Ublox SARA-N211 board communication setup guide

Krzysztof Malarski, Alba Carrillo Mateo

May 2018

1 Before start

It is assumed that you have the SODAQ SARA board with miniUSB-USB (old board) /microUSB-USB (new board) cable and a SIMcard for NB-IoT. Moreover for UDP communication, a remote server supporting UDP is up. Since the communication with the board occurs by means of a serial port, some serial terminal software is needed. For Windows the recommended one is CoolTerm, as in there one can copy-paste the AT commands without the need of typing them each time.

2 Sending UDP packets via AT commands

Once the device is plugged in, open CoolTerm (or your favourite serial terminal). The serial port should be automatically detected, if not, go to *Options* and in *Serial Port* Tab click *Re-scan Serial Ports* button. Also, ensure that In *Terminal* Tab Enter Key Emulation is set to **CR+LF** (see figure 1).

On the main panel click Connect and then in *Connection* dropdown menu select *Send String....* In this panel you can type the AT command to send. Remember that every time a new command is issued, it must be terminated with a new line (in other words, after typing the command **ALWAYS** type *ENTER*). See figure 2.

The following sequence of commands enables sending a 2-byte UDP packet (0x4142) to 178.62.63.119 on port 1337. NOTE: Old versions of commands refer to the modules with separate Arduino boards, while the new ones correspond to the new SODAQ board with embedded Arduino. Proper command execution should result in OK status and, depending on the type of the command, some additional information.

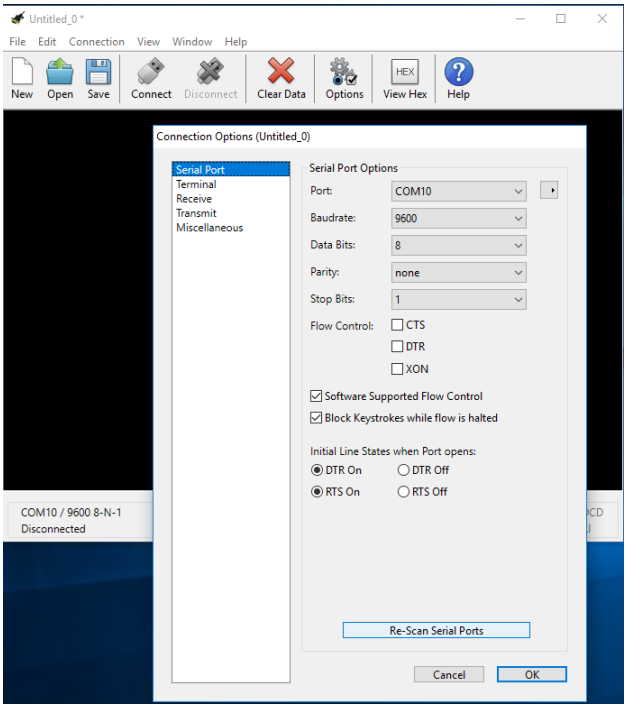


Figure 1: Serial terminal configuration

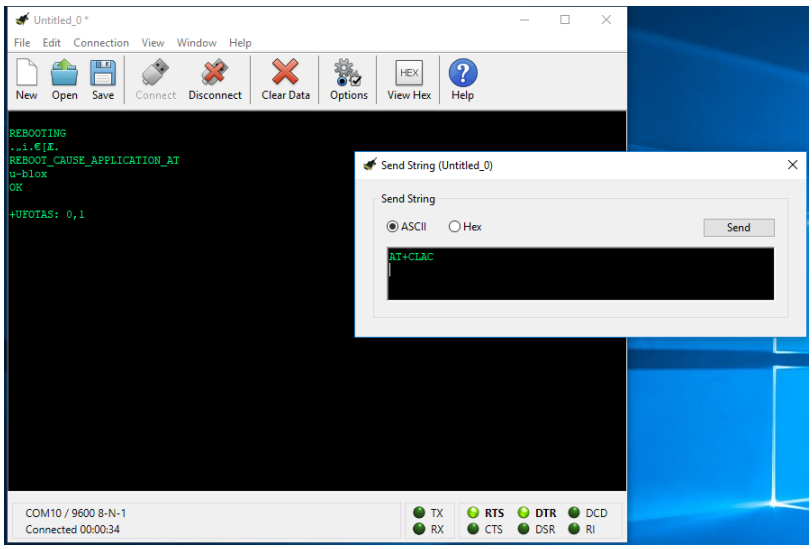


Figure 2: Serial communication example

```
// Reboot
AT+NRB

// Basic settings
// Old
AT+NCONFIG=CR_0354_0338_SCRAMBLING,TRUE
AT+NCONFIG=CR_0859_SI_AVOID,FALSE
//New
AT+NCONFIG="CR_0354_0338_SCRAMBLING","TRUE"
AT+NCONFIG="CR_0859_SI_AVOID","FALSE"

// Check settings
AT+NCONFIG?

// Switch off the radio
AT+CFUN=0

// Set the APN for authentication
AT+CGDCONT=1,"IP","company.iot.dk1.tdc"

// Switch on the radio
AT+CFUN=1

// Select the band
AT+NBAND=20

// Forces an attempt to select and register with the network operator
AT+COPS=1,2,"23801"

// Check signal quality
AT+CSQ

// Check if attached to the network
AT+CGATT?

// Check own IP address
AT+CGPADDR

// Display network statistics
AT+NUESTATS

// Ping
//Old
AT+NPING=8.8.8.8
//New
AT+NPING="8.8.8.8"
```

```
// Switch on the send message indicator
AT+NSMI=1

// Send message 11 bytes in HEX
//Old
AT+NMGS=11,48656c6c6f20576f726c64
//New
AT+NMGS=11,"48656c6c6f20576f726c64"

// Check the send message queue
AT+NQMGS

//Open socket
//Old
T+NSOCR=DGRAM,17,42000,1
//New
T+NSOCR="DGRAM",17,42000,1

//Send UDP packet using the socket value returned above
//Old
AT+NSOST=0,178.62.63.119,1337,2,4142
//New
AT+NSOST=0,"178.62.63.119",1337,2,"4142"
```

3 Programming in Arduino IDE

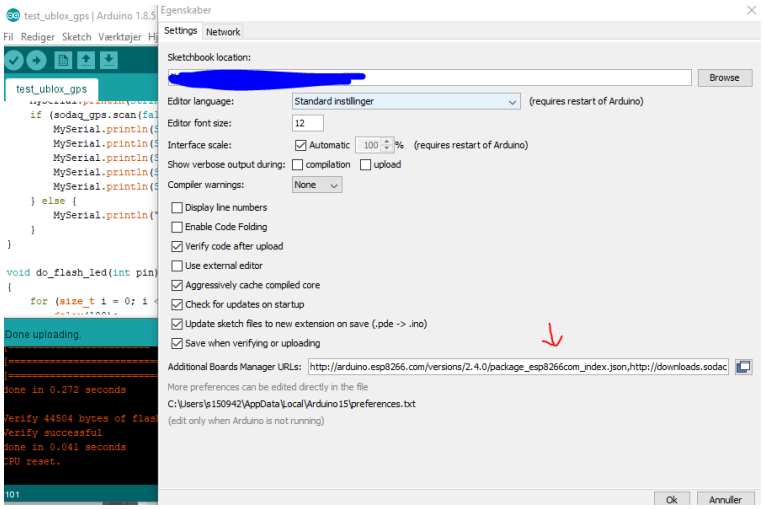
Since SODAQ boards have Arduino modules embedded or attached, one can program custom behaviour with the aid of Arduino IDE. Here are the steps to take in order to run the example programs:

- Download and install Arduino IDE (

  `https://www.arduino.cc/en/Main/Software`

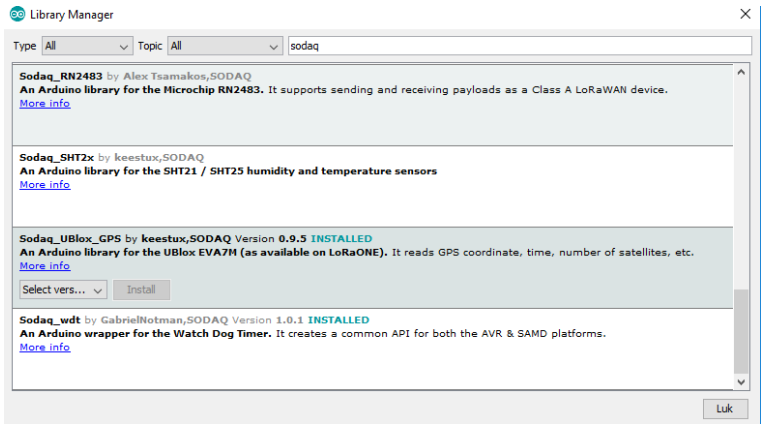
)
- Go to File - Preferences and ensure that Additional Boards Manager URLs path contains the following (separated by comma, without new lines):

  ```
  http://downloads.sodaq.net/package_sodaq_index.json,
  http://downloads.sodaq.net/package_sodaq_samd_index.json
  ```



- Go to Sketch - Include library - Manage libraries..., then type *sodaq* in the search field. Install the following libraries:

```
Sodaq_LIS3DE
Sodaq_LSM303AGR
Sodaq_nbIOT
Sodaq_UBlox_GPS
Sodaq_wdt
```



NOTE: these libraries provide example code for testing and debugging purposes, and the drivers for built-in GPS and accelerator modules. Should you use any other equipment, be aware that appropriate libraries have to be installed!

- Before compiling any code go to Tools and choose the appropriate board: *SODAQ SARA*, if you are using the board with embedded Arduino, and

Arduino M0 (NOT *Arduino M0 Pro*) for the old boards with attached Arduino. Connect the board and select the proper serial port. Do not change anything in Programmer field.

- The example programmes should be available under File - Examples - Examples from SODAQ SARA or Examples from Custom Libraries. It is enough to compile (verify) and then upload the code. Serial output can be seen in Serial Monitor (Tools - Serial Monitor). Remember to set the correct baud rate when sending any serial data to the board.

4 Tips&Tricks

1. After some (hard to say precisely) time of no packet transmission the device tends to enter a kind of "sleep mode", in which when you for example poll for statistics, you get the out-dated one. In such a case, try sending something or rebooting the device.

2. During configuration you may experience wrong values or errors right after issuing a command. Remember to wait a bit and give the device some time to process the commands. Try again and see the expected results (hopefully).

3. If the device is suddenly giving errors when trying to send packets, first try restarting the socket. If this helps not, reboot the device.

4. Generally, if the device stops working properly, starts giving errors, just reboot and reconfigure the device.

5. Remember that the output you get is different for the old board from the new one. The difference is mostly whether the output value is surrounded by quotation marks or not.

5 More help

`AT Commands manual for SARA modules:`
`https://www.u-blox.com/sites/default/files/SARA-N2_ATCommands_%28UBX-16014887%29.pdf`

```
AT+NRB

REBOOTING
.æf...Bÿ.
REBOOT_CAUSE_APPLICATION_AT
Neul
OK
AT+NCONFIG=CR_0354_0338_SCRAMBLING,TRUE
AT+NCONFIG=CR_0859_SI_AVOID,FALSE

OK
AT+NCONFIG?

+NCONFIG:AUTOCONNECT,FALSE
+NCONFIG:CR_0354_0338_SCRAMBLING,TRUE
+NCONFIG:CR_0859_SI_AVOID,FALSE

OK
AT+CFUN=0

OK
AT+CGDCONT=1,"IP","nb.internet"

OK
AT+CFUN=1

OK
AT+NBAND=20

OK
AT+COPS=1,2,"23801"

OK
AT+CSQ

+CSQ:15,99

OK
AT+CGATT?

+CGATT:1

OK
AT+CGPADDR

+CGPADDR:0,10.212.128.4

OK
AT+NUESTATS

Signal power:-905
Total power:-823
TX power:20
TX time:869
RX time:29850
Cell ID:11620236
DL MCS:0
UL MCS:0
DCI MCS:2
ECL:0
SNR:165
EARFCN:6445
PCI:172

OK
```

Figure 3: Example serial output (old board)