perform a firmware upgrade.

Usage:

AT+FTP_UPLOAD=1

AT+FTP_USER

Description: This command sets the username of the account used to access the FTP server.

Usage:

AT+FTP_USER=xxx

where 'xxx' is a string containing the username of the account on the FTP server.

Example: To configure the FTP username as "administrator", enter:

AT+FTP_USER=administrator

AT+HISTORY

Description: This command is used to retrieve the previous 250 SMS commands issued to the NTC-100.

Usage:

AT+HISTORY?

Example: To add retrieve the last 250 SMS messages, enter:

AT+HISTORY?

AT+HW_VERSION

Description: This command displays the hardware version of the NTC-100 board.

Usage: To display the hardware version of the NTC-100, board enter:

AT+HW_VERSION?

AT+IMEI

Description: This command retrieves the IMEI of the NTC-100.

Usage:

AT+IMEI?

Example: To print the NTC-100's IMEI to the screen, enter

AT+IMEI?

AT+IPV4_MTU

Description: This command is used to set the maximum transmission unit (MTU) for the IPv4 protocol. The default value is *1460*.

Usage 1: To set the MTU for the IPV4 protocol, enter:

AT+IPV4_MTU=x

Where 'x' is a value between 1000 and 1460.

Example: To set the MTU for the IPv4 protocol to 1000, enter:

AT+IPV4_MTU=1000

AT+LOCAL_IP

Description: Retrieves the NTC-100's allocated WAN IP address.

Usage: **AT+LOCAL_IP?**

AT+LOG?

Description: Displays all the contents of the log file in a serial port terminal

Usage: **AT+LOG?**

Example: To display the contents of the log file in a serial port terminal, enter:

AT+LOG?

AT+LOG=n

Description: Displays the last *n* number of lines of the log file.

Usage: **AT+LOG=n**

Where 'n' is an integer

Example: To display the last 100 lines of the log file, enter:

AT+LOG=100

AT+LOG_CLEAR=1

Description: Clears the log file.

Usage: **AT+LOG_CLEAR=1**

Example: To clear the log file, enter:

AT+LOG_CLEAR=1

AT+LOG_DUMP=1

Description: Retrieves the logs locally from QEFS explorer. After executing the "LOG_DUMP" command, open the QEFS explorer tool and copy LogFileDump.txt from the datatx/LogFiles directory to your PC.

Usage: **AT+LOG_DUMP=1**

Example: To retrieve the logs from QEFS explorer, enter:

AT+LOG_DUMP=1

AT+LOG_ENABLED

Description: Enables or disables the logging feature.

Usage: **AT+LOG_ENABLED=x**

Options: 0 – Disabled (Default)
1 – Enabled

Example: To enable logging on the NTC-100, enter:

AT+LOG_ENABLED=1

AT+LOG_ENABLED?

Description: Retrieves the status of the logging feature.

Usage: **AT+LOG_ENABLED?**

Example: To retrieve the status of the logging feature, enter:

AT+LOG_ENABLED?

AT+LOG_UPLOAD=1

Description: Uploads the log file to the currently configured FTP host. The FTP should be configured using the AT+FTP_HOST, AT+FTP_PATH, AT+FTP_USER and AT+FTP_PASS commands.

Usage: **AT+LOG_UPLOAD=1**

Example: To upload the log file to the currently configured FTP host, enter:

AT+LOG_UPLOAD=1

AT+LOGIN

Description: This command enables/disables login authentication while connecting via serial port.

Usage: **AT+LOGIN=x**

Options: 0 = Disable Login authentication
1 = Enable Login authentication (Default)

Example: To disable login authentication

AT+LOGIN=0

AT+LOGIN_PASS

Description: This command configures the password required to log in to the AT interface via a serial connection.

Usage: **AT+LOGIN_PASS=<Password>**

Example: The default setting is admin. To set it to pa$$w0rd:

AT+LOGIN_PASS=pa$$w0rd

AT+LOGIN_USER

Description: This command configures the username required to log in to the AT interface via a serial connection.

Usage: **AT+LOGIN_USER=<Username>**

Example: The default setting is root. To set it to admin:

AT+LOGIN_USER=admin

AT+LWM2M_ENDPOINT?

Description: This command reads an LWM2M endpoint. The endpoint name reported by the LWM2M client uses the IMEI URN format

Usage: **AT+LWM2M_ENDPOINT?**

Example: To read an LWM2M endpoint, enter:

AT+LWM2M_ENDPOINT?

AT+LWM2M_BOOTSTRAP

Description: This command configures an LWM2M server or bootstrap. Note: If you are using a bootstrap server, configuration needs to be done in the bootstrap server to point the NTC-100 to your LWM2M server.

Usage: **AT+LWM2M_BOOTSTRAP==<bootstrap>,<binding>,<lifetime>,<security mode>[,security params],<uri>**

Parameters: <bootstrap> - "0" or "1" (0: Server is LWM2M Server, 1: Server is Bootstrap LWM2M Server)
<binding> - "U" (UDP) or "UQ" (queued UDP)
<lifetime> - "30" - "2592000" (seconds; max 30 days)
<security mode> - "0" (pre-shared key) or "3" (no security)
[security params] - "<identity>,<key>" (only present if using pre-shared key mode)
<uri> - "coap[s]://server:port[/path]"

Example 1: To configure an LWM2M server without PSK Security:

at+lwm2m_bootstrap=0,U,60,3,coap://rdm.netcommwireless.com:5683

Example 2: To configure an LWM2M server with PSK Security:

at+lwm2m_bootstrap=0,U,60,0,user,a1b2c3,coaps://rdm.netcommwireless.com:5684

Example 3: To configure a Bootstrap server without PSK Security:

at+lwm2m_bootstrap=1,U,60,3,coap://rdm.netcommwireless.com:5681

Example 4: To configure a Bootstrap server with PSK Security:

at+lwm2m_bootstrap=1,U,60,0,user,a1b2c3,coaps://rdm.netcommwireless.com:5682

AT+LWM2M_BOOTSTRAP?

Description: This command reads the LWM2M server configuration

Usage: **AT+LWM2M_BOOTSTRAP?**

Example: To read the LWM2M server configuration, enter :

AT+LWM2M_BOOTSTRAP?

AT+MODEM_MODE

Description: This command sets the NTC-100 into IP/PAD mode or PPP mode.
In PPP mode customized AT commands cannot be accessed when the NTC-100 is connected to the network.
In order to switch between modem modes you can either run **at+cgatt=0** command or take the SIM out before entering the **AT+MODEM+MODE AT** command.
Note that the SMS command to switch modem mode does not have this restriction.

Usage 1: **AT+MODEM_MODE=x**

where 'x' is an option number.

Usage 2: **AT+MODEM_MODE?**

Options:
0 PPP mode
1 IP/PAD mode (default)

Example: To set the NTC-100 to IP mode, enter

AT+MODEM_MODE=1

AT+NO_WHITELIST

Description: This command is used to remove a phone number from the SMS whitelist.
Mobile phone numbers must be entered in the following format: +614XXXXXXXX.

Usage **AT+NO_WHITELIST=+XXXXXXXXXXX**

where '+XXXXXXXXXXX' is a mobile phone number.

Example: To remove +61412345678 from the SMS whitelist, enter:

AT+NO_WHITELIST=+61412345678

To remove +61412345678 and +61411234567 from the whitelist, enter:

AT+NO_WHITELIST=+61412345678,+61411234567

AT+NON_REBOOT

Description: This command defines whether the NTC-100 will reboot when PAD mode is changed using the AT+PAD command.

Usage 1: To set the NTC-100 to not reboot after changing PAD mode, enter:

AT+NON_REBOOT=0

Usage 2: To set the NTC-100 to reboot after changing PAD mode, enter:

AT+NON_REBOOT=1

Options:
0 no reboot (default)
1 reboot

AT+PAD

Description: Specifies the NTC-100 PAD operation mode. To exit PAD mode, enter '+++'. This sets PAD mode to 0. This feature is used when modem_mode=1.

Usage 1: To set the operation mode

AT+PAD=x

where 'x' is an option number.

Usage 2: To retrieve the currently configured operation mode

AT+PAD?

Help: **AT+PAD=?**

Options: 0 Disabled (default)
1 TCP client
2 TCP server
3 UDP client
4 UDP server

Example: To switch the NTC-100 to TCP client mode, enter

AT+PAD=1

To exit PAD mode, enter

+++

AT+PAKBUS

Description: Enables a buffer time for serial data before it is sent to the IP network. Must be used in conjunction with the **AT+CHAR_TIMEOUT** and **AT+EOL** commands.
If **CHAR_TIMEOUT** is **> 0**, serial data is buffered and checked for carriage return (EOL) characters. When PAKBUS is set to 0 and a single EOL appears, the data is sent to the IP network. If PAKBUS is 1, EOL characters must be seen on either side of the data frame before the data is sent. For example:

<EOL> xx xx xx xx <EOL> - data is sent

EOL><EOL> xx xx xx xx <EOL> - data is sent

<EOL> xx xx xx xx – data is not sent

EOL><EOL> xx xx xx xx – data is not sent

However, when **CHAR_TIMEOUT** value is reached, the NTC-100 sends all data in the buffer even if no EOL characters have appeared yet.

Usage: **AT+PAKBUS=x**

where 'x' is an option number

Help: **AT+PAKBUS=?**

Example: To set PAKBUS to 1, enter

AT+PAKBUS=1

AT+PDP_TYPE

Description: This command sets the packet data protocol type for PDP context 1.

Usage: To set the packet data protocol type, enter:

AT+PDP_TYPE=x

Where 'x' is an option string.

Options: IPv4 *(default)*
PPP

Example: To set the packet data protocol type to IPv4, enter:

AT+PDP_TYPE=IPv4

AT+PING

Description: This command is used to send a ping to an internet host.

Usage: **AT+PING=*[domain name/IP address]***

Example: To ping www.google.com, enter:

AT+PING=www.google.com

AT+PING_ACC_TIMER

Description: This command configures the accelerated periodic ping timer for the ping watchdog.

Usage: **AT+PING_ACC_TIMER=[60-65535]**

Example: The default setting is 60. To set it to 120 seconds:

AT+PING_ACC_TIMER=120

AT+PING_IP1

Description: This command configures first destination IP address for the ping watchdog.

Usage: **AT+PING_IP1=<IP address/hostname>**

Example: To set the first destination IP address to 8.8.8.8:

AT+PING_IP1=8.8.8.8

AT+PING_IP2

Description: This command configures the second destination IP address for the ping watchdog.

Usage: **AT+PING_IP2=<IP address/hostname>**

Example: To set the second destination IP address to 8.8.4.4:

AT+PING_IP2=8.8.4.4

AT+PING_TIMER

Description: This command configures the periodic ping timer for the ping watchdog.

Usage: **AT+PING_TIMER=[120-65535]**

Example: The default setting is 300.To set it to 120 seconds:

AT+PING_TIMER=120

AT+PING_WATCHDOG

Description: This command is used to enable/disable ping watchdog feature.

Usage: **AT+PING_WATCHDOG=0,1**

Options: 0 disabled (default)
1 enabled

Example: To enable the ping watchdog:

AT+PING_WATCHDOG=1

AT+REPLY_CMD_ERROR

Description: This command is used to enable or disable the NTC-100 from sending error replies if an invalid command is sent. Note that error replies are not sent if the password is incorrect, regardless of the status of the AT+REPLY_CMD_ERROR option. Also, AT+SMS_ACK must be enabled for this option to work. When enabled, the NTC-100 replies with an error message.

Usage 1: **AT+REPLY_CMD_ERROR=x**

where 'x' is an option number.

Usage 2: **AT+REPLY_CMD_ERROR?**

Options: 0 disable
1 enable (default)

Example: To enable error replies, enter:

AT+REPLY_CMD_ERROR=1

AT+SAVE

Description: Saves any changes made to the settings using commands in this list.

Changes to settings using the commands in the AT commands list **do not take effect immediately and must be saved** to the board's flash memory **using this command** (AT+SAVE=1), **followed by a reboot** (AT+CFUN=1,1).

Usage: To save settings to the onboard flash memory

AT+SAVE=1

Example: To save settings to the onboard flash memory, enter

AT+SAVE=1

Then enter

AT+CFUN=1,1

to perform a reboot so that the new settings take effect.

AT+SAVE_CONFIG_DEFAULT=1

Description: Saves the current configuration of the NTC-100 to be the default configuration.

Usage: **AT+SAVE_CONFIG_DEFAULT=1**

Example: To save the current settings of the NTC-100 to be the default settings, enter

AT+SAVE_CONFIG_DEFAULT=1

AT+SERIAL_BAUD

Description: Sets the baud rate used for communication between the modem and the connected device.

Usage 1: To set the baud rate

AT+SERIAL_BAUD=[baud]

Usage 2: To retrieve the currently configured baud rate

AT+SERIAL_BAUD?

Help: **AT+SERIAL_BAUD=?**

Options: 300, 600, 1200. 2400. 4800, 9600, 19200, 38400, 57600, 115200 (default value), 230400.

Example: To configure the baud rate to 115200bps, enter

AT+SERIAL_BAUD=115200

AT+SERIAL_FLOW

Description: Sets the hardware flow control used for communication between the modem and the connected device.

Usage 1: To set the flow control

AT+SERIAL_FLOW=x

where 'x' is an option number.

Usage 2: To retrieve the currently configured flow control setting

AT+SERIAL_FLOW?

Help: **AT+SERIAL_FLOW=?**

Options:
0 no flow control, default value
2 hardware, RTSCTS

Example: To set no flow control enter

AT+SERIAL_FLOW=0

AT+SERIAL_FORMAT

Description: Sets the serial format used for communication between the modem and the connected device.

Usage 1: To set the serial format

AT+SERIAL_FORMAT=x

where 'x' is an option number.

Usage 2: To retrieve the currently configured serial format

AT+SERIAL_FORMAT?

Help: **AT+SERIAL_FORMAT=?**

Options:
1 8 data 2 stop
2 8 data 1 stop – default value
3 7 data 2 stop
4 7 data 1 stop

Example: To set the serial format to 8 data 2 stop enter

AT+SERIAL_FORMAT=1

AT+SERIAL_MODE

Description: This command is used to set the serial port mode of the Serial AT interface.

Usage 1: To set the serial port mode, enter:

AT+SERIAL_MODE=x

Where 'x' is an option string.

Usage 2: To display the current serial port mode, enter:

AT+SERIAL_MODE?

Options:
RS232 *(default)*
RS422
RS485

Example: To set the serial port mode to RS422, enter:

AT+SERIAL_MODE=RS422

AT+SERIAL_ON_START

Description: This command configures whether the serial port initialises on power up or initialises when there are active connections. When set to 1, the serial port does not respond to AT commands as it enters into data mode.

Usage 1: **AT+SERIAL_ON_START=x**

where 'x' is an option number

Usage 2: **AT+SERIAL_ON_START?**

Help: **AT+SERIAL_ON_START=?**

Options:
0 serial port is initialised when there are active connections (default)
1 serial port is initialised on power up

Example: **AT+SERIAL_ON_START=1**

AT+SERIAL_PARITY

Description: Sets the serial parity used for communication between the modem and the connected device.

Usage 1: To set the serial parity

AT+SERIAL_PARITY=x

where 'x' is an option number.

Usage 2: To retrieve the currently configured serial parity

AT+SERIAL_PARITY?

Help: **AT+SERIAL_PARITY=?**

Options:
0 Odd
1 Even
2 No parity, default value

Example: To set no serial parity enter

AT+SERIAL_PARITY=2

AT+SERVER

Description: Sets the TCP/UDP server IP address/hostname and port.
In TCP Client and UDP client mode this command sets the remote TCP/UDP server IP address and remote port number. In TCP Server and UDP server mode the port number will be used as the local TCP/UDP Server port number. If PAD=1 or 3 i.e. PAD client, then specifying a Server IP/hostname is mandatory.
If PAD=2 or 4 i.e. PAD Server then Server IP/hostname is not necessary; if configured it will be ignored.

Usage 1: To set remote server IP/hostname and port in TCP/UDP client mode.

AT+SERVER=xxx.xxx.xxx.xxx,yyyyy

where 'xxx.xxx.xxx.xxx' is the server IP address and 'yyyyy' is the port number

Usage 2: To set port in TCP/UDP Server mode.

AT+SERVER=,yyyyy

where 'yyyy' is the port number that the NTC-100 is listening on. Note: If Server IP address is configured in Server mode, it is ignored.

Usage 3: To retrieve the currently configured server IP and port

AT+SERVER?

Help: **AT+SERVER=?**

Options:
ip address: the ip address of the server
hostname: the hostname of the server
port number: the port number of the server

Example: To set the IP address of the server to 10.1.193.11 and port to 1516, enter

AT+SERVER=10.1.193.11,1516

To set the hostname of the server to 'testhost.domain.com' and port to 8888, enter

AT+SERVER=testhost.domain.com,8888

AT+SMS

Description: Instructs the NTC-100 to send an SMS message.

Usage: To send an SMS message, enter:

AT+SMS=<phone>,<message>

Where 'phone' is a valid phone number and 'message' is the SMS message you want to send.

Example: To send an SMS message containing the text "Hello world" to mobile number +61412345678, enter:

AT+SMS=+61412345678,"Hello world"

AT+SMS_ACK

Description: Sets the status of the SMS acknowledgment feature. When enabled, the NTC-100 sends a reply SMS to inform whether the command was successful.

Usage 1: To configure SMS acknowledgments

AT+SMS_ACK=x

where 'x' is an option number.

Usage 2: To retrieve the SMS acknowledgment status

AT+SMS_ACK?

Help: **AT+SMS_ACK=?**

Options:
0 disabled
1 enabled (default)

Example: To enable SMS acknowledgments, enter

AT+SMS_ACK=1

AT+SMS_DIAGNOSTICS

Description: Sets the status of the SMS Diagnostics feature on the NTC-100.

Usage: To set the status of SMS Diagnostics

AT+SMS_DIAGNOSTICS=x

where 'x' is an option number.

Help: **AT+SMS_DIAGNOSTICS=?**

Options:
0 disabled
1 enabled (default)

Example: To enable SMS Diagnostics, enter

AT+SMS_DIAGNOSTICS=1

AT+SMS_PASSWORD

Description: Used to define the password used with the SMS Diagnostics feature.
NTC-100 SMS Passwords have the following characteristics:

- can be comprised of alphanumeric or special characters
- letters of the alphabet are case-sensitive
- can be from one to six characters in length (see Warning below for zero character passwords)
- spaces can be included between characters but this is not recommended.
- default password is '1234'

Warning – If no character is specified, that is if the password is left blank – **AT+SMS_PASSWORD=** – no password will be required before SMS commands and your device's SMS password security will be disabled.
For security reasons we strongly recommend that you always use the NTC-100's password protection functionality.

Usage 1: To set the SMS password

AT+SMS_PASSWORD=XXXXXX

Help: **AT+SMS_PASSWORD=?**

Example: To set the password to 'A45&bn2', enter

AT+SMS_PASSWORD=A45&bn2

AT+STATUS

Description: Instructs the NTC-100 to print its current status details including signal strength, Cat-M1/Cat-NB1/EGPRS connection, device uptime, connection uptime and PAD mode status.

Usage: **AT+STATUS?**

Example: To print the current status to the screen, enter

AT+STATUS?

AT+STATUS_FORMAT

Description: Sets the format that information is presented in when using the AT+STATUS command.

Usage: **AT+STATUS_FORMAT=x**

where 'x' is an option number

Options: 0 single line

1 multiple lines

Example: To set the output of AT+STATUS to multiple lines, enter

AT+STATUS_FORMAT=1

AT+TCP_RETRY

Description: If the NTC-100 is operating in TCP client mode and the connection with the server is down, the application will try for the AT+TCP_RETRY number of times to re-establish the connection with the server, then it will wait for the specified TCP_TIMEOUT period and try again. The minimum value is 0 which will cause the NTC-100 to retry the connection until a connection is made while the maximum value is 10.

Usage 1: To set the TCP retry count

AT+TCP_RETRY=xx

where 'x' is an integer between 0 and 10.

Usage 2: To retrieve the currently configured TCP retry count

AT+TCP_RETRY?

Help: **AT+TCP_RETRY=?**

Options: 0 Infinite (always try to connect when connection fails)

1 – 10 times to attempt reconnection

Example: To configure the NTC-100 to retry a TCP connection 10 times, enter

AT+TCP_RETRY=10

AT+TCP_TIMEOUT

Description: This command sets the TCP timeout value in seconds. If the TCP/IP connection is not working, the application will wait for this period of time to re-establish the connection. The minimum timeout period is 10 seconds while the maximum is 65535 seconds.

Usage 1: To configure the TCP timeout value

AT+TCP_TIMEOUT=xxxxx

where 'x' is an integer in seconds between 10 and 65535.

Usage 2: To read the currently configured TCP timeout value

AT+TCP_TIMEOUT?

Help: **AT+TCP_TIMEOUT=?**

Example: To set the TCP timeout period to 10 seconds

AT+TCP_TIMEOUT=10

AT+USER_PASS

Description: Sets the username and password used to connect to the broadband network associated with the APN.

Usage: To set the username and password

AT+USER_PASS=<username>,<password>

Help: **AT+USER_PASS=?**

Options: username: the user name for the broadband account
password: the password for the broadband account

Example: To configure the username as 'user1' and password as 'testpass' enter

AT+USER_PASS=user1,testpass

AT+VERSION

Description: Displays the version number of the application firmware and module firmware installed.

Usage: **AT+VERSION?**

AT+WEB_CONFIG_DOWNLOAD=1

Description: This command instructs the NTC-100 to download the current config file from the currently configured HTTP(S) server.

Usage: **AT+WEB_CONFIG_DOWNLOAD=1**

Example: To download the current config file from the currently configured HTTP(S) server, enter:

AT+WEB_CONFIG_DOWNLOAD=1

AT+WEB_DEFAULT_CONFIG_DOWNLOAD=1

Description: This command downloads the default configuration from the currently configured HTTP(S) server.

Usage: **AT+WEB_DEFAULT_CONFIG_DOWNLOAD=1**

Example: To download the current configuration from the currently configured HTTP(S) server, enter:

AT+WEB_DEFAULT_CONFIG_DOWNLOAD=1

AT+WEB_FILE

Description: This command configures the file name hosted on the web server for module firmware upgrade, application firmware upgrade or config files download.

Usage: **AT+WEB_FILE=<Filename>**

Example: To configure filename to NTC100.bin.signed, enter:

AT+WEB_FILE=NTC100.bin.signed

AT+WEB_HOST

Description: This command configures the HTTP/S server for the module or application firmware OTA upgrade or config files download.

Usage: **AT+WEB_HOST=<hostname/ipaddress>**

Example: To configure the HTTP/S server, enter:

AT+WEB_HOST=http://repository.netcomm.com

AT+WEB_HOST=https://repository.netcomm.com

AT+WEB_PASS

Description: This command configures the password if authentication is implemented on the HTTP/S server. Note: Username/password authentication can be implemented on the HTTP/S server only for the application firmware OTA, not for module firmware OTA.

Usage: **AT+WEB_PASS=<password>**

Example: To configure the password to admin, enter:

AT+WEB_PASS=admin

AT+WEB_PATH

Description: This command configures file path on the HTTP/S server for the module or application firmware OTA upgrade or config files download.

Usage: **AT+WEB_PATH=<PATH>**

Example: To configure the path to the NTC-100 firmware, enter:

AT+WEB_PATH= NTC100/firmware/

AT+WEB_PORT

Description: This command configures the HTTP/S port for the module or application firmware OTA upgrade or config files download.

Usage: **AT+WEB_PORT=<port>**

Example: To configure the port to 8081, enter:

AT+WEB_PORT=8081

AT+WEB_RETRY

Description: This command configures the number of retry attempts if HTTP/S OTA fails.

Usage: **AT+WEB_RETRY=[4-255]**

Example: To configure the number of retries to 5, enter:

AT+WEB_RETRY=5

AT+WEB_UPLOAD

Description: This command triggers the firmware upgrade from the HTTP/S server.

Usage: **AT+WEB_UPLOAD=1,2**

Example: To perform an HTTP/S OTA for the application firmware, enter:

AT+WEB_UPLOAD=1

To perform an HTTP/S OTA for the module firmware, enter:

AT+WEB_UPLOAD=2

AT+WEB_USER

Description: This command configures the username if authentication is implemented on the HTTP/S server. Note: Username/password authentication can be implemented on the HTTP/S server only for the application firmware OTA, not for module firmware OTA.

Usage: **AT+WEB_USER=<username>**

Example: To configure the username to admin, enter:

AT+WEB_USER=admin

AT+WHITELIST

Description: This command is used to add a phone number to the SMS whitelist. When the first number is added to the whitelist, the whitelist is enabled and numbers that are not on the whitelist are unable to execute commands. Mobile phone numbers must be entered in the following format: +614XXXXXXXX. You may enter multiple numbers which are comma separated.

Usage: **AT+WHITELIST=+XXXXXXXXXXX**

where '+XXXXXXXXXXX' is a mobile phone number.

Example: To add +61412345678 to the SMS whitelist, enter:

AT+WHITELIST=+61412345678

Quectel AT command list

This section contains a small collection of useful AT command sets for the Quectel BG96 module.

Refer to the *BG96 AT Commands Manual* available at www.quectel.com for full list of AT commands available to this module.

AT+CEREG EPS Network Registration Status

The command queries the network registration status and controls the presentation of:

- the unsolicited result code **+CEREG: <stat>** when **<n>**=1 and there is a change in the MT's EPS network registration status in E-UTRAN,
- the unsolicited result code **+CEREG: <stat>[,[<tac>],[<ci>],[<Act>]]** when **<n>**=2 and there is a change of the network cell in E-UTRAN, and
- the unsolicited result code **+CEREG: <stat>[,[<tac>],[<ci>],[<AcT>][,,[,[<Active-Time>],[<Periodic -TAU>]]]]** when **<n>**=4 and there is a change of the network cell in E-UTRAN.

AT+CEREG EPS NETWORK REGISTRATION STATUS	
Test Command **AT+CEREG=?**	Response **+CEREG:** (list of supported **<n>**s) **OK**
Read Command **AT+CEREG?**	Response When **<n>**=0, 1, or 2 and command successful: **+CEREG: <n>,<stat>[,[<tac>],[<ci>],[<AcT>[,<cause_type>,<reject_cause>]]]** When **<n>**=4 and command successful: **+CEREG: <n>,<stat>[,[<tac>],[<ci>],[<AcT>],[<rac>][,[<cause_type>],[<reject_cause>][,[<Active-Time>],[<Periodic-TAU>]]]]** **OK**
Write Command **AT+CEREG[=<n>]**	Response **OK** If there is any error, response: **ERROR**
Maximum Response Time	300ms
Reference 3GPP TS 27.007	

Figure 10 – AT+CEREG EPS Network Registration Status

Parameter

<n>	0	Disable network registration unsolicited result code
	1	Enable network registration unsolicited result code: **+CEREG:<stat>**
	2	Enable network registration and location information unsolicited result code:
	4	+CEREG: <stat>[,<tac>,<ci>[,<Act>]] For a UE that wants to apply PSM, enable network registration and location information unsolicited result code: **+CEREG: <stat>[,[<tac>],[<ci>],[<AcT>][,,[,[<Active-Time>],[<Periodic-TAU>]]]]**
<stat>	0	Not registered. MT is not currently searching an operator to register to.

1 Registered, home network
2 Not registered, but MT is currently trying to attach or searching an operator to register to.
3 Registration denied
4 Unknown
5 Registered, roaming

<tac> String type. Two-byte tracking area code in hexadecimal format.

<ci> String type. Four-byte E-UTRAN cell ID in hexadecimal format.

<Act> Access technology selected
0 GSM
8 LTE Cat M1
9 LTE Cat NB1

<cause_type> Integer type. The type of **<reject_cause>**.
0 Indicates that **<reject_cause>** contains an EMM cause value.
1 ndicates that **<reject_cause>** contains a manufacturer-specific cause.

<reject_cause> Integer type. Contains the cause of the failed registration. The value is of type as defined by **<cause_type>**.

<Active-Time> String type. One byte in an 8 bit format. Active Time value (T3324) to be allocated to the UE.
(e.g. "00001111" equals to 1 minute)
Bits 5 to 1 represent the binary coded timer value.
Bits 6 to 8 define the timer value unit as follows:
Bits 8 7 6
0 0 0 value is incremented in multiples of 2 seconds
0 0 1 value is incremented in multiples of 1 minute
0 1 0 value is incremented in multiples of decihours
1 1 1 value indicates that the timer is deactivated.

<Periodic-TAU> String type. One byte in an 8 bit format. Extend periodic TAU value (T3412_ext) to be allocated to the UE in E-UTRAN.
(e.g. "00001010" equals to 100 minutes)
Bits 5 to 1 represent the binary coded timer value.
Bits 6 to 8 define the timer value unit as follows:
Bits 8 7 6
0 0 0 value is incremented in multiples of 10 minutes
0 0 1 value is incremented in multiples of 1 hour
0 1 0 value is incremented in multiples of 10 hours
0 1 1 value is incremented in multiples of 2 seconds
1 0 0 value is incremented in multiples of 30 seconds
1 0 1 value is incremented in multiples of 1 minute

AT+CGATT Attachment or Detachment of PS

The Write Command is used to attach the MT to, or detach the MT from the Packet Domain service. After the command has been completed, the MT remains in V.25ter command state. If the MT is already in the requested state, the command is ignored and the OK response will be returned. If the requested state cannot be achieved, an ERROR or +CME ERROR response is returned.

AT+CGATT ATTACHMENT OR DETACHMENT OF PS	
Test Command **AT+CGATT=?**	Response **+CGATT:** (list of supported **<state>**s) **OK**
Read Command **AT+CGATT?**	Response **+CGATT: <state>** **OK**
Write Command **AT+CGATT=<state>**	Response **OK** If there is an error related to ME functionality, response: **+CME ERROR: <err>**
Maximum Response Time	140s, determined by network.
Reference 3GPP TS 27.007	

Figure 11 - AT+CGATT Attachment or Detachment of PS

Parameter

<state> Indicates the state of PS attachment

0	Detached
1	Attached

Other values are reserved and will result in an ERROR response to the Write Command.

Example

```
AT+CGATT=1                    //Attach to PS service
OK
AT+CGATT=0                    //Detach from PS service
OK
AT+CGATT?                     //Query the current PS service state
+CGATT: 0
OK
```

AT+CLCK Facility Lock

The command is used to lock, unlock or interrogate a MT or a network facility **<fac>**. It can be aborted when network facilities are being set or interrogated. The factory default password of PF, PN, PU, PP and PC lock is "12341234".

AT+CLCK FACILITY LOCK	
Test Command **AT+CLCK=?**	Response **+CLCK:** (list of supported **<fac>**s) **OK**
Write Command **AT+CLCK=<fac>,<mode>[,<passwd>[,<class>]]**	Response This command is used to lock, unlock or interrogate the ME or network facility **<fac>**. Password is normally needed to do such actions. When querying the status of network service (**<mode>**=2) the response line for „not active" case (**<status>**=0) should be returned only if service is not active for any **<class>**. If **<mode>** is not equal to 2 and the command is executed successfully: **OK** If **<mode>**=2 and the command is executed successfully: **+CLCK: <status>[,<class>]** **[+CLCK: <status>[, <class>]]** **[…]** **OK**
Maximum Response Time	5s
Reference 3GPP TS 27.007	

Figure 12 - AT+CLCK Facility Lock

Parameter

<fac>	**"SC"**	(U)SIM (lock SIM/UICC card installed in the currently selected card slot) (SIM/UICC asks password in MT power-up and when this lock command issued).
	"AO"	BAOC (Bar All Outgoing Calls) (refer to *3GPP TS 22.088 clause 1*).
	"OI"	BOIC (Bar Outgoing International Calls) (refer to *3GPP TS 22.088 clause 1*).
	"OX"	BOIC-exHC (Bar Outgoing International Calls except to Home Country) (refer to *3GPP TS 22.088 clause 1*).
	"AI"	BAIC (Bar All Incoming Calls) (refer to *3GPP TS 22.088 clause 2*).
	"IR"	BIC-Roam (Bar Incoming Calls when Roaming outside the home country) (refer to *3GPP TS 22.088 clause 2*).
	"AB"	All Barring services (refer to *3GPP TS 22.030*) (applicable only for **<mode>**=0).
	"AG"	All outgoing barring services (refer to *3GPP TS 22.030*) (applicable only for **<mode>**=0).
	"AC"	All incoming barring services (refer to *3GPP TS 22.030*) (applicable only for **<mode>**=0).
	"FD"	SIM card or active application in the UICC (GSM or USIM) fixed Dialling memory feature (if PIN2 authentication has not been done during the current session, PIN2 is required as **<passwd>**).

	"PF"	Lock Phone to the very first inserted SIM/UICC card (also referred in the present document as PH-FSIM) (MT asks password when other SIM/UICC cards are inserted).
	"PN"	Network Personalization (*refer to 3GPP TS 22.022*)
	"PU"	Network Subset Personalization (*refer to 3GPP TS 22.022*)
	"PP"	Service Provider Personalization (*refer to 3GPP TS 22.022*)
	"PC"	Corporate Personalization (*refer to 3GPP TS 22.022*)
<mode>	0	Unlock
	1	Lock
	2	Query status
<passwd>		Password
	1	Voice
	2	Data
	4	FAX
	7	All telephony except SMS (Default)
	8	Short message service
	16	Data circuit synchronization
<class>	1	Voice
	2	Data
	4	FAX
	7	All telephony except SMS (Default)
	8	Short message service
	16	Data circuit synchronization
	32	Data circuit asynchronization
<status>	0	OFF
	1	ON

Example

```
AT+CLCK="SC",2                    //Query the status of (U)SIM card
+CLCK: 0                          //The (U)SIM card is unlocked (OFF)
OK
AT+CLCK="SC",1,"1234"             //Lock (U)SIM card, and the password is 1234
OK
AT+CLCK="SC",2                    //Query the status of (U)SIM card
+CLCK: 1                          //The (U)SIM card is locked (ON)
OK
AT+CLCK="SC",0,"1234"             //Unlock (U)SIM card
OK
```

AT+COPS Operator Selection

The command returns the current operators and their status and allows setting automatic or manual network selection.

AT+COPS OPERATOR SELECTION	
Test Command **AT+COPS=?**	Response TA returns a set of five parameters, each representing an operator presenting in the network. Any of the formats may be unavailable and should then be an empty field. The list of

AT+COPS OPERATOR SELECTION	
	operators shall be in the order of: home network, networks referenced in (U)SIM and other networks. **+COPS:** (list of supported**<stat>**, long alphanumeric **<oper>**, short alphanumeric **<oper>**, numeric **<oper>s**)[,< **Act>**])s] [,,(list of supported **<mode>**s),(list of supported **<format>**s)] **OK** If there is an error related to ME functionality: **+CME ERROR: <err>**
Read Command **AT+COPS?**	Response TA returns the current mode and the currently selected operator. If no operator is selected, **<format>**, **<oper>** and **<Act>** are omitted. **+COPS: <mode>[,<format>[,<oper>][,<Act>]]** **OK** If there is an error related to ME functionality: **+CME ERROR: <err>**
Write Command **AT+COPS=<mode>[,<format>[,<oper>[,<Act>]]]**	Response TA forces an attempt to select and register the GSM/UMTS network operator. If the selected operator is not available, no other operator shall be selected (except **<mode>**=4). The format of selected operator name shall apply to further Read Command (**AT+COPS?**). **OK** If there is an error related to ME functionality: **+CME ERROR: <err>**
Maximum Response Time	180s, determined by network.
Reference 3GPP TS 27.007	

Figure 13 - AT+COPS Operator Selection

Parameter

<stat>	0	Unknown
	1	Operator available
	2	Current operator
	3	Operator forbidden
<oper>	Operator in format as per **<mode>**	
<mode>	0	Automatic mode. **<oper>** field is ignored.
	1	Manual operator selection. **<oper>** field shall be presented and <Act> optionally.
	2	Manual deregister from network.
	3	Set only **<format>** (for **AT+COPS?** Read Command), and do not attempt to register/deregister (**<oper>** and **<Act>** fields are ignored). This value is invalid in the response of the Read Command.
	4	Manual/automatic selection. **<oper>** field shall be presented. If manual selection fails, automatic mode (<mode>=0) is entered.
<format>	0	Long format alphanumeric **<oper>** which can be up to 16 characters long
	1	Short format alphanumeric **<oper>**
	2	Numeric **<oper>**. GSM location area identification number.

<Act> Access technology selected. Values 3, 4, 5 and 6 occur only in the response of the Read Command while MS is in data service state and is not intended for AT+COPS Write Command.

0	GSM
2	UTRAN
3	GSM W/EGPRS
4	UTRAN W/HSDPA
5	UTRAN W/HSUPA
6	UTRAN W/HSDPA and HSUPA
7	E-UTRAN
100	CDMA

Example

```
AAT+COPS=?                                          //List all current network operators
+COPS:
(1,"CHN-
UNICOM","UNICOM","46001",2),(1,"CHN-
UNICOM","UNICOM","46001",0),(2,"CHN-
UNICO
M","UNICOM","46001",7),(1,"46011","46
011","46011",7),(3,"CHINA
MOBILE","CMCC","46000",0),,
(0,1,2,3,4),(0,1,2)
OK
OK AT+COPS?                                         //Query the currently selected network operator
+COPS: 0,0,"CHN-UNICOM",0
OK
```

AT+CPIN Enter PIN

The command is used to enter a password or query whether or not the module requires a password which is necessary before it can be operated. The password may be (U)SIM PIN, (U)SIM PUK, PH-SIM PIN, etc.

AT+CPIN ENTER PIN	
Test Command AT+CPIN=?	Response OK
Read Command AT+CPIN?	Response TA returns an alphanumeric string indicating whether or not some password is required. +CPIN: <code> OK
Write Command AT+CPIN=<pin>[,<new pin>]	Response TA stores a password, such as (U)SIM PIN, (U)SIM PUK, etc., which is necessary before it can be operated. If the PIN is to be entered twice, the TA shall automatically repeat the PIN. If no PIN request is pending, no action is taken and an error message, +CME ERROR, is returned to TE.

AT+CPIN ENTER PIN	
	If the PIN required is (U)SIM PUK or (U)SIM PUK2, the second pin is required. This second pin, **<new pin>**, is used to replace the old pin in the (U)SIM. **OK**
Maximum Response Time	5s
Reference 3GPP TS 27.007	

Figure 14 - AT+CPIN Enter PIN

Parameter

<code>	READY	MT is not pending for any password
	SIM PIN	MT is waiting for (U)SIM PIN to be given
	SIM PUK	MT is waiting for (U)SIM PUK to be given
	SIM PIN2	MT is waiting for (U)SIM PIN2 to be given
	SIM PUK2	MT is waiting for (U)SIM PUK2 to be given
	PH-NET PIN	MT is waiting for network personalization password to be given
	PH-NET PUK	MT is waiting for network personalization unblocking password to be given
	PH-NETSUB PIN	MT is waiting for network subset personalization password to be given
	PH-NETSUB PUK	MT is waiting for network subset personalization unblocking password to be given
	PH-SP PIN	MT is waiting for service provider personalization password to be given
	PH-SP PUK	MT is waiting for service provider personalization unblocking password to be given
	PH-CORP PIN	MT is waiting for corporate personalization password to be given
	PH-CORP PUK	MT is waiting for corporate personalization unblocking password to be given
<pin>	String type.	Password. If the requested password was a PUK, such as (U)SIM PUK1, PH-FSIM PUK or another password, then **<pin>** must be followed by **<new pin>**.
<new pin>	String type.	New password required if the requested code was a PUK.

Example

```
//Enter PIN
AT+CPIN?                          //Queried PIN code is locked
+CPIN:SIM PIN
OK
AT+CPIN=1234                      //Enter PIN
OK                                //PIN has already been entered
+CPIN: READY
AT+CPIN?                          //Queried PUK code is locked
+CPIN: READY
OK
//Enter PUK and PIN
AT+CPIN?
+CPIN: SIM PUK
OK
AT+CPIN="26601934","1234"         /Enter PUK and new PIN password
                                  //PUK has already been entered
```

```
OK
+CPIN: READY
AT+CPIN?
+CPIN: READY
OK
```

AT+GSN Request International Mobile Equipment Identity (IMEI)

The command returns the International Mobile Equipment Identity (IMEI). It is identical with **AT+CGSN**.

AT+GSN REQUEST INTERNATIONAL MOBILE EQUIPMENT IDENTITY (IMEI)	
Test Command **AT+GSN=?**	Response **OK**
Execution Command **AT+GSN**	Response TA reports the IMEI (International Mobile Equipment Identity) number in information text which permits the user to identify the individual ME device. **<IMEI>** **OK**
Maximum Response Time	300ms
Reference V.25ter	

Figure 15 - AT+GSN Request International Mobile Equipment Identity (IMEI)

Parameter

<IMEI> IMEI of the ME

Note – The serial number (IMEI) varies with the individual ME device.

AT+QCFG="band" Band Configuration

The command specifies the frequency bands allowed to be searched of UE. If **<effect>** is omitted, the configuration will take effect immediately.

AT+QCFG="BAND" BAND CONFIGURATION	
Write Command **AT+QCFG="band"[,<gsmbandval>,<catm1bandval>,<catnb1bandval>[,<effect>]]**	Response If configuration parameters and **<effect>** are omitted (that is, only execute **AT+QCFG="band"**), return the current configuration: **+QCFG: "band",<gsmbandval>,<catm1bandval>,<catnb1bandval>** **OK** If configuration parameters are all entered, configure the frequency bands allowed to be searched: **OK** If there is an error related to ME functionality, response: **+CME ERROR: <err>** If there is any other error, response: **ERROR**

AT+QCFG="BAND" BAND CONFIGURATION	
Maximum Response Time	300ms

Figure 16 - AT+QCFG="band" Band Configuration

Parameter

<gsmbandval> A hexadecimal value that specifies the GSM frequency band. If it is set to 0, it means not to change GSM frequency band. (eg.: 0x0a=0x02(GSM1800)+ 0x08(GSM1900))

00000000	No change
00000001	GSM 900MHz
00000002	GSM 1800MHz
00000004	GSM 850MHz
00000008	GSM 1900MHz
0000000F	Any frequency band

<catm1bandval> A hexadecimal value that specifies the LTE Cat M1 frequency band. If it is set to 0 or 0x40000000, it means not to change the frequency band. (eg.: 0x15=0x01(LTE B1)+0x04(LTE B3)+0x10(LTE B5))

0x1 (CM_BAND_PREF_LTE_EUTRAN_BAND1)	LTE B1
0x2 (CM_BAND_PREF_LTE_EUTRAN_BAND2)	LTE B2
0x4 (CM_BAND_PREF_LTE_EUTRAN_BAND3)	LTE B3
0x8 (CM_BAND_PREF_LTE_EUTRAN_BAND4)	LTE B4
0x10 (CM_BAND_PREF_LTE_EUTRAN_BAND5)	LTE B5
0x80 (CM_BAND_PREF_LTE_EUTRAN_BAND8)	LTE B8
0x800(CM_BAND_PREF_LTE_EUTRAN_BAND12)	LTE B12
0x1000 (CM_BAND_PREF_LTE_EUTRAN_BAND13)	LTE B13
0x20000 (CM_BAND_PREF_LTE_EUTRAN_BAND18)	LTE B18
0x40000(CM_BAND_PREF_LTE_EUTRAN_BAND19)	LTE B19
0x80000 (CM_BAND_PREF_LTE_EUTRAN_BAND20)	LTE B20
0x2000000 (CM_BAND_PREF_LTE_EUTRAN_BAND26)	LTE B26
0x8000000(CM_BAND_PREF_LTE_EUTRAN_BAND28)	LTE B28
0x4000000000(CM_BAND_PREF_LTE_EUTRAN_BAND39)	LTE B39
0x40000000	No change
0x400A0E189F (CM_BAND_PREF_ANY)	Any frequency band

<catnb1bandval> A hexadecimal value that specifies the LTE Cat NB1 frequency band. If it is set to 0 or 0x40000000, it means not to change the frequency band.

0x1 (CM_BAND_PREF_LTE_EUTRAN_BAND1)	LTE B1
0x2 (CM_BAND_PREF_LTE_EUTRAN_BAND2)	LTE B2
0x4 (CM_BAND_PREF_LTE_EUTRAN_BAND3)	LTE B3
0x8 (CM_BAND_PREF_LTE_EUTRAN_BAND4)	LTE B4
0x10 (CM_BAND_PREF_LTE_EUTRAN_BAND5)	LTE B5
0x80 (CM_BAND_PREF_LTE_EUTRAN_BAND8)	LTE B8
0x800(CM_BAND_PREF_LTE_EUTRAN_BAND12)	LTE B12
0x1000 (CM_BAND_PREF_LTE_EUTRAN_BAND13)	LTE B13
0x20000 (CM_BAND_PREF_LTE_EUTRAN_BAND18)	LTE B18
0x40000(CM_BAND_PREF_LTE_EUTRAN_BAND19)	LTE B19
0x80000 (CM_BAND_PREF_LTE_EUTRAN_BAND20)	LTE B20
0x2000000 (CM_BAND_PREF_LTE_EUTRAN_BAND26)	LTE B26
0x8000000(CM_BAND_PREF_LTE_EUTRAN_BAND28)	LTE B28
0x40000000	No change
0xA0E189F (CM_BAND_PREF_ANY)	Any frequency band

<effect> When to take effect

0	Take effect after UE reboots
1	Take effect immediately

Notes – 1. **<gsmbandval>** is applicable to multi-mode BG96 only.
2. **<catm1bandval>** is not supported on BG96-N.
3. **<catnb1bandval>** is not supported on BG96-M..

AT+QCFG="celevel" Get LTE Cat NB1 Coverage Enhancement Level

AT+QCFG="CELEVEL" GET LTE CAT NB1 COVERAGE ENHANCEMENT LEVEL	
Read Command **AT+QCFG="celevel"**	Response **+QCFG: "celevel",<level>** **OK** If there is an error related to ME functionality, response: **+CME ERROR: <err>**
Maximum Response Time	300ms

Figure 17 - AT+QCFG="celevel" Get LTE Cat NB1 Coverage Enhancement Level

Parameter

<level>	LTE Cat NB1 Coverage Enhancement Level	
	0	CE level 0
	1	CE level 1
	2	CE level 2

Note – This command is not supported on BG96-M.

AT+QCFG="iotopmode" Configure Network Category to be Searched under LTE RAT

The command specifies the network category to be searched under LTE RAT. If **<effect>** is omitted, the configuration will take effect immediately.

AT+QCFG="IOTOPMODE" CONFIGURE NETWORK CATEGORY TO BE SEARCHED UNDER LTE RAT	
Write Command **AT+QCFG="iotopmode"[,<mode>[,<effect>]]**	Response If **<mode>** and **<effect>** are both omitted, return the current configuration: **+QCFG: "iotopmode",<mode** **OK** If **<mode>** and **<effect>** are not omitted, configure the network category to be searched under LTE RAT: **OK** If there is an error related to ME functionality, response: **+CME ERROR: <err>** If there is any other error, response: **ERROR**
Maximum Response Time	300ms

Figure 18 - AT+QCFG="iotopmode" Configure Network Category to be Searched under LTE RAT

Parameter

<mode>	Number format.	Network category to be searched under LTE RAT.
	0	LTE Cat M1
	1	LTE Cat NB1
	2	LTE Cat M1 and Cat NB1
<effect>	Number format.	When to take effect.
	0	Take effect after UE reboots
	1	Take effect immediately

Note – This command is not supported on BG96-M.

AT+QCFG="nwscanmode" Network Search Mode Configuration

The command specifies the mode of searching network. If <effect> is omitted, the configuration will take effect immediately.

AT+QCFG="NWSCANMODE" NETWORK SEARCH MODE CONFIGURATION	
Write Command AT+QCFG="nwscanmode"[,<scanmod e>[,<effect>]]	Response If <scanmode> and <effect> are both omitted, return the current configuration: +QCFG: "nwscanmode",<scanmode> OK If <scanmode> and <effect> are not omitted, set the network search mode: OK ERROR If there is an error related to ME functionality: +CME ERROR: <err>
Maximum Response Time	300ms

Figure 19 - AT+QCFG="nwscanmode" Network Search Mode Configuration

Parameter

<scanmode>	Number format.	Network search mode.
	0	AUTO
	1	GSM only
	2	WCDMA only
	3	LTE only
	4	TD-SCDMA only
	5	UMTS only
	6	CDMA only
	7	HDR only
	8	CDMA and HDR only
<effect>	Number format.	When to take effect.
	0	Take effect after UE reboots
	1	Take effect immediately

AT+QCFG="nwscanseq" Network Searching Sequence Configuration

The command specifies the sequence of searching network.

This configuration is valid only after the module is restarted.

AT+QCFG="NWSCANSEQ" NETWORK SEARCHING SEQUENCE CONFIGURATION	
Write Command **AT+QCFG="nwscanseq"[,<scanseq>]**	Response If **<scanseq>** is omitted, return the current configuration: **+QCFG: "nwscanseq",<scanseq>** **OK** If **<scanseq>** is not omitted, configure the network searching sequence : **OK** **ERROR** If there is an error related to ME functionality: **+CME ERROR: <err>**
Maximum Response Time	300ms

Figure 20 - AT+QCFG="nwscanseq" Network Searching Sequence Configuration

Parameter

<scanseq>	Number format.	Network search sequence. (e.g.: *04030201(LTE/WCDMA/TD-SCDMA/GSM)*)
	00	Automatic (LTE/WCDMA/TD-SCDMA/GSM)
	01	GSM
	02	TD-SCDMA
	03	WCDMA
	04	LTE
	05	CDMA

AT+QCFG="PDP/DuplicateChk" Establish Multi PDNs with the Same APN

The command allows/refuses establishing multiple PDNs with the same APN profile.

The configuration will take effect immediately.

AT+QCFG="PDP/DUPLICATECHK"ESTABLISH MULTI PDNS WITH THE SAME APN	
Write Command **AT+QCFG="PDP/DuplicateChk"[,<enable>]**	Response If **<enable>** is omitted, return the current configuration: **+QCFG: "PDP/DuplicateChk",<enable>** If **<enable>** is not omitted, allow/refuse establishing multiple PDNs with the same APN profile: **OK** **ERROR** If there is an error related to ME functionality: **+CME ERROR: <err>**
Maximum Response Time	300ms

Figure 21 - AT+QCFG="PDP/DuplicateChk" Establish Multi PDNs with the Same APN

Parameter

<enable>

0	Refused to establish multi PDNs with the same APN profile
1	Allowed to establish multi PDNs with the same APN profile

AT+QCSQ Query and Report Signal Strength

The command is used to query and report the signal strength of the current service network. If the MT is registered on multiple networks in different service modes, customers can query the signal strength of networks in each mode. No matter whether the MT is registered on a network or not, the command can be run to query the signal strength or allow the MT to unsolicitedly report the detected signal strength if the MT camps on the network. If the MT is not using any service network or the service mode is uncertain, "NOSERVICE" will be returned as the query result.

AT+QCSQ QUERY AND REPORT SIGNAL STRENGTH	
Execution Command **AT+QCSQ**	Response **+QCSQ:** **<sysmode>,[,<value1>[,<value2>[,<value3>[,<value4>]]]]** **OK**
Maximum Response Time	300ms

Figure 22 - AT+QCSQ Query and Report Signal Strength

Parameter

<sysmode> A string type value indicating the service mode in which the MT will unsolicitedly report the signal strength.

"NOSERVICE"	NOSERVICE mode
"GSM"	GSM/GPRS/EDGE mode
"CAT-M1"	LTE Cat M1 mode
"CAT-NB1"	LTE Cat NB1 mode

<value1>, <value2>, <value3>, <value4>: the following table lists the signal strength type corresponding to each service mode.

<sysmdoe>	<value1>	<value2>	<value3>	<value4>
"NOSERVICE"				
"GSM"	<gsm_rssi>			
"CAT-M1"	<lte_rssi>	<lte_rsrp>	<lte_sinr>	<lte_rsrq>
"CAT-NB1"	<lte_rssi>	<lte_rsrp>	<lte_sinr>	<lte_rsrq>

<gsm_rssi>,<lte_rssi> An integer indicating the received signal strength.
These parameters are available for GSM and LTE mode respectively.

<lte_rsrp> An integer indicating the reference signal received power (RSRP).
This parameter is available for LTE mode.

<lte_sinr> An integer indicating the signal to interference plus noise ratio (SINR).
Logarithmic value of SINR. Values are in 1/5th of a dB.
The range is 0-250 which translates to -20dB - +30dB.

<lte_rsrq> An integer indicating the reference signal received quality (RSRQ) in dB.

Example

```
AT+QCSQ                                                    //Execute command to
query signal
+QCSQ: "CAT-M1",-52,-81,195,-10
OK
AT+QCSQ =?                                                 //List of supported
<sysmode>s
+QCSQ: "NOSERVICE","GSM","CAT-M1","CAT-NB1"
BG96_AT_Commands_Manual 101 / 208
OK
```

AT+QNWINFO Query Network Information

The command indicates network information such as the access technology selected, the operator, and the band selected.

AT+QNWINFO QUERY NETWORK INFORMATION	
Test Command AT+QNWINFO=?	Response OK
Execution Command AT+QNWINFO	Response +QNWINFO: <Act>,<oper>,<band>,<channel> OK
Maximum Response Time	300ms

Figure 23 - AT+QNWINFO Query Network Information

Parameter

<Act>	String type.	Access technology selected "NONE"
	"CDMA1X"	
	"CDMA1X AND HDR"	
	"CDMA1X AND EHRPD"	
	"HDR"	
	"HDR-EHRPD" "GSM"	
	"GPRS"	
	"WCDMA"	
	"HSDPA"	
	"HSUPA"	
	"HSPA+"	
	"TDSCDMA"	
	"TDD LTE"	
	"FDD LTE"	
<oper>	String type.	Operator in numeric format
<band>	String type.	Band selected
	"CDMA BC0" – "CDMA BC19"	
	"GSM 450"	
	"GSM 480"	
	"GSM 750"	
	"GSM 850"	
	"GSM 900"	

"GSM 1800"
"GSM 1900"
"WCDMA 2100"
"WCDMA 1900"
"WCDMA 1800"
"WCDMA 1700 US"
WCDMA 850"
"WCDMA 800"
"WCDMA 2600"
"WCDMA 900"
"WCDMA 1700 JAPAN"
"WCDMA 1500"
"WCDMA 850 JAPAN"
"LTE BAND 1" – "LTE BAND 43"
"TDSCDMA BAND A"
"TDSCDMA BAND B"
"TDSCDMA BAND C"
"TDSCDMA BAND D"
"TDSCDMA BAND E"
"TDSCDMA BAND F"

<channel> Integer type; channel ID

Note – BG96 supports SRLTE. Executing **AT+QNWINFO** will display CDMA 1X and LTE network information in SRLTE mode.

Example

```
AT+QNWINFO=?
OK
AT+QNWINFO
+QNWINFO: "CDMA1X","46003","CDMA
BC0",283
+QNWINFO: "FDD LTE","46011","LTE BAND
1",75
OK
```

AT+QSPN Display the Name of Registered Network

AT+QSPN DISPLAY THE NAME OF REGISTERED NETWORK	
Test Command AT+QSPN=?	Response OK
Execution Command AT+QSPN	Response +QSPN: <FNN>,<SNN>,<SPN>,<alphabet>,<RPLMN> OK
Reference	

Figure 24 - AT+QSPN Display the Name of Registered Network

Parameter

<SPN>	Service provider name
<alphabet>	Alphabet of full network name and short network name
	0 GSM 7 bit default alphabet
	1 UCS2
<RPLMN>	Registered PLMN
<FNN>	Full network name
<SNN>	Short network name

Note –
1. If <alphabet> is 0, <FNN> and <SNN> will be shown in GSM 7 bit default alphabet string.
2. If <alphabet> is 1, <FNN> and <SNN> will be shown in UCS2 hexadecimal string.

Example

```
AT+QSPN                                          //Query the EONS information of RPLMN
+QSPN: "CHN-UNICOM","UNICOM","",0,"46001"
OK
```

AT+CVERSION Display module firmware version

Description: Displays the module firmware version and build timestamp.

Usage: **AT+CVERSION?**

Modem configuration binaries

Modem Configuration Binaries (MBNs) are a set of critical NV/EFS settings to configure the NTC-100 to make it comply with operator requirements. Below are some AT commands related to MBN.

AT+QMBNCFG="List"

List All MBN Files uploaded in the module.

Example

```
+QMBNCFG: "List",0,0,0,"China_Common",0x05802800,201806231
+QMBNCFG: "List",1,0,0,"Att_Non_Volte_Lab",0x05010310,201712191
+QMBNCFG: "List",2,0,0,"Verizon_Commercial",0x05803801,201806301
+QMBNCFG: "List",3,0,0,"ROW_Commercial",0x05800801,201806301
+QMBNCFG: "List",4,0,0,"Telstra_Commercial",0x05801806,20190319
OK
```

AT+QMBNCFG="Select"

Select MBN File.

Syntax:

```
AT+QMBNCFG="Select", <MBN name>
```

Example:

```
 at+qmbncfg="Select","Telstra_Commercial"
OK
```

After selection, activate the selected MBN file by rebooting the device with at+cfun=1,1 command

To verify that the MBN is activated, list the mbn files again and check for the activation field as in the example below. In this example, (1,1) before Telstra_Commercial indicates that the Telstra MBN is selected and activated.

```
at+qmbncfg="list"
+QMBNCFG: "List",0,0,0,"China_Common",0x05802800,201806231
+QMBNCFG: "List",1,0,0,"Att_Non_Volte_Lab",0x05010310,201712191
+QMBNCFG: "List",2,0,0,"Verizon_Commercial",0x05803801,201806301
+QMBNCFG: "List",3,0,0,"ROW_Commercial",0x05800801,201806301
+QMBNCFG: "List",4,1,1,"Telstra_Commercial",0x05801806,20190319
OK
```

Note: On the NTC-100, since only PDP 1 is used, we recommend that you remove any APN configuration in other PDPs after mbn activation. Use the commands below:

```
at+cgdcont=2   (removes unnecessary APN configured by mbn file in PDP2)
at+cgdcont=3  (removes unnecessary APN configured by mbn file in PDP3)
at+cgdcont=4  (removes unnecessary APN configured by mbn file in PDP4)
```

AT+QMBNCFG="Deactivate"

This command is used to deactivate the MBN file which is running on the module.

LWM2M

The Lightweight M2M (LWM2M) feature allows you to read, write and save most of the AT command configurations of the NTC-100 from a remote LWM2M server. You can remotely reboot, factory reset and install application firmware using the LWM2M server. When the parameters are written they should be saved (Execute Save Resource /33041/0/52) before rebooting the device so that the configuration changes are retained.

The LWM2M functionality is particularly useful for deployment and management of large numbers of NTC-100 devices via a remote device management system that supports LWM2M such as the Casa Systems Remote Device Manager.

Features supported:

- No Security and PSK security mode when communicating with Bootstrap/LWM2M Servers
- Communication with servers via UDP, in both queued and non-queued modes.
- Application firmware update with HTTP and HTTPS via Pull method. In this method, the LWM2M server writes the firmware update URI in the device so that the device can download and install the application firmware via HTTP/HTTPS server.

  A link to the firmware update file must be written to the Firmware Update/Package URI resource in the form: **`https://user:pass@host:port/path/to/file/filename.bin.signed`**

  If there is no authorisation, the ***`user:path@`*** section may be left out.

  Module firmware update is not supported.
- The NetComm Custom object 33041 is implemented to expose configuration parameters available on the device.

LWM2M Configuration

The LWM2M configuration can be accomplished using either AT commands via a terminal emulator or via SMA commands from an SMS enabled device.

To enable/disable LWM2M feature

AT command: **`at+enable_lwm2m=0 or 1 where 0=disable (default), 1=enable`**

SMS command: **`set enable_lwm2m=0 or 1 where 0=disable (default), 1=enable`**

To read whether LWM2M is enabled or disabled

AT command: **`at+enable_lwm2m?`**

SMS command: **`get enable_lwm2m`**

To read Server Configuration

AT command: **`at+lwm2m_bootstrap?`**

SMS command: **`get lwm2m_bootstrap`**

To read LWM2M endpoint

AT command: **`at+lwm2m_endpoint?`**

SMS command: **`get lwm2m_endpoint`**

The endpoint name reported by the LWM2M client uses the IMEI URN format

To configure LWM2M server or bootstrap Server

AT command:

`at+lwm2m_bootstrap=<bootstrap>,<binding>,<lifetime>,<security mode>[,security params],<uri>`

SMS command:

`set lwm2m_bootstrap=<bootstrap>,<binding>,<lifetime>,<security mode>[,security params],<uri>`

Note – If you are using a bootstrap server, configuration needs to be done in the bootstrap server to point the NTC-100 to your LWM2M server.

Parameters:

bootstrap:	"**0**" or "**1**" (**0:** Server is LWM2M Server, **1**: Server is Bootstrap LWM2M Server)
binding:	"**U**" (UDP) or "**UQ**" (queued UDP)
lifetime:	"**30**" - "**2592000**" (seconds; max 30 days)
security mode:	"**0**" (pre-shared key) or "**3**" (no security)
security params:	"**<identity>,<key>**" (only present if using pre-shared key mode)
uri:	"**coap[s]://server:port[/path]**"

Example 1:

Configuring LWM2M server without PSK Security:

`at+lwm2m_bootstrap=0,U,60,3,coap://rdm.netcommwireless.com:5683`

Example 2:

Configuring LWM2M server with PSK Security:

`at+lwm2m_bootstrap=0,U,60,0,user,a1b2c3,coaps://rdm.netcommwireless.com:5684`

Example 3:

Configuring Bootstrap server without PSK Security :

`at+lwm2m_bootstrap=1,U,60,3,coap://rdm.netcommwireless.com:5681`

Example 4:

Configuring Bootstrap server with PSK Security:

`at+lwm2m_bootstrap=1,U,60,0,user,a1b2c3,coaps://rdm.netcommwireless.com:5682`

Supported LWM2M objects

The table below lists the supported object IDs on the NTC-100. For further information on the objects, refer to the Open Mobile Alliance LWM2M registry.

OBJECT	OBJECT ID	NOTE
LWM2M Server	1	
Device	3	
Connectivity Monitoring	4	
Firmware Update	5	
Expose configuration parameters	33041	Private object reserved by NetComm Wireless.

Figure 25 - Supported LWM2M objects

Log storage and export

The NTC-100 can capture device logs and save them to a file, which can be exported to the local PC using the QEFS Explorer tool or to a remote FTP server using AT/SMS commands. They may also be read in a terminal using an AT command.

The maximum size of the log file is 300KB and the oldest log data will be erased first when the log file is full.

Enable/Disable Log feature

AT command: **at+log_enabled=0** or **1** where **0** is disable (default), **1** is enable

SMS command: **set log_enabled=0** or **1**

Read whether logging is enabled/disabled

AT command: **at+log_enabled?**

SMS command: **get log_enabled**

Display all contents of log file in Serial Port terminal

AT command: **at+log?**

Clear logs from the log file

AT command: **at+log_clear=1**

SMS command: **execute log_clear**

ConfigureFTP Server parameters and upload log file to FTP server

AT command: **at+ftp_host=ftphostname**

at+ftp_path=dir/

at+ftp_user=username

at+ftp_pass=password

at+log_upload=1

SMS command: **set log_upload=1**

Retrieve logs locally from QEFS explorer

AT command: **at+log_dump=1**

SMS command: **execute log_dump**

After "LOG_DUMP" command, open QEFS explorer tool, copy LogFileDump.txt from datatx/LogFiles directory to your PC.

Default and current configuration files

There are two configuration files stored on the NTC-100. The Default config file contains the settings that are applied when a factory reset is performed while the current config file contains the current settings.

There are AT and SMS commands to upload and download current_config and default config files to or from an FTP server and download current_config and default config files from an HTTP/S server.

There are also SMS and AT commands to save a current config file as the default config file. Refer to the AT and SMS command list for the commands.

Updating the application firmware

Via Local PC

Pre-requisites for application firmware installation

Please ensure that you have the following items:

- A PC running Windows (XP or newer) with QEFS Explorer installed
- An NTC-100 device
- A MicroUSB Type B plug to Standard-A plug USB cable

Required files

Please ensure that you have all the following files to complete the upgrade:

- Windows BG96 USB Driver file
- QEFS Explorer tool to install application firmware
- Application package (NTC100.bin, NTC100.signature, oem_app_path.ini) if the base firmware is older than v3.3.1 or the device is flashed and has no firmware
- Application firmware (NTC100.x.x.x.bin.signed) if base firmware is v3.3.1 or newer
- TeraTerm or PuTTY

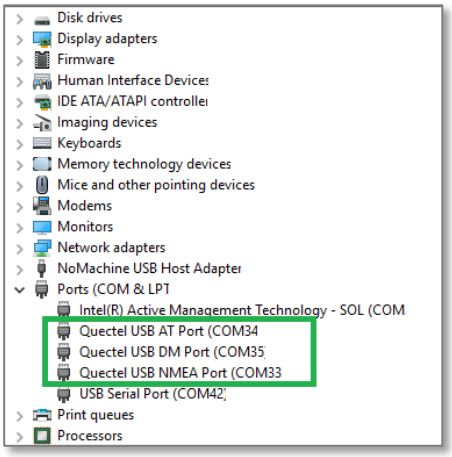
Application firmware installation steps

1 Install the Quectel BG96 Windows USB drivers by double-clicking on:

Quectel_BG96_Windows_USB_Driver.exe

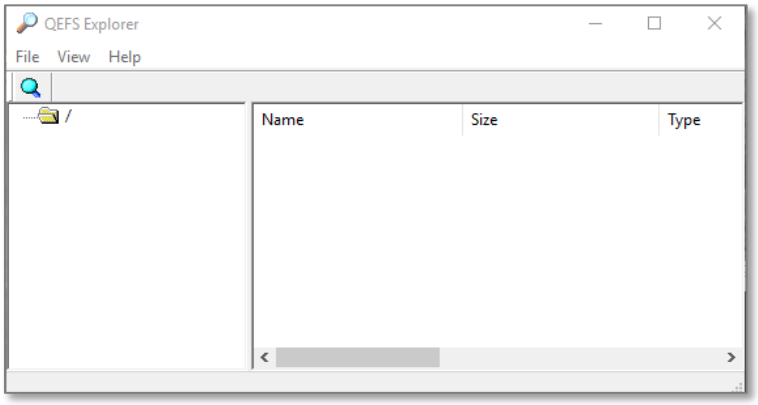
2 When the installation is complete, reboot the PC.

3 After the driver has been installed and rebooted, connect the NTC-100 to a Windows PC with a USB cable and verify in the Device Manager that the three COM ports (**Quectel USB AT port**, **Quectel USB DM port** and **Quectel USB NMEA port**) have enumerated.



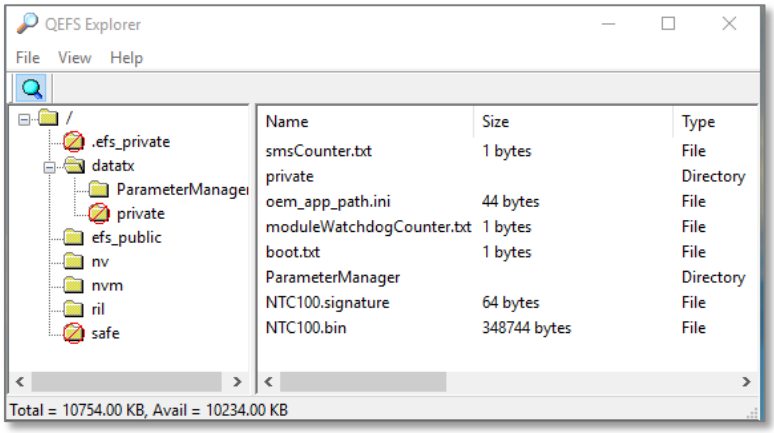
4 Open QEFS Explorer.

5 Click **File**, then **Device** and **Quectel USB DM Port**.



6 Click the magnifying glass icon below File.

The list of files in the file system are displayed.



7 If the base firmware is v3.3.1 or newer, navigate to the /NTC100_UPGRADE_FW folder by double-clicking on it and draging the signed application firmware file (NTC100.x.x.x.bin.signed) from your local PC to this directory.

If the base firmware is older than v3.3.1 or there is no firmware in the device, navigate to the /datatx folder by double-clicking on it and dragging the three application firmware files (NTC100.bin, NTC100.signature, oem_app_path.ini) from your local PC to the datatx directory. If old firmware files are present, they will be replaced by the new files.

Note – Copy and paste (**Ctrl+C**, **Ctrl+V**) does not work
Drag/drop is required to move files into this folder.

8 When the file transfer is finished, close the window and power cycle the device.

9 After the reboot, the device will install the new application firmware and reboot again. The update is complete.

Over the Air (OTA)

There are two ways to upgrade the application firmware over the air:

- From an FTP Server
- From an HTTP or HTTPS Server

There are also two ways to run commands to configure parameters and initiate the upgrade process.

- Using customized AT commands via the serial interface
- Using SMS commands

Pre-requisites for Application Firmware Over the Air Upgrade:

Please ensure that you have the following items:

- An HTTP/S Server or FTP Server for storing application firmware
- An NTC-100 device
- The serial Y-cable provided with NTC-100
- A USB to RS232 serial adapter cable
- A power adapter
- A valid SIM

Please ensure that you have all the following files to complete the upgrade.

- The application file: *NTC100.x.x.x.bin.signed*
- TeraTerm or PuTTY

Application firmware upgrade Over the Air from FTP server using SMS

1 Save *NTC100.x.x.x.bin.signed* on the FTP server.

For example, in the /application folder on the FTP server with the address "repository.example.com".

2 Insert the SIM in the NTC-100, power it on and connect the device to the network.

The NTC-100 has connected to the network when the Status LED displays solid green.

3 Check the current application version by sending the SMS command: **`1234get version`**

4 Configure the FTP server parameter on the NTC-100 by sending the SMS command:

`1234set ftp_host=repository.example.com`

Wait for the acknowledgment message from the NTC-100.

5 Configure the FTP Path with the following command: **`1234set ftp_path=application/`**

(Note: The folder should not be preceded by a /)

Wait for the acknowledgment message from the NTC-100.

6 Configure the file name of the application firmware: **1234set ftp_file=NTC100.x.x.x.bin.signed**

Wait for the acknowledgment message from the NTC-100.

7 Configure the FTP user with the following command: **1234set ftp_user=username**.

Wait for the acknowledgment message from the NTC-100.

8 Configure FTP password with the following command: **1234set ftp_pass=password**.

Wait for the acknowledgment message from the NTC-100.

9 Save the configured parameters with the command: **1234set execute save**

10 Check configured parameters with the command: **1234get ftp_para**

11 Initiate the application firmware upgrade with the command: **1234Upload**

Wait for around two minutes and the NTC-100 will power cycle itself indicating that the firmware upgrade was successful.

12 When the NTC-100 has finished rebooting and connected to the network, confirm the new application firmware with the SMS command:

1234get version

Application firmware upgrade Over the Air from FTP server using customized AT commands

1 Save *NTC100.bin.x.x.x.signed* on the FTP server.

For example, in the /application folder on FTP server with the address "repository.example.com".

2 Insert the SIM in the NTC-100, power it on and connect the device to the network.

The NTC-100 has connected to the network when the Status LED displays solid green.

3 Connect the NTC-100 to the PC via the serial interface. You can use a standard USB to DE-9 cable to connect to the DE-9 female port of the Serial Y cable provided with the NTC-100.

4 Navigate to Device Manager and identify assigned COM port

5 Open a Terminal emulator such as TeraTerm or PuTTY and configure the baud rate to 115200. Leave the other serial parameters as default.

6 Type any character on the keyboard. The terminal prompts for a username and password.

For the USERNAME, enter **root** and for PASSWORD, enter **admin**.

7 When you have logged in, you can run customized AT commands and module AT commands.

Note that from the USB AT interface, you can run only module AT commands.

8 Type **at+version?** and press Enter to check current application firmware version.

9 Configure the FTP server parameter on the NTC-100 by typing the command:

at+ftp_host=repository.example.com

10 Configure the FTP Path by entering the command:

at+ftp_path=application/

(Note: The folder should not be preceded by a /)

11 Configure the file name by entering the command: **at+ftp_file=NTC100.bin.x.x.x.signed**

12 Configure the FTP user by entering the command: **at+ftp_user=username**

13 Configure the FTP password by entering the command: **at+ftp_pass=password**

14 Save the configured parameters by entering the command: **at+save=1**

15 Check the configured parameters by entering the command: **at+ftp_para?**

16 Initiate the application firmware upgrade by entering the command: **at+ftp_upload=1**

If successful, the NTC-100 replies with **OK**, otherwise it will reply with **ERROR**.

17 When the NTC-100 has finished rebooting and connected to the network, confirm the new application firmware with the command:

at+version?

Application firmware upgrade Over the Air from an HTTP/S server using SMS:

1 Save *NTC100.x.x.x.bin.signed* on the HTTP or HTTPS server.

For example, in the /application folder on the HTTP/S server with the address "repository.example.com".

2 Insert the SIM in the NTC-100, power it on and connect the device to the network.

The NTC-100 has connected to the network when the Status LED displays solid green.

3 Check the current application version by sending the SMS command: **1234get version**

4 Configure the HTTP/S server parameter on the NTC-100 by sending SMS command:

1234set web_host=http://repository.example.com for http

OR

1234set web_host=https://repository.example.com for https

Wait for the acknowledgment message from the NTC-100.

5 Configure the HTTP/S path by entering the following command:

1234set web_path=application/

(Note: The folder should not be preceded by a /)

Wait for the acknowledgment message from the NTC-100.

6 Configure the file name by entering the following command:

1234set web_file=NTC100.bin.x.x.x.signed

Wait for the acknowledgment message from the NTC-100.

7 Configure the HTTP/S port by entering the following command:

1234set web_port=80 or 1234set web_port=443

8 Save the configured parameters by entering the following command:

1234set execute save

9 Check the configured parameters by entering the following command:

1234get web_host, 1234get web_path, 1234get web_file, 1234get web_port

10 Initiate the application firmware upgrade by entering the following command:

1234set web_upload=1

Wait for around two minutes.

If the upgrade was successful, the NTC-100 replies with "ACK" and power cycles itself.

If the upgrade failed, the NTC-100 replies with "Error" and does not reboot.

11 When the NTC-100 has finished rebooting and connected to the network, confirm the new application firmware with the SMS command:

1234get version

Application firmware upgrade Over the Air from an HTTP/S server using Customized AT command:

1 Save *NTC100.x.x.x.bin.signed* on the HTTP or HTTPS server. For example, in the /application folder on the HTTP/S server with the address "repository.example.com".

2 Insert the SIM in the NTC-100, power it on and connect the device to the network. The NTC-100 has connected to the network when the Status LED displays solid green.

3 Connect the NTC-100 to the PC via the serial interface. You can use a standard USB to DE-9 cable to connect to the DE-9 female port of the Serial Y cable provided with the NTC-100.

4 Navigate to Device Manager and identify assigned COM port

5 Open a Terminal emulator such as TeraTerm or PuTTY and configure the baud rate to 115200. Leave the other serial parameters as default.

6 Type any character on the keyboard. The terminal prompts for a username and password. For the username, enter **root** and for password, enter **admin.**

7 When you have logged in, you can run customized AT commands and module AT commands. Note that from the USB AT interface, you can run only module AT commands.

8 Type **at+version?** and press Enter to check current application firmware version.

9 Configure the HTTP/S server parameter on the NTC-100 by entering the following command:

at+ web_host=http://repository.example.com

OR

at+ web_host=https://repository.example.com

10 Configure the HTTP/S path by entering the following command:

at+web_path=application/

(Note: The folder should not be preceded by a /)

11 Configure the file name by entering the following command:

at+web_file=NTC100.x.x.x.bin.signed

12 Configure the HTTP/S port by entering the following command:

at+web_port=80 or at+web_port=443

13 Save the configured parameters by entering the following command:

at+save=1

14 Check the configured parameters by entering the following command:

at+web_host?, at+web_file?,at+web_path?

15 Initiate the application firmware upgrade by entering the following command:

at+web_upload=1

If successful, the NTC-100 replies with **ACK**, otherwise it will reply with **ERROR**.

16 When the NTC-100 has finished rebooting and connected to the network, confirm the new application firmware with the command:

at+version?

Updating the module firmware

Via Local PC

Pre-requisites for module firmware installation:

The module firmware can be upgraded locally via the USB interface. Please ensure that you have the following items:

- A PC running Windows (XP or newer)
- An NTC-100 device
- A Micro-USB Type B plug to Standard A plug USB cable

Please ensure that you have all the following files to complete the upgrade.

- The Windows BG96 USB Driver file
- QFlash Software to install module firmware
- The module firmware package for the upgrade
- TeraTerm/PuTTY
- QEFS Explorer (may be required)

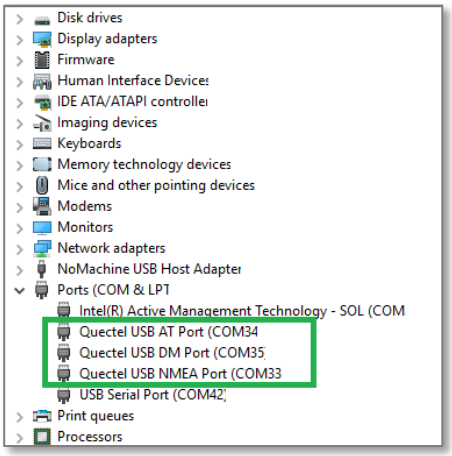
Module firmware installation steps

1 Install the Quectel BG96 Windows USB drivers by double-clicking on:

Quectel_BG96_Windows_USB_Driver.exe

2 When the installation is complete, reboot the PC.

3 After the driver has been installed and rebooted, connect the NTC-100 to a Windows PC with a USB cable and verify in the Device Manager that the three COM ports (**Quectel USB AT port**, **Quectel USB DM port** and **Quectel USB NMEA port**) have enumerated.



Warning – This process will erase the existing application firmware.

4 If the device doesn't contain application firmware, go to the next step. Otherwise, open QEFS Explorer. Click **File>Device>DM port**. Click the magnifying glass icon below the File menu. The file system in the module is displayed. Navigate to /datatx and delete the "oem_app_path.ini" file. Powercycle the device and close QEFS Explorer.

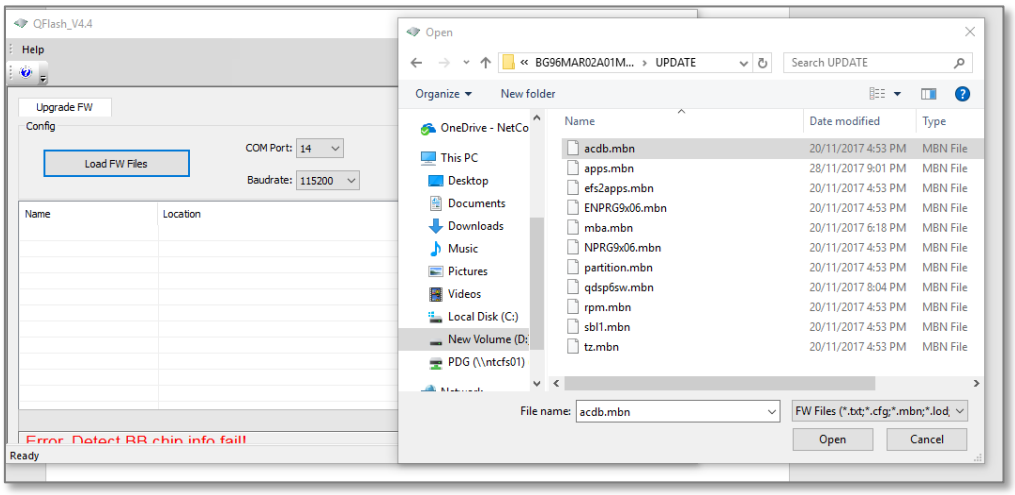
5 Open the QFlash software tool.

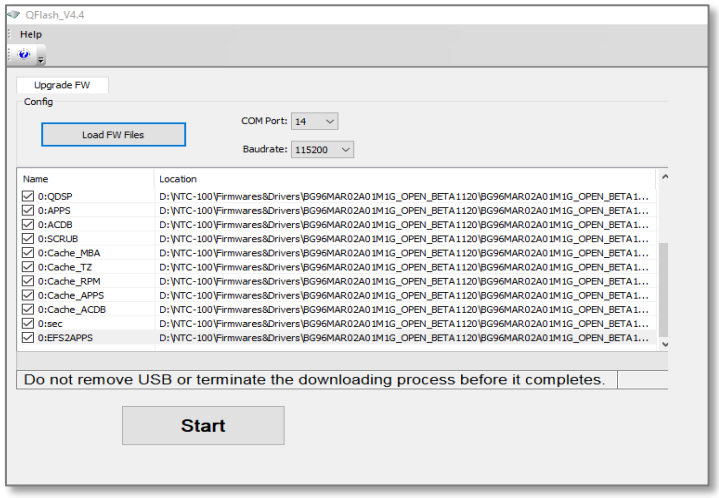
   a Set **Baud rate=115200** and

   b Set **COM port=Port** assigned to USB DM port as shown in above screenshot.

6 Click the **Load FW Files** button and browse to module firmware files.

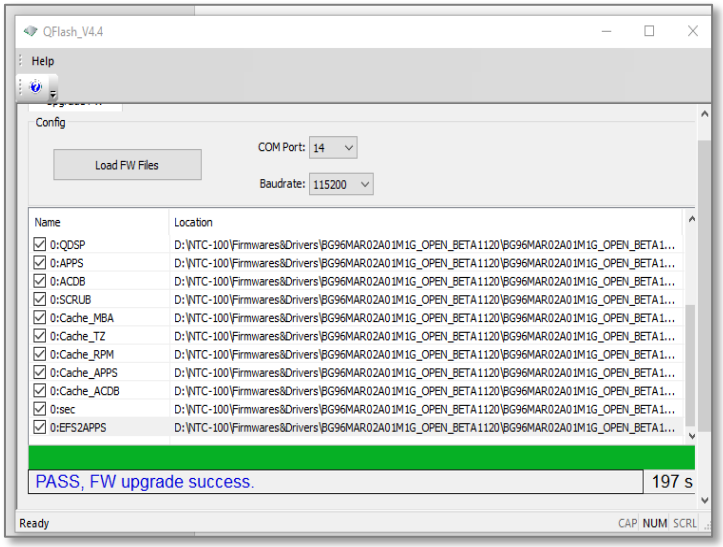
7 Select any of the **.mbn** files and click **Open,** then **Start** to initiate the module firmware installation process.





8 Wait a few minutes for the process to complete until you see the "**PASS**" message as shown in the figure below.

9 When you see "**PASS**", the module firmware has been updated and you can close the window.



If you have a problem upgrading the module firmware such as a "**Dynamic Port**" error, try removing the **.init** file of the existing application firmware using QEFS Explorer (delete the **/datatx/oem_app_path.ini** file first and retry from step 4).

10 To verify the newly installed module firmware version, open TeraTerm or PuTTY and set the baud rate to 115200 and port to the COM Port assigned to the USB AT port in Device Manager.

11 Type `ATI` in the terminal to retrieve the current module firmware version.

Over the Air (OTA)

Module firmware can be upgraded Over the Air from an HTTP or HTTPS Server. The NTC-100 supports the DFOTA (Delta Firmware Upgrade Over-the-Air) function which allows you to upgrade the firmware to a new version and revert to the old version if required. Before upgrading the module firmware, you must prepare the delta firmware package which contains only the differences between the old and new firmware versions. This reduces the amount of data transmitted and accelerates the speed of the module firmware upgrade.

There are two ways to run the commands to configure parameters and initiate the upgrade process.

- Using custom AT commands from the serial interface (Note: Custom AT commands are not accessible via the USB AT interface)
- Using SMS commands

Pre-requisites for Module Firmware Over the Air Upgrade

Please ensure that you have the following items:

- An HTTP/S Server for storing the Delta package of the module firmware
- An NTC-100
- The serial Y cable provided with the NTC-100
- A power adapter
- A valid SIM

Please ensure that you have all the following files to complete the upgrade.

- The Delta firmware package
- TeraTerm/PuTTY

Important – The application firmware update must be done before updating the module firmware.

Module firmware upgrade Over the Air from an HTTP/S server using customized AT commands

1 Save the delta module firmware package (e.g.: update.zip, update.bin) on the HTTP or HTTPS server. For example, in the /firmware folder on an http/s server with the address "repository.example.com".

2 Insert the SIM in the NTC-100, power it on and connect the device to the network. The NTC-100 has connected to the network when the Status LED displays solid green.

3 Connect the NTC-100 to the PC via the serial interface. You can use a standard USB to DE-9 cable to connect to the DE-9 female port of the Serial Y cable provided with the NTC-100.

4 Navigate to Device Manager and identify assigned COM port

5 Open a Terminal emulator such as TeraTerm or PuTTY and configure the baud rate to 115200. Leave the other serial parameters as default.

6 Type any character on the keyboard. The terminal prompts for a username and password. For the username, enter **root** and for password, enter **admin.**

7 When you have logged in, you can run customized AT commands and module AT commands. Note that from the USB AT interface, you can run only module AT commands.

8 Type **at+version?** and press Enter to check current module firmware version.

9 Configure the HTTP/S server parameter on the NTC-100 by entering the following command:

at+ web_host=http://repository.example.com

OR

at+ web_host=https://repository.example.com

10 Configure the HTTP/S path by entering the following command: **at+web_path=firmware/**

(Note: The folder should not be preceded by a /)

11 Configure the file name by entering the following command: **at+web_file=update.zip**

12 Configure the HTTP/S port by entering the following command: **at+web_port=80**

or **at+web_port=443**

13 Save the configured parameters by entering the following command: **at+save=1**

14 Check the configured parameters by entering the following commands: **at+web_host?**

at+web_file?

at+web_path?

15 Initiate the module firmware upgrade by entering the command: **at+web_upload=2**

If successful, the NTC-100 replies with **OK**, otherwise it will reply with **ERROR**.

16 When the NTC-100 has finished rebooting and connected to the network, confirm the new module firmware with the command:

at+version?

Module firmware upgrade Over the Air from an HTTP/S server using SMS

1 Save the delta module firmware package (e.g.: **update.zip, update.bin**) on the HTTP or HTTPS server. For example, in the **/firmware** folder on an http/s server with the address "**repository.example.com**".

2 Insert the SIM in the NTC-100, power it on and connect the device to the network.

The NTC-100 has connected to the network when the Status LED displays solid green.

3 Check the current module version by sending the SMS command: **1234get version**

4 Configure the HTTP/S server parameter on the NTC-100 by entering the following command:

1234set web_host=http://repository.example.com

OR

1234set web_host=https://repository.example.com

Wait for the acknowledgment message from the NTC-100.

5 Configure the HTTP/S path by entering the following command: **1234set web_path=firmware/**

(Note: The folder should not be preceded by a /)

Wait for the acknowledgment message from the NTC-100.

6 Configure the file name by entering the following command: **1234set web_file=update.zip**

Wait for the acknowledgment message from the NTC-100.

7 Configure the HTTP/S port by entering the following command: **1234set web_port=80**

or **1234set web_port=443**

8 Save the configured parameters by entering the command: **1234set execute save**

9 Check the configured parameters by entering the following commands: **1234get web_host**
1234get web_path
1234get web_file
1234get web_port

10 Initiate the module firmware upgrade by entering the following command: **1234set web_upload=2**

Wait for around ten minutes.

- If the upgrade was successful, the NTC-100 replies with "**ACK**" power cycles itself.
- If the upgrade failed, the NTC-100 replies with "**ERROR**" and does not reboot.

11 When the NTC-100 has finished rebooting and connected to the network, confirm the new module firmware with the SMS command:

1234get version

NanoFit connector diagram

The following table displays the PIN out configuration for the 10-pin power/data connector of the NTC-100.

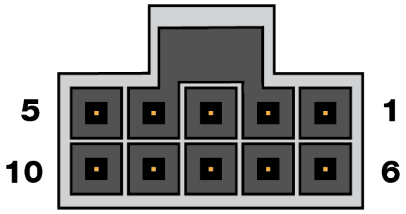


Figure 26 - NanoFit header

Note – The image above depicts the NanoFit connector on the NTC-100 as viewed from the side of the device.

NANO-FIT PIN	DE-9 PIN	WIRE COLOUR	RS-232	RS-485	RS-422
1	2	Green	RXD	A	RD-
2	1	Blue	DCD	B	RD+
3	7	Yellow	RTS		
4	9	Orange	RI		
5	5	Black	GND	GND	GND
6	4	Brown	DTR		TD-
7	3	White	TXD		TD+
8	6	Purple	DSR		
9	8	Grey	CTS		
10	-	Red	DC In	DC In	DC In

Table 9 - NanoFit header pin outs

The NTC-100 is a DCE (Data Circuit-Terminating Environment), so the RTS (Ready To Send) signal is received by the NTC-100 and the CTS (Clear to Send) signal is transmitted with flow controlled from both ends.

Product service and support

The following section provides some assistance with issues that may be encountered when using the NTC-100 as well as providing web-based links for product specific information.

Troubleshooting

1 I am unable to send any AT commands to the NTC-100

- Verify the NTC-100 is connected to both the power supply and an appropriate COM port.
- Verify the LEDs on the front of the NTC-100 are illuminated.
- Verify your terminal program settings or device is set to use the appropriate COM port.
- Power cycle the NTC-100 by removing the power supply for 15 seconds and then reconnect it.

2 I only receive garbage text when sending AT commands to the NTC-100

- Verify that the COM port parameters have not changed since the NTC-100 was initially connected. Garbage text usually indicates that the port speed has been changed.

> **Note** – Please refer to the AT Command reference document for more information on enabling remote access to the NTC-100.

3 The NTC-100 LEDs are not lighting up

- Verify that the NTC-100 is connected to an appropriate power supply and that an active SIM has been inserted.
- Power cycle the NTC-100 by removing the power supply for 15 seconds and then reconnect it.

4 The LED is not turning on

- Verify that the NTC-100 has sufficient signal strength to connect by checking the available signal strength via the appropriate AT command.

> **Note** – Please refer to the AT Command reference document for more information on signal strength.

5 I am receiving an 'ERROR' response from the NTC-100

- Verify the AT command you are utilising has the correct syntax specified.

6 I am receiving an 'ERROR (##)' response from the NTC-100 with an error code that I don't understand

- Please refer to the error codes in the AT Command manual which can be found on the Quectel website to learn the meaning of the Result codes.

If you are still experiencing issues after performing the above checks, please contact NetComm Technical Support by going to: http://support.netcommwireless.com/

FAQs

Q: Is the NTC-100 a serial modem?

A: The NTC-100 is able to operate as a serial modem, however it is also so much more. It is also able to perform the following functions:

- Creating a TCP server
- Creating UDP sockets / TCP clients and a TCP server
- Creating a PING session
- Creating an FTP session (upload and download files)
- Connect to a remote HTTP server

Q: What are the port settings required for the NTC-100?

A: Generally, a port speed of 115200, 8 data bits, 1 stop bit, no parity and hardware flow control should be fine. Garbage text usually indicates that the port speed has been changed.

Q: Can the micro USB port be used to connect to legacy devices?

A: No. The micro USB port requires Windows XP, Windows Vista, Windows 7, Windows 8 or Windows 10 operating systems.

Q: Why can't I configure customized AT commands from the USB AT interface?

A: The USB AT interface talks directly to the module and has access only to module AT commands. Customized Application AT commands can be accessed only via the serial port.

Q: How does the device connect to the network on multi APN configuration?

A: The application first checks the network registration, then it tries to connect to the first APN listed in the APN register.
If unsuccessful, it checks the network registration again and tries to connect to the other APNs according to the sequence that they are configured on the device's APN register.

Notes:

- During the first connection attempt cycle through the APN register the waiting interval between each APN connection attempt is 30 seconds. This interval will be doubled on each subsequent connection attempt cycle through the register.
- At the end of the first full cycle through the register, if there has not been a successful connection to any of the APNs then the application waits for five seconds and repeats the entire process again. This five second waiting interval will then be doubled at the end of each subsequent cycle and the entire process will be repeated.
- If no connection is made within 20 minutes of the device attempting to connect to any of the APNs, the device will reboot.
- If the device is successfully registered and connected to an APN and the device is subsequently rebooted, it will start from the last remembered APN.

List of tables

Safety and product care

Electrical safety

Accessories

Only use approved accessories.

Do not connect with incompatible products or accessories.

Connection to a car

Seek professional advice when connecting a device interface to the vehicle electrical system.

Distraction

Operating machinery

Full attention must be given to operating the machinery in order to reduce the risk of an accident.

Product handling

You alone are responsible for how you use your device and any consequences of its use.

You must always switch off your device wherever the use of a mobile phone is prohibited. Do not use the device without the clip-on covers attached, and do not remove or change the covers while using the device. Use of your device is subject to safety measures designed to protect users and their environment.

Always treat your device and its accessories with care and keep it in a clean and dust-free place.

Do not expose your device or its accessories to open flames or lit tobacco products.

Do not expose your device or its accessories to liquid, moisture or high humidity.

Do not drop, throw or try to bend your device or its accessories.

Do not use harsh chemicals, cleaning solvents, or aerosols to clean the device or its accessories.

Do not paint your device or its accessories.

Do not attempt to disassemble your device or its accessories, only authorised personnel must do so.

Do not use or install this product in extremely hot or cold areas. Ensure that the device is installed in an area where the temperature is within the supported operating temperature range (-40°C to 85°C)

Do not use your device in an enclosed environment or where heat dissipation is poor. Prolonged use in such space may cause excessive heat and raise ambient temperature, which will lead to automatic shutdown of your device or the disconnection of the mobile network connection for your safety. To use your device normally again after such shutdown, cool it in a well-ventilated place before turning it on.

Please check local regulations for disposal of electronic products.

Do not operate the device where ventilation is restricted

Installation and configuration should be performed by trained personnel only.

Do not use or install this product near water to avoid fire or shock hazard. Avoid exposing the equipment to rain or damp areas.

Arrange power and Ethernet cables in a manner such that they are not likely to be stepped on or have items placed on them.

Ensure that the voltage and rated current of the power source match the requirements of the device. Do not connect the device to an inappropriate power source.

Small children

Do not leave your device and its accessories within the reach of small children or allow them to play with it.

They could hurt themselves or others, or could accidentally damage the device.

Your device contains small parts with sharp edges that may cause an injury or which could become detached and create a choking hazard.

Emergency & other situations requiring continuous connectivity

This device, like any wireless device, operates using radio signals, which cannot guarantee connection in all conditions. Therefore, you must never rely solely on any wireless device for emergency communications or otherwise use the device in situations where the interruption of data connectivity could lead to death, personal injury, property damage, data loss, or other loss.

Device heating

Your device may become warm during normal use.

Faulty and damaged products

Do not attempt to disassemble the device or its accessories.

Only qualified personnel must service or repair the device or its accessories.

If your device or its accessories have been submerged in water punctured or subjected to a severe fall, do not use until they have been checked at an authorised service centre.

Interference

Care must be taken when using the device in close proximity to personal medical devices, such as pacemakers and hearing aids.

Pacemakers

Pacemaker manufacturers recommend that a minimum separation of 15cm be maintained between a device and a pacemaker to avoid potential interference with the pacemaker.

Hearing aids

People with hearing aids or other cochlear implants may experience interfering noises when using wireless devices or when one is nearby.

The level of interference will depend on the type of hearing device and the distance from the interference source, increasing the separation between them may reduce the interference. You may also consult your hearing aid manufacturer to discuss alternatives.

Medical devices

Please consult your doctor and the device manufacturer to determine if operation of your device may interfere with the operation of your medical device.

Hospitals

Switch off your wireless device when requested to do so in hospitals, clinics or health care facilities. These requests are designed to prevent possible interference with sensitive medical equipment.

Interference in cars

Please note that because of possible interference to electronic equipment, some vehicle manufacturers forbid the use of devices in their vehicles unless an external antenna is included in the installation.

Explosive environments

Petrol stations and explosive atmospheres

In locations with potentially explosive atmospheres, obey all posted signs to turn off wireless devices such as your device or other radio equipment.

Areas with potentially explosive atmospheres include fuelling areas, below decks on boats, fuel or chemical transfer or storage facilities, areas where the air contains chemicals or particles, such as grain, dust, or metal powders.

Blasting caps and areas

Turn off your device or wireless device when in a blasting area or in areas posted turn off “two-way radios” or “electronic devices” to avoid interfering with blasting operations.

Warranty

For warranty information, visit the Warranty Info page of the NetComm Wireless website.