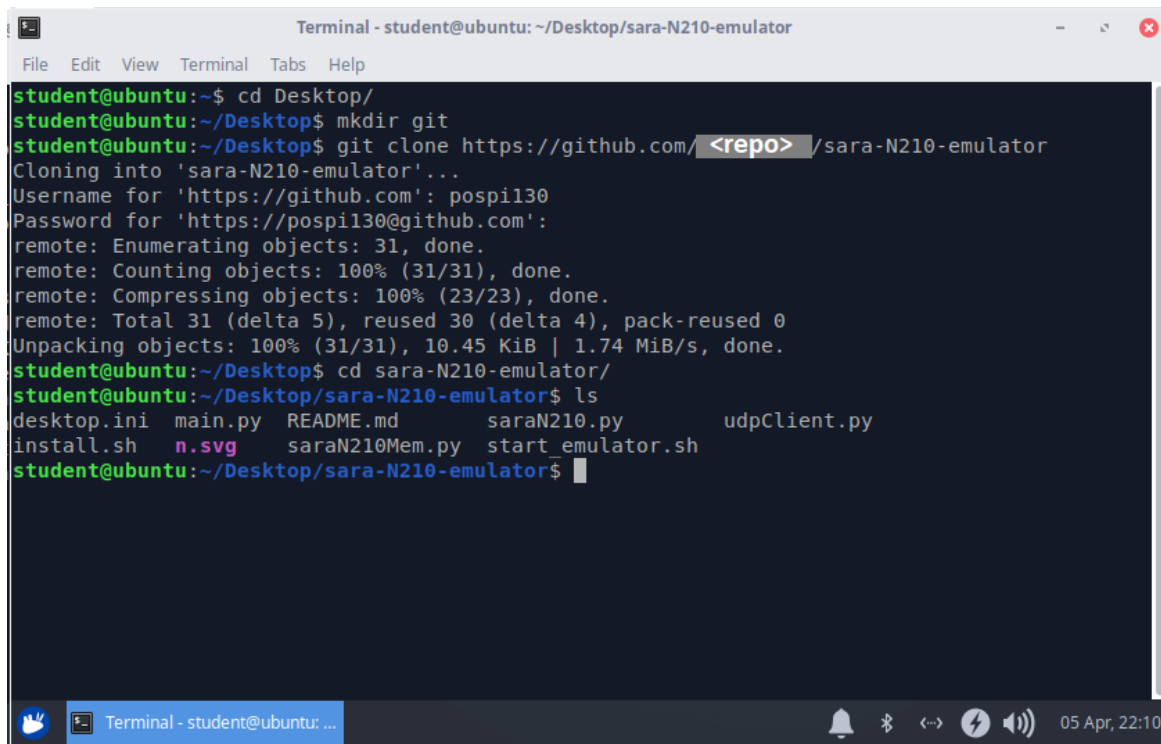


# Manual for the NB-IoT technology emulator

In the virtual machine (VMware: xIoT\_21)

Using the Terminal Emulator, create a folder .e.g. on Desktop, and clone the git repository:

```
cd Desktop
mkdir git
cd git
git clone https://github.com/BUTResearch/sara-N210-emulator
cd sara-N210-emulator
```



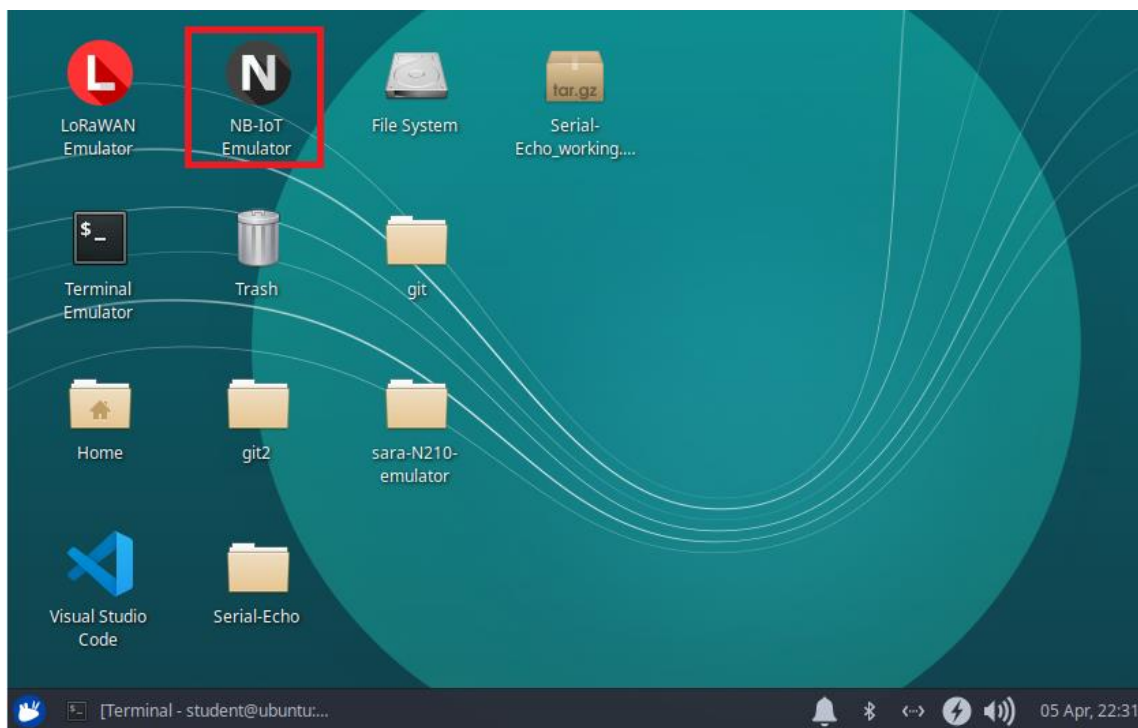
```
Terminal - student@ubuntu: ~/Desktop/sara-N210-emulator
File Edit View Terminal Tabs Help
student@ubuntu:~$ cd Desktop/
student@ubuntu:~/Desktop$ mkdir git
student@ubuntu:~/Desktop$ git clone https://github.com/<repo>/sara-N210-emulator
Cloning into 'sara-N210-emulator'...
Username for 'https://github.com': pospil30
Password for 'https://pospil30@github.com':
remote: Enumerating objects: 31, done.
remote: Counting objects: 100% (31/31), done.
remote: Compressing objects: 100% (23/23), done.
remote: Total 31 (delta 5), reused 30 (delta 4), pack-reused 0
Unpacking objects: 100% (31/31), 10.45 KiB | 1.74 MiB/s, done.
student@ubuntu:~/Desktop$ cd sara-N210-emulator/
student@ubuntu:~/Desktop/sara-N210-emulator$ ls
desktop.ini  main.py  README.md  saraN210.py  udpClient.py
install.sh  n.svg  saraN210Mem.py  start_emulator.sh
student@ubuntu:~/Desktop/sara-N210-emulator$
```

Then assign the correct rules to the install.sh file using the **chmod** command and run the install.sh script. The **install.sh** script will create a desktop emulator launch icon:

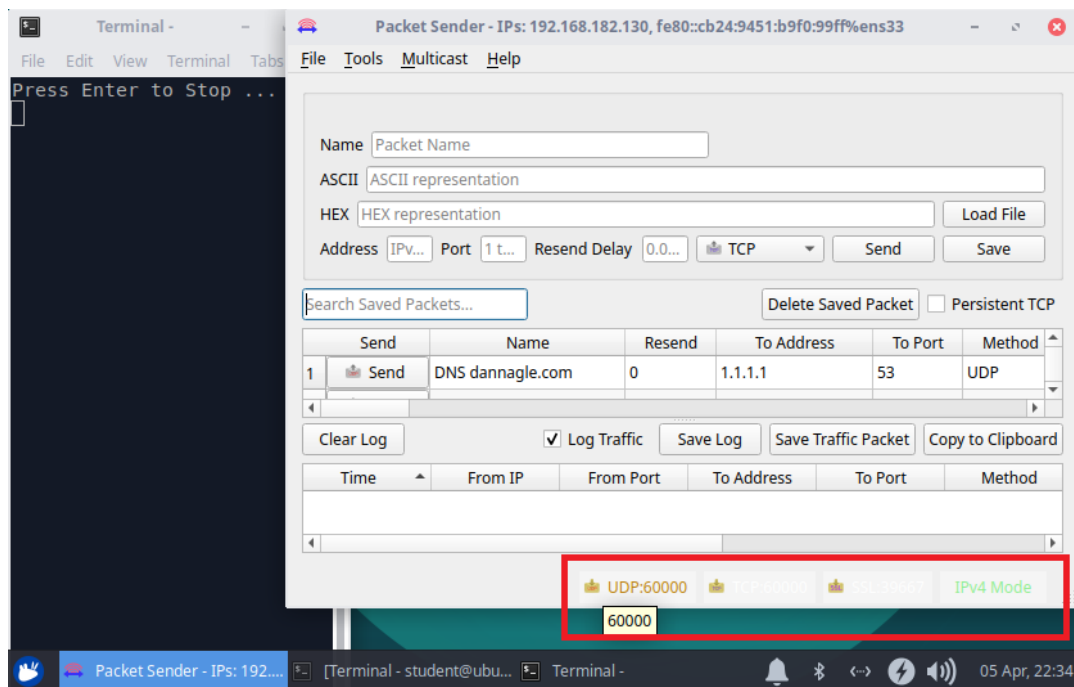
```
sudo chmod 755 install.sh
./install.sh
```

```
Terminal - student@ubuntu: ~/Desktop/sara-N210-emulator
File Edit View Terminal Tabs Help
student@ubuntu:~/Desktop/sara-N210-emulator$ sudo chmod 755 install.sh
student@ubuntu:~/Desktop/sara-N210-emulator$ ./install.sh
Requirement already satisfied: ping3 in /usr/local/lib/python3.8/dist-packages (2.7.0)
Reading package lists... Done
Building dependency tree
Reading state information... Done
packetsender is already the newest version (7.0.5-1).
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
student@ubuntu:~/Desktop/sara-N210-emulator$
```

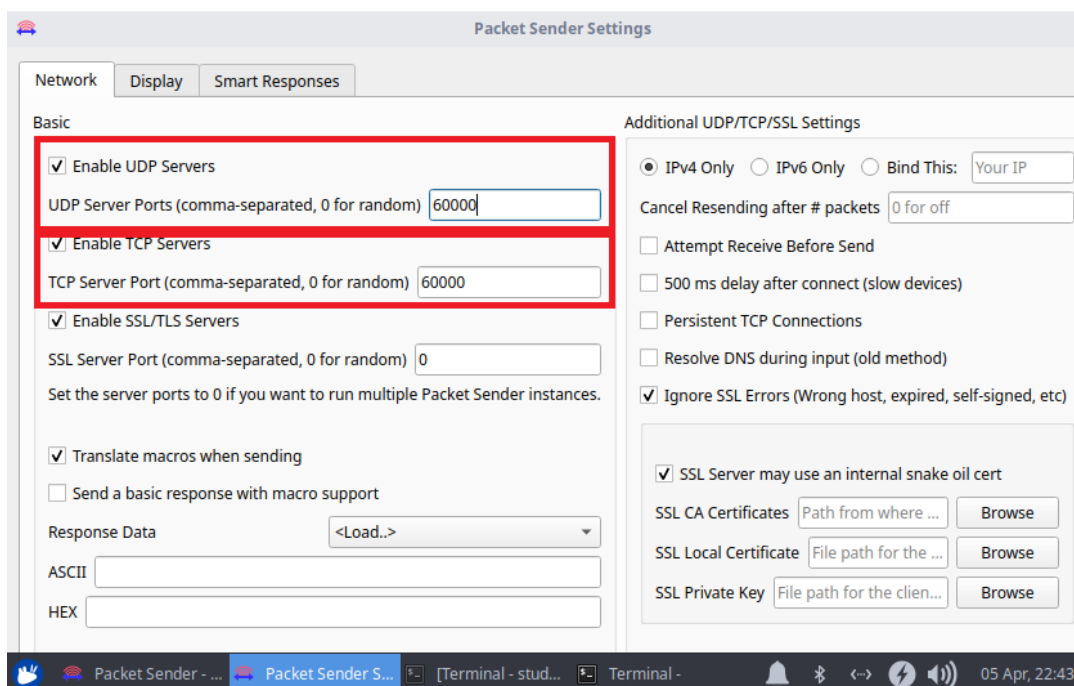
Run the **NB-IoT Emulator** program:



The two windows will show up. The **emulator's console** and **Packet Sender**. The **Packet Sender** program will be used for sending and receiving a packets (as a server-side for the modem emulator). As highlighted in the following picture, the program listens on the selected port (or randomly assigned).



To change the port number for UDP (or TCP) receive (depending on what type of communication will be used), go to the **File->Settings** and set the ports for the UDP (or TCP) separately. Then click **OK**. The program then listens to the selected ports.



If everything went OK, after sending a UDP datagram from the **custom application** using the NB-IoT emulator, the **Packet Sender** should show the received datagram.

Example of successful command sequence of sending UDP payload that is received by the **Packet Sender** (modem response in blue color):

```
//Check that modem works
```

```
AT
```

```
OK
```

```
// Enable URC (Unsolicited Result Code) messages that informs about the  
// connection state (0: disconnected, 1: connected)
```

```
AT+CSCON=1
```

```
OK
```

```
// Enable the modem full function
```

```
AT+CFUN=1
```

```
OK
```

```
// Set the Access point name (APN) e.g. "ep.inet.gdsp"
```

```
AT+CGDCONT=1,"IP","ep.inet.gdsp",0,0
```

```
OK
```

```
// Register to the network operator that has a number 23003 (Vodafone CZ)
```

```
AT+COPS=1,2,"23003"
```

```
OK
```

```
// Waiting till the modem sends: +CSCON: 1 (Means: connected), that might  
// take a few seconds
```

```
+CSCON: 1
```

```
// Create the socket - DATAGRAM (UDP), protocol: 17 (UDP), port: 60002,  
enable downlink notification: 1
```

```
AT+NSOCR="DGRAM",17,60002,1
```

```
+CSCON: 1,1
```

```
OK
```

```
// Send packet using the 0. socket, dest. addr: 127.0.0.1 address,
```

```
// port: 60000, payload: 0xAABB
```

```
AT+NSOST=0,"127.0.0.1",60000,2,"AABB"
```

```
0
```

```
OK
```

```
0,2
```

```
OK
```

Received UPD datagram in the Packet Sender:

Packet Sender - IPs: 192.168.182.130, fe80::cb24:9451:b9f0:99ff%ens33

FileToolsMulticastHelp

NamePacket Name

ASCIIASCII representation

HEXHEX representation

AddressIPv4, IPv6, DNS Loo...Port1 to 65535Resend Delay0.0/blank offTCP

SendSave

Load File

Search Saved Packets...

Delete Saved Packet

Persistent TCP

	Send	Name	Resend	To Address	To Port	Method	ASCII
1	Send	DNS dannagle.com	0	1.1.1.1	53	UDP	f7e30100000100000000...
2	Send	DNS example.com	0	8.8.8.8	53	UDP	918b0100000100000000...

Clear Log (1)Log TrafficSave LogSave Traffic PacketCopy to Clipboard

Time	From IP	From Port	To Address	To Port	Method	Error	ASCII	Hex
23:04:49.279	127.0.0.1	60002	You	60000	UDP		\aa\bb	AA BB

UDP 60000TCP 60000SSL 43973IPv4 Mode

Packet Sender - IPs: 192....main.cpp - Serial-Echo - ...Terminal -05 Apr, 23:11