



CAT-M Module USER GUIDE



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Software Acknowledgements

Document Revision History

Revision	Date	Description
1	09 30, 2016	Creation

Referenced Documents

	Revision	Date	Document Name	Document Title
	1	09 25, 2016	Cat-M_Board_user_manual	Cat-M Board user manual

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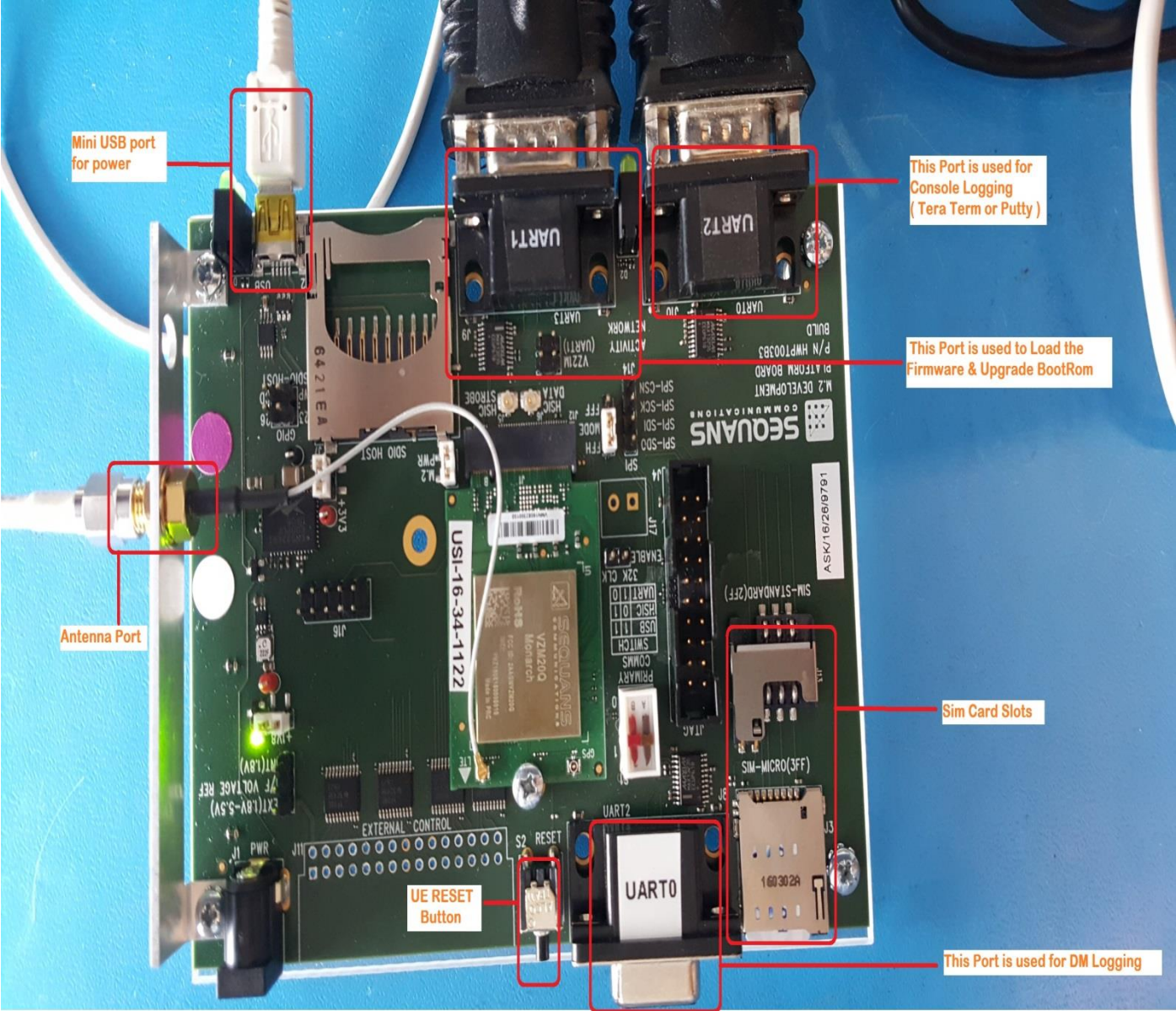
1.Introduction

This document describes how to use the Cat-M "Module" board, from boot to data traffic.

This document targets engineers who will need to use the Cat-M Module board for test activities and demos.

2.Board overview

The main interfaces and buttons are described in the picture below.



NOTE : A USB to Serial Adapter will be required to communicate with the Module

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3. Board boot up

3.1. MFW

MFW is based on default.ELF file.

Note : That currently the FW is to be pushed from the Laptop and hence requires a dedicated Laptop per UE to be used at all times. Bootup procedure below needs to be performed everytime the UE is USB Powered down or Reset is performed.

3.2. BAT file for FW flashing

Please contact your Sequans POC for Batch file to Flash the UE & Latest FW

Firmware file (*.elf) should be renamed to default.elf & be placed under SQN_CATM_DM_STP_V0.3\SQN_FW_Load\Firmwares (Please unzip the Batchfile to get this location. Note this folder can be placed & run from anywhere on your PC, however it is important that *.elf file be placed inside the Firmwares folder)

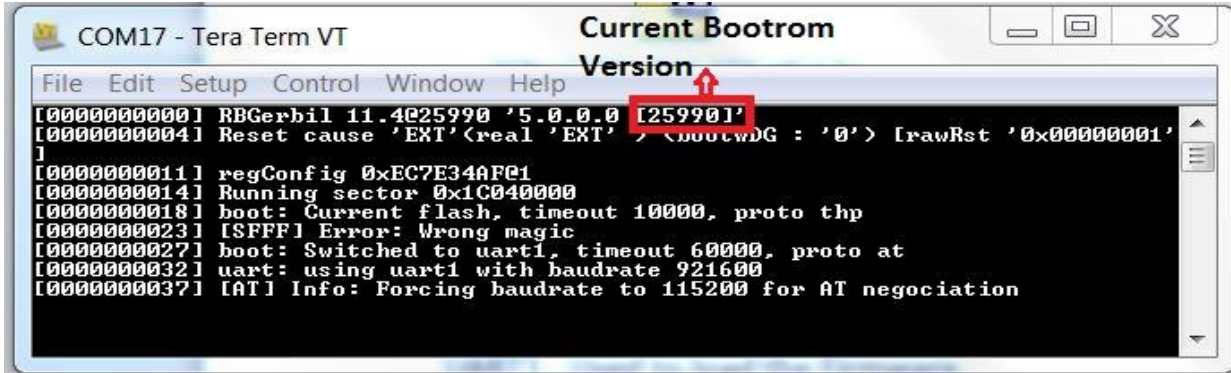
Note : Firmware file & Bootloader both are both in *.elf but can be differentiated by size. Firmware file is approximately 3+ megabytes while the Bootrom will be approximately 1.5 megabytes

3.3. Bootup

1. Connect USB cable on the laptop to power up. Serial Ports will appear as you connect them to different UART ports.
2. Use putty or teraterm to open UE console through UART2 with the baud rate 115200
3. On UE press on the Reset button to have UE loading the bootrom and to be able to load the firmware
4. Copy your *.elf into the folder "SQN_FW_Load/Firmwares" with the name "default.elf"
5. Modify the "load_SQN_CatM_Fw.bat" script so as to use your correct COM port Number instead of the preconfigured "COM45" & set the Baud rate to 921600
6. Run the "load_SQN_CatM_Fw.bat" script
7. When the FW finish to load with 100%.
8. Now you can start your DM
9. Let's configure the DM if it was not done
10. DM->File->Preferences-> the window "Configuration" will open
11. Tick "enable UART"; then type correct COMM port corresponding to UART0 in the port name, use baud rate 921600 instead of 115200 on the baudrate section
12. Click on OK. Using the UART0 serial port UE can now be seen connected on the DM.

3.4. Bootloader Update

To check the current Bootrom Version Log into UE through console Port & The first line displays the current version of Bootrom.



Steps to update the Bootrom:

1. Connect UE USB cable on the laptop. Serial Ports will appear as you connect them to different UART ports.
2. Use putty or teraterm to open UE console through UART2 with the baud rate 115200 and keep it open all the while.
3. On UE press on the Reset button to have UE load the bootrom and to see the current version.
4. Copy your *.elf into the folder "SQN_FW_Load/Firmwares" with the name "default.elf" . Modify the "load_SQN_CatM_Fw.bat" script so as to use your correct COMM port Number instead of the preconfigured "COM45" & set the Baud rate to 921600
5. Run the "load_SQN_CatM_Fw.bat" script
6. When the FW finish to load with 100%.
7. Go back to already open console port and press Enter. Mtools dedicated application text will appear on screen.
8. To upgrade the Bootrom use the following commands.
AT (Press Enter)
AT+SMBB=0,"DROP" (Press Enter)
9. Bootrom is updated when console port returns "OK". Reset the UE Manually or use AT^Reset & from next boot up updated bootrom will be used.

See below image highlighting the above steps.

```
COM17 - Tera Term VT
File Edit Setup Control Window Help
-----
5.0.0.0 [26014] by robot-soft at 2016-09-21 20:24:25 LPU DLP start
Wait for LPU to boot ...
SLO started
version 1
LPU ready
mTools dedicated application.
-----
-> AT
value = 1 = 0x1
$ AT+SMBB=0,"DROP"

ERROR
$ AT+SMBB=0,"DROP"

OK
$ at^RESET
[0000000000] RBGerbil 11.4026014 '5.0.0.0 [26014]'
[0000000004] Reset cause 'SW'(real 'SW' ) <bootWDG : '0'> [rawRst '0x00000004']
[0000000011] regConfig 0xEC7E34AFC1
[0000000014] Running sector 0x1C080000
[0000000018] boot: Current flash, timeout 10000, proto thp
[0000000023] [SFFF] Error: Wrong magic
[0000000026] boot: Switched to uart1, timeout 60000, proto at
[0000000032] uart: using uart1 with baudrate 921600
[0000000037] [AT] Info: Forcing baudrate to 115200 for AT negotiation
```

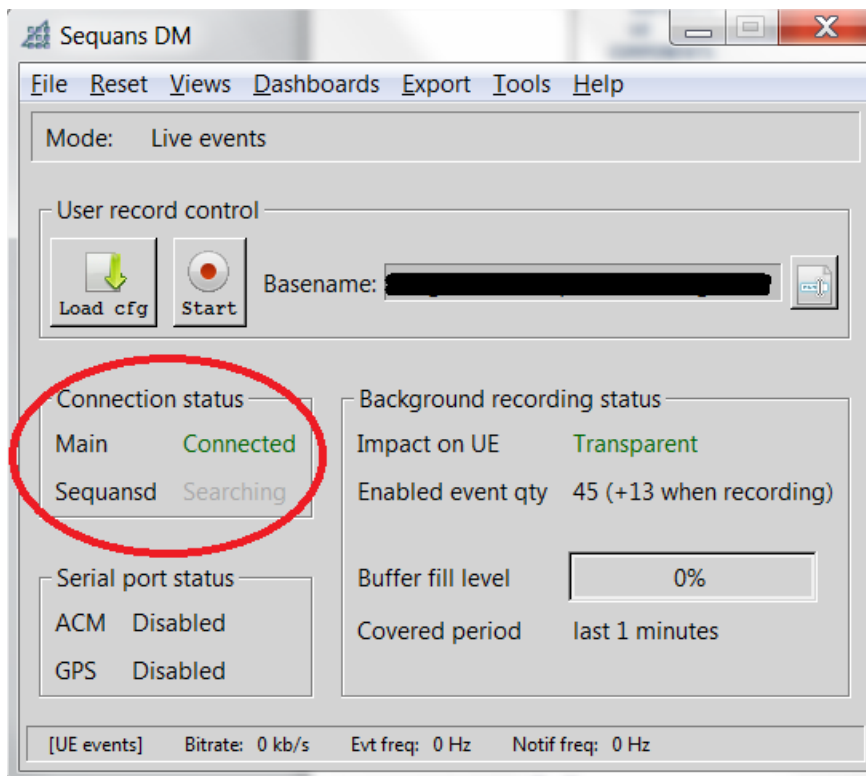
Please Note : Currently Reverting back to Older Bootrom is not compatible.

4. DM connection

Please contact Sequans POC for latest Version of DM tool.

4.1. Start DM

1. Click on “4G Debug & Monitoring tool”; Sequans DM window shall be displayed as below:



2. If not, make sure “File->Offline Mode” is untick.

4.2. Activate light events

1. Click on “Views->Record config”

The screenshot shows the 'Record configuration (LIVE)' window. The 'Event selection' section is highlighted with a red box, containing the 'Add base events' button. Below this, a list of covered groups and events is shown. The 'Enabled events (10)' table lists various events and their activation locations. The right side of the window shows options for user recording configuration import/export and scripts and log configuration.

Event selection

Buttons: Add base events, Clear all, Expand all, Collapse all

Covered groups: Base, LTE-PHY-DL, LTE-RRC, cli, fsm, lte, ul-link
Covered events: l1p-cinr0, l1p-cinr1, l1p-dl-ack,

Quantity	Event name	Activation loc
0	catMsg	Added when rec
0	cli-external-in	CLI External
0	cli-external-out	CLI External
0	cli-ims-in	CLI Ins
0	cli-ims-out	CLI Ins
0	cli-omadm-in	CLI Omadm
0	cli-omadm-out	CLI Omadm
0	cli-sequansd-in	CLI Sequansd
0	cli-sequansd-out	CLI Sequansd
0	cli-ue-in	CLI Ue
0	cli-ue-out	CLI Ue
4	em-auth-fsm	Added when rec
0	em-conn-fsm	Added when rec
0	em-main-fsm	Added when rec
0	em-tau-fsm	Added when rec
0	em-test-fsm	Added when rec
0	em-bearer-fsm	Added when rec
0	hp-cat-fsm	Added when rec
0	hp-main-fsm	Added when rec
0	hp-sms-mo-fsm	Added when rec
0	hp-sms-ut-fsm	Added when rec
0	hp-usim-fsm	Added when rec
0	l1p-cinr0	Added when rec
0	l1p-cinr1	Added when rec
n	l1p-dl-ack	Added when rec

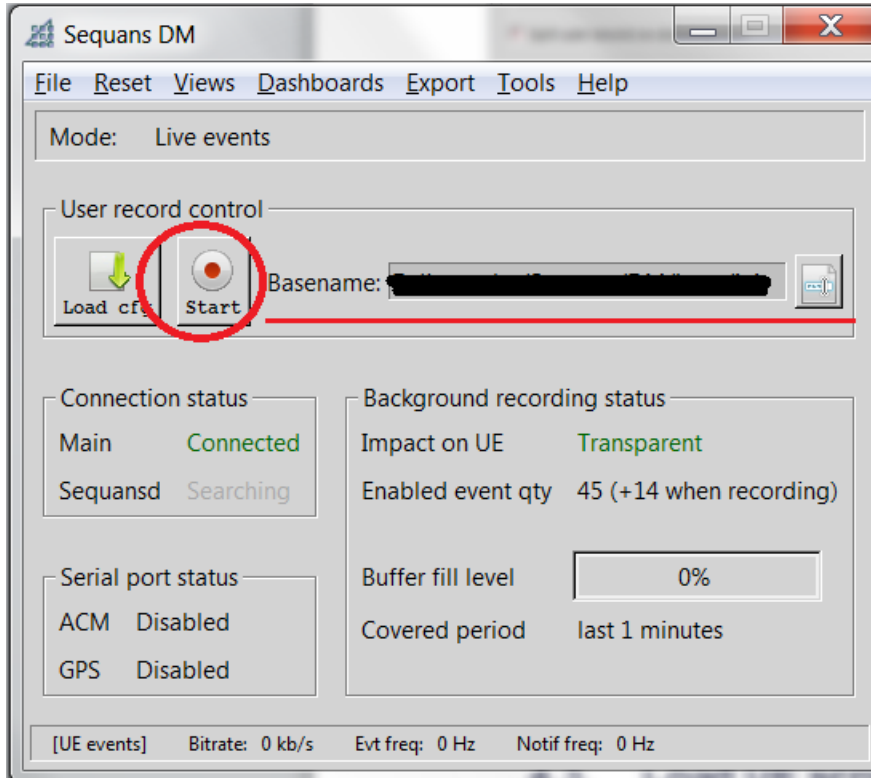
Event selection list:

- cli
- dl-link
- fsm
- gps
- log
- LTE-MAC
- LTE-PHY-DL
- LTE-PHY-UL
- LTE-RRC
- lte
- rt-logs
- sniff
- traffic
- ul-link
- zsp0
- zsp1

2. Click on “Add base events” this will enable basic LTE events, Add specific events if required.

4.3. Activate and stop DM logs

1. Before performing the test, activate DM logs by clicking on “Start” on “Sequans DM” window.



2. At the end of your test, stop DM logs by clicking on same button, then click on “Cancel”. DM logs are located at “Basename” path

4.4. Power up & Power Down the UE

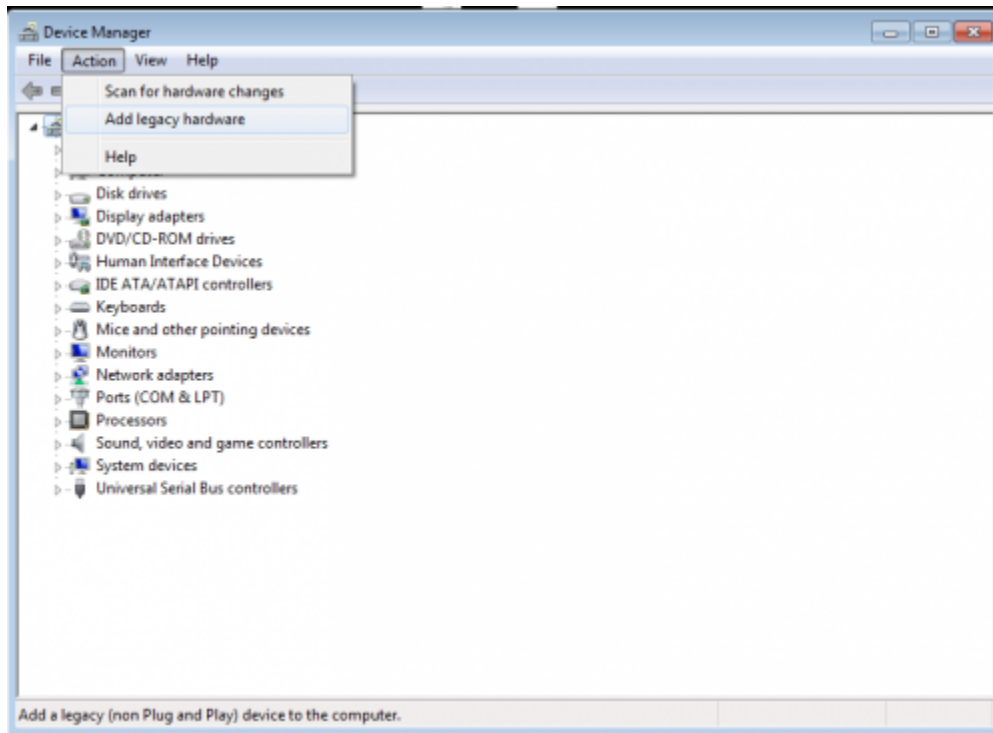
1. To power up the UE, type “poweron” then press Enter on “CLI for UE” window.
2. To power off the UE, type “poweroff” then press Enter on “CLI for UE” window.

Please run the command “addscanfreq 13 5230” before running any test in “CLI for UE” window

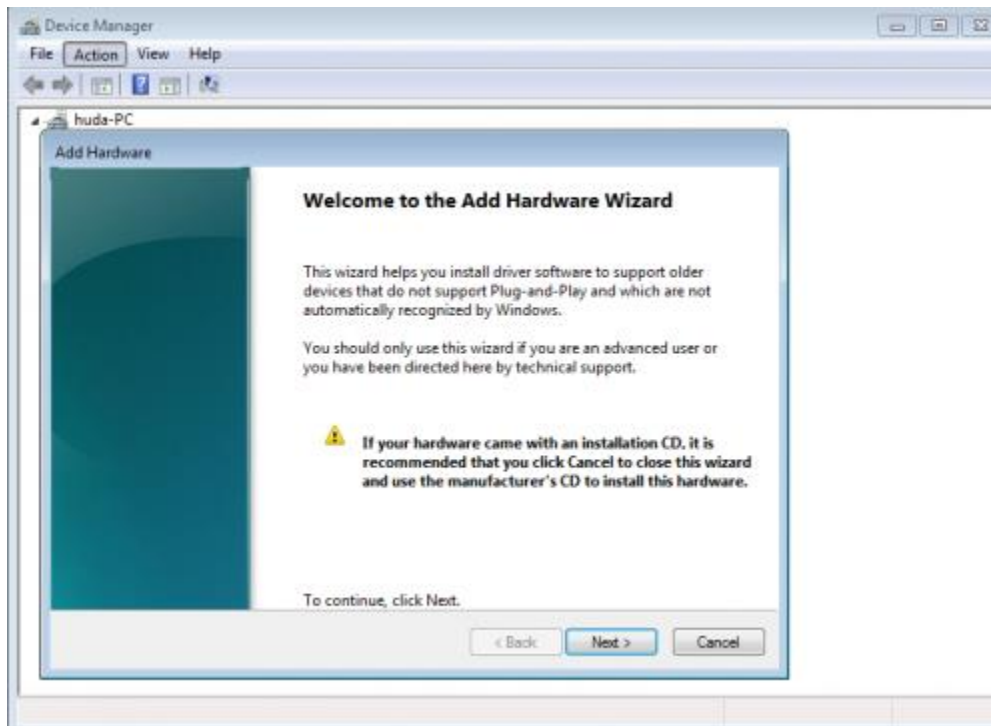
5. Establish Data Connection to PC

5.1. Setup the Modem & Baud Rate

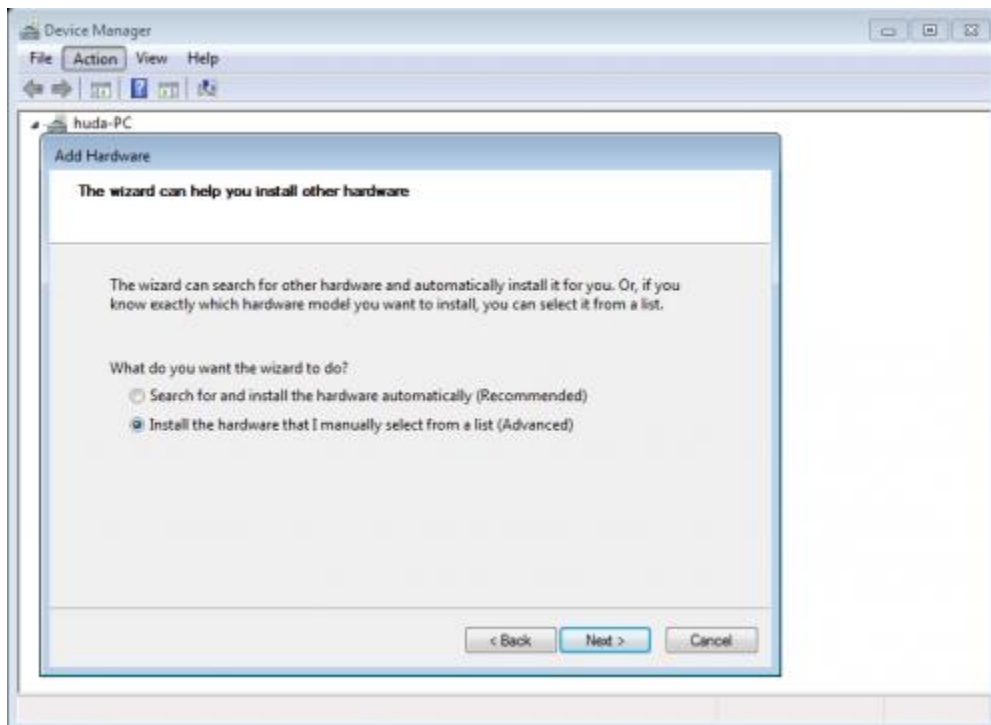
Open the device manager, click on Action→Add legacy hardware



Click on Next

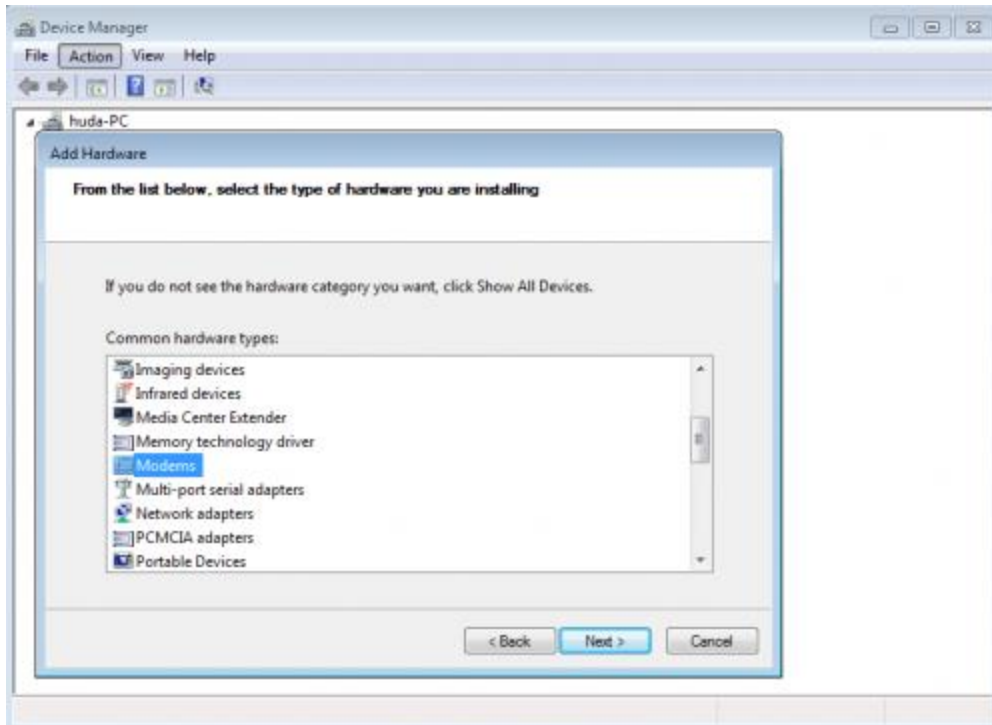


Select Install the hardware manually

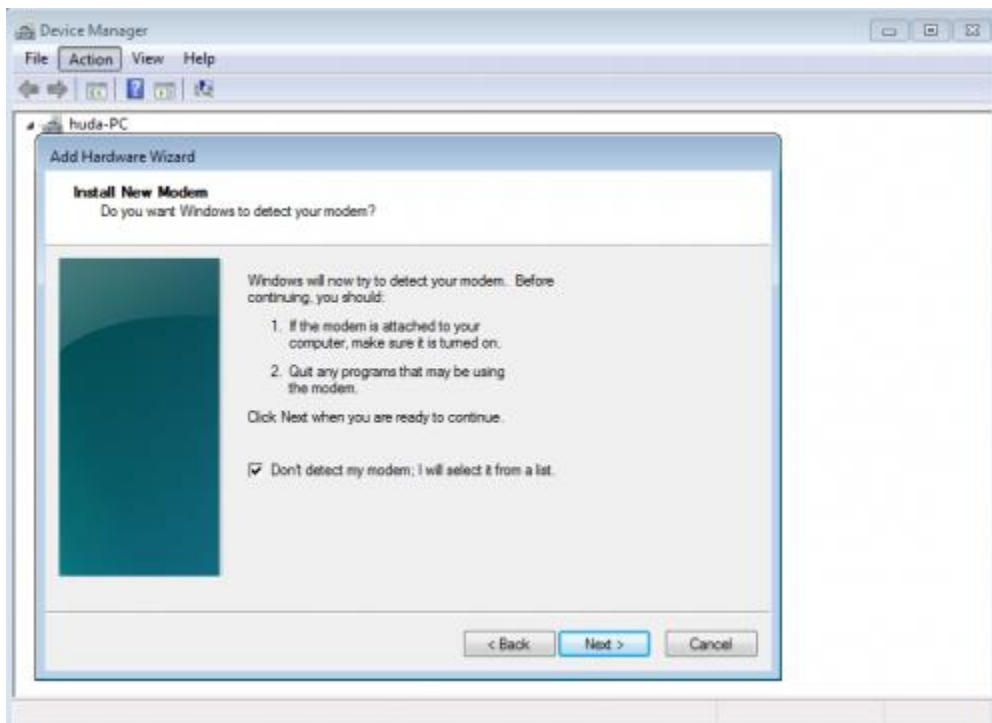


In the list, select Modem

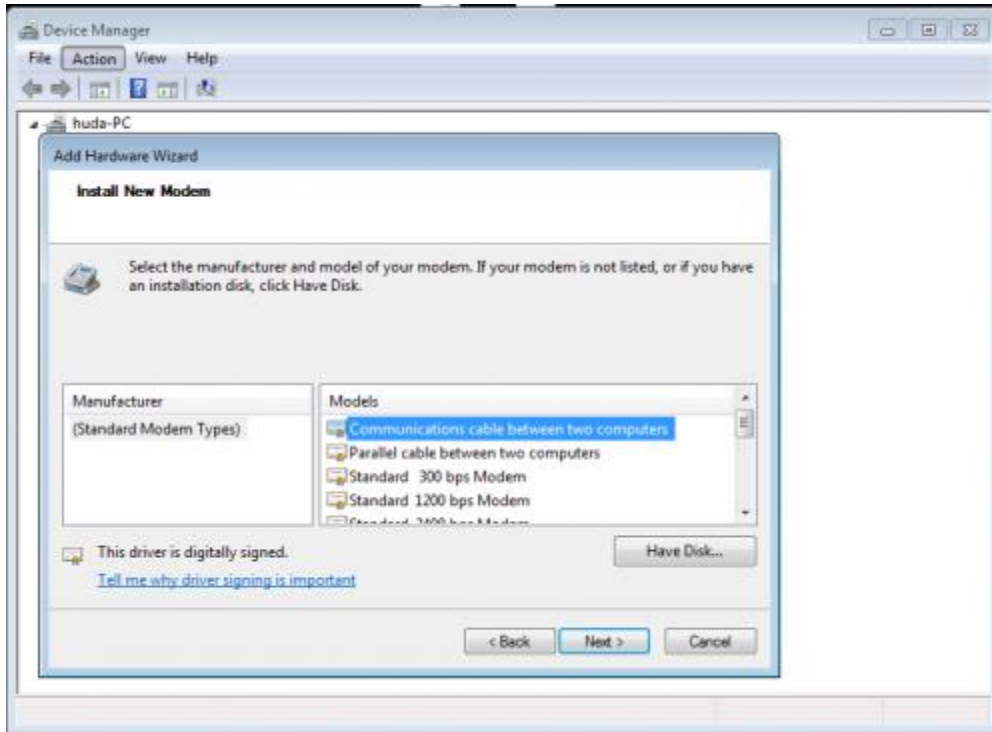
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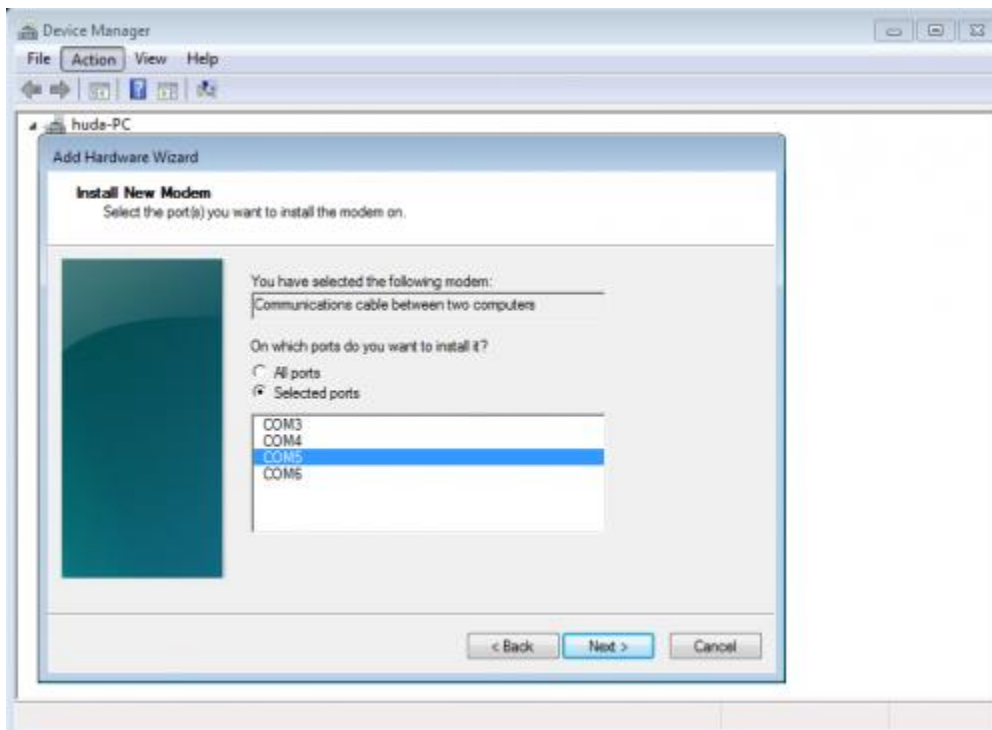
Check *Don't detect my modem*



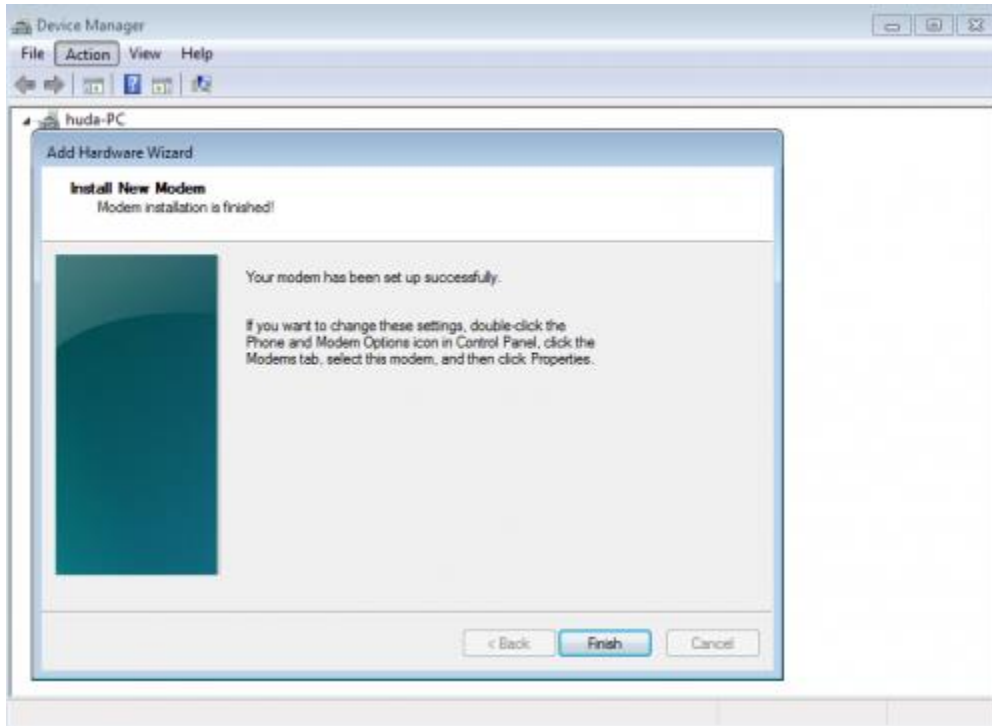
In the list, select *Communications cable between two computers*



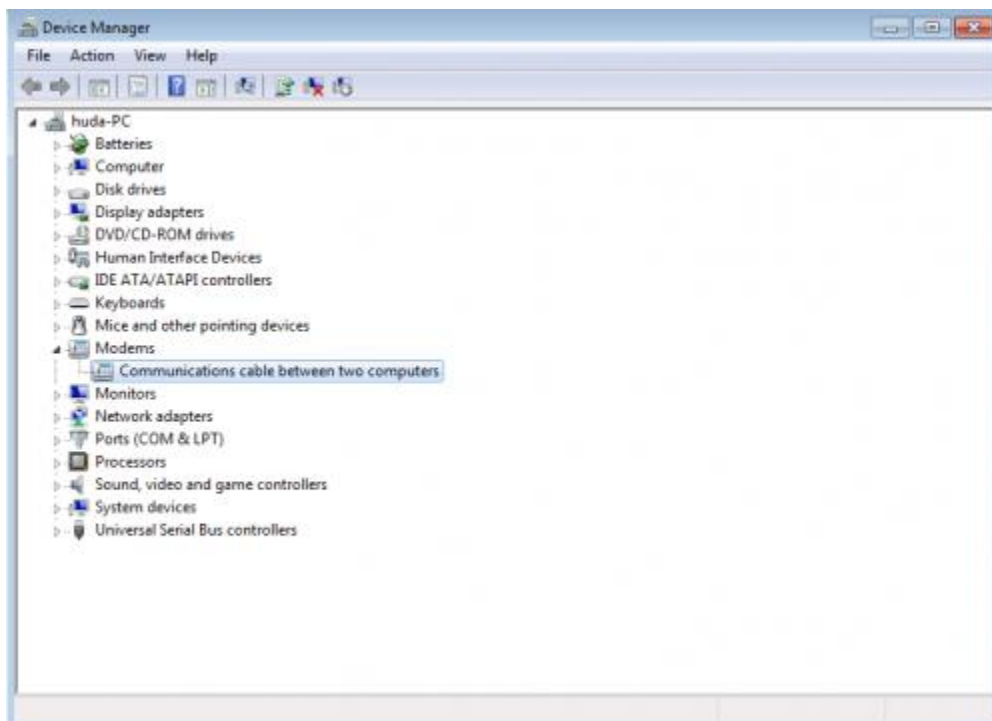
Select the COM port associated with the UART1 of the board (in this case, we use COM5)



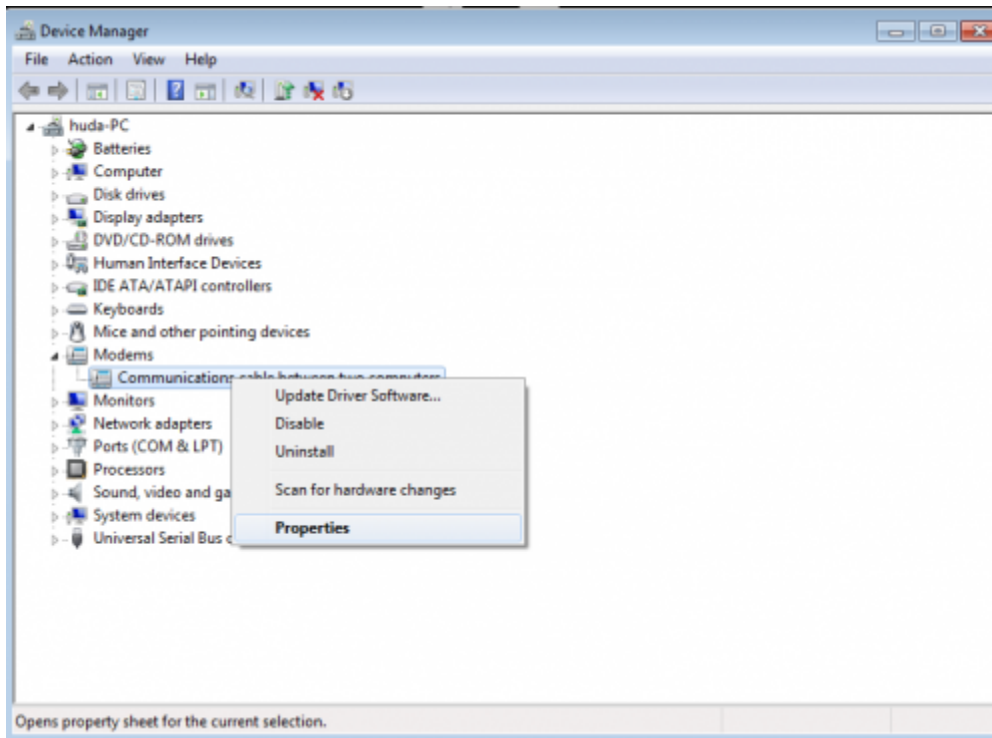
Click on Finish



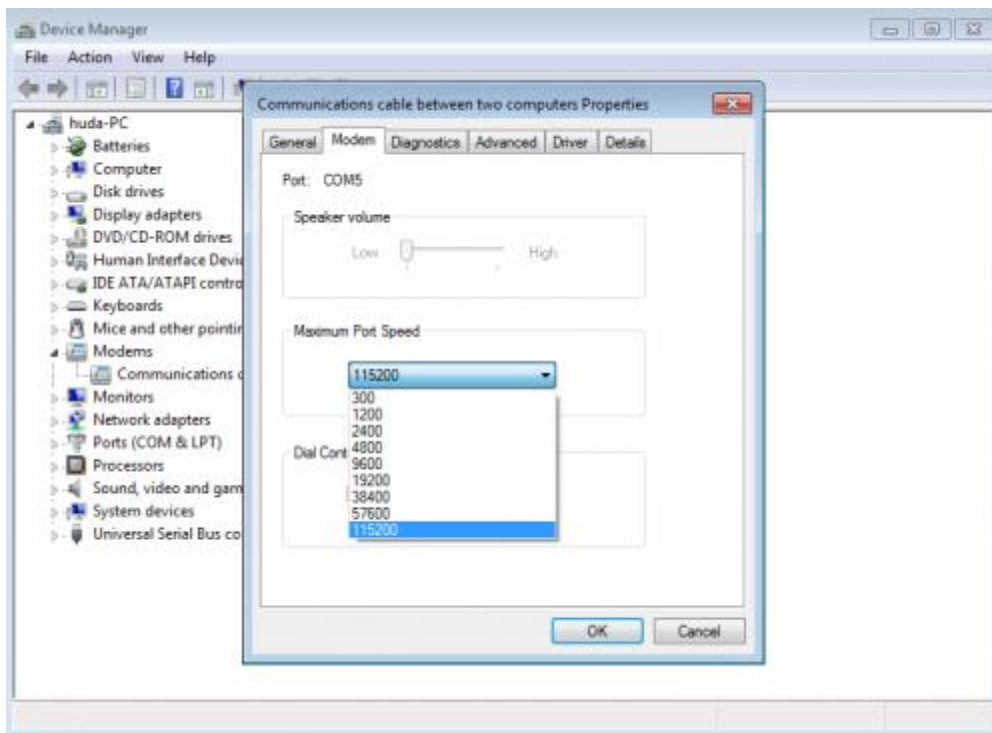
Now in the device manager, under the Modem section, you can see the Communications cable between two computers



Click right on it, and select Properties



In the tab Modem list the baudrates for Maximum Port Speed, you will see that the maximum value is 115200.

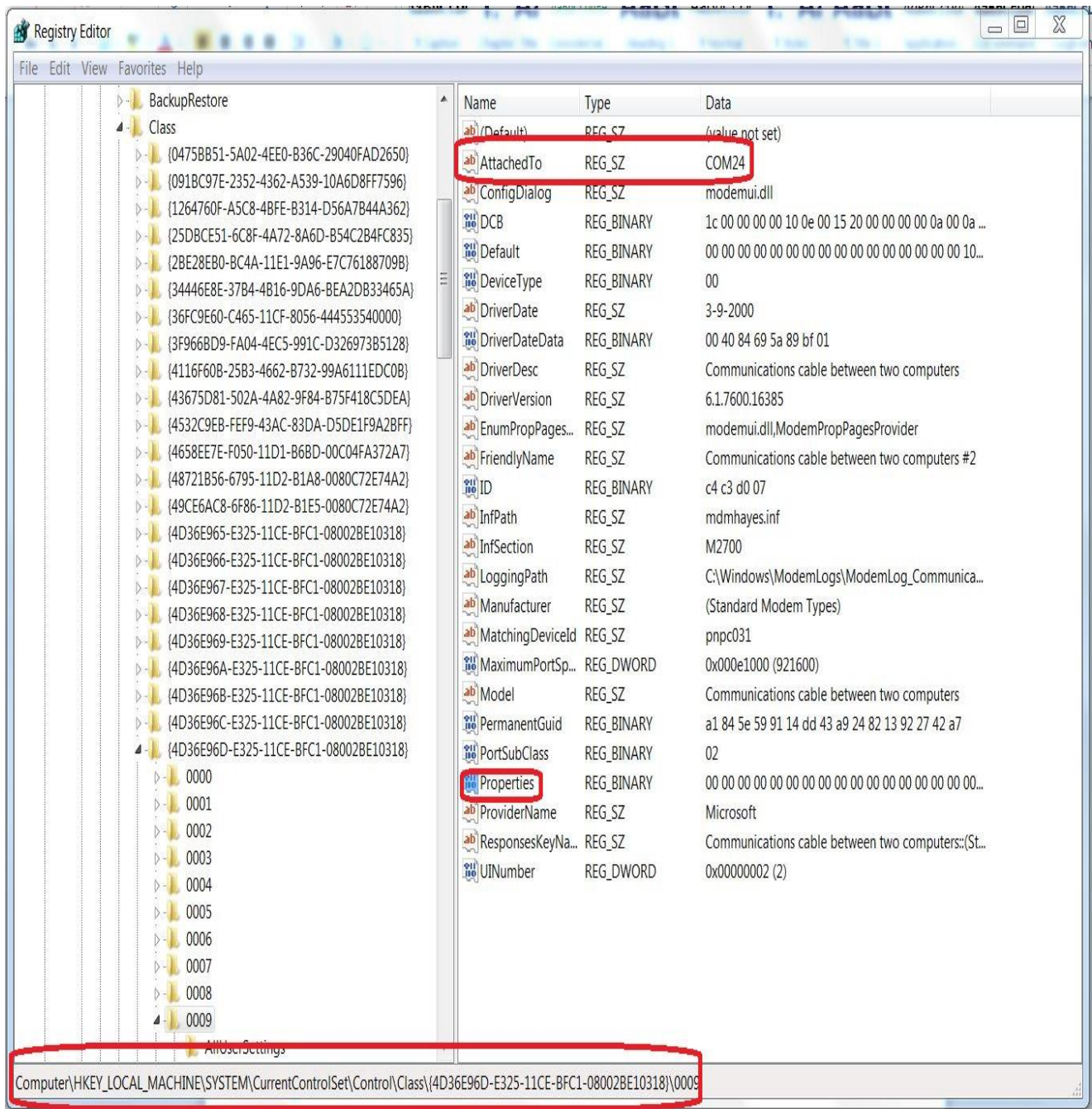


We want to make 921600 baudrate available. To do so we have to modify the base register.

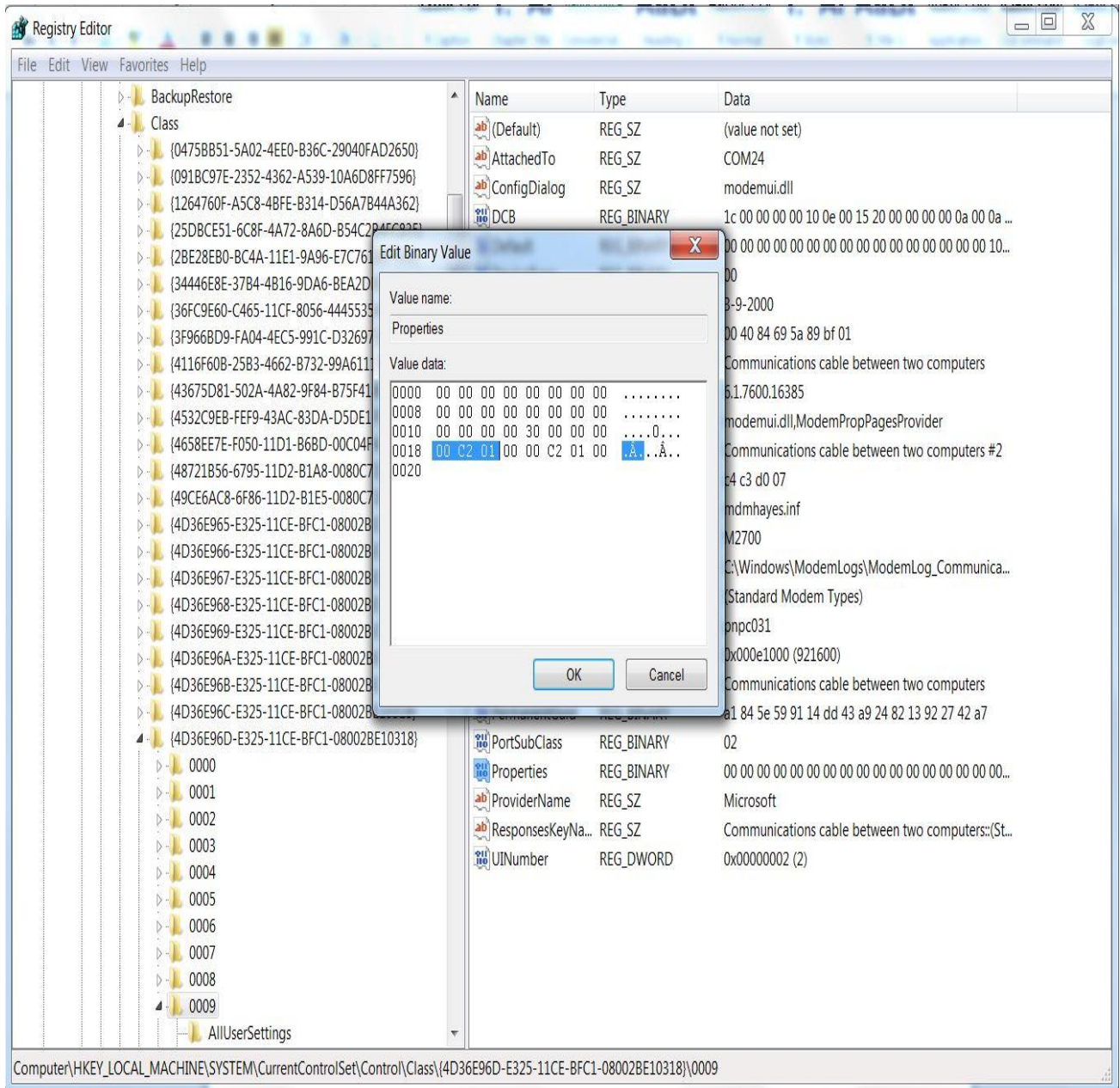
Close the Properties window and start regedit as administrator

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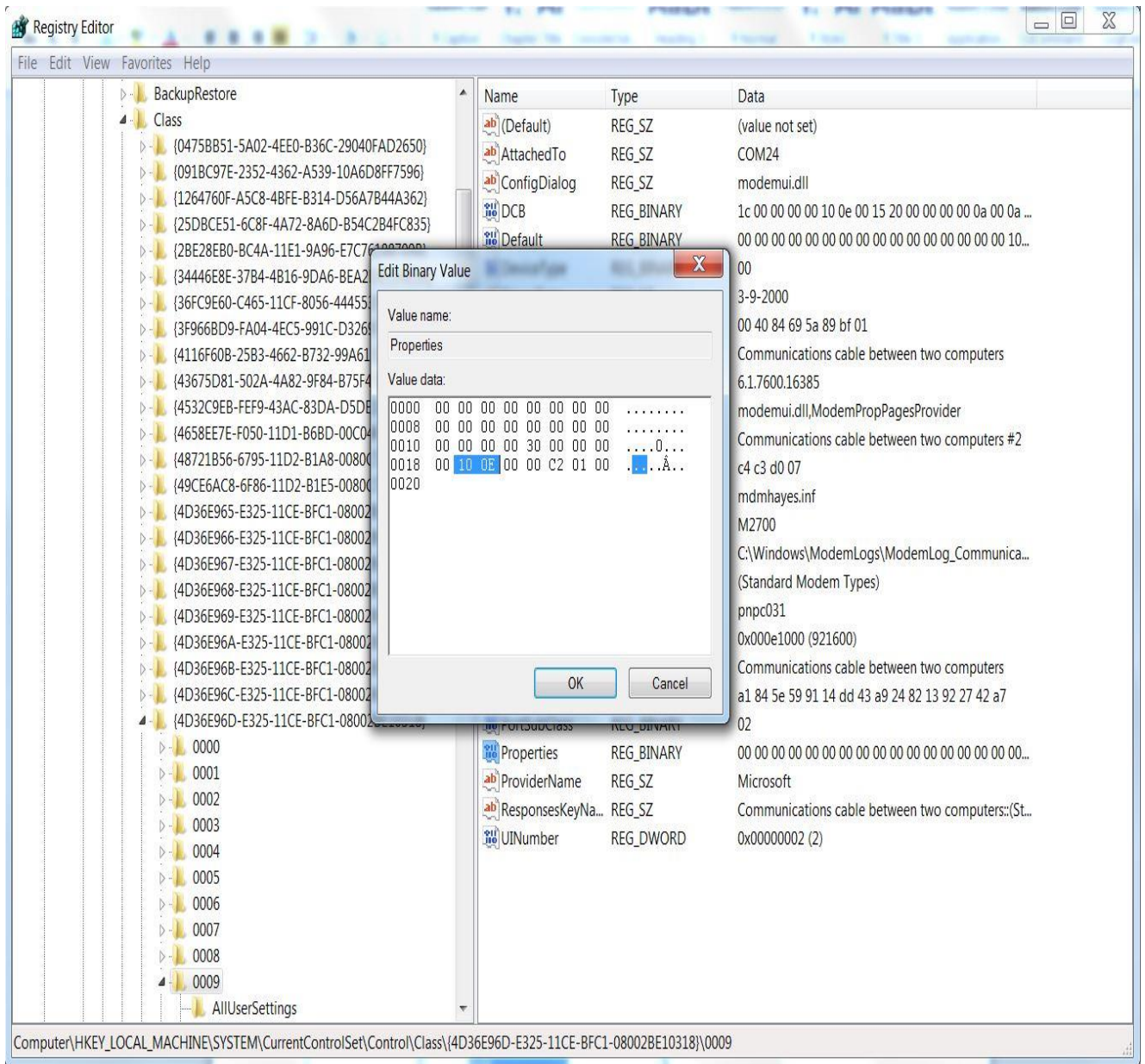
Go into HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\Class\{4D36E96D-E325-11CE-BFC1-08002BE10318}\0000 Check the AttachedTo field value matches the UART1 COM port. Here we have highlighted an example of COM24.



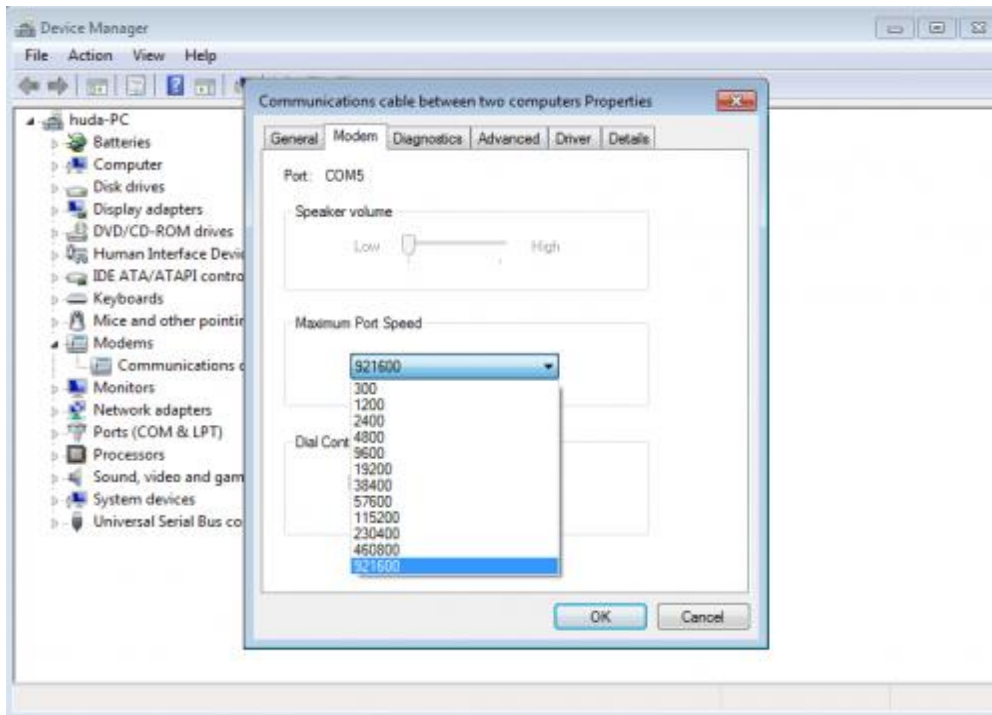
Double click on Properties



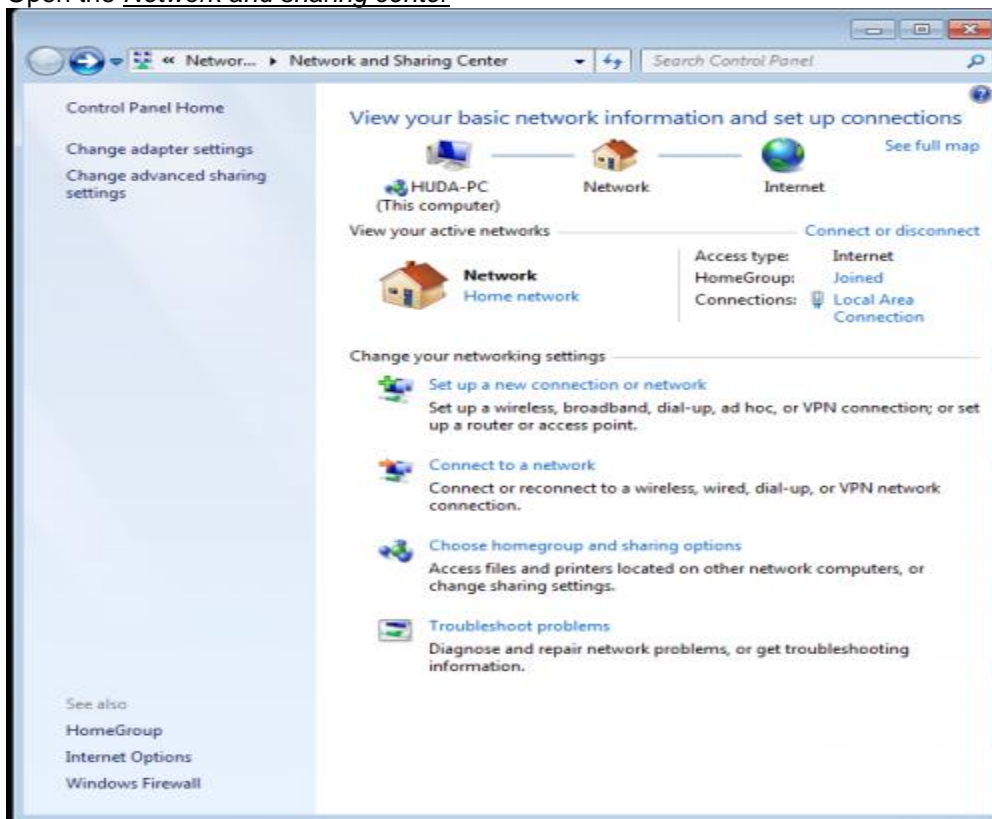
Find the first occurrence of 00 C2 01 00 and change it into 00 10 0E 00



Close regedit, return in the device manager and re-open the Properties window of Communications cable between two computers
 Select 921600 as maximum baudrate



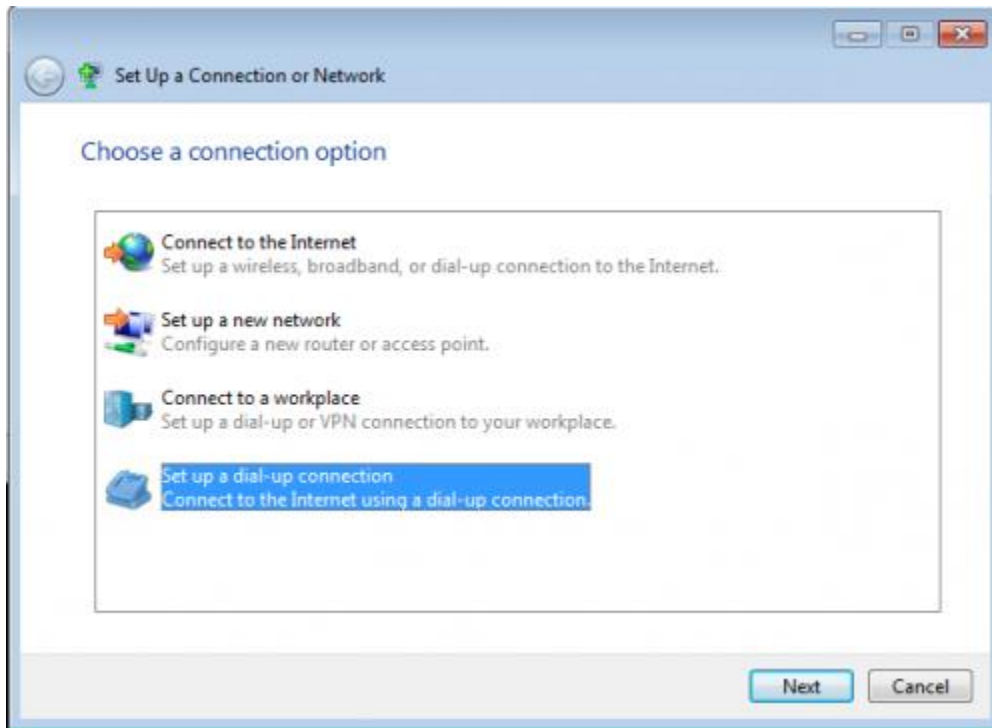
Open the Network and sharing center



Click on Set up a new connection or network

Select Set up a dial-up connection

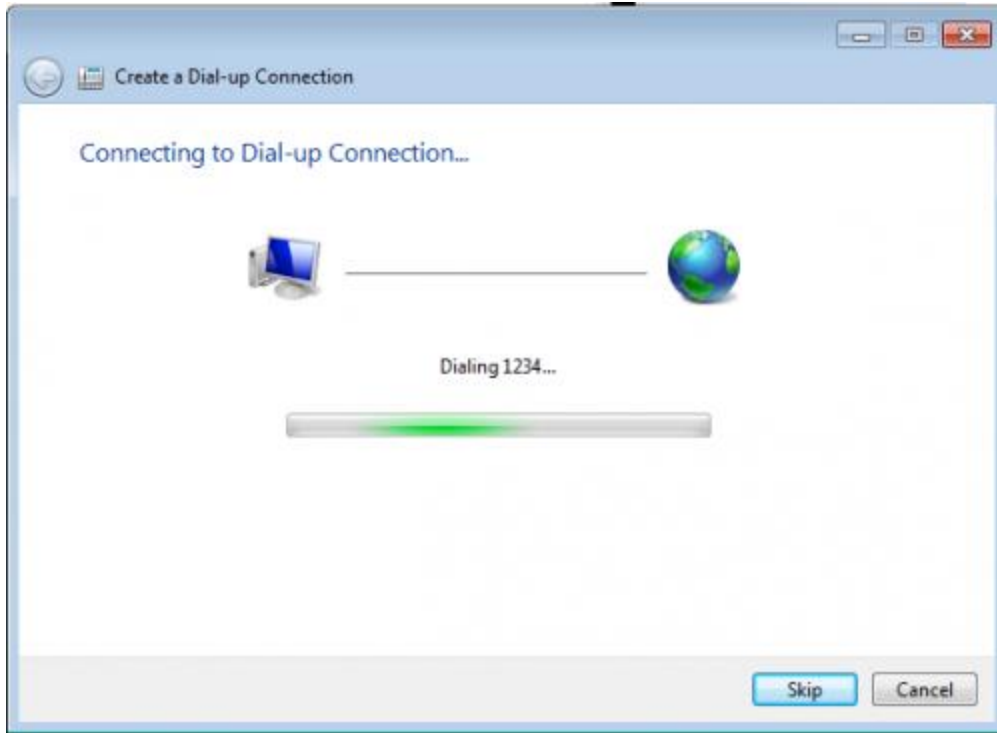
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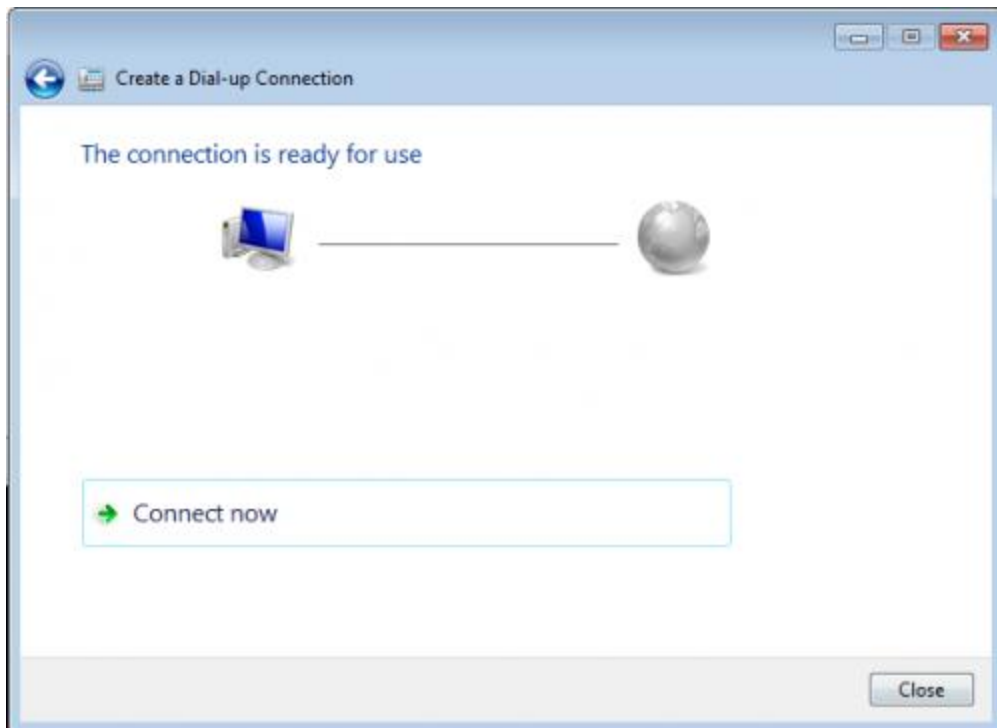
Put a dummy number in Dial-up phone number then click on Connect



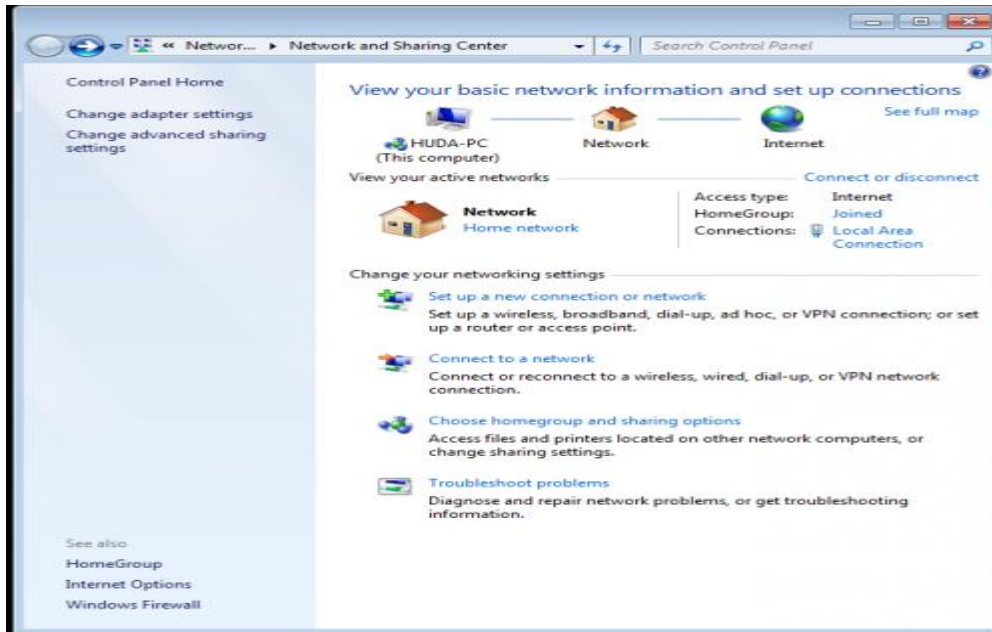
When the dialing window appear, click on Skip



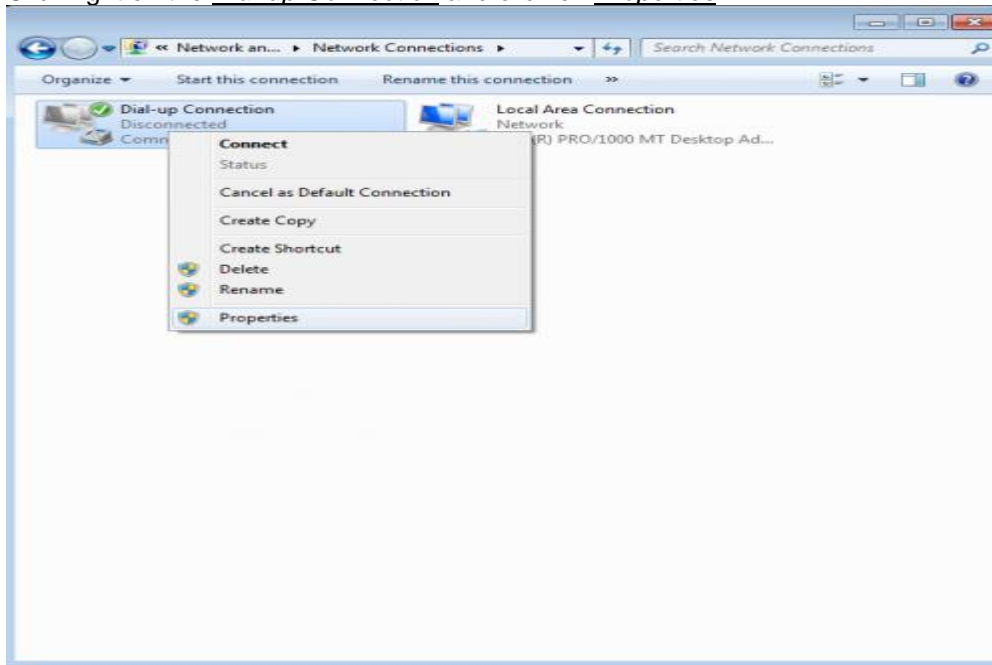
Click on Close on the next window



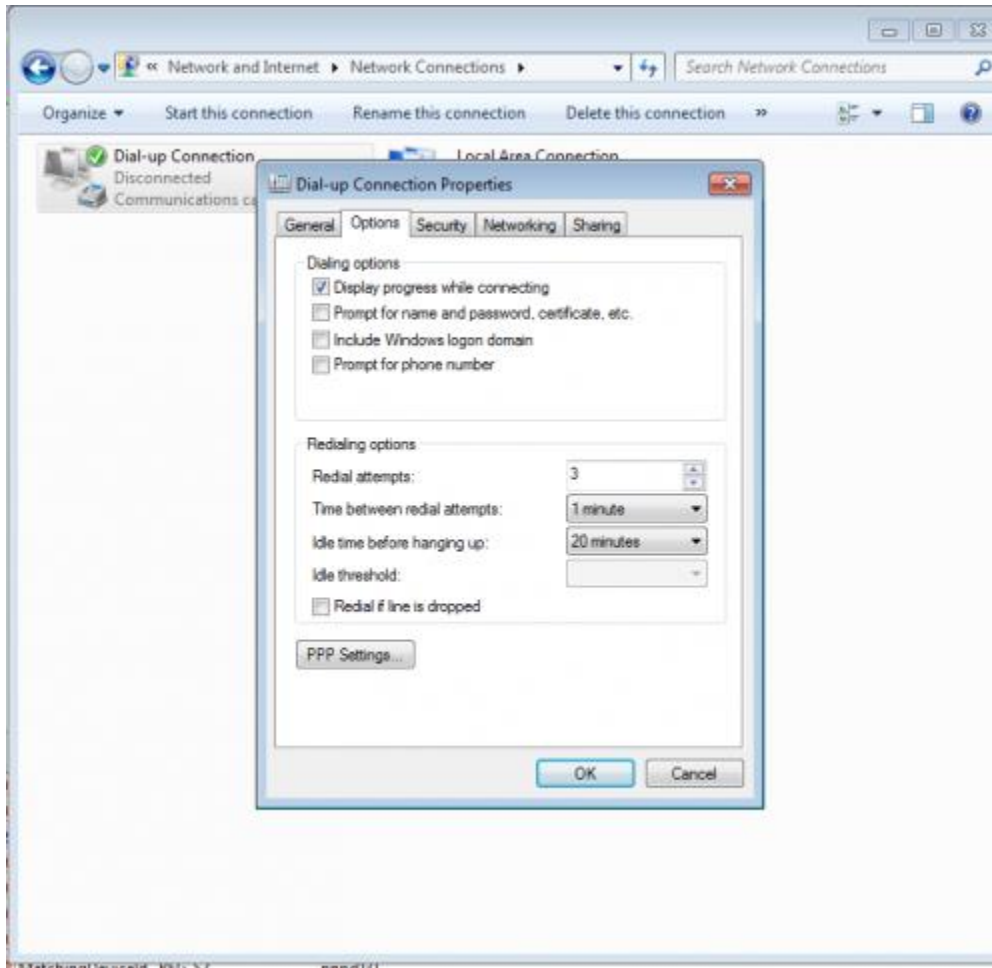
Return in the Network and sharing center and click on Change adapter settings on the top left
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Click right on the Dial-up Connection and click on Properties



In the Options tab, uncheck Prompt for name and password, certificate, etc. and Prompt for a phone number



Once the UE is ATTACHED to the Network, Type below commands to establish PPP connection to the Laptop

Connect to the UART1 port(Used to load the FW) with baud rate of 921600 & then

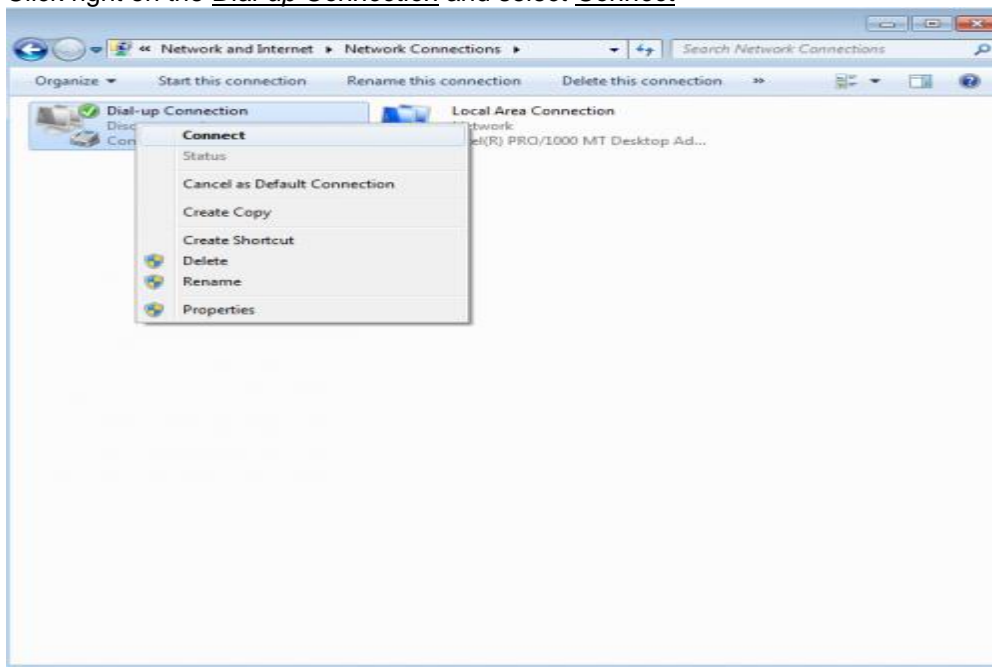
AT (Press Enter)

AT+CGDATA="PPP",1,1

Once you see Connect message close the window and proceed to Next Step.

Note : It is important to close the window as otherwise the port remains occupied and PPP connections is not established.

Click right on the Dial-up Connection and select Connect



A dialog window opens, passes quickly the connection steps until it shows Connected for a few seconds, then it closes itself.

The console of the board shows that PPP connection is established and shows the local and remote IP addresses.

