xN930 M.2 EVK User Guide

1VV0301121 Rev.0 – 2013-12-29

Making machines talk.

APPLICABILITY TABLE

PRODUCT
LN930
LN930-AP
HN930

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Contents

1 Introduction

This document is a technical specification for Telit's next generation form factor M.2 module family EVK. The next generation form factor M.2 module family is a natural transition from the PCI Express Mini Card and Half Mini Card to a smaller form factor size.
The M.2 Card Type 3042 offers single sided component mounting, 75 pins (8 dedicated for key), in a compact size (30 mm x 42 mm). A range of 2G/3G/4G (LTE) M.2 modules supporting multiple operating systems and unique features in the WWAN Card Type 3042 form factor are available.

1.1 Scope

The document will cover the hardware interfaces of the M.2 EVK presently available. It will also provide a detailed user guide for the M.2 EVK..

1.2 Purpose

The intent of this document is to provide user guidelines and information for M.2 EVK.

1.3 Audience

This document is intended for integrators and developers that are working with M.2 portfolio products.

1.4 Contact Information, Support

For general contact, technical support, to report documentation errors and to order manuals, contact Telit Technical Support Center (TTSC) at:

TS-EMEA@telit.com
TS-NORTHAMERICA@telit.com
TS-LATINAMERICA@telit.com
TS-APAC@telit.com

Alternatively, use:

http://www.telit.com/en/products/technical-support-center/contact.php

For detailed information about where you can buy the Telit modules or for recommendations on accessories and components visit:

http://www.telit.com

To register for product news and announcements or for product questions contact Telit Technical Support Center (TTSC).

Our aim is to make this guide as helpful as possible. Keep us informed of your comments and suggestions for improvements.

Telit appreciates feedback from the users of our information.

1.5 Document Organization

This document contains the following chapters (sample):

"Chapter 1: "Introduction" provides a scope for this document, target audience, contact and support information, and text conventions.

"Chapter 2: "Chapter two" gives an overview of the features of the product.

"Chapter 3: "Chapter three" describes in details the characteristics of the product.

"Chapter 6: "Conformity Assessment Issues" provides some fundamental hints about the conformity assessment that the final application might need.

"Chapter 7: "Safety Recommendation" provides some safety recommendations that must be follow by the customer in the design of the application that makes use of the AA99-XXX.

1.6 Text Conventions

Danger – This information MUST be followed or catastrophic equipment failure or bodily injury may occur.

Caution or Warning – Alerts the user to important points about integrating the module, if these points are not followed, the module and end user equipment may fail or malfunction.

Tip or Information – Provides advice and suggestions that may be useful when integrating the module.

All dates are in ISO 8601 format, i.e. YYYY-MM-DD.

1.7 Related Documents

- xN930 Hardware User Guide
- xN930_MBIM_Command_Functional_Specification
- xN930 AT Command Reference Guide

2 M.2 EVK Overview

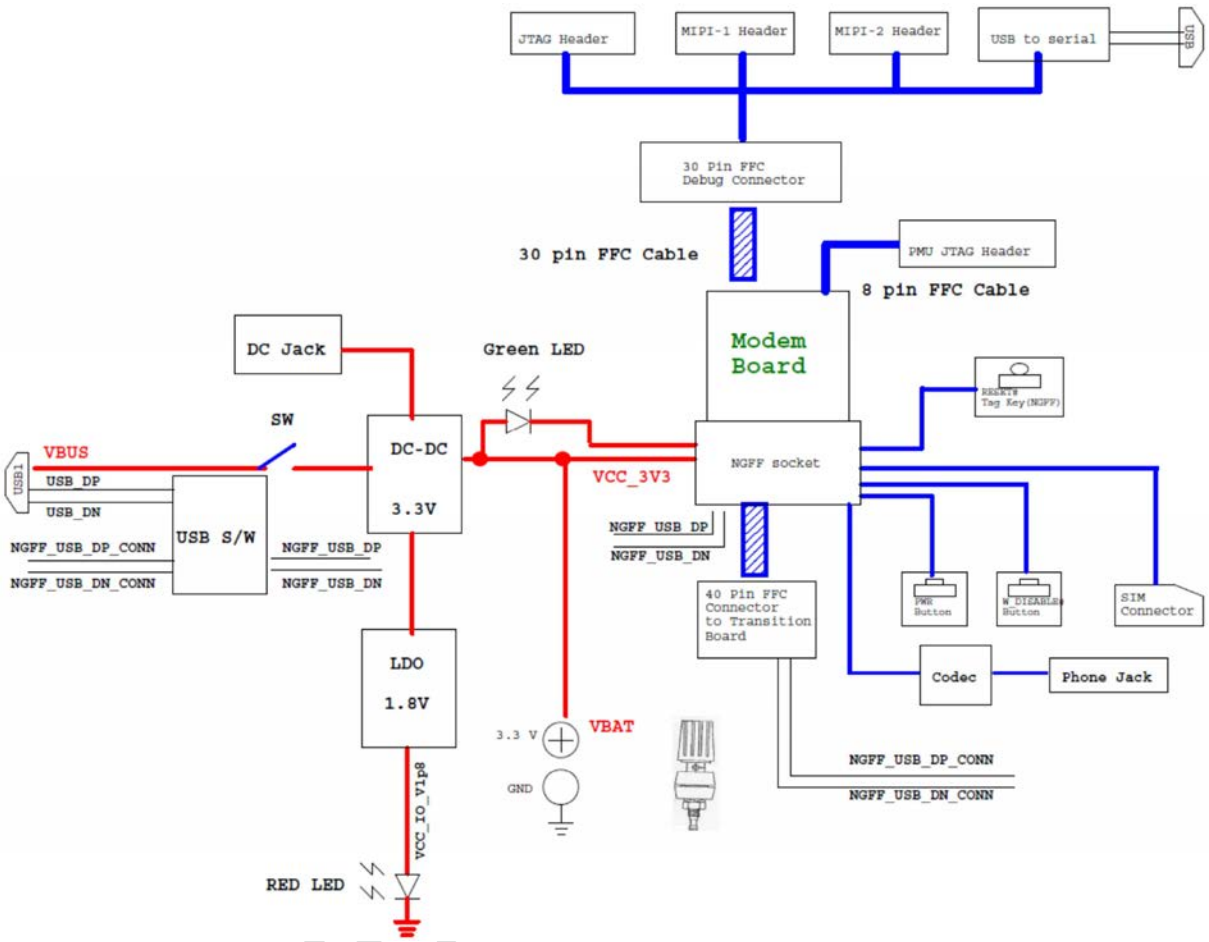

Figure 1 Board overview

2.1 M.2 Carrier Board Hardware revisions

User Guide of this Carrier board has been released a second time; therefore, there are 2 hardware revisions.

This document is only for SB0NFF2BK0D NGFF CARRIER BOARD Revision 2.0.

2.1.1 M.2 EVK Carrier Board Revisions

1st NGFF Carrier Board PCB-assemblies

SB0NFF2BK0B

NGFF CARRIER BOARD Rev 1.0

2nd NGFF Carrier Board PCB-assemblies

SB0NFF2BK0D

NGFF CARRIER BOARD Rev 2.0

Note. This document is only for Rev2.0 HW version.

3 M.2 EVK Carrier Board

3.1 General External IF and power supply

This NGFF Test Board includes the following:

Connectors:

- 1 USB for PC host (FIH modem Debug)
- 1 USB with USB-to-UART interface to support UART connection.
- 2 JTAG Connectors
  - For JTAG interface for modem and PMU, 2 standard 20 pin JTAG connector are used.
- 2 MIPI Connectors (MIPI_PTI1, MIPI_PTI2)
- 40 pin connector to transition Board
- eMMC daughter card connector
- (2)SIM and SD card sockets mounted on the bottom side of the carrier board
- 30 pin debug PCB is common across all FIH NGFF project. Mounted on the bottom side of the carrier board.
  - 30 pin debug FPCB must be connected between target and carrier board to use JTAG/MIPI/UART

Switches:

- On/off switch via ON1_N for Modem_power_off# and W_DISABLE#
- Tag switch for NGFF board reset
- RADIO OFF switch (to disable RF)
- USB PWR switch (Enable USVB VBUS to power up FIH)

Power Supplies:

- External 3.3V Power supply plug for simulated battery.
- USB VBUS - 5V to be regulated to 3.3V using DCDC
- 5V DC Jack – regulated to 3.3V

Power supply also could be supplied by either USB VBUS, 5V DC jack and 3.3V external power supply. However, it is not recommended to use USB VBUS since it cannot supply enough current for high power radio transmission.

3-way power supply

- USB cable can supply up to 500mA theoretically.
  - Be aware that LTE data call can consume more than 1A during calibration or high power radio transmission. This exceeds the capability of the USB VBUS source.
- External supply(3.3V) on banana plug – direct supply to NGFF card
- 5V DC jack can be used to supply power for carrier and modem board – DCDC regulated to 3.3V

USB VBUS power is disabled by USB VBUS ON/OFF switch, U2406. This must be turned off during normal operation. If firmware downloading without power supply is needed, turn on VBUS power supply and download firmware.

3.2 M.2 EVK Carrier Board Overview

Figure 2. gives a top view of the board. The location of the connectors, buttons and switches is outlined in

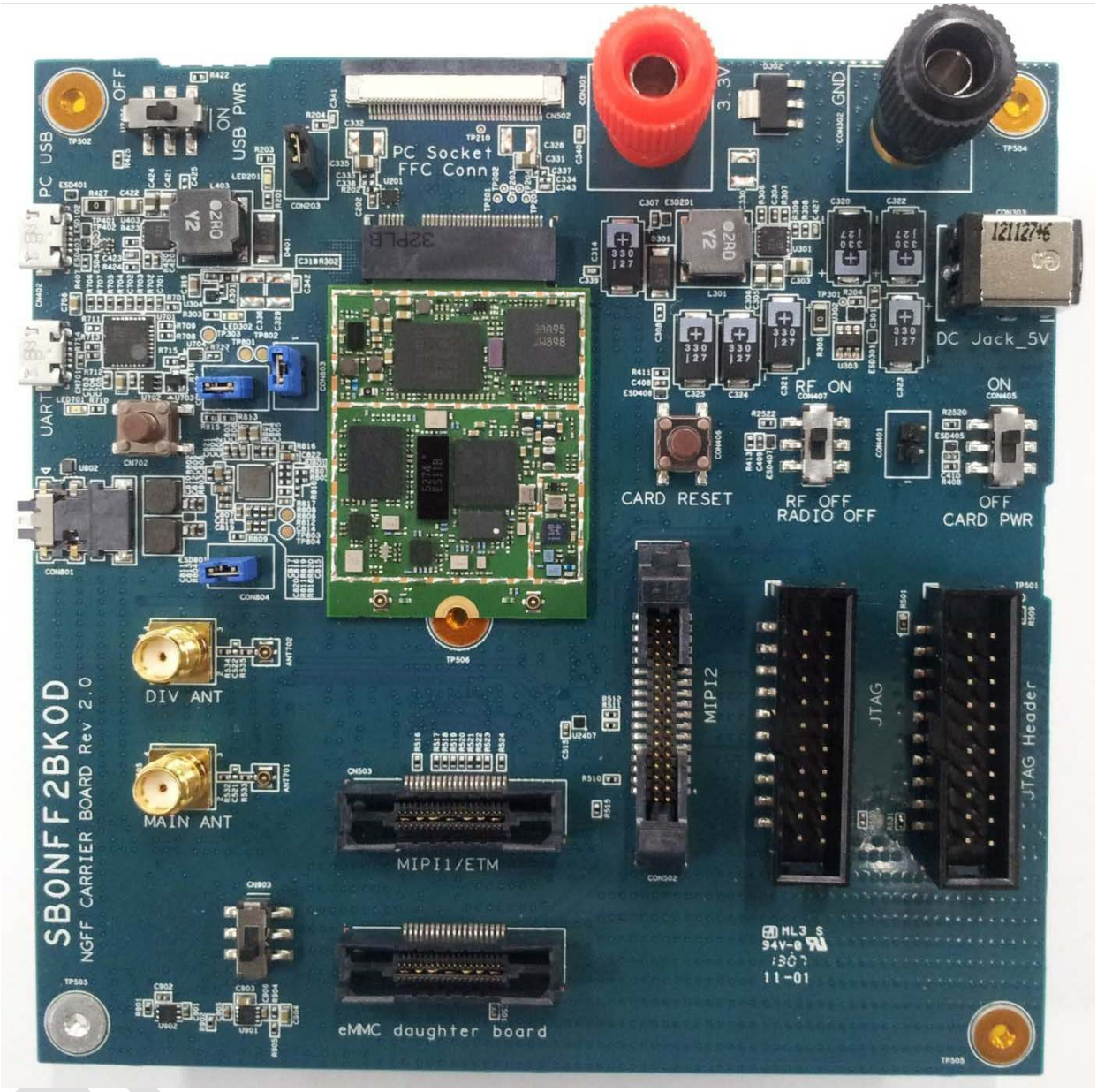

Figure 2 M.2 EVK Carrier Board top view

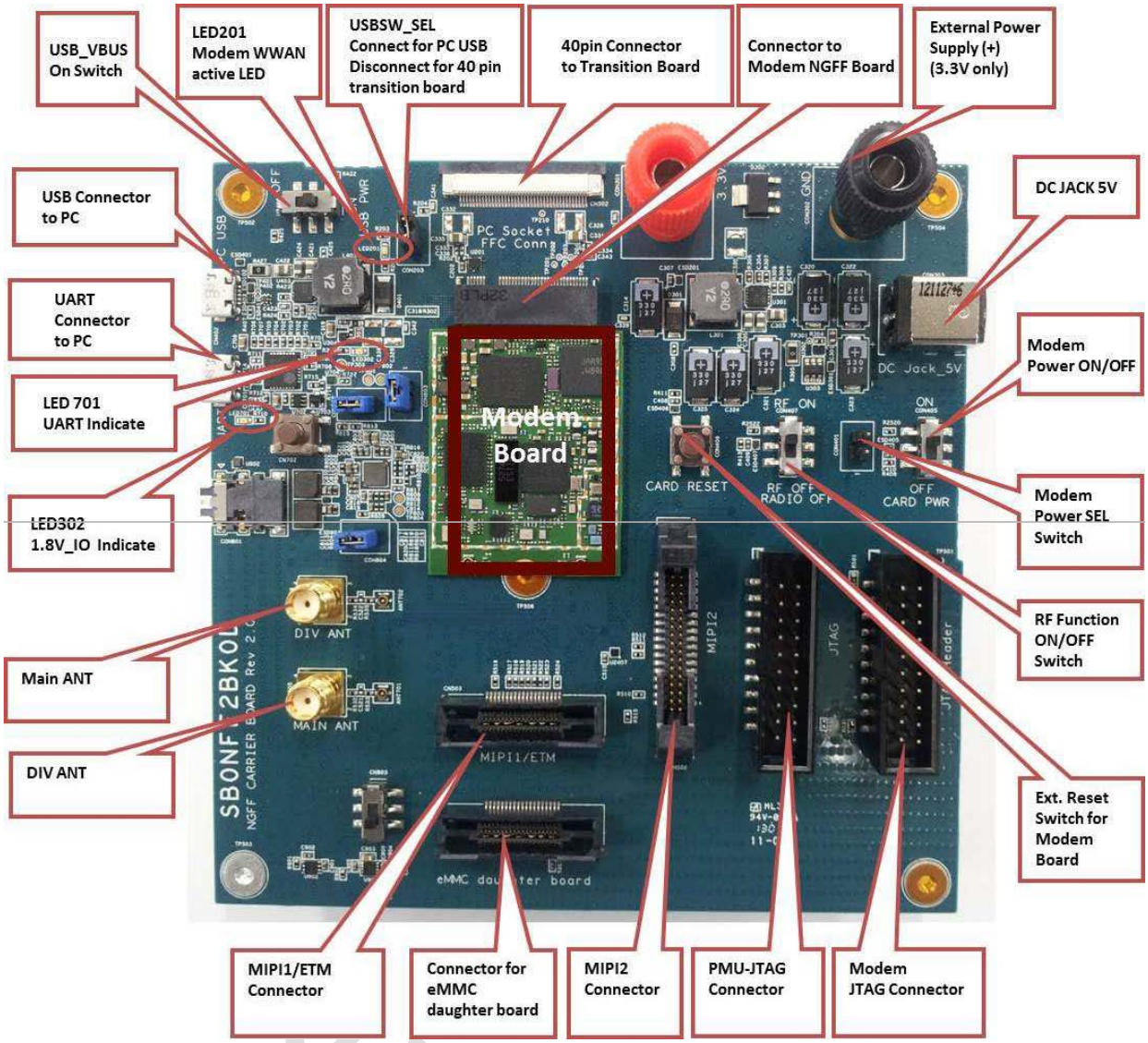

Figure 3 Carrier Board Top View Connectors

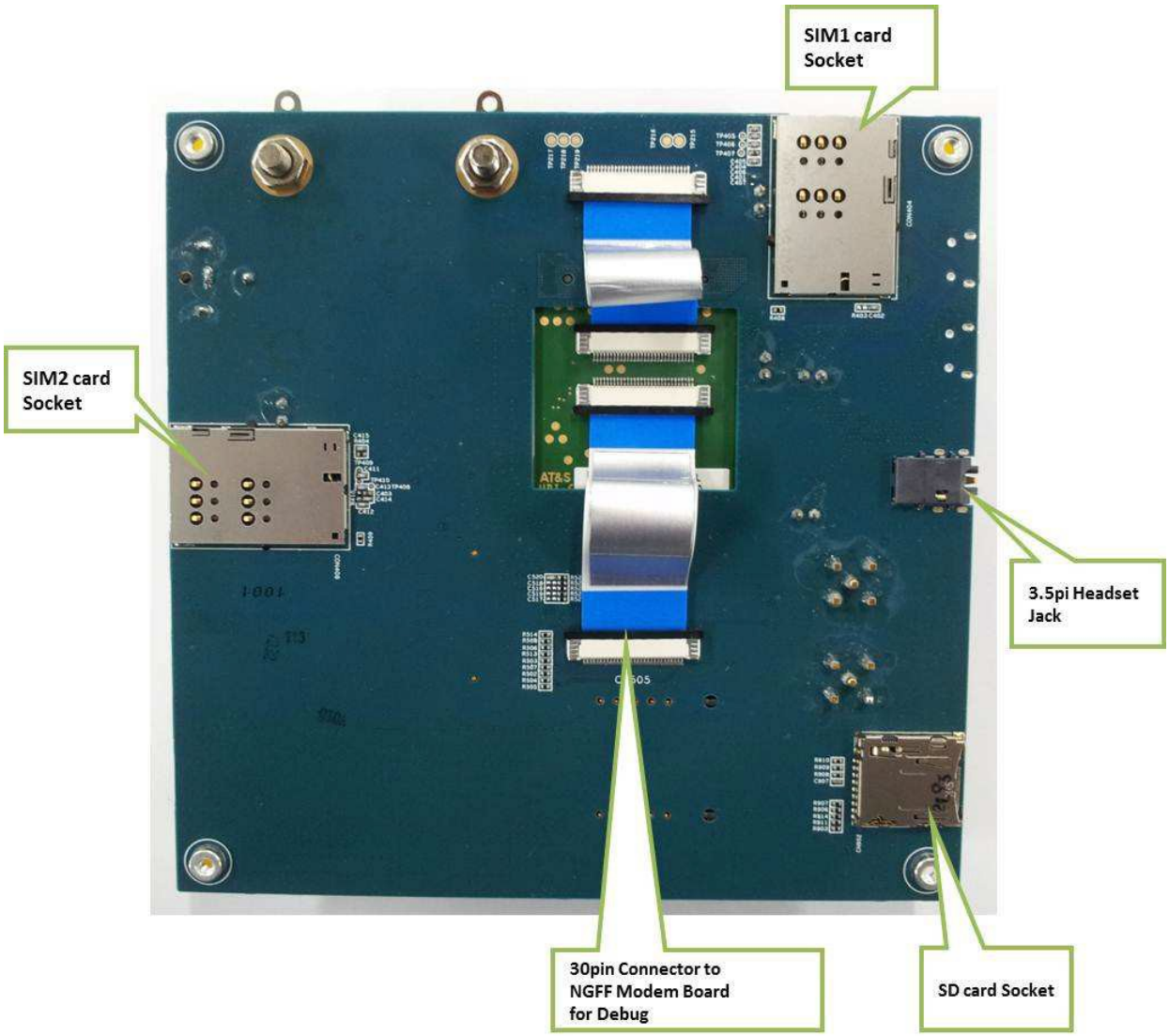

Figure 4 M.2 EVK Carrier Board Bottom View Connectors

3.3 M.2 EVK Carrier Board Setup

In order to operate a carrier board, please follow these first steps:

1. Select one of the three options to supply the test board and connect the supply a. 3.3V supply to direct DC power connector CON301(+)/CON302(-)
   b. 5V supply to USB HS connector CN402
      Note: USB connectors for UART interfaces cannot be used for board supply!
   c. 5V DC Jack can supply to the DCDC for carrier and modem board.
2. Check the LED indication for the connected power-supply
   a. Both case of supply from 5V DC Jack and VBUS connector show on Green and Red LED.
      Note: Green LED is only lighted when NGFF modem SW turn the LED ON. Only red LED will be turned on as long as power is supplied. (see Figure 8)

b. See Figure 6 for supply from DC jack and
c. See Figure 8 for supply from USB (green LED LED201 on, red LED LED302 on)

3. Connect the carrier board to a PC via a USB cable
   a. Already done in case USB connection is used for both, power supply and data interface.
   b. USB connector also can supply the power to the carrier board as 5V and 500mA max current source.
4. Short the circuit header to use on/off/reset switch.
   a. CON401 header is for modem board power on if R408 is not mounted.
   b. After short this header and then it's possible to use ON/OFF switch of modem board power.
5. Check the dip-switches to turn on modem board (see Figure 11) and could be use RESET button to reset modem board.
   a. If Switch CON405 is in ON position, auto-power-on is activated.
   b. CON407 switch can disable RF function of the modem if set to OFF.
      Note: Please make sure to set it to always on for all test except airplane mode test.
   c. IF you press CON406, NGFF modem board will be HW reset.

3.4 PCB Layout

NGFF carrier board uses the layer stack up of 8 layers.

3.5 Board Power Supply

The power concept provides three different ways to supply the carrier and modem board.

1. The carrier board can be supplied via the DC 5V JACK (CON303) supply path. It will be down converted by DCDC to 3.3V.
2. The Carrier Board can be supplied via the USB supply path from USB connector CN402.
   Supplied via 5V VBUS voltage and then changed to 3.3V for the modem board by DCDC down converter.
   Switch ON U2406 to make USB VBUS supply power on to the carrier and modem board.
3. The Carrier Board can be supplied via the Direct DC VBAT supply path which must be set to 3.3V. Supplied via VBAT connector CON301 (+),CON302(-).
   3.3V set should be followed.
   Note: The voltage provided on the Direct DC connector must be within the specified VBAT supply range of 2.5 V to 4.2 V. There is no enough overvoltage protection.

In case more than one supply is available, the priority is

1. Direct DC VBAT supply path
   If the direct DC connector is plugged, both other supply paths are disabled.
   Note: Disabling does not depend on the applied supply voltage. The DC connector

must be unplugged in case another supply source is chosen.

2. DC JACK supply path
   If the DC jack is plugged, the USB supply path is disabled.
   Note: Disabling does not depend on the applied supply voltage. The DC jack connector must be unplugged in case the USB supply source is chosen.
3. USB supply path

Attention: It is not allowed to change direct DC supply source during operation (hot swap)!

Additional features of board power supply: LED indication of power supply status

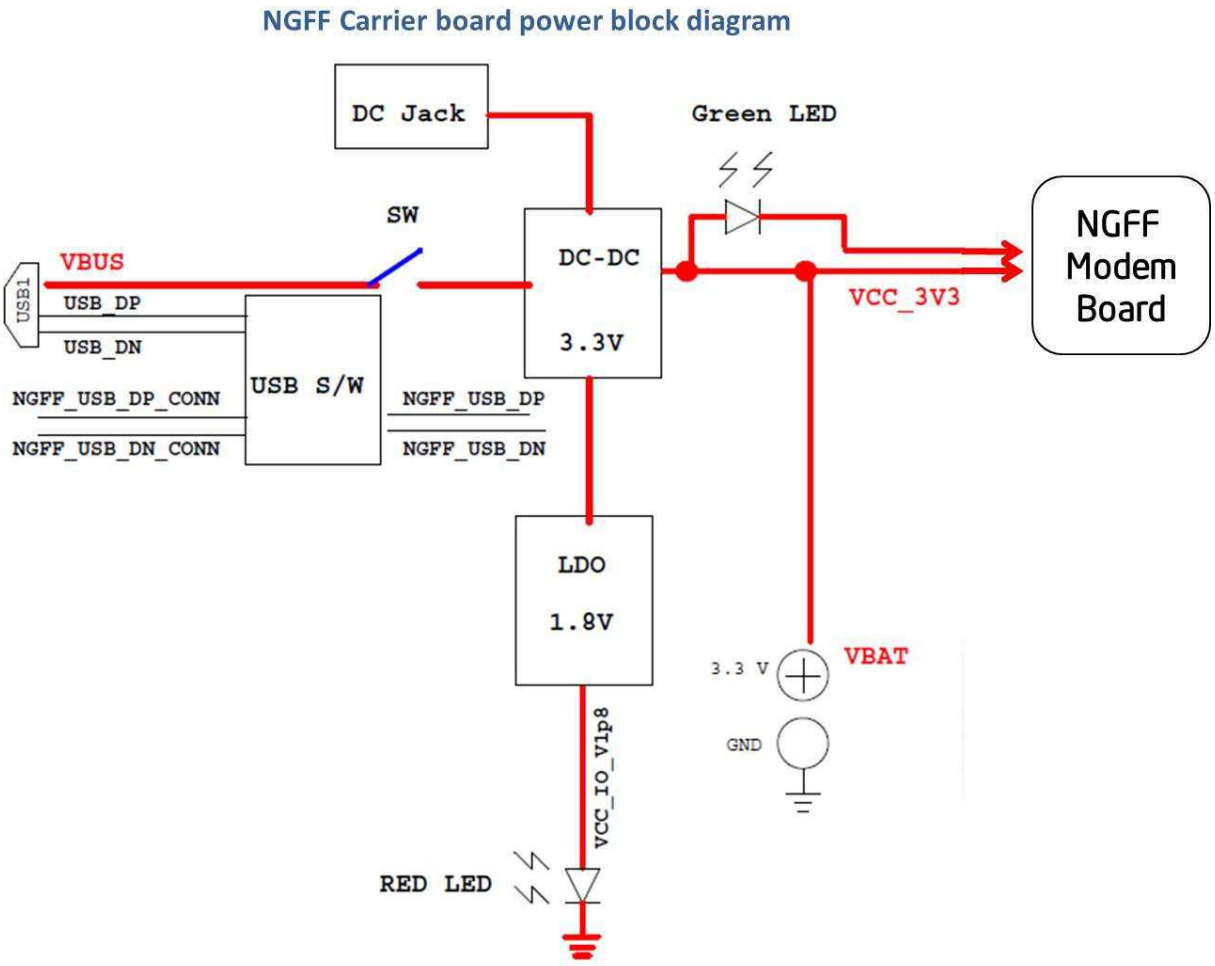

Figure 5 M.2 EVK Carrier Board power supply block diagram

3.5.1 Direct DC supply path

Connector CON301, CON302 is an additional VBAT connector which is directly connected to 3.3V DCDC. This connector is intended to be used in following use cases:

RF-performance test

Current save measurements

Attention: The allowed power supply is 3.3V only with this method.

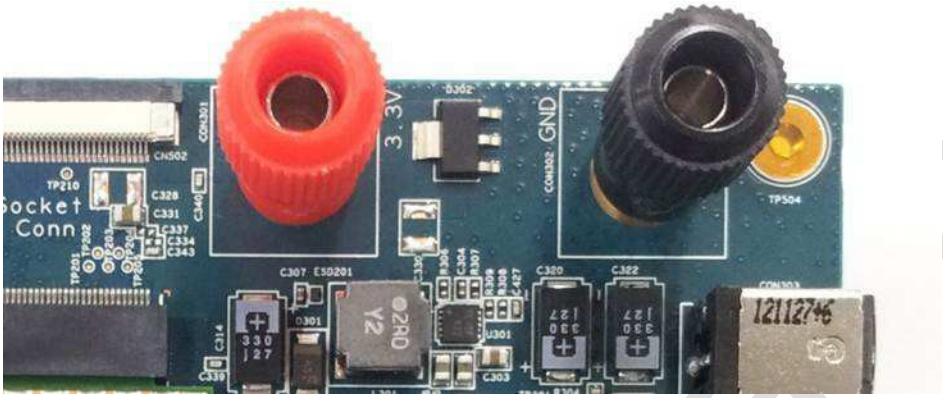

Figure 6 Direct DC Supply Path: Connector position on PCB

Table 1 Direct DC supply connector pinning

Direct DC supply connector			
Pin	Signal	Pin	Signal
CON301(Red)	+ power	CON302(Black)	GND

3.5.2 5V DC Jack

Connector: center is '+', body is '-'; size is 2.1mm * 5.5mm

Voltage: 5.0 V type DC Jack.

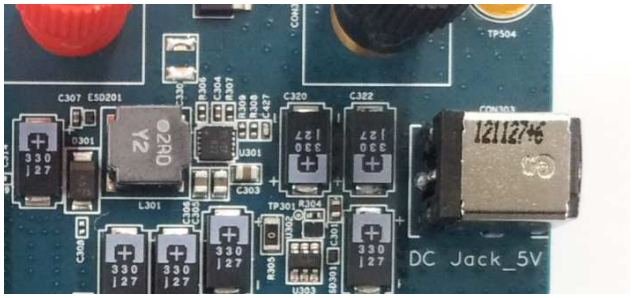

Figure 7 5V DC Jack

A DCDC converter generates the VBAT voltage of 3.3V from the DC voltage provided at the DC jack. Overvoltage protection controller and N-Channel MOSFET were included for

safety on the carrier board.

A green LED for DCDC_3.3V and red LED for 1.8V indicate that power is supplied by the DC jack.

3.5.3USB Supply

The system can be powered from USB (USB connector CN402). It is allowed to draw up to 500 mA from a USB host; hence up to 2.5W can be supplied.

A green LED for DCDC_3.3V and red LED for 1.8V indicate that power is supplied.

To enable this USB supply, switch (U2406) should be set to on as below picture. If set this switch set to off, only USB data interface is available on the carrier board without USB power supply.

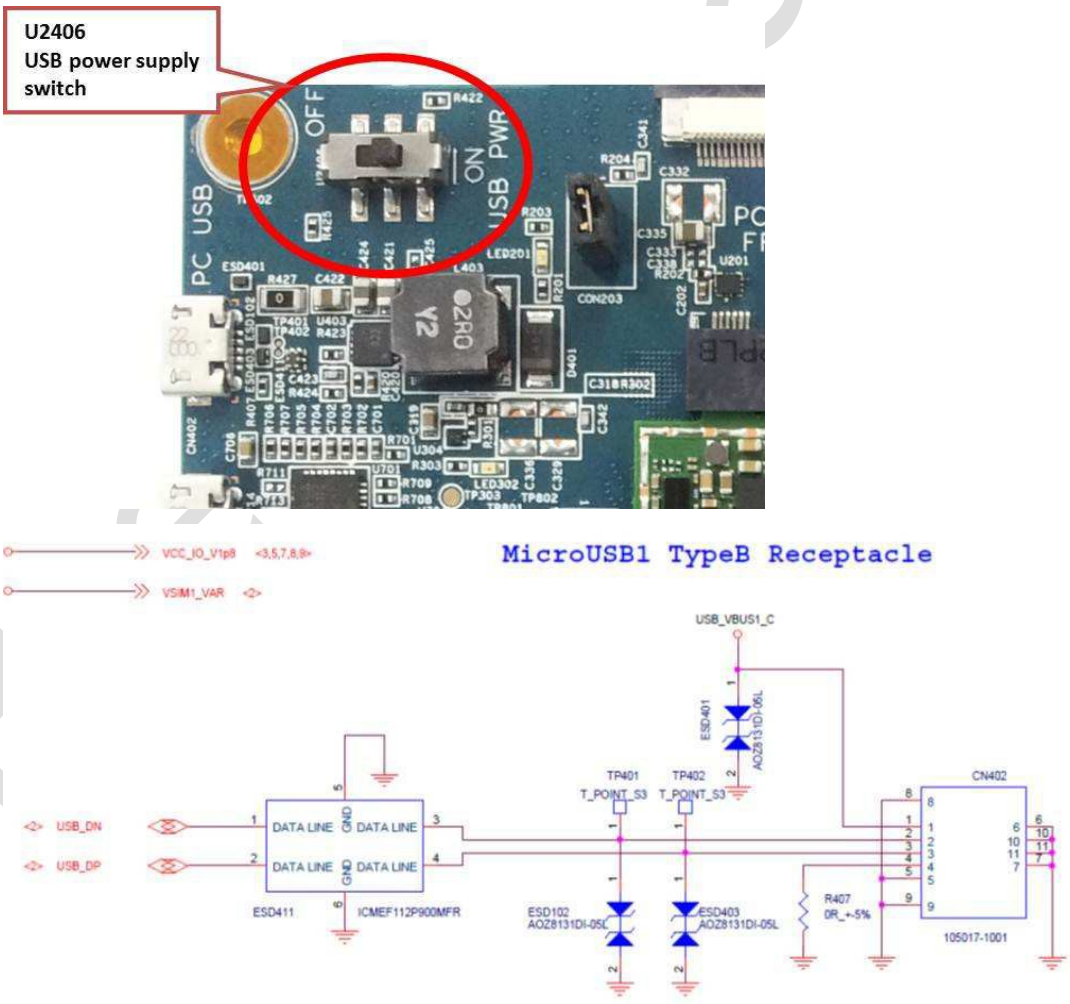

Figure 8 USB connector for modem supply

3.6 LED indicators

The green LED (LED201) indicates that the DCDC 3.3V is supplied to Modem board. The red LED (LED302) indicates that 1.8V is supplied to Carrier board.

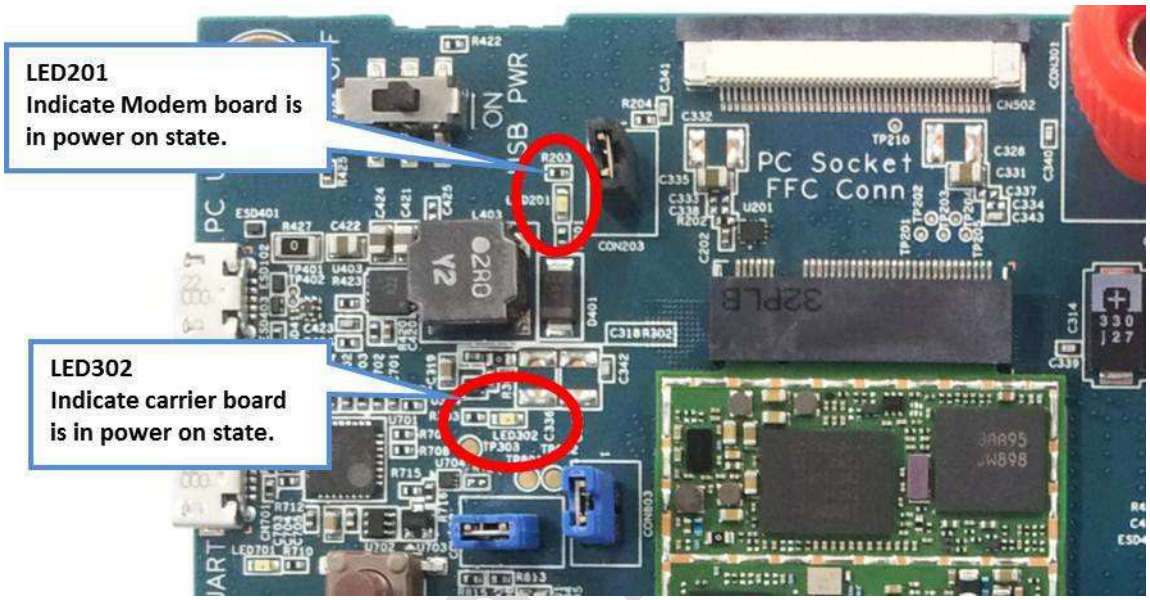

Figure 9 Indicator: VCC_3V3 and VCC_IO_1V8 supply

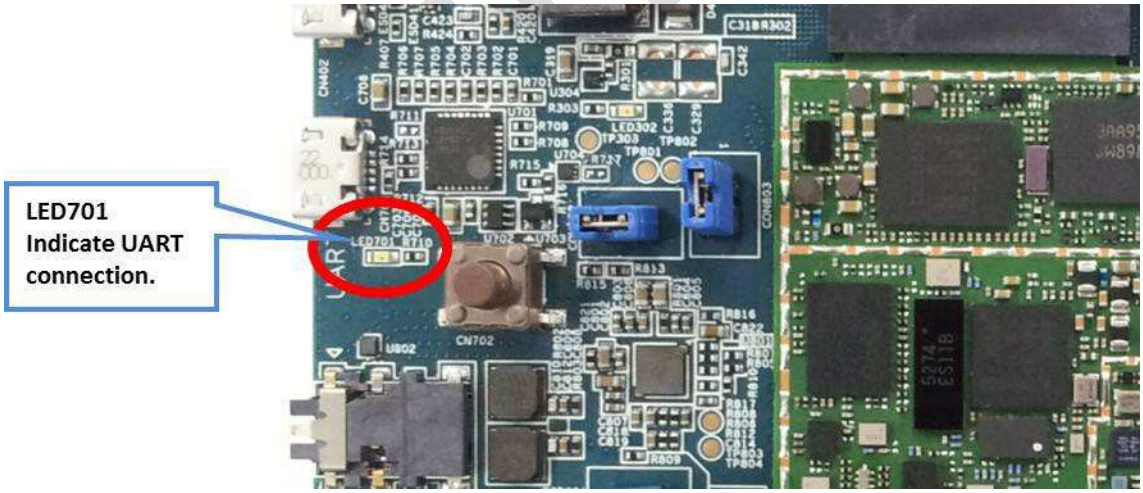

Figure 10 Indicator: UART Connection

3.7 Switches for Power/RESET/RF_Disable

Power On/Off, Reset and RF Disable (Wireless disable) can be controlled by hand (See button description below.). Another alternative would be a remote reset triggered at the

JTAG interface, e.g. by the Lauterbach tools.

The RST_KEY will power down modem board by RESET button (CON406) which is placed on the NGFF carrier board. The PMU of modem board can be hard reset by this RST_KEY which is a fully asynchronous reset.

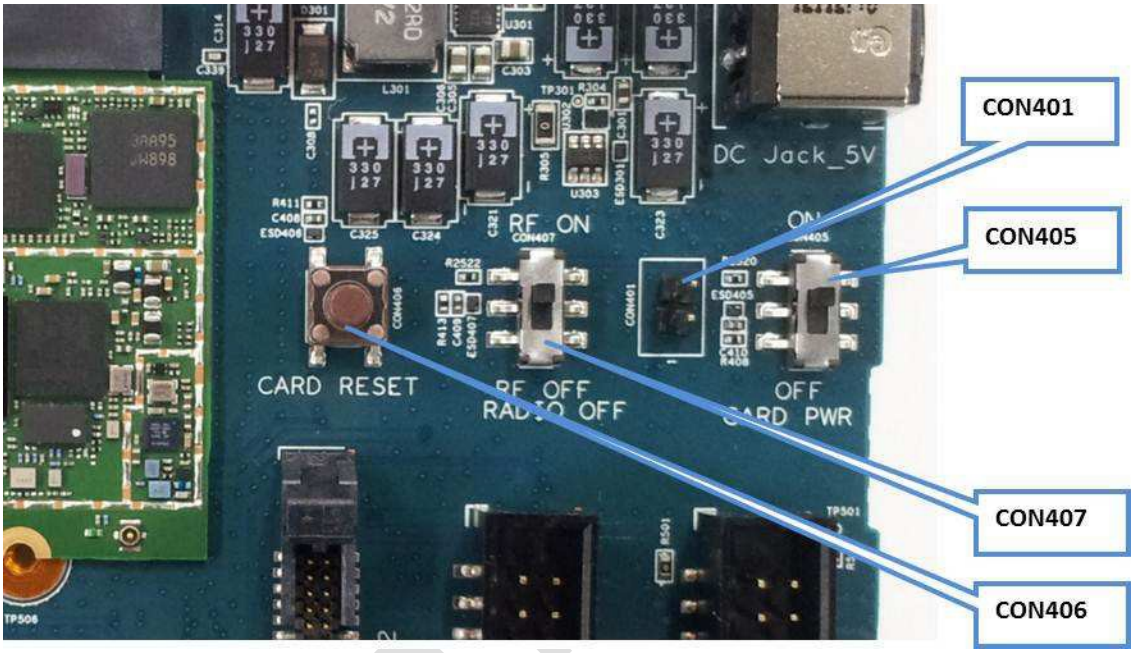

Figure 11 ON/OFF/RESET for Carrier board

Table 2 ON/OFF/RESET Switch Settings

Part Num	Signal	Description
CON405 CON401	Modem board Power on/off	CON401 should be short to make power on modem board if no R408 on carrier board (Mounting R408 is default option)
CON407	RF function on/off	Off means flight mode of modem board.
CON406	Modem Board Reset	Hard reset of modem board when press this button.

There is a USB power on switch (U2406) on the carrier board for USB power connection. This switch should be set ON to supply USB power to board. USB path switch CON203 is for selection the path of the USB lines. To connect the modem USB port with a PC, short CON203. When CON203 is an open circuit, modem board USB will connect to the transition board via CN502 connector.

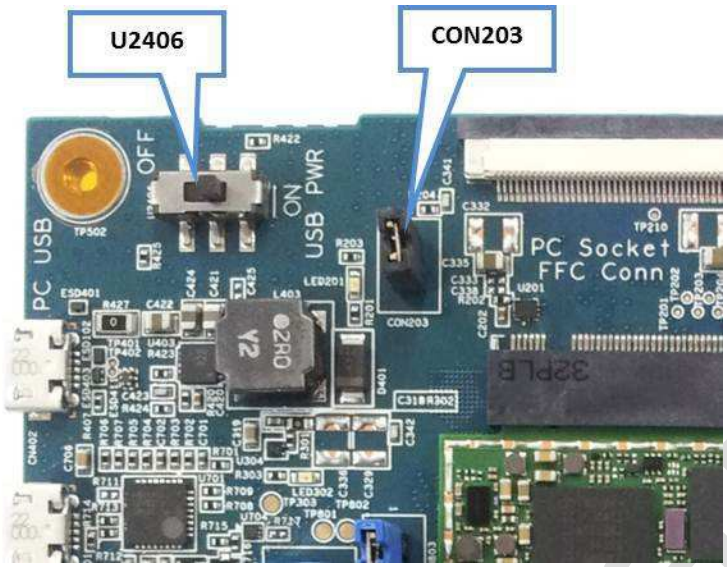

Figure 12 ON / OFF for USB power

Table 3 USB Power Switch Setting

Part Num.	Signal	Description
U2406	USB power on/off	To enable DCDC converter U403.
CON203	High(shot)	Modem to pc
	Low(open)	Modem to transition board via CN502 con.

3.8 Audio test via Headset Jack

Audio testing is possible from carrier board rev. 2.0 after Cirrus audio codec was added. A stereo audio headset path is available, including a headset microphone test as well.

Three connectors (CON802, CON803, CON804) must be shorted to the enable audio codec as shown in Figure 12. The 3.5pi headset jack should be used.

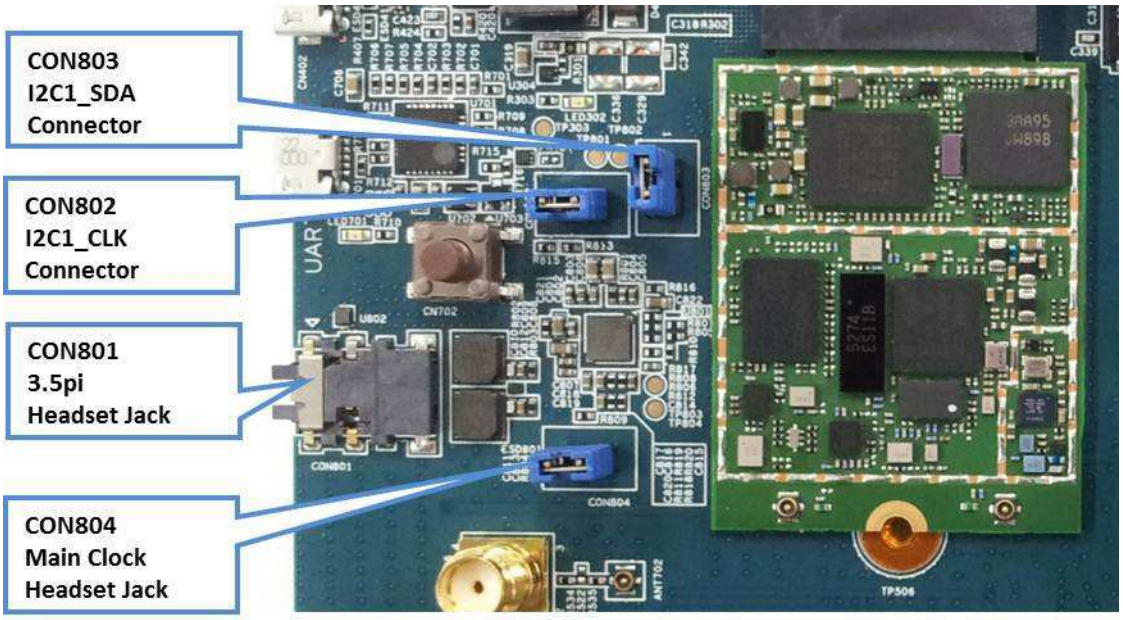

Figure 13 Audio Codec

3.9 Mechanical Constraints Modem Board

3.9.1 Support Bolts for Debugger cable and SIM card

In Figure 13, you can see the support bolts to get a stable connection for the debugger cable and plug-on board.

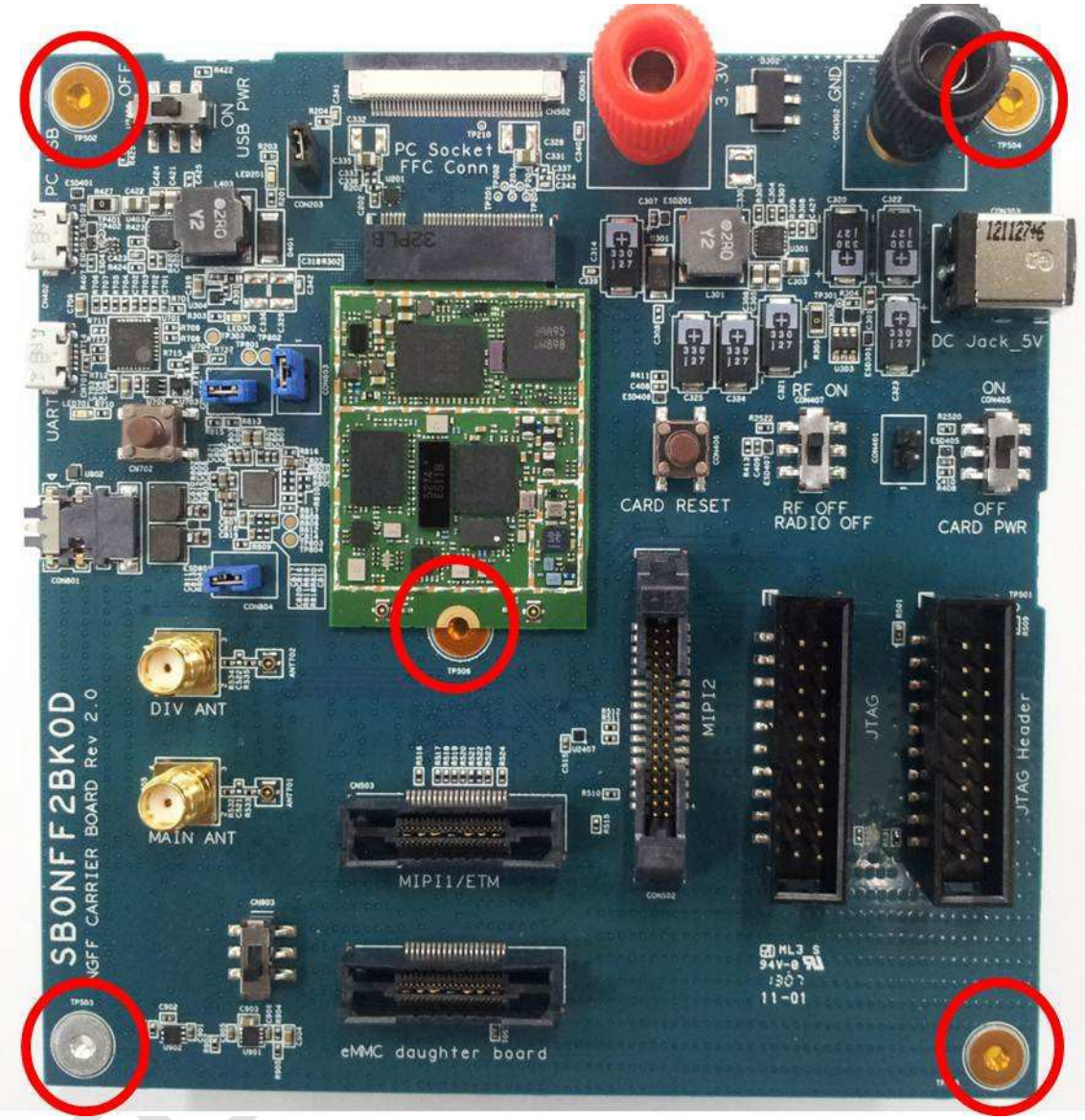

Figure 14 Carrier Board Support Bolts

3.9.2 Mechanical fixing of Plug-On boards

When connecting a Plug-On board (NGFF modem board) to carrier board, always make sure that the Plug-On board is properly connected by bolts and screws to the modem board. This makes the carrier and modem board stable and safer.

4 Software Framework

The provided software control framework supports trace, debug and real telephone functionality.

The first mandatory step for all environments is the driver installation. Different work and debug tools can be used if the drivers are prepared accurately.

There are two different operation modes for test and debug provided that require different software framework and driver configurations:

1. In normal mode or dial up mode the modem board can be operated as a real telephone. The main control and debug tool are the Phone Tool and probably the Lauterbach debugger. Several COM ports for control, data transfer and debug were provided by the drivers.
2. In service mode the RCTTH interface becomes activated. The ARM, the LTE IP and the RF can be controlled by Matlab, Octave or Java clients. This mode is very common for layer 1 LTE software development, test and debug tasks where no protocol stack is required or needed.

4.1 Common Test and Debug Configurations

There are generally two different test and debug configurations common.

There is a simplified test setup that requires only one Win test PC. This is a portable setup that can be transferred to other sides or used for demonstration at e.g. exhibitions. This setup mainly supports local operation. The LTE firmware development and test framework must be down stripped to dedicated use and test cases that can be performed at the Win PC.

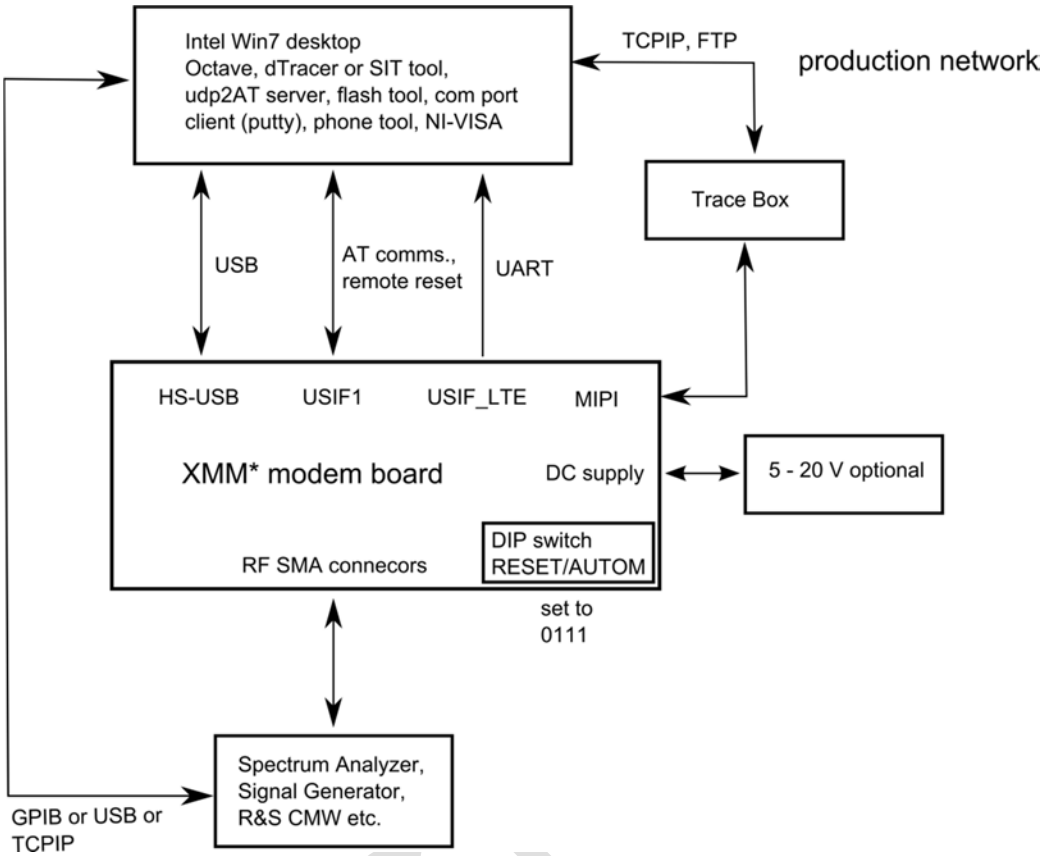

Figure 15 Simplified test and debug configuration (with USB, RF, power and Ethernet cables)

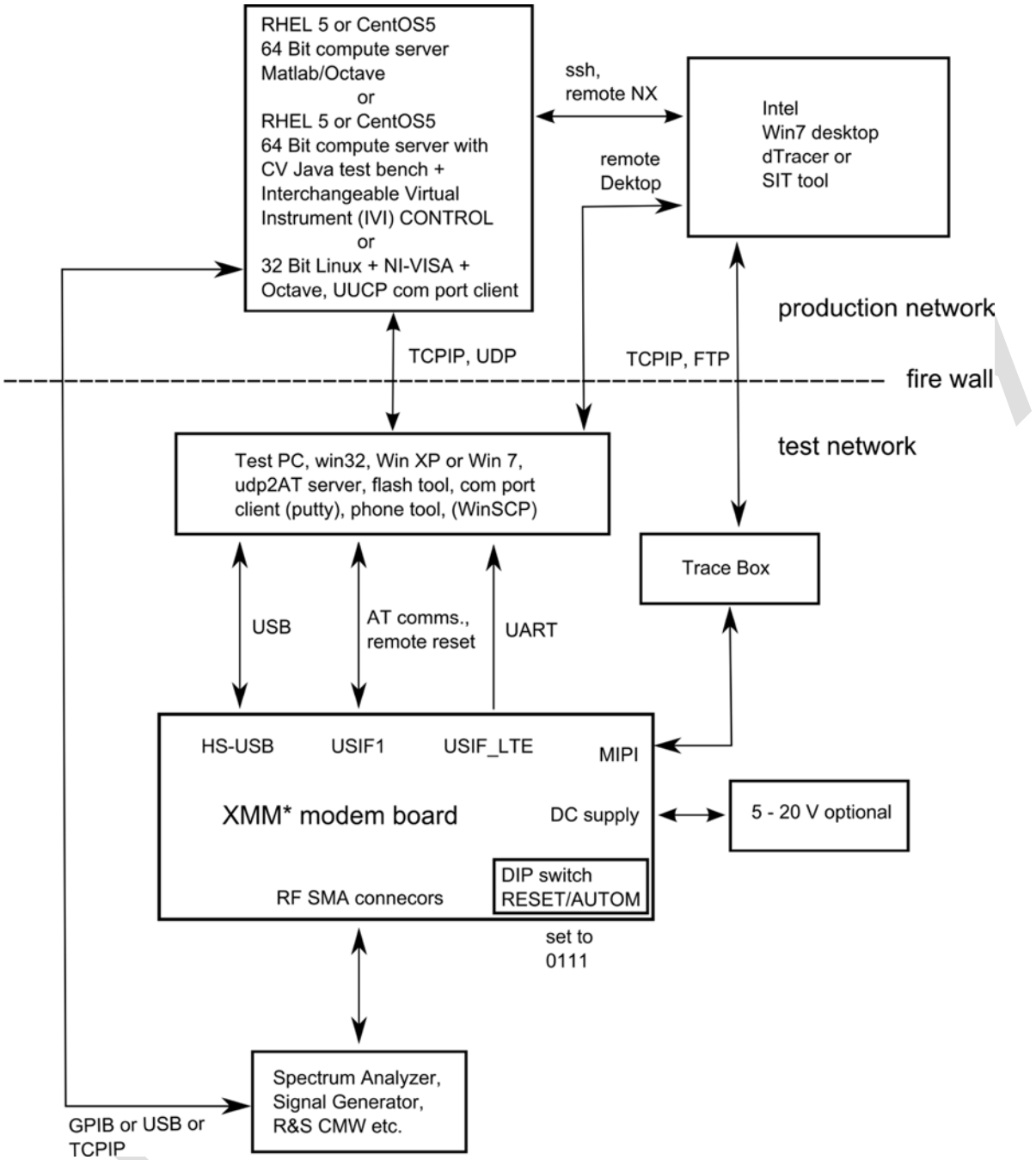

Figure 16 Complete test and debug configuration (with USB, RF, power and Ethernet cables)

The complete test and debug configuration is a more complex setup. It is very common for LTE firmware development, test and debug, RF test and debug, IC design test and debug, CV firmware release testing etc. It supports remote operation and enables therefore hardware sharing between different users. The complete LTE firmware and (ICD) hardware development and test framework is supported. Octave and Java clients are the commonly used software tools to run tests.

4.2 Obtain Firmware Releases

Contact Telit for all firmware release.

4.3 DUT Configuration for Normal/Dial up Mode

There is a switch within the ARM software that controls the operation mode that occurs after DUT reboot.

Common ARM software builds from the release folder do boot typically into normal operation mode.

4.4 DUT Configuration for Service Mode

There is a switch within the ARM software that controls the operation mode that occurs after DUT reboot. Only special ARM builds boot directly into the operation mode.

The Phone Tool is needed to switch from the normal/dialup mode to the service mode.

In addition an AT command is needed to enable the service mode completely.

ARM for Inc3.0: 'at@ephy:smon()'

Note: Please check with the provider of the ARM image which commands are valid for the actual build!

The Prolific driver is mandatory to access the UART outputs from the XG706. The usage of the Comneon or the ECM 200 driver depends on firmware settings. It is possible to use the Phone Tool to switch from the Comneon modem driver to the ECM 200 driver. As the FW main line is not really stable this conditions are changing from time to time

4.5 RF Integration

SMARTi specific information is available directly from Intel.

4.6 Driver Installation

4.6.1 General Considerations

The two different test and debug configurations always require a Win PC where up to five different drivers must be installed accurately.

These are:

1. The Intel High Speed Modem Driver (ecm200),
2. The Comneon High Speed Modem Driver,
3. The Prolific serial to USB driver (part of the flash tool folder),
4. The Flash USB driver (part of the flash tool folder) and the FTDI diver.

4.6.2 Intel High Speed Modem Driver (ecm200)

Take the recommended driver, see Subsec. 3.6.1, (folder e.g. WMC_ecm200_3.61.0) and follow the instructions from the installation wizard.

Enable the IP forwarding: run the sriptenable_ip_forwarding.reg

Hint: Copy the file to the local PC and then run it with root

privileges. Now connect the cable to the USB-HS connector.

Win XP asks now it's typical questions and gets the common answers, see Figure 17 and Figure 18. Win 7 does not ask and loads the driver automatically.

After installation, the appearance of the network modem and 4 COM ports appears in Device manager as shown in Figure 19

Figure 17 WinXP Common Installation Question1

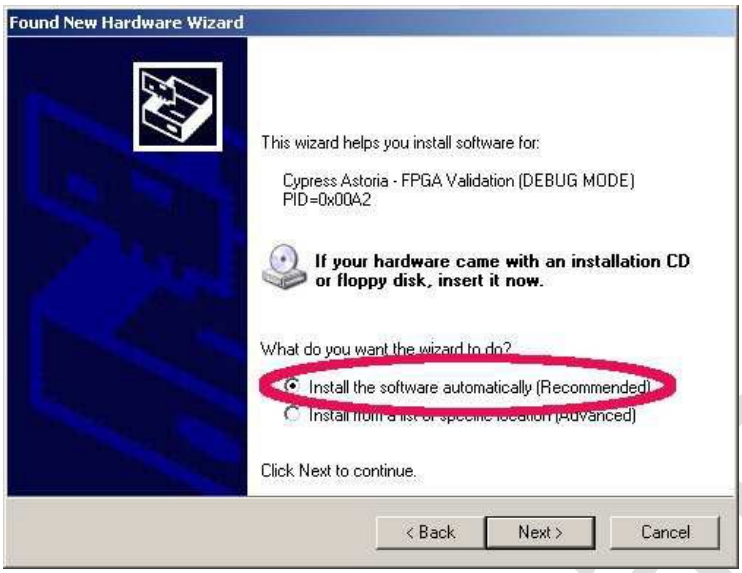

Figure 18 WinXP Common Installation Question2

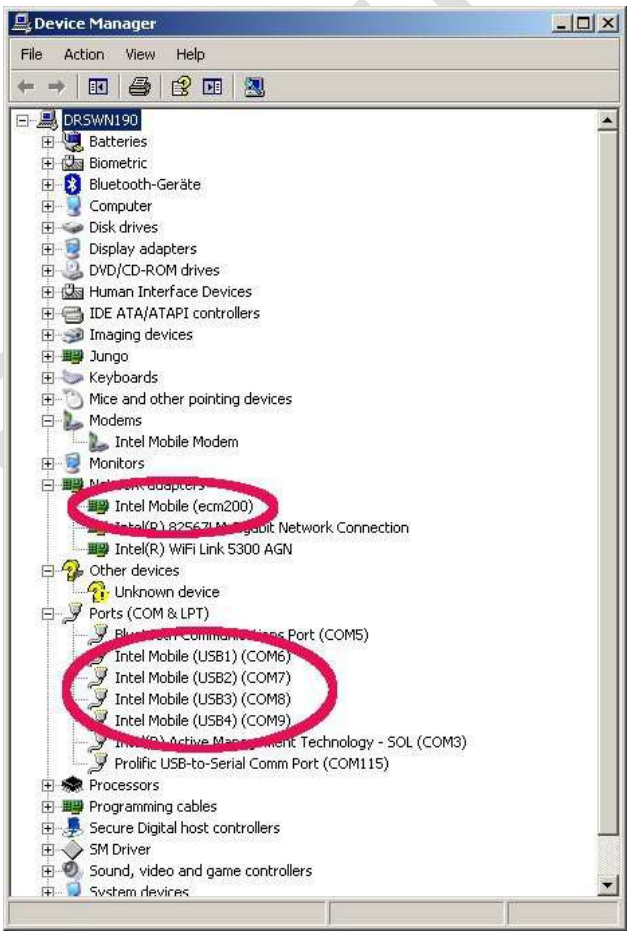

Figure 19 Device Manager – Port Appearance after Installation

Now open the network manager and configure the network settings of the modem

In WinXP: Start:Settings:NetworkConnections
A new network device did opo up. I ti snot yet connected (see Figure 20).

Figure 20 WinXP Network Connections - New network not yet connected

In Win7, select Start: Control Panel: Network and Sharing Center" followed by "Change adapter settings" (see Figure 21).

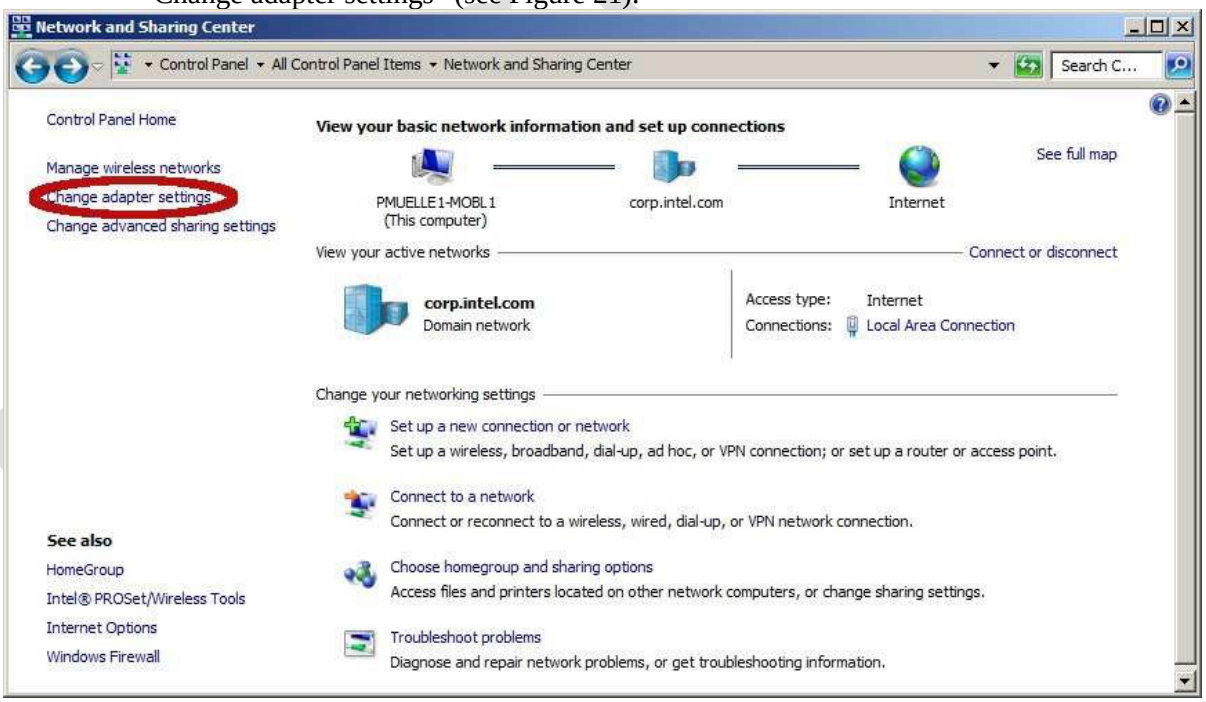

Figure 21 Win7: Network and Sharing Center

Open the properties dialog of the new network device (right click). See Figure 22.

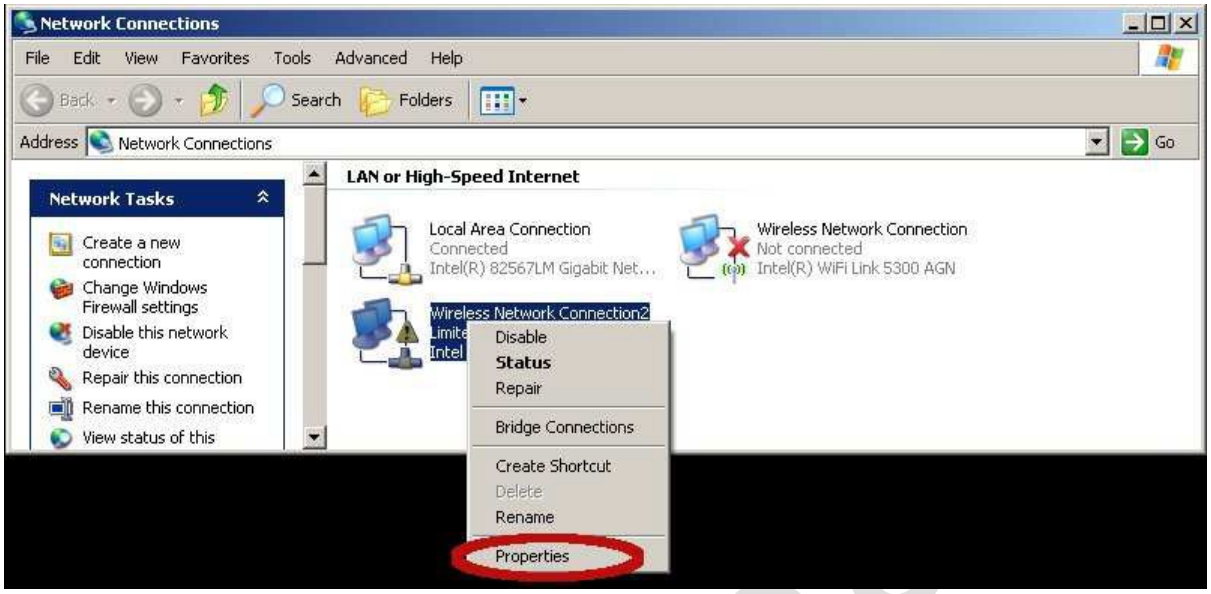

Figure 22 Network Properties Dialog Box

4.6.2.1 Client offset configuration.

This must be done before the IP settings. If the order is flipped the IP settings get lost.

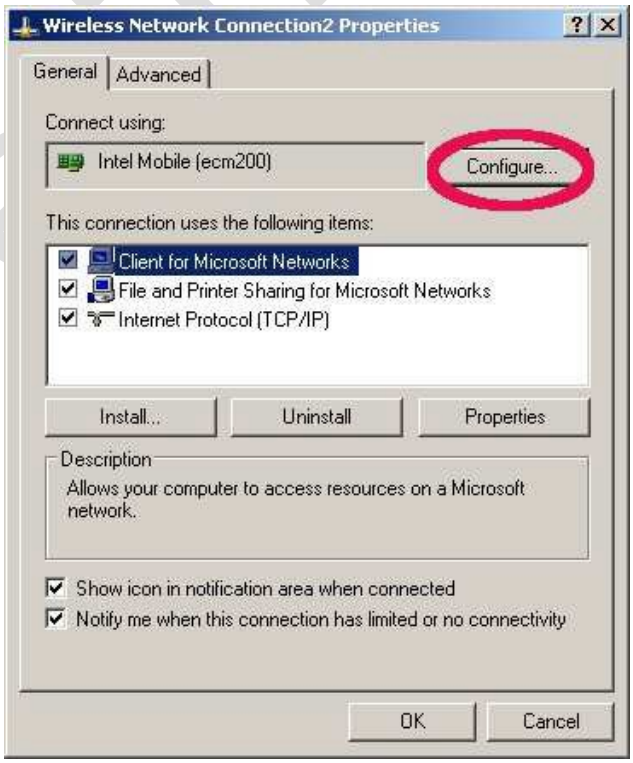

Figure 23 Select the configuration dialog

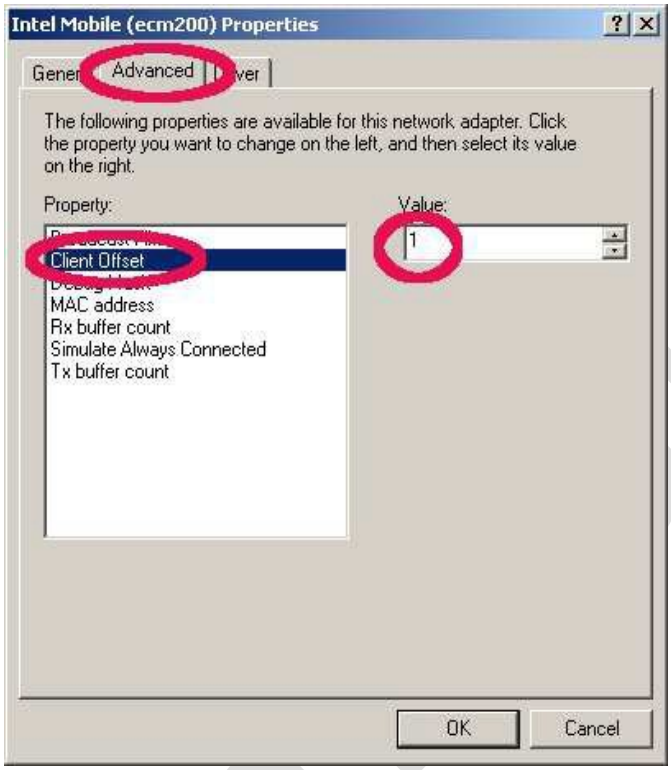

Figure 24 Set client offset to 1 and press "OK"

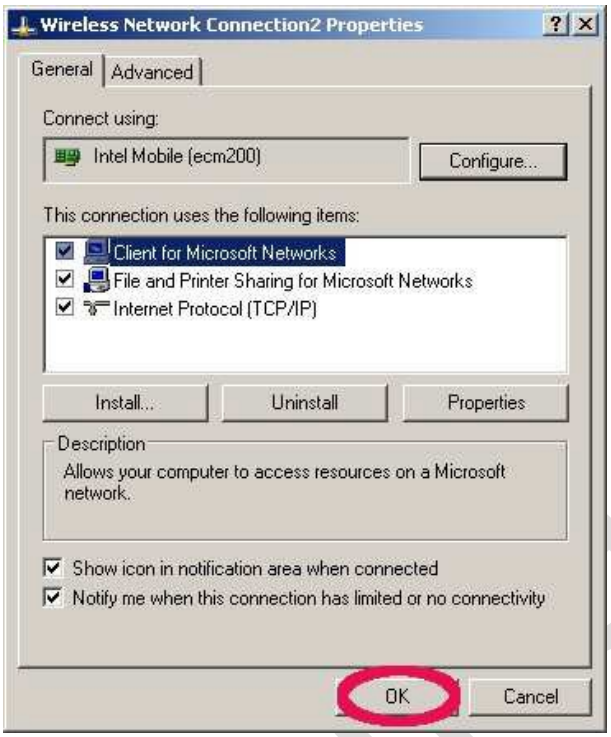

Figure 25 Press "OK" to save these settings. Otherwise these settings get lost

4.6.2.2 Static IP Address Configuration

The given example IP number in Figure 27 is for a simplified test and debugs setup, refer to Error! Reference source not found., where the octave or java client runs on the Win PC that also carries all necessary Win drivers and is connected to the DUT. The ecm200 driver runs in a subnet that is only visible from this PC.

The complete setup, see Figure 15, consists of test PCs that were provided together with recommended IP settings for the ecm200 driver. The static route settings were set typically IT system wide.

In case two PCs were used to run the tests, a test PC with the drivers and a desktop PC that carries the Octave or the Java client a static route must be set at the desktop PC. The example below helps to find proper static route settings:

test PC with static IP: 10.1.0.126
ecm200 client at test PC with IP: 172.16.126.1 (client offset set to 1)
run as root at the PC where the Octave is running on.

route print #read out route settings
route add 172.16.126.0 mask 255.255.255.0 10.1.0.126

test the configuration:

ping 172.16.126.1 #response from the ecm200 driver
ping 172.16.126.2 #response from the booted LTE-IP block (L1CC)

Reopen the Network Connection Properties Dialog.

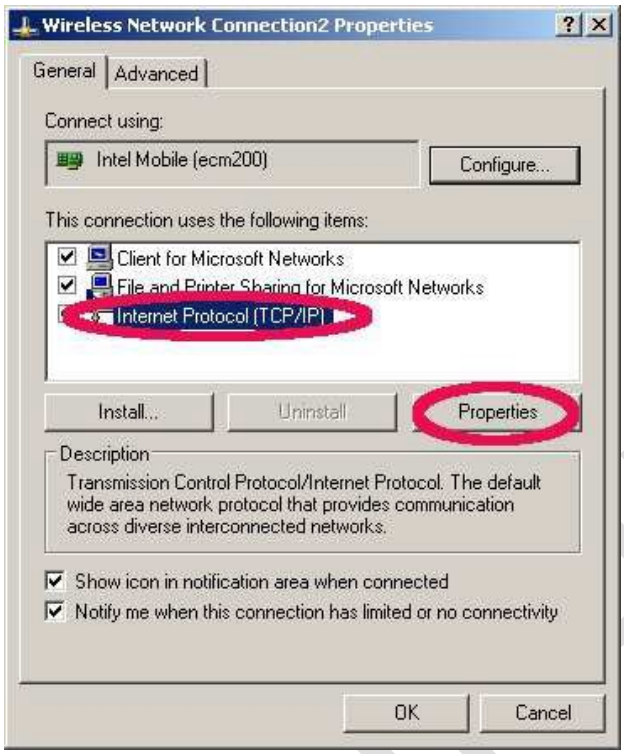

Figure 26 Open the Internet Protocol TCP/IP settings

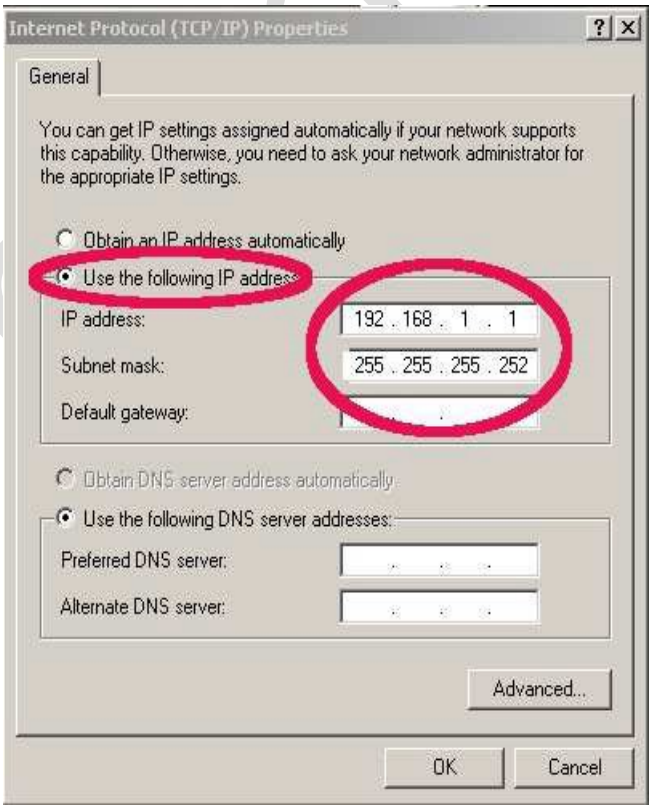

Figure 27 Set the static Network IP and press OK

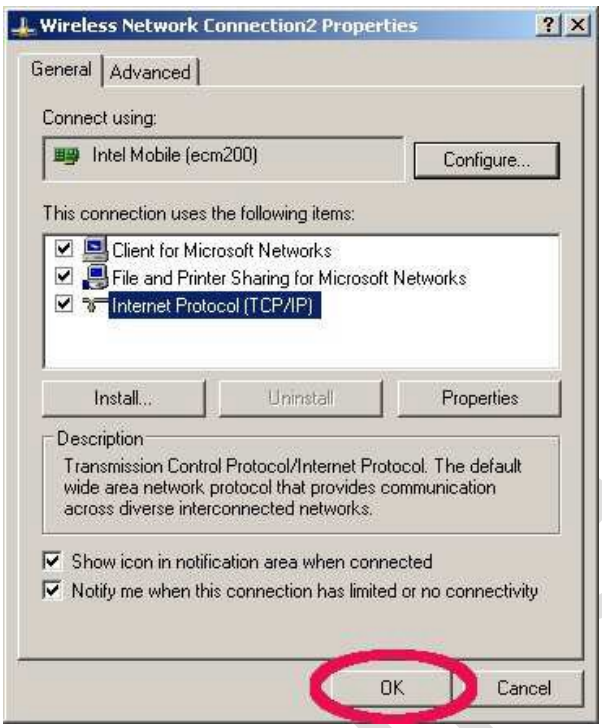

Figure 28 Close the properties dialog and save the settings press "OK"

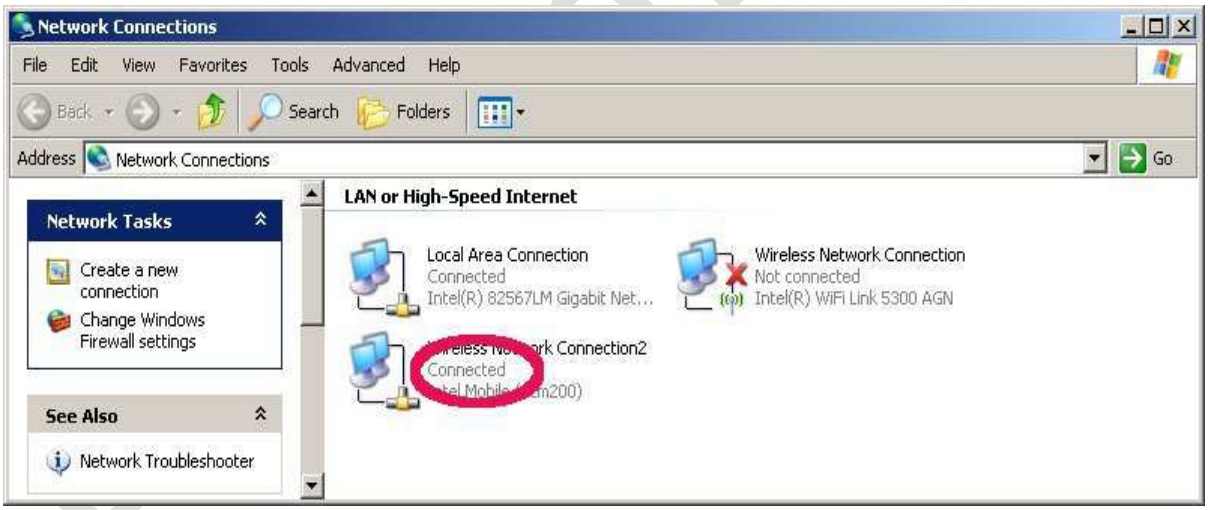

Figure 29 ecm200 driver and its IP connection are now properly configured

If desired it is now also possible to rename the network device from "Wireless Connection2" to something more convenient e.g. ecm200 + IP address.

4.6.3 Comneon High Speed Modem Driver

Take the recommended driver, \\musdsara001.imu.imc.local\SW_builds\xmm6360\tools\usb_drivers See also SMS02534274: - Please use 3.46 version and not WMC_comneon2_3.55.0, ,

(folder Comneon_High_Speed_Modem_Driver) and follow the instructions from the installation wizard.

Now connect the cable to the USB-HS connector.

WinXP asks now it's typical questions again and gets the common answers, see below. Win 7 does not ask and loads the driver automatically.

Figure 30 Use the already installed driver

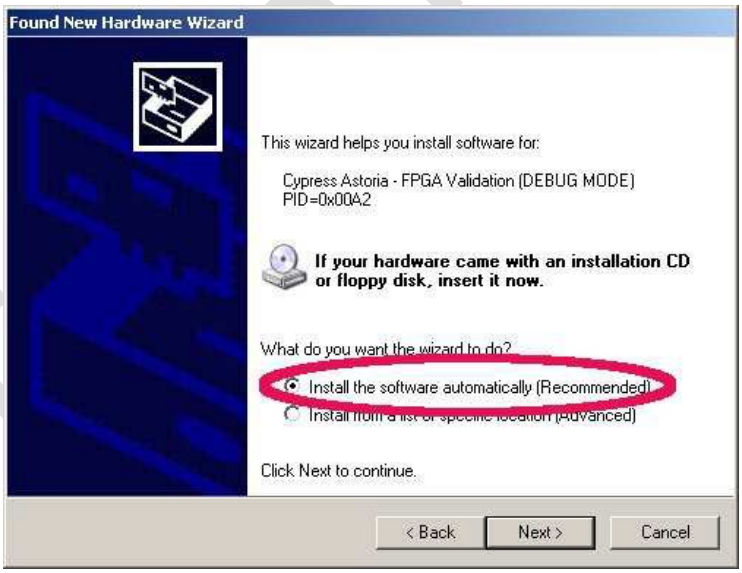

Figure 31 Install the driver

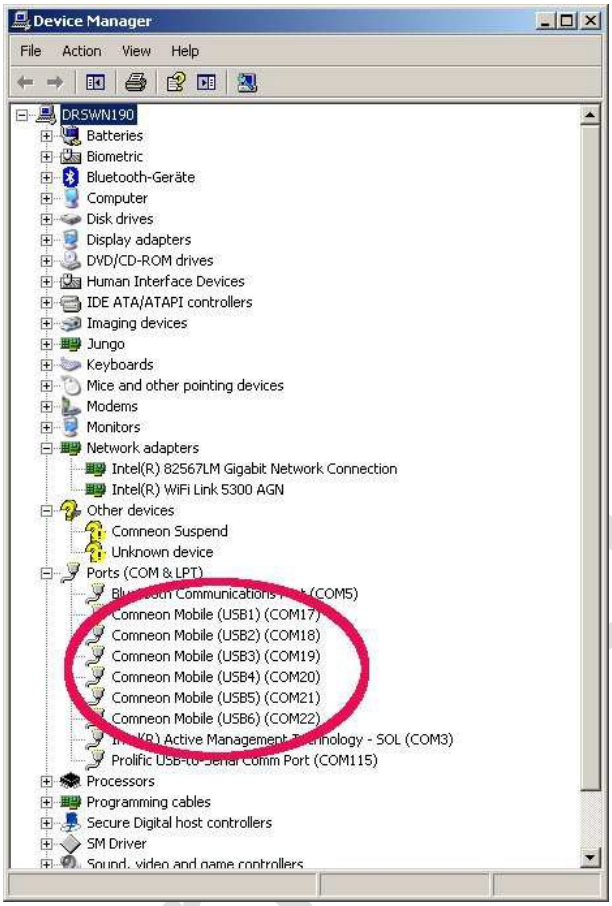

Figure 32 Comneon suspend and six COM ports are now appearing at the device manager

Congratulations, your driver installation has finished successfully.

4.6.4 Flash USB driver and FTDI Driver

These drivers are mandatory to flash new ARM software and LTE firmware images at the modem board. Take the recommended drivers, see Subsec. 4.6.1, (flash tool subfolder) and follow the instructions from the installation wizards.

Note: If these drivers are not installed correctly, instabilities at the flash process will occur without substantial error information from Win XP or Win 7.

4.6.5 Prolific Serial to USB Driver

The Prolific driver is mandatory to access all modem board UART (USIF) ports. Take the recommended driver, see Subsec. 4.6.1, (folder Prolific Driver) and follow the instructions from the installation wizard.

Connect the USB cable to the desired USIF port and check that the COM port appears correctly in the Win device manager. (Win:Settings:Control Panel:System Properties:Hardware:Device Manager. This is quite similar to find at Win XP and Win 7.)

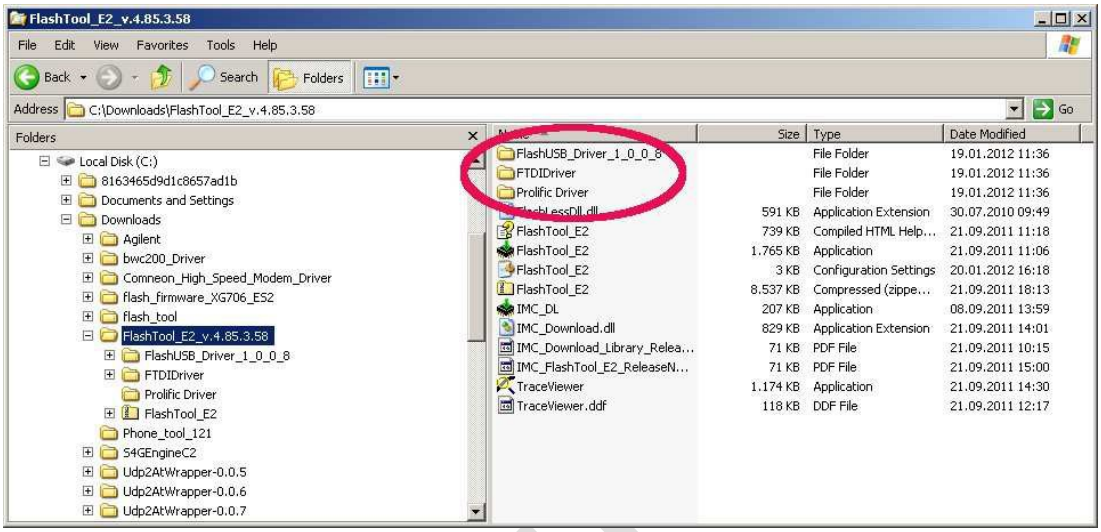

Figure 33 Driver Locations on PC

Please note that Win does not always complain if drivers 4 to 5 are not installed. If one of these drivers is missing, flashing problems are occurring.

The ARM software and LTE firmware releases are linked to individual driver revision numbers that were used for release testing. They were typically published together with the ARM software and the LTE firmware.

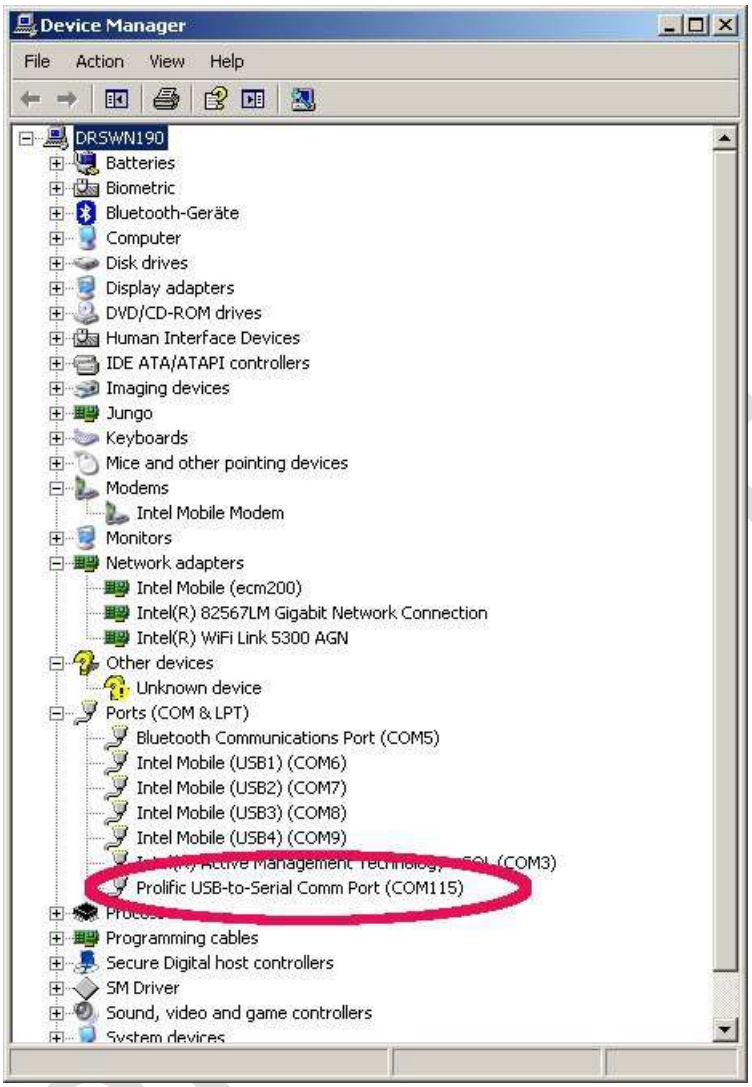

Figure 34 USIF1 Device Manager Prolific USB-to-Serial COM Port

4.7 LTE debug UART configuration

After the preliminary setting, run any AT terminal application (e.g. HyperTerminal) on your PC's communication port, with the following settings.

Table 4 Terminal Port Settings

Data rate	115200 bps
Data bits	8
Parity	N
Stop Bits	1
Flow Control	HW

on UNIX xterm use this with uucp:

%docing station serial port, uucp
chown uucp /dev/ttyUSB0

cu -l /dev/ttyUSB0 -s 115200

If putty http://www.putty.org is used this looks like this:

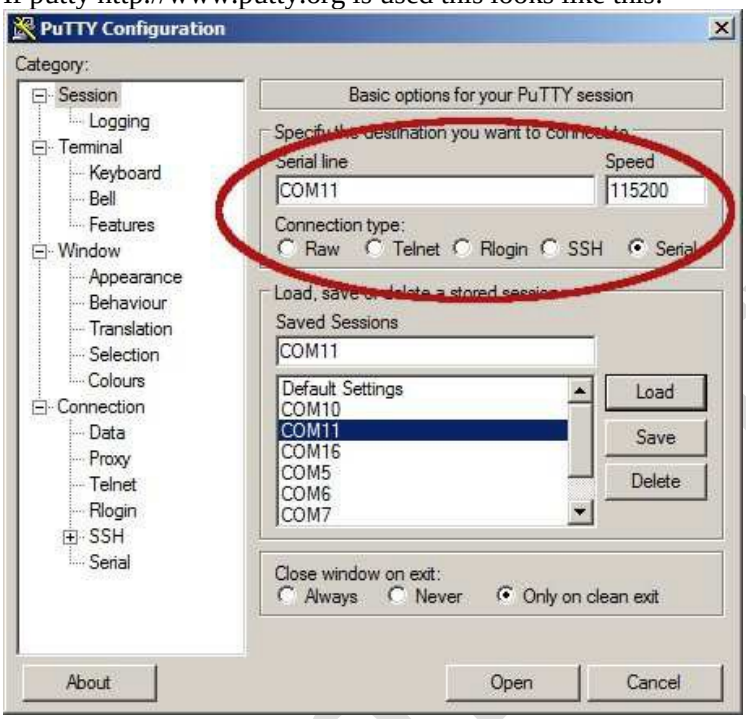

Figure 35 Putty configuration

4.8 Flash Tool

Flash Tool is needed to flash new ARM software and LTE firmware images onto the flash memory on the modem board.

\\musdsara001.imu.imc.local\SW_builds\xmm6360\tools\flashtool
Take the recommended flash tool *.zip file, see Subsec. 3.6.1, (flashtool*.zip) and unzip it to a local folder at the WinPC where all USB cables from the modem
boards are connected to. No further installation is needed. It is recommended to create a desktop shortcut (soft link) to the file “Flashtool_E2.exe”.

To enable full LTE operation two files must be flashed into the modem board flash memory.
The ARM software file, which is called “XMM7160*.fls” and
The LTE firmware file, which is called “allcpus*Li.fls”., see Subsec. 3.2.

Flashtool supports two operation modes.
1. The GUI by executing the file “Flashtool_E2.exe”
2. A command line mode by executing the file “IMC_DL.exe”. This mode also enables remote flashing e.g. by using the udp2AT server or Lauterbach scripts.

The HS-USB port or the USIF1 COM port (typically used as fallback) can be used to flash the modem board.

4.8.1 GUI Flashing via HS_USB Port

1. Check that all cables describes in Subsec. 2.3 are connected and that the boot mode switch is configured as described in Subsec. 2.7.
2. Start the Flash Tool GUI.
3. Add the files to be flashed to the “Download Setup” dialog and check that they are selected, see Figure 35. Hint: “Drag and Drop” between the Flash Tool and the MS explorer is supported.
4. It is also possible to check the “Startup in Test Mode” box to have the phone already in the production test mode from the next boot on.

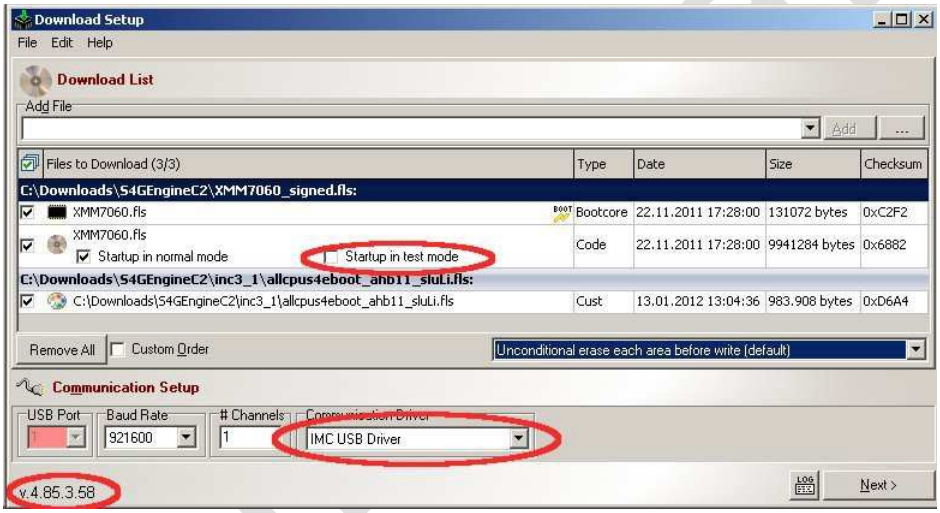

Figure 36 FlashTool Screen

Add the files to be flashed to the “Download Setup” dialog and check that they are selected. Hint: “Drag and Drop” between the Flash Tool and the MS explorer is supported.

FlashTool Select the files to be flashed and press “Next”. Check that the Flash Tool version number, the selected mode and the driver settings fit to the configuration.

If HS-USB flash option is selected, the modem board cannot trigger a board reset. This must be done manually. Follow the sequence from 0

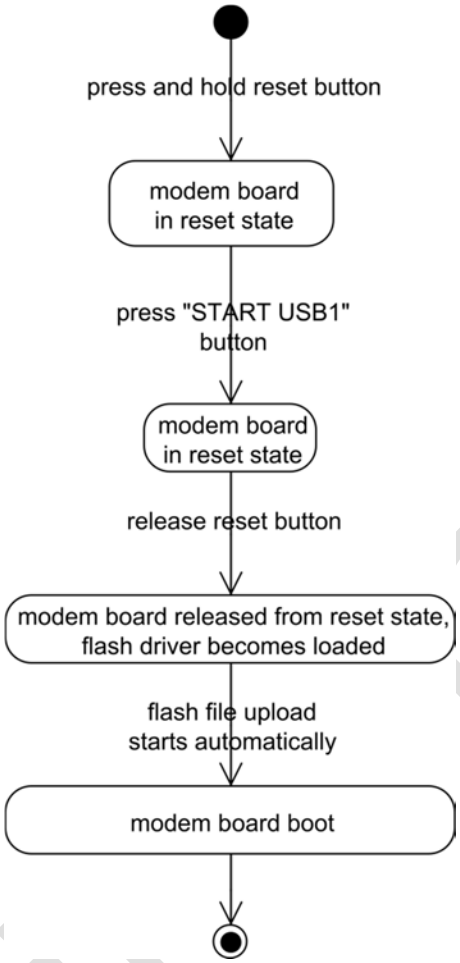

Figure 37 Reset sequence for HS-USB port flashing

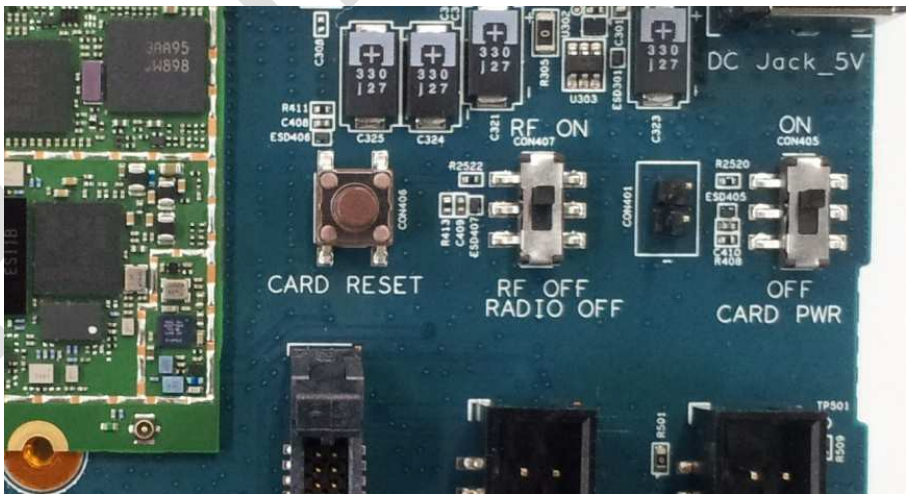

Figure 38 Reset button location (CON406)

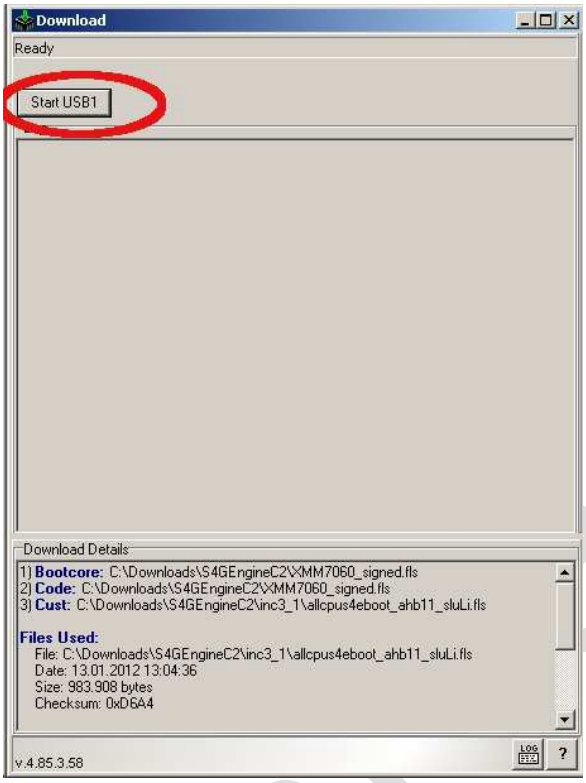

Figure 39 Location of the Start USB1 button

Figure 40 Wait. Everything is fine

Figure 41 Flashing finished successfully

4.8.2 GUI flashing via USIF1 COM Port

The required power and reset cycle features were described.

The Flash Tool is working via the High Speed USB connection of the BGLU-Board (next to the MIPI interface). To use this USB interface you have to install the required driver from the subdirectory FlashUSB.

Check that all cables describes in Subsec. 3.3 are connected and that the boot mode switch is configured as described in Subsec. 3.7.
Start the Flash Tool GUI.
Select the right COM port and enter this value into the FlashTool.

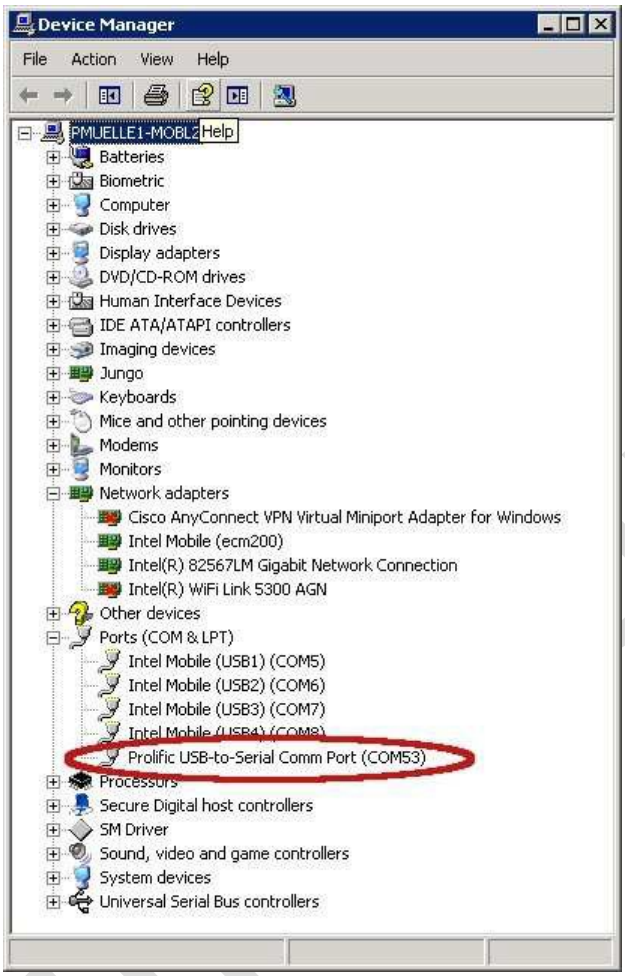

Figure 42 Device Manager – COM port assignment – Prolific USB-Serial

Add the files to be flashed to the “Download Setup” dialog and check that they are selected. “Drag and Drop” between the Flash Tool and the MS explorer is supported.

The Flash Tool also supports the configuration of the DUT mode after flashing. Normal mode or test mode can be selected.

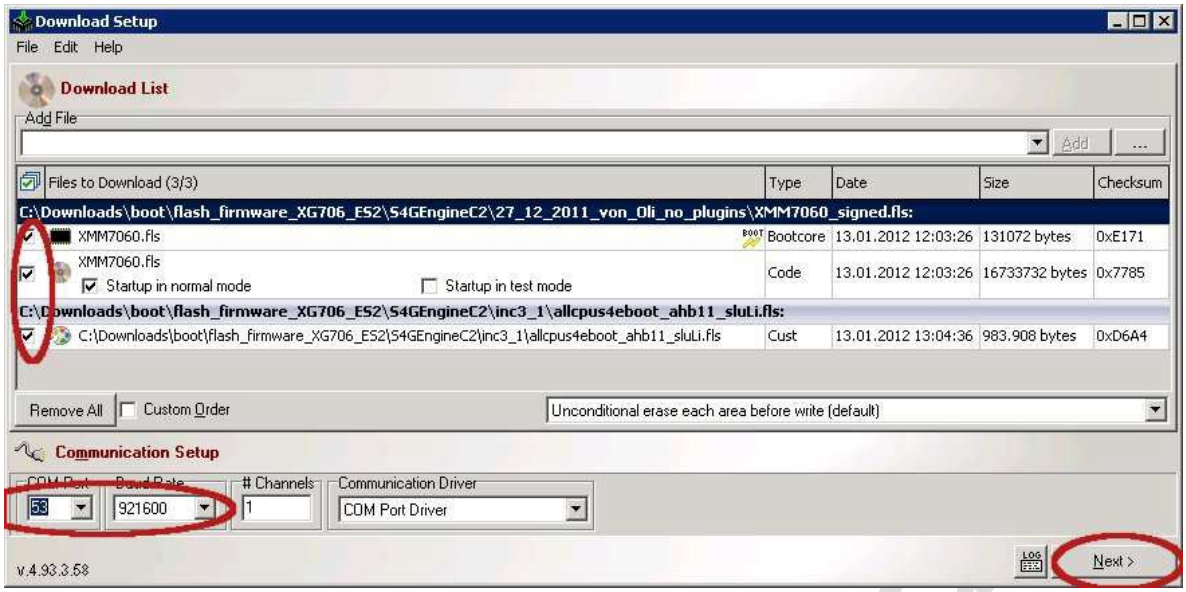

Figure 43 FlashTool – UART

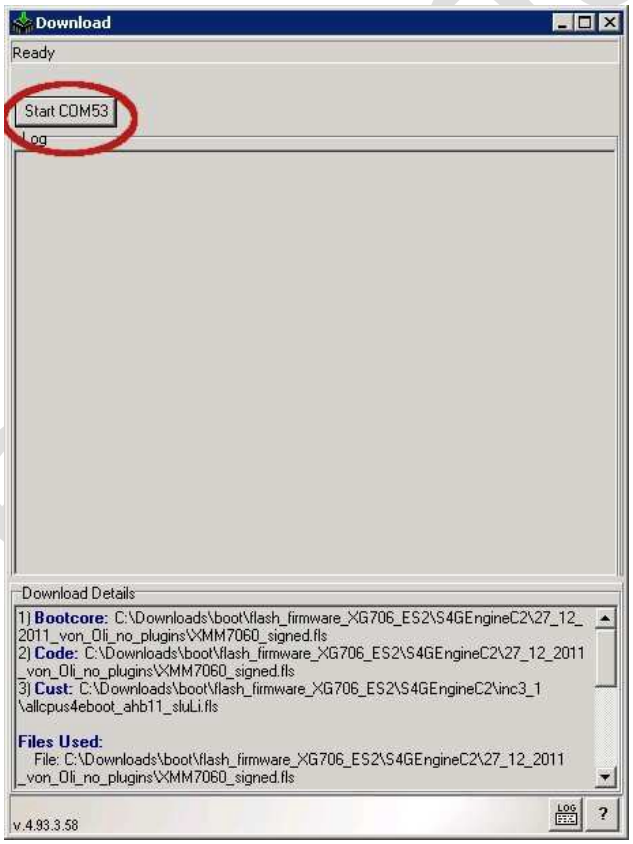

Figure 44 Location of the "Start COM" port button

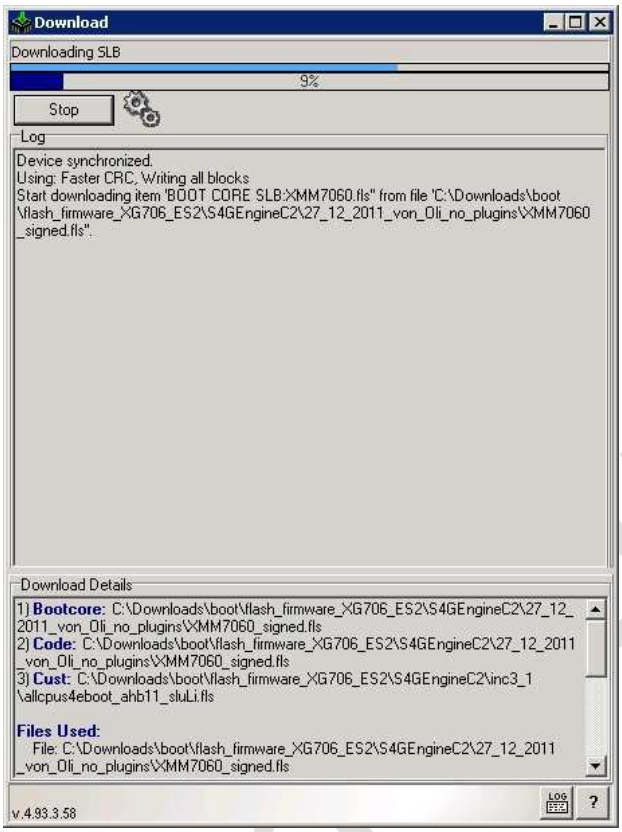

Figure 45 Wait. Everything is fine

Figure 46 Success

4.8.3 Flash Tool in Command line Mode

The Flash Tool also supports command line operation. Use

1. .\IMCDownload.exe -cUSB1 .\allcpus4eboot_ahb11_sluLi.fls if USB1 is desired.
2. Or use
3. .\IMCDownload.exe –c53 .\allcpus4eboot_ahb11_sluLi.fls if the prolific port is com port 53 is desired.

4.8.4 Remote command Line flashing with the usb2AT Server

The server can be found here:

https://svn.bluwo.net/mwc10/trunk/Software/bwcHost/Udp2AtWrapper/dist/

4.8.4.1 About

There is an usb2AT server that can run the Flash Tool in Command line mode. It therefore allows remote flash operation. The firmware to be flashed becomes downloaded to a temporary file location first and then flashed by the Flash Tool in command line mode. The server supports Java and Matlab/Octave clients.

The server also provides a UDP server component listening for L1D messages and redirecting them to a serial port translating them to AT commands (and sending back the responses read from serial port).

4.8.4.2 Running the Server

Depending on your system, do one of the following:
On Windows (32 bit): Double-click the file udp2at-win32.bat
On Windows (64 bit): Double-click the file udp2at-win64.bat
On Linux (64 or 32 bit): Start the file udp2at.sh (should also work from your file manager)

It is also usefully to create a shortcut that helps to start the udp2ATserver easily.

4.8.4.3 Running the Server Manually

Running the server manually might be of use because you want to see stuff printed to standard output or because the provided scripts fail. First, note that the server uses the RXTX JNI library for connections to serial ports. A version of the library is provided for Windows and Linux (for both in 32 and 64 bit flavors). Usually, the following command should be sufficient to start the server:

```
java -Djava.library.path=path/to/rxtx/libs -jar udp2at.jar
```

Make sure the libraries in the location you pointed to by java.library.path match your system architecture (otherwise you'll get errors and the server won't start up).

4.8.4.4 Configuration

Simply setup the values and click the "Start Server" button. You can safely close the Window (there is an icon in the system tray which you can use to show the window again).

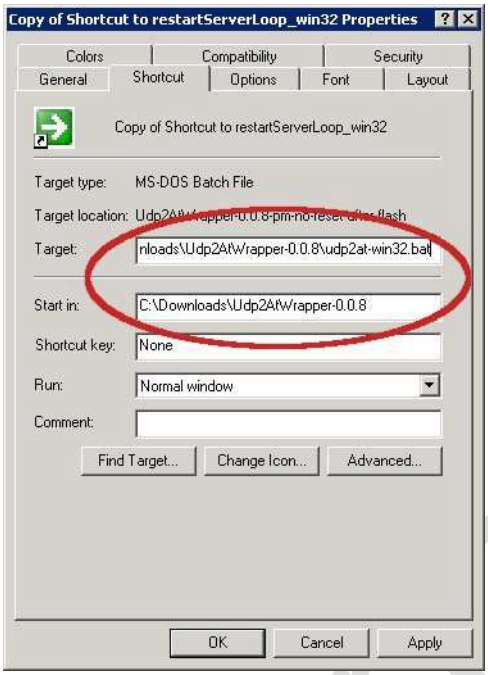

Figure 47 Udp2AT server shortcut configuration

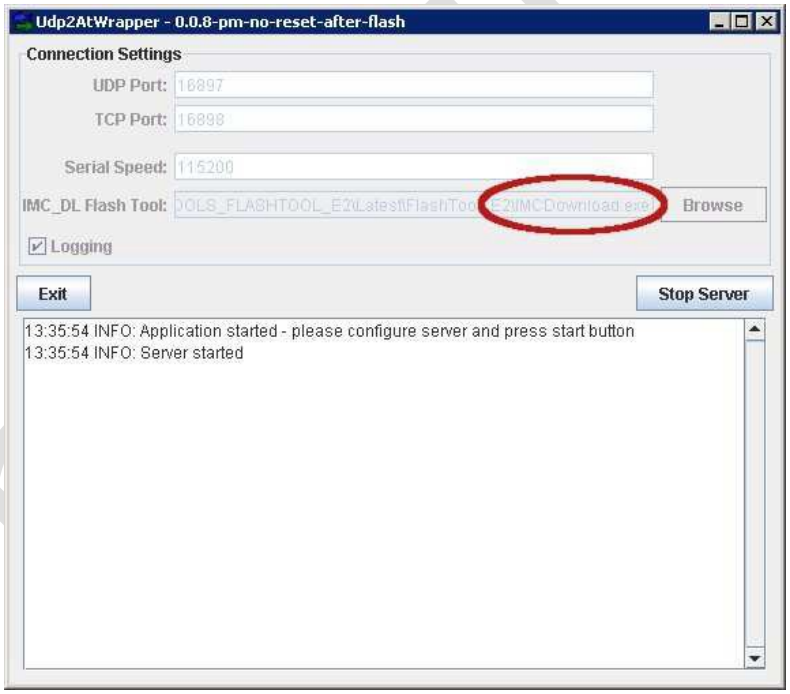

Figure 48 Start the server

Start the server and check that IMCDownload.exe is selected. If not, stop the server, select the proper file and restart the server.

Check that there is only one server session active. Manually close any “Zombie” sessions.

Figure 49 Check for running "Zombie" servers. Only one of these icons should appear

Matlab/Octave sample code, if the modem board was booted/set into service mode:

```
ctrlDev.hostPC      = '10.217.230.18';
ctrlDev.hostPCResetPort= 9;      %Prolific USIF1 COM port
ctrlDev.hostPCSrvcPort = 7;      %Intel mobile USB3 COM port from HS-
USB ecm200 driver
ctrlDev.localBoard = 1;          %true, local board -> no board from
devPool


fw1 = sprintf('%s/boot/flash_firmware_XG706_ES2/S4GEngineC2/
27_12_2011_von_Oli_no_plugins/XMM7060_signed.fls', pwd); %ARM
SW fw2 = sprintf('%s/boot/flash_firmware_XG706_ES2/
S4GEngineC2/inc3_1/allcpus4eboot_ahb11_sluLi.fls', pwd); %LTE
fw

flashDevice(ctrlDev, fw1, fw2);      %ARM SW and

LTE fw flashDevice(ctrlDev, fw2);    %LTE fw only

sendAtMsg(ctrlDev,7);   %switch on service mode [7] at@ephy:smon()

%query SMARTi chip ID and boot status
CIB_CHIP_ID=dec2hex(sluRfRegRead(dev,      0xd8eeca, 0, 'CoreS4G'))

%read S4G boot status
CIB_FW_BOOT_STAT_REG_value = dec2hex(sluRfRegRead(dev,
0xd8eec8,0,'CoreS4G'))
```

4.8.5 Treating Flash Tool Errors

Memory map related issues can be treated as described below

There are two error messages coming up at the flash process that prevent from proper flashing, see Figure 49 and Figure 50.

Open the MakePrg tool and compare the Memory maps. At IMC-DRS this can be found here:

/engineering/Software/XMM7060_tools/Makeprg at IMC-DRS

Compare the memory maps from the ARM software and the LTE firmware and adapt the memory maps in case there are any differences. The maps must be identical.

The memory map configuration of the LTE fw can be found here:
~/projects/mwc10/branches/SW/Software_inc3.1Integration_20111107/Software/bwcCommon/mk/hex2fls/cust/xg706

Figure 50 Flash Tool error message at file selection

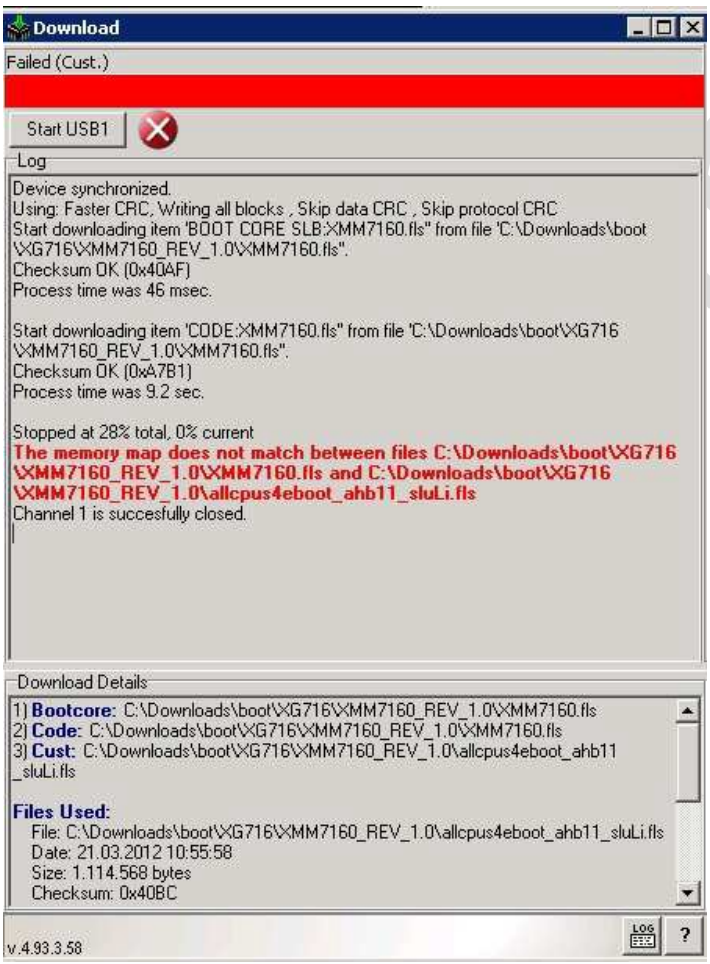

Figure 51 Phone Tool error message after failed flash process

4.9 Phone Tool

4.9.1 Installation

To communicate between PC and Modem Board the Phone Tool is used. Also the HyperTerminal or other tools can be used for AT-command communications. Here the communication via the Phone Tool will be shown.

Run PhoneTool_setup.exe to install the Phone Tool.

4.9.2 Configuration

Phone Tool Settings: choose COM port which is shown in the device manager as 'Comneon Mobile' Comport, if the device is connected via USB, or Prolific USB-to-Serial COM Port, if device is connected via USIF.

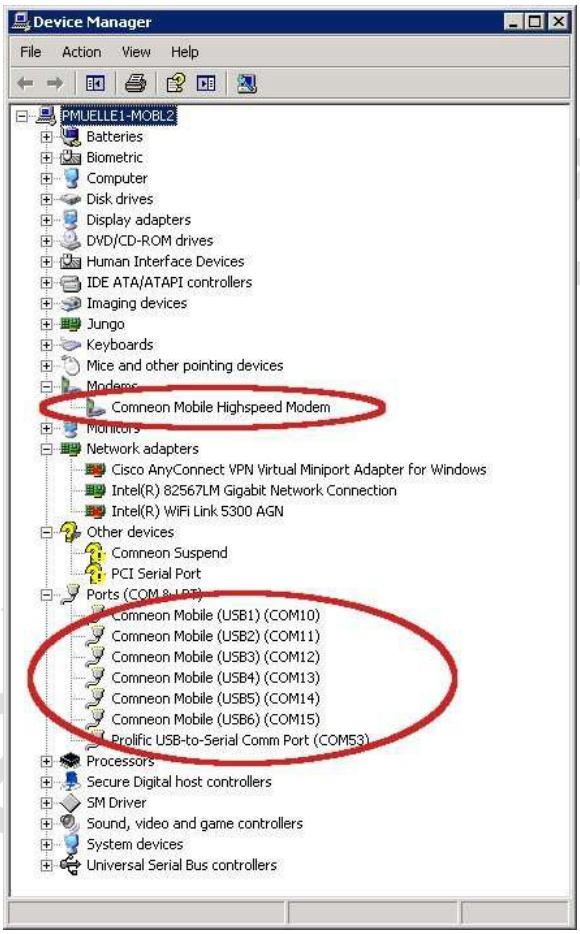

Figure 52 Phone Tool Settings, choose Comport

4.9.3 Connection via USB

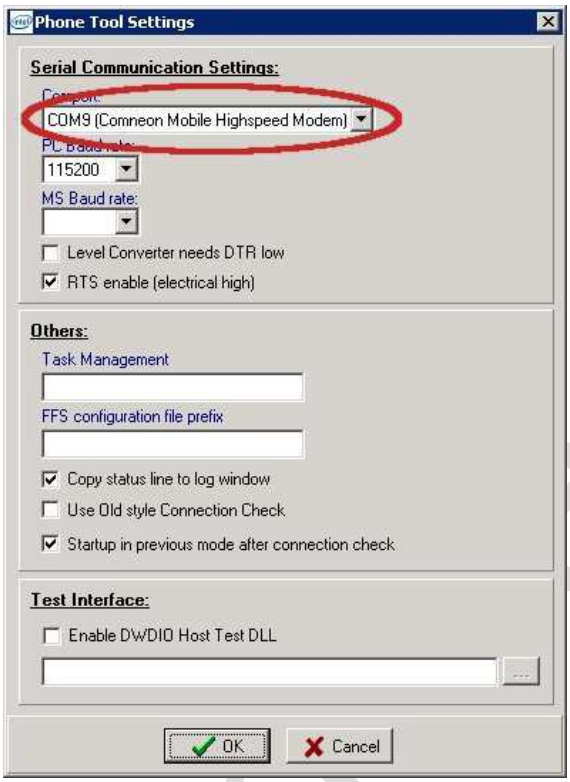

Figure 53 Phone Tool Settings, choose Comport

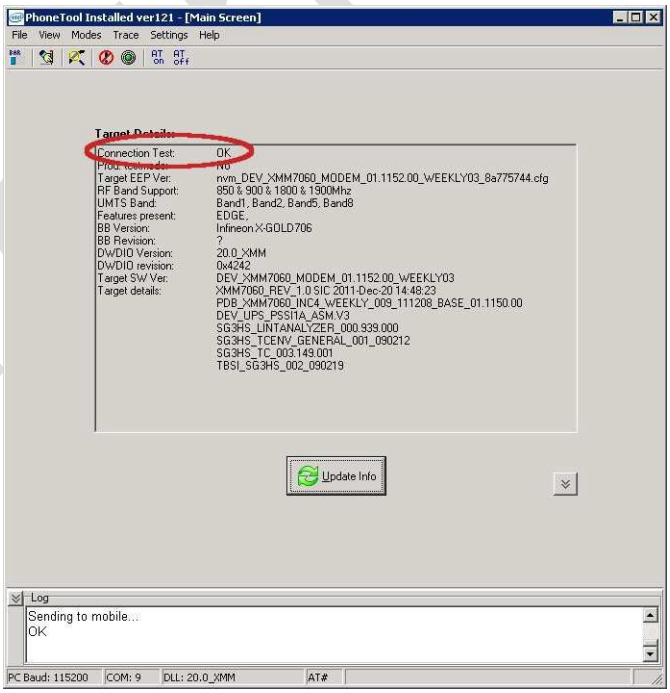

Figure 54 Phone Tool command "Update Info"

Note: After selecting Update Info, check the connection test response.

4.9.4 Connection via USIF 1 Com Port

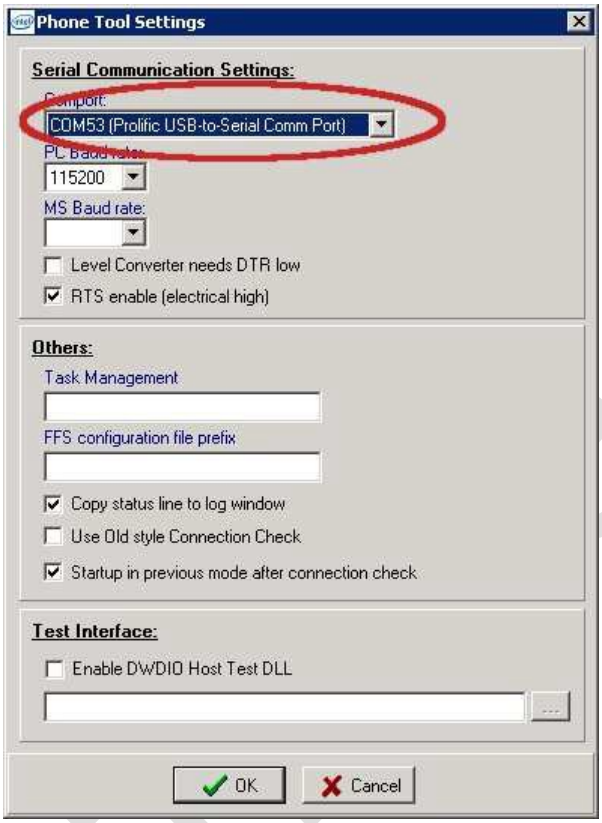

Figure 55 Phone Tool Settings, choose Comport

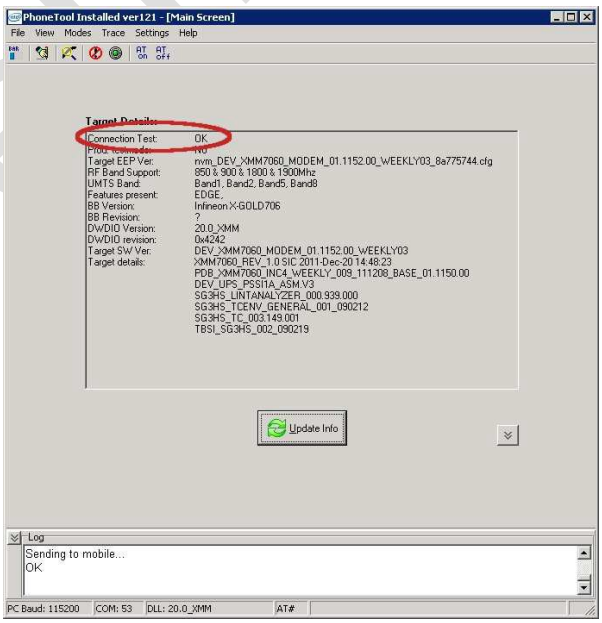

Figure 56 Phone Tool command "Update Info" and check the connection test response

4.9.5 Set Modem Board into Service Mode

To switch the modem board from the normal/dial up mode to the service mode nvm settings must be modified to the values below by using the phone tool or plain AT commands:

old: nvm_static_fix.usb_nvm_sta_fix.config = 0x22

new: nvm_sta_fix.usb_nvm_sta_fix.config[0] + [1] = 0x22

In addition an AT command is needed to enable the service mode completely. See Subsec. 3.11.2.3.

ARM for Inc3.0: 'at@ephy:smon()'

Note: Please check with the provider of the ARM image which commands are valid for the actual build!

The nvm* setting corresponds to a switch from the Comneon driver to the Intel ecm 200 driver. The Phone Tool or AT commands can be used to do this. The needed steps for the Phone Tool are listed below. The also prints out the AT commands that were used to modify this settings. Other tools e.g. the udp2AT server can be used to apply this AT commands without using the Phone Tool.

Check that the Phone Tool can talk to the modem board by accessing: Phone Tool: Modes : Main Screen; Press: Update Info

Open: Phone Tool:Modes:EPROM Editor

If no *.cfg file is found an error message appears.

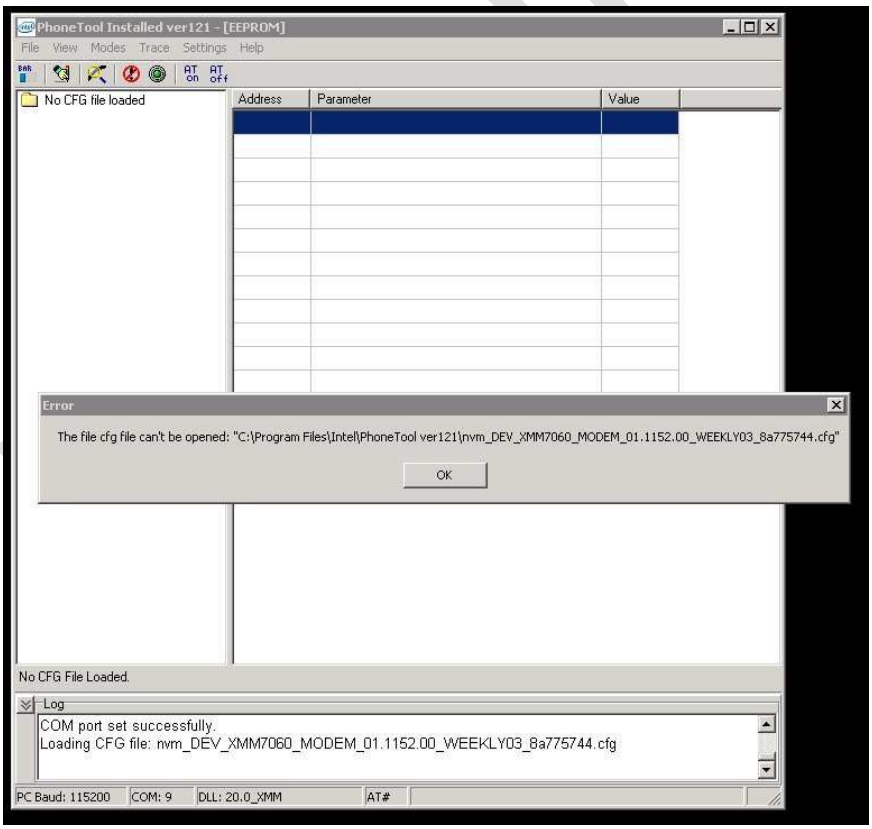

Figure 57 Error message if no *.cfg file can be found

Manually load the *.cfg file that is supplied with the XMM7060.fls file. Select: File:Load CFG file manually and select the file.

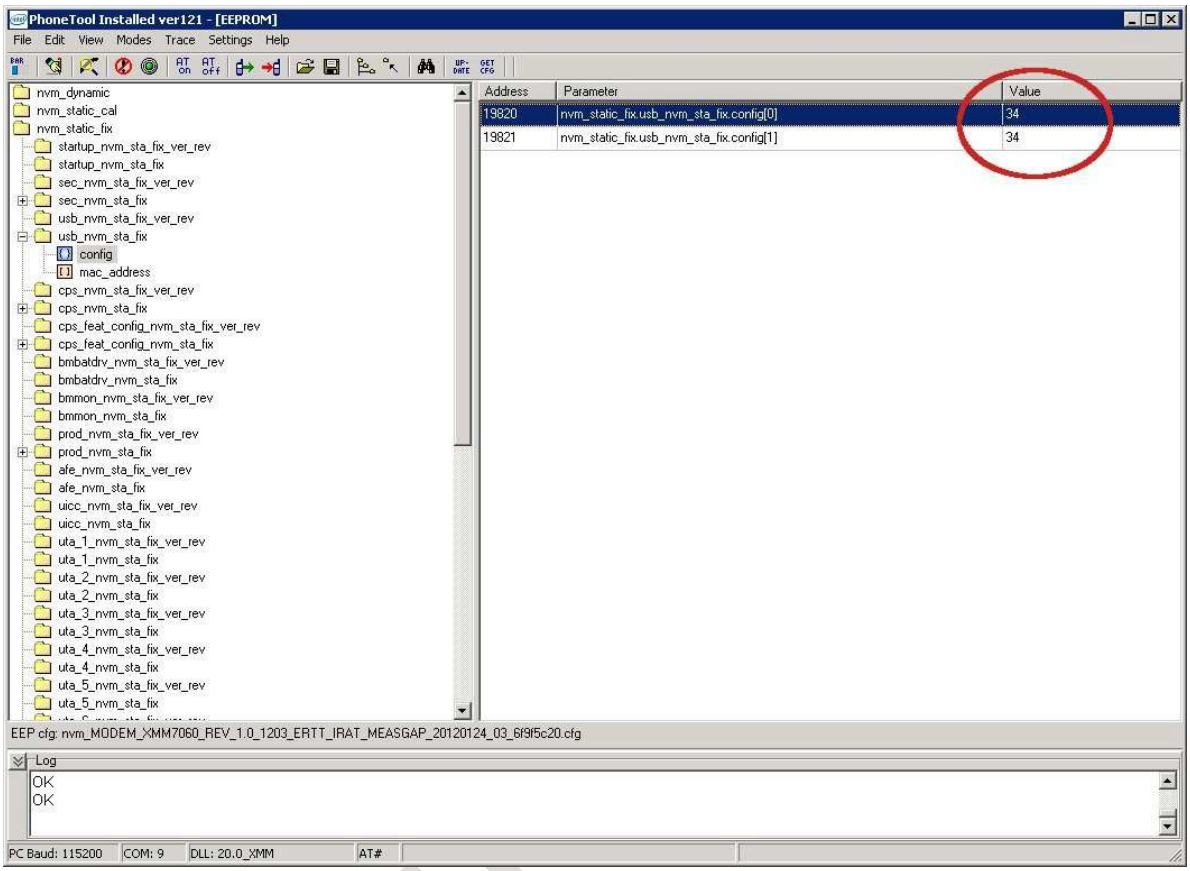

Figure 58 Changing the nvm_sta_fix.usb_nvm_sta_fix.config value

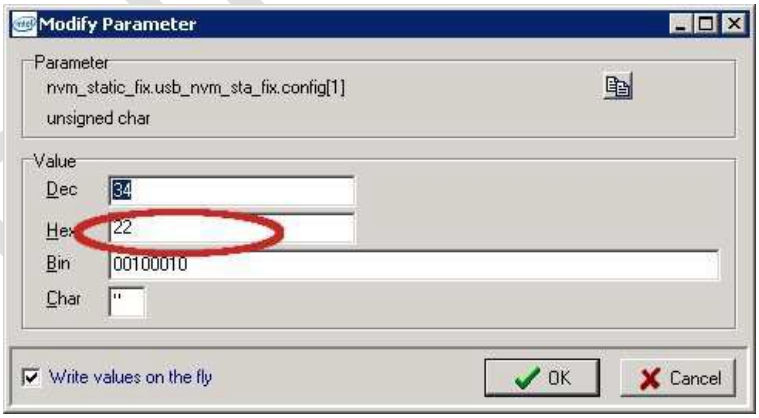

Figure 59 Configuration of the nvm_sta_fix.usb_nvm_sta_fix.config value

Reset the board.

The ecm200 modem is appearing, see 0.

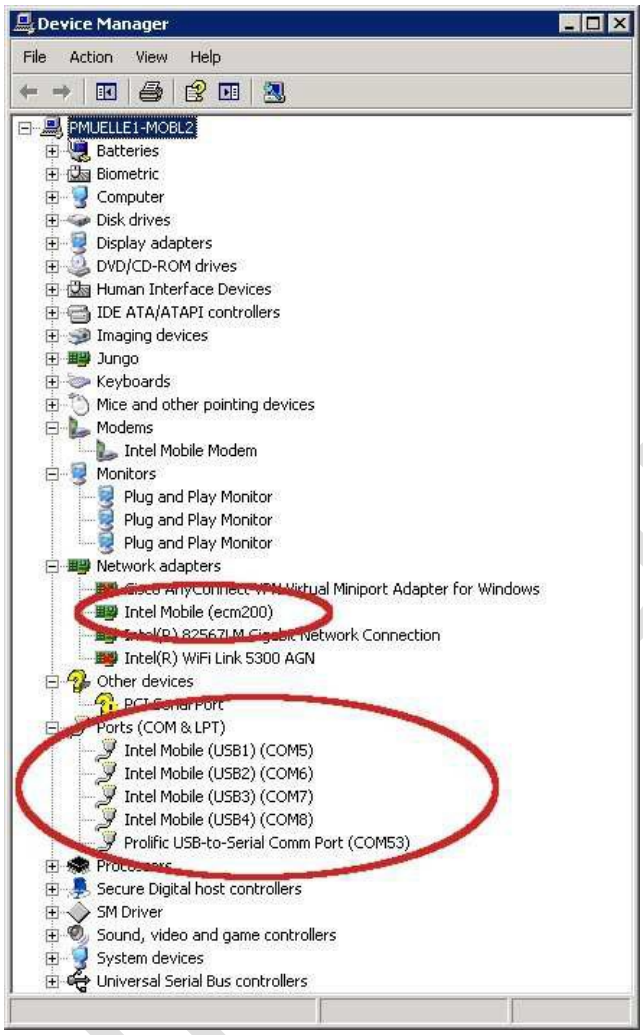

Figure 60 Intel ecm 200 driver is now appearing after the board reset

To configure the ecm200 driver follow now the instructions from Subsec. 3.6.2.

4.9.6 IMEI Programming

The security menu can be used to program IMEI, make personalization key and program different kinds of SIM locks. The Normal User Mode is a minimal interface for the users, who only have to use basic features of Security Programming. For advanced use and programming, users have to switch to Advanced User Mode.

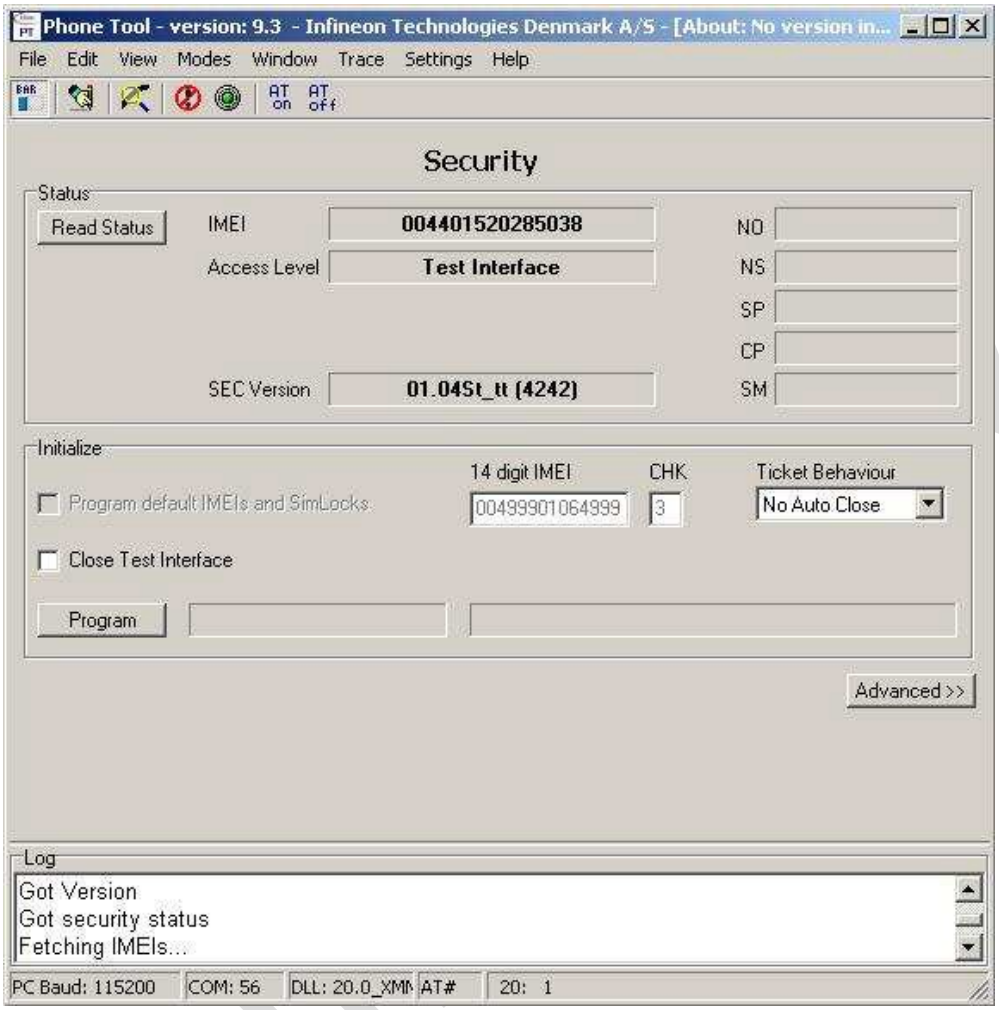

Figure 61 IMEI Programming

4.9.6.1 Read Status

This will read and display the IMEI, current Access Level of user and the Sec Version of the target. The Access Level would be No Access, Test Interface, Boot Core or SEC Module. It also displays the status of the NO, NS, SP, CP and SM Sim Locks – Disabled, Armed, Active etc.

4.9.6.2 Program

Program is used to program the default security data to target and/or open or close the test interface.

4.9.6.3 Open/Close Test Interface

If this is enabled, the Test Interface is opened/ closed for user.

For detail user information, please refer to the file “PhoneTool.chm” in Phone Tool installation folder.

4.9.7 RF Testing

The Phone Toll supports also basic functional RF testing.

1. Check that the PhoneTool is connected to the DUT via High Speed USB (HS- USB) or via USIF1.
2. Open the Phone Tool Main Screen and check the interconnection.
3. Open the PhoneTool Menue : Modes:RF Adjustment:Non-Signaling Test
4. Open the Tab: LTE no-signaling control
5. Enter the settings and start the transmission/reception with Start/Update RX/Start Update TX

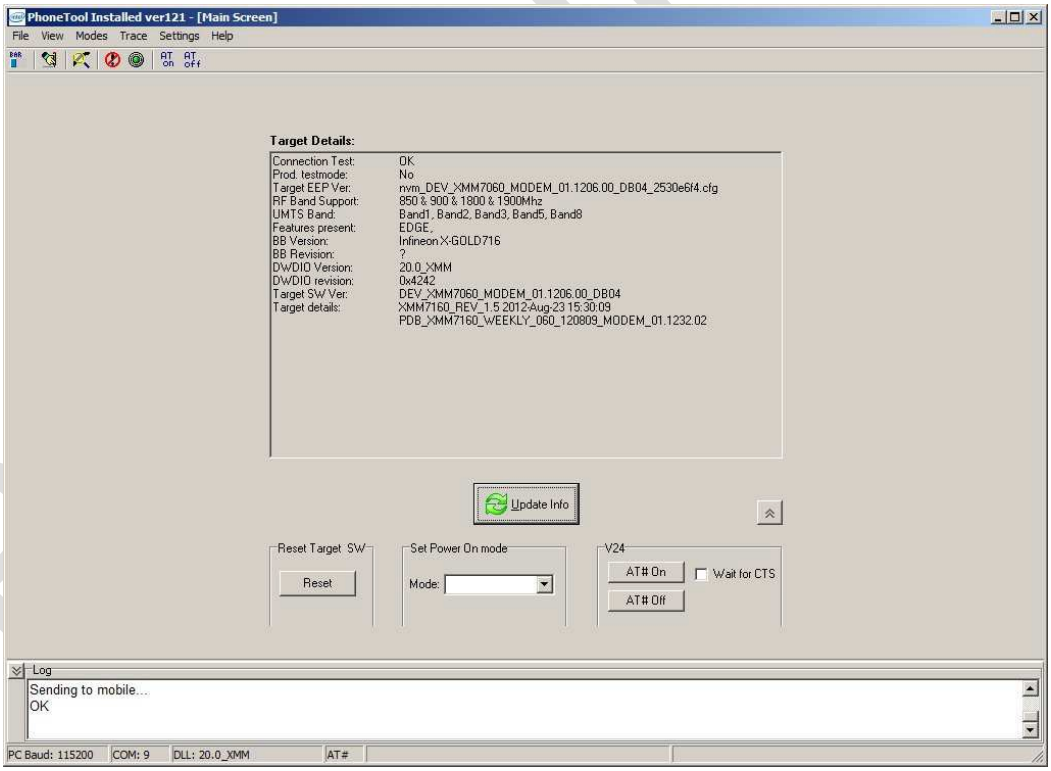

Figure 62 Interconnection test at the PhoneTool Main Screen

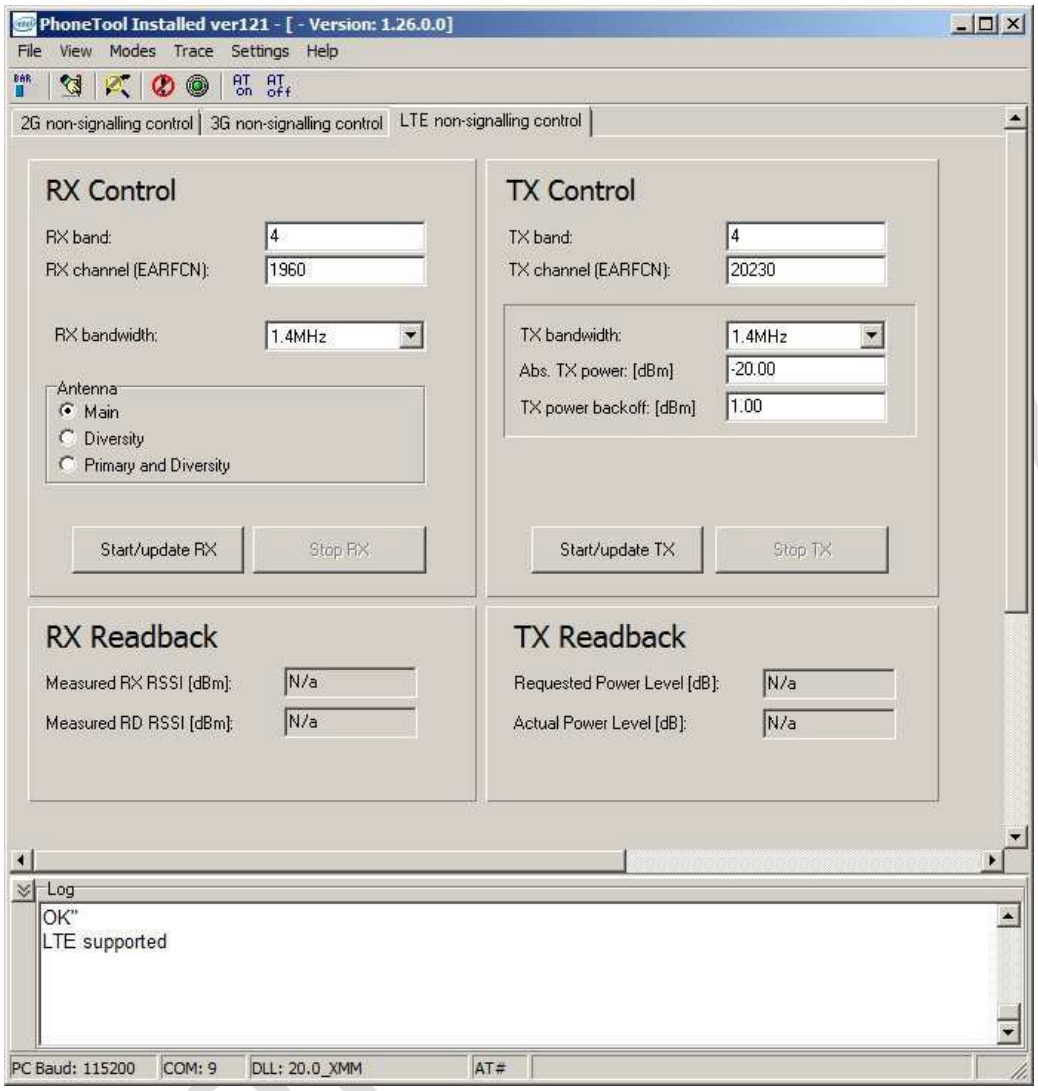

Figure 63 Interconnection test at the PhoneTool Main Screen

4.10 Cal Tool

4.10.1 General Considerations

The Cal Tool is generally documented in separate documents. Nevertheless some preconditions must be fulfilled to enable proper Cal Tool functionality. The most important precondition is the EEPROM configuration that must fit to the used board.

The documentation comes with the installer. The Cal tool also supports scripted operation by using Win batch files.

NI-VISA and NI-488.2 is also needed to enable remote CMW500 and power supply control. Install NI-VISA from here: http://download.ni.com/support/softlib/visa/NI- VISA/

and NI-488.2 from here: http://download.ni.com/support/softlib/gpib/Windows/3.0/ .

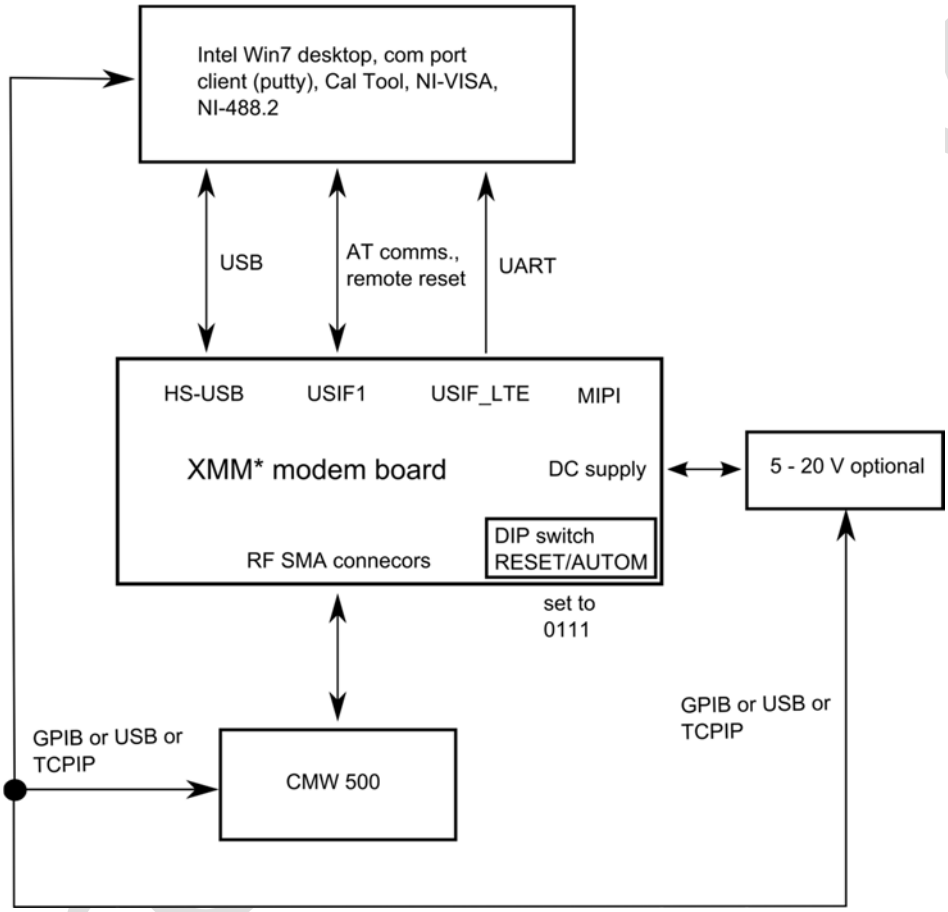

Figure 64 Measurement setup for Modem board calibration

Connect all cables as to be seen in Figure 63 and power the DUT up. Start the Cal tool and select the configuration file see Figure 64.
Check that the right COM port is selected. It is the same as it is used by the Phone Tool see Subsec. 3.9.2. Run the COM port connection test.
Check that the GPIB addresses are assigned to the CMW500 and if needed also to the controllable power supply
Select the bands to be tested
Run the test.

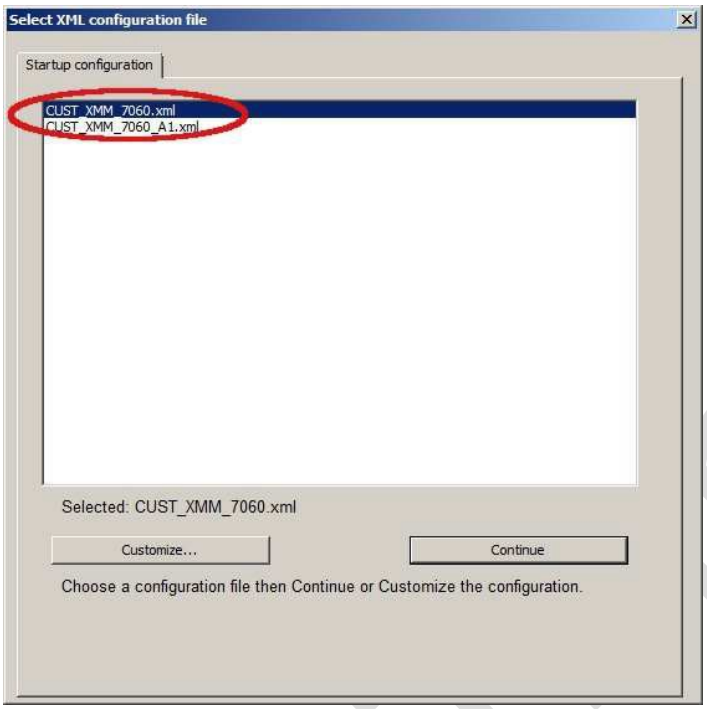

Figure 65 Configuration files selection

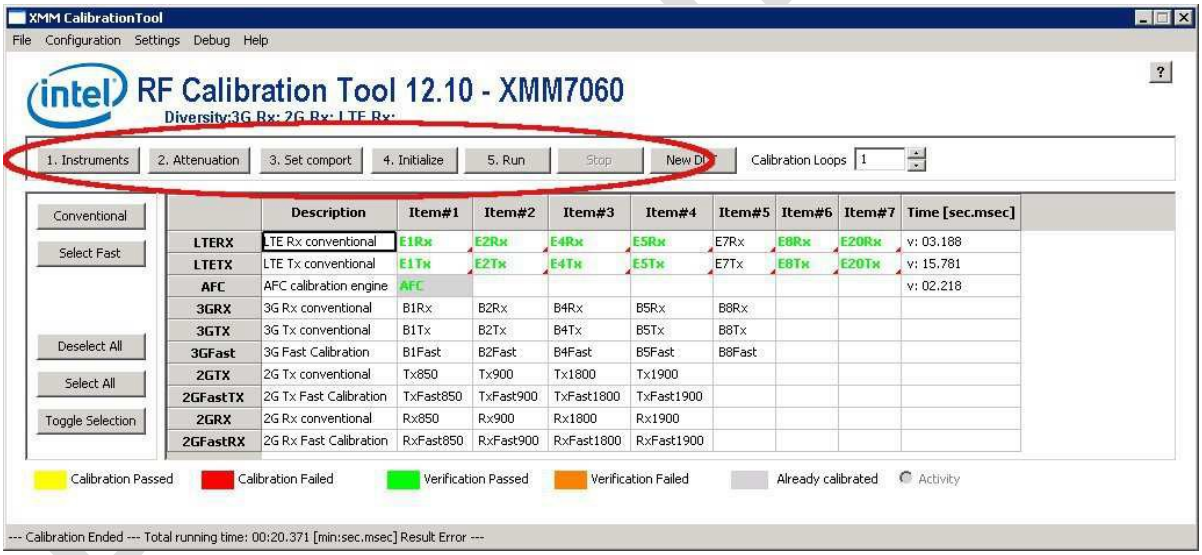

Figure 66 Follow the steps 1 to 5 to calibrate the DUT (press the buttons)

4.10.2 Tracing the RF Tests controlled by the Cal Tool

Open the dTracer from here M:\bin\bwcDebugTracer\dTracer-2 (at DRS-IMC). Setup the calibration framework as to be seen in Subsec.3.10.1.
Connect the system trace box as described in Subsec.3.11.2.
Use the Prolific COM port (USIF-1) for calibration and the Comneon or the ecm200 USB2 port for the control commands e.g. entered by the PhoneTool.

Check that all necessary decoders are installed at the dTracer, see Figure 66. Take the latest ones from here:
\\musdsara001.imu.imc.local\SW_builds\xmm7060\Release\Tools\STT- Decoders\LTE-PS
The required at commands are listed below:
MIPI2-Tracing at+trace=1
at+xsystrace=0,"bb_sw=4;3g_sw=4;digrfx=4","digrfx=0x03","oct=4"
at+xsystrace=1,"lte_l1_sw=4"
at+xsystrace=1,"digrfx=4","digrfx=0x3"
MIPI1-Tracing
at+trace=1
at+xsystrace=0,"bb_sw=2;3g_sw=2;digrfx=2","digrfx=0x03","oct=2"
at+xsystrace=1,"lte_l1_sw=2"
at+xsystrace=1,"digrfx=2","digrfx=0x3"
A reset is neeted to achieve L1CC trace messages after triggering the AT commands.
check traces
at+xsystrace=10

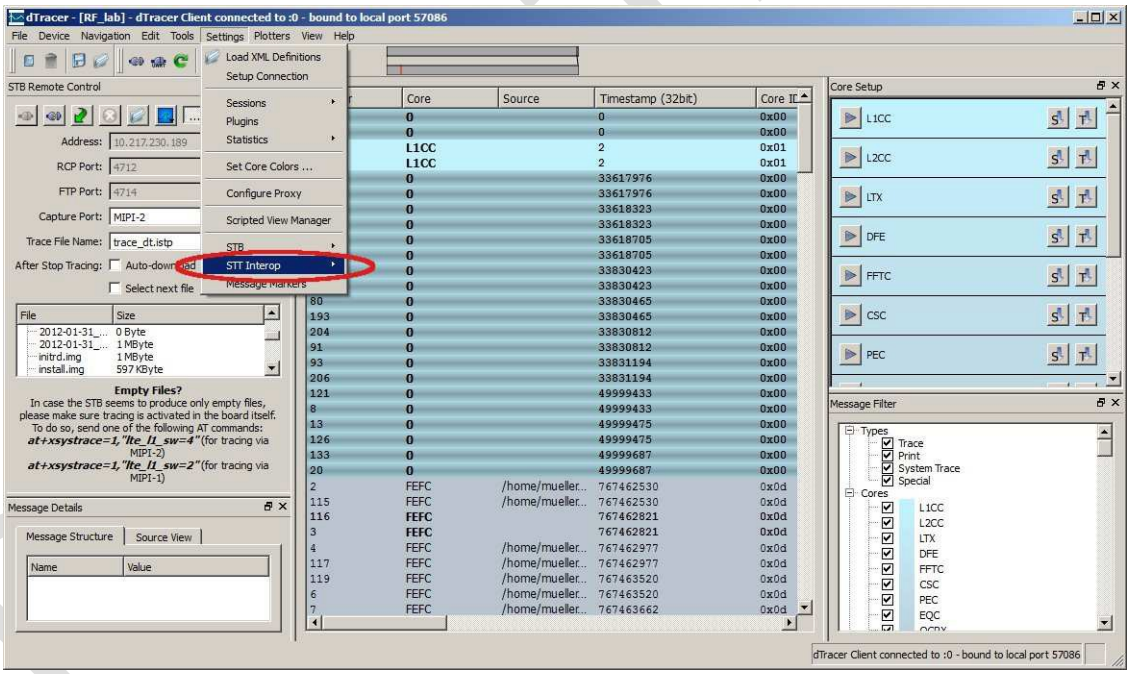

Figure 67 dTracer decoder selection

4.11 System Trace Box

4.11.1 Location of latest Firmware and Software Releases

The STT and Trace Box FW release can be received directly from Telit.

4.11.2 Setup and Configuration

4.11.2.1 Hardware Requirements for Trace to System Trace Tool

PC including a USB connector (Comneon USB to Serial driver must be installed).
Power supply
1 USB cable for trace and another for AT commands.
XMM7160 Modem Development board.

4.11.2.2 Installation

System Trace Tool (STT) is supported for Windows platform. The STT is delivered as self-extractable windows binary: setup.exe.

The setup instructions for Windows platform are as follows

4. Execute the setup.exe by double click or typing the same in the command prompt
5. Enter the path where the STT has to be installed. By default STT displays it under the $UserDirectory/Local settings/Application Data (This will be changed to be put under the program files)
6. Change the directory if you wish to install in your specified location or click next to continue.
7. The STT will be unpacked under the mentioned location.
8. Select QuickLaunch and/or Desktop to create shortcuts if any
9. Select Launch now to execute the STT from the installed location.

4.11.2.3 Entering AT Commands

The AT commands mentioned below must be sent to the COM port that corresponds to the Intel Mobile (USB3) COM port in case the ecm 200 driver is used or
to the COM port that corresponds to the Comneon High Speed Modem, see 0.

The COM port that corresponds to the USIF-1 USB port, see Figure 54 may also work.

The udp2AT server can be used to enter local AT commands from remote locations, see Subsec. 3.8.4.

4.11.2.4 Trace Box Initialization

Connect the Trace box to the test board and to the network as to be seen in

Subsec. 4.1

Tracing Initialization

When the STB is switched ON after plugged to the power the first time it has to be 'Soft'-restarted, that means

Wait until the STB is started up

Push the black button and select Power down

Push the black button again to start

It seems that the 0byte file behavior always came up after flashing new ARM SW to the board after flashing a very strict procedure has to be executed in order to get tracing switched on again

Figure 68 MIPI-2 interconnection for tracing at the modem board

4.11.2.5 Board Configuration and required AT Commands

Reset the board in a way that is booting from the flash

Enable tracing using: at+xsystrace=0,"lte_l1_sw=4"

Reset the board again in a way that is booting from the flash

Now the initialization at commands to switch to Service Mode (that is the mode to use RCTTH) can be sent if needed:

ARM for Inc2.8: 'at@ecal:' 'at@ecal_init():'
ARM for Inc3.0: 'at@ephy:smon()'

Note: Please check with the provider of the ARM image which commands are valid for the actual build!!!

The AT commands below are mandatory to enable tracing:

a. Enable tracing at all sources: at+trace=1;
b. Route traces through UE's "OCT-Block", which creates the ISTP format: at+xsio=3;
c. Select the traces from specific sources, use at+xystrace command. For example, to configure the traces from specific to select ONLY the 3g_sw traces: at+xsystrace=0,"3g_sw=1",,"oct=4"
d. make sure your SIM is not waiting for entering a PIN: at+cpin? If it is, send the PIN at at+cpin=<sim pin number>
e. make sure, the 3G protocol stack is sending traces: at+cops=0; (this command triggers the phone to (re-)register to the network)

4.11.2.6 Further AT Commands

(Contact person Munich: Haiduc, CorneliuX)

Command syntax for “at+xsystrace”:

0 – means that the existing configuration is deleted and the new one is applied

1 – means that the existing configuration is kept and the additional traces are enabled

0 and 1 can be used in the at commands depending on the configuration you want to apply and on the traces you want to generate

The result of the AT commands is stored in NVM so the configuration is preserved after board power down.

4 coresponds to MIPI-2 port

2 corresponds to MIPI-1 port

Table 5 AT Commands trace box support

Command sent by DTE	DCE Response	Description
at+trace=1		
	OK	
at+xsystrace=0,"digrfx=4"		to enable digrfv4 traces
	OK	
at+xsystrace=1,"digrf=4","digrf=0x84"		to enable digrfv3
	OK	
at+xsystrace=1,"lte_l1_sw=4"		to enable lte fw tracing
	OK	
• at+xsystrace=10		shows mapping of trace sources; this command can be used to check what traces have been enabled; you will see OFF for all traces not enabled and MIPI2 for all enabled traces
	OK	

4.11.3 Trace Box2

4.11.3.1 Prepare UE

open a putty session to the target for AT control

Configure to send out on MIPI1 using at+xsystrace=0,"bb_sw=2"

Switch off power saving with at+xsystrace=80

Configure to send out calibration pattern using at+xsystrace=1,,,"pti1=0x4104“

P.S: Power saving has to be disabled before test pattern generation. This has to be supported by the 7160.

4.11.3.2 Prepare STB

Attach a USB keybord to USB port 2

Select a virtual console with Shft+Alt+F2

Create the device with mknod /dev/istp0 c 251 0

Set calibration pattern with cistpctrl -c AA

Set MIPI1 interface for capture with cistpctrl -i 2

P.S: I have put the above steps (2.3) to (2.5) into /android/data/media/disk1/bin/prepare.sh to make it easy for you. So please invoke : sh /android/data/media/disk1/bin/prepare.sh

4.11.3.3 Check Calibration Result

cistpctrl -f -r -o 4 -g 1 && dmesg | tail -2 Check whether the value is 0x000EAA04(E indicates calibration done)

P.S: I have put that step in to /android/data/media/disk1/bin/check.sh. So please invoke: sh /android/data/media/disk1/bin/check.sh

4.11.3.4 Top Sending Test Pattern from UE

stop sending test data from UE at+xsystrace=1,,,"pti1=0x0004"

get back to power save mode with at+xsystrace=81

4.11.3.5 Record MIPI-1 Traces on STB

Issue trace.record.start from putty session to STB

flush the FPGA fifos using cistpctrl -u 1. This is available as /android/data/media/disk1/bin/flush.sh

Check flush finished with cistpctrl -f -r -o 4 -g 1 && dmesg | tail -2 Check whether the value is 0x000CAA0D

Issue trace.record.stop from putty session to STB

4.11.4 Tracing and Trace Analysis with the dTracer

The dTracer can control the system trace box and display the traces.

The tool is more or less self-explaining.

The trace box IP number must be added manually to enable remote trace box operation.

Add decoders from STT here: Settings -> Stt Interop -> Manage Decoders

Settings -> Stt interop -> Custom Fields enables decoder specific views

Diagramme can be added via Settings -> Add Diagram, each Diagram contains the entry View -> Diagrams

There is also a command line interface, Example:

dTracerApp --headless --exec=addSttDecoder:C:\Users\mhoeher\Desktop\decoders\decoders\sttdecoder-ltel1-10709000161000000000.dll --exec=istpToCsv:C:\Users\mhoeher\Documents\dTracer-WorkShop\Markers\trace_working2.istp;.\test.csv;000000040000002e006600690065006c0064002d00620079002d006e0061006d0065002f00540069006d0065007300740061006d00700000002e006600690065006c0064002d00620079002d006e0061006d0065002f004d006100730074006500720020004900440000003000660069006500 6c0064002d00620079002d006e0061006d0065002f00430068006100 6e006e0065006c00200049004400000001e0032002f006c00740065006c0031002f004400650074006100690 06c0073

explaination:

- --headless – start dTracer in command line mode
- --exec=... – execute the given command
- load decoder: --exec=addSttDecoder:FILENAME ... loads the STT decoder from a given file
- convert ISTP into CSV: --exec=istpToCsv:ISTPFILENAME;CSVFILENAME;USERMODELSETUP

  USERMODELSETUP hexdump oft the colums tob e exported

  Export dTracer configuration (user model) is supported

4.11.5 AT Settings for MIPI-2 Tracing

at+xsystrace=1,,,"pti1=0x4104"

The SMS for trace and debug is SMS02883485
at+xsystrace=0,"bb_sw=2"

disable MIPI1 using cistpctrl -i 2

cistpctrl -i 1

at+xsystrace=1,,,"pti1=0x0004"

at+xsystrace=81

at+tado="!",65535,10000

at+tado="!",128,10000

Enabling calibration pattern

at+xsystrace=80

at+xsystrace=0,"bb_sw=2"

at+xsystrace=1,,,"pti1=0x4104"

disabling calibration pattern

at+xsystrace=1,,,"pti1=0x0004" at+xsystrace=81

test pattern

at+tado="!",65535,10000

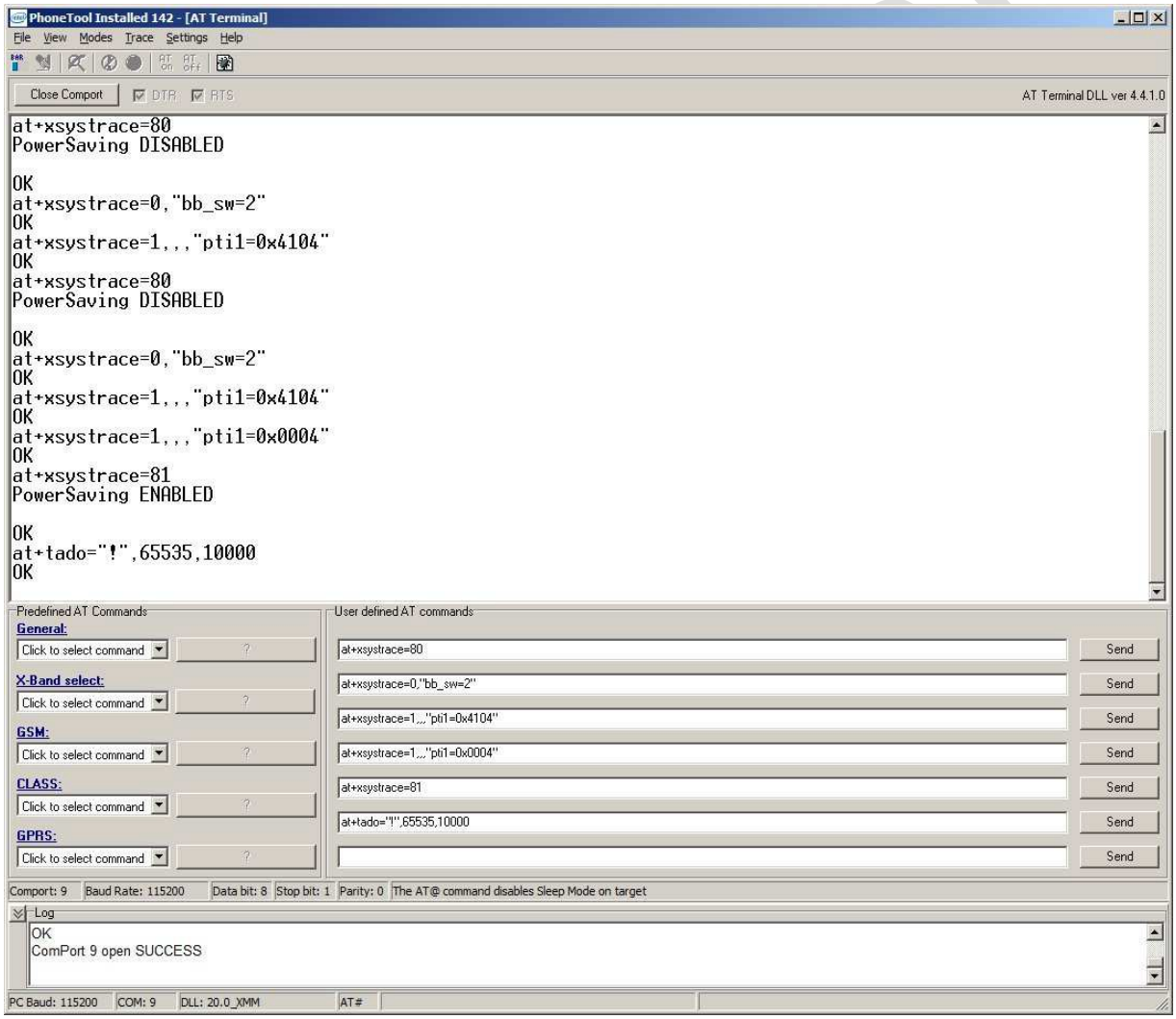

Figure 69 MIPI-1 tracing debug settings (At terminal at the PhoneTool)

The dTracer can be used to start, stop tracing.

4.11.6 Tracing and Trace Analysis with the System Trace Tool

4.11.6.1 Installation

System Trace Tool (STT) is currently supported for Windows platform. The STT is delivered as self-extractable windows binary: setup.exe.

Install the System Trace Tool into a folder without space in the path name e.g.
C:\software\STT

The setup instructions for Windows platform are as follows:

1. Execute the setup.exe by double click or typing the same in the command prompt
2. Install the System Trace Tool into a folder without space in the path name
3. Enter the path where the STT has to be installed. By default STT displays it under the $UserDirectory/Local settings/Application Data (This will be changed to be put under the program files)
4. Change the directory if you wish to install in your specified location or click next to continue.
5. The STT will be unpacked under the mentioned location.
6. Select QuickLaunch and/or Desktop to create shortcuts if any
7. Select Launch now to execute the STT from the installed location.
8. Add decoders for LTE and DigRF trace decoding:
9. Copy new decoder files to the following locations:...\STT\decoders\decoders and
10. ...\STT\STT\decoders<< File: sttdecoder-digrf_S4G.dll >> << File: decoders.txt
11. >> << File: mids.txt >> The dll attached is the digrfv4 decoder.
12. The l1 fw decoder dll that is generated by the Dresden team must be renamed to sttdecoder-ltel1.dll to match the decoders.txt.

When STT is launched, the version number is shown in the screen.

4.11.6.2 Trace Setup

STT allows different trace use cases:

Tracing over MIPI PTI to SystemTraceBox (standalone) Tracing over MIPI PTI to SystemTrace Box (with control PC) Tracing over legacy interfaces to System Trace Box (standalone)

Tracing over legacy interfaces to System Trace Box (with control PC)

Tracing to Application Processor

Tracing to SD-Card

Tracing to SystemTraceTool

4.11.6.3 Run the test

The STT tool does not support trace box remote control. The trace at the box must be started and stopped manually. The IMC-DRS-CV team does also use a Java based trace box client.

Start and Stop the box manually.

Load the trace file to the local PC. To get the trace out of the STB a ftp connection has to set up to port 4714: ftp://IP_ADDRESS:4714

The IP address is visible on the STB's main screen. Use the MS Internet Explorer or a dedicated FTP client to obtain the data. Firefox does not work and returns an error message.

Import the file into the STT tool and enable the required decoders.

4.11.7 Connecting the UE

- Connect the UE to the PC as described in section 2.3.
- Find the com-port in which UE is connected using comtest tool. Run the command comtest –l. It will list the ports. Carefully evaluate the port for tracing and port for control.
- To check whether PC is connected to UE properly, try connecting the control port with the terminal emulator and send "AT" command, If the response is OK, UE is connected successfully. This can be done via AT Console in SystemTraceTool.
- Send the below AT commands:

a. Enable tracing at all sources: at+trace=1;

b. Route traces through UE's "OCT-Block", which creates the ISTP format: at+xsio=3;

c. Select the traces from specific sources, use at+xystrace command. For example, to configure the traces from specific to select ONLY the 3g_sw traces: at+xsystrace=0,"3g_sw=1",,"oct=4"

d. make sure your SIM is not waiting for entering a PIN: at+cpin? If it is, send the PIN at at+cpin=<sim pin number>

e. make sure, the 3G protocol stack is sending traces: at+cops=0; (this command triggers the phone to (re-)register to the network)

4.12 AT Commands Examples

After the preliminary setting, run any AT terminal application (e.g. HyperTerminal) on your PC's communication port, with the following settings

Table 6 Terminal Port Settings

Data rate	115200 bps
Data Bits	8
Parity	N
Stop Bits	1
Flow Control	HW

AT Command to check ARM Software version

Table 7 AT Commands to check ARM software version

Command sent by DTE	Response of DCE	Description
at+xgendata		The device will reply with the running ARM software version

Register on the network (GSM/UMTS)

Table 8 AT Commands to Register on the Network

Command sent by DTE	Response of DCE	Description
AT+XRAT=1,2		select radio access technology: 1=GSM/UMTS Dual mode; 2=UMTS
	OK	
AT+COPS=0		Register the phone on the network
	OK	
AT+CREG?		Verify registration
	+CREG: 0, 1 OK	
AT+COPS?		
	+COPS: 0,0,"AT&T",0	Read operator name

Incoming Voice Call

Table 9 AT Commands for an Incoming Call

Command sent by DTE	DCE Response	Description
ATA		
	OK	

Outgoing Voice Call

Table 10 AT Commands for an Outgoing Call

Command sent by DTE	DCE Response	Description
AT		
	OK	
AT+CLIP=1		Activation of Caller line ID presentation
	OK	
ATD+862161019000;		Outgoing voice call
	OK	Voice call is accept from network
ATH		Hang up
	OK	

SMS Management

Table 11 AT Commands for SMS Management

Command sent by DTE	DCE Response	Description
AT+CMGF=1	OK	Set the text mode as the format that will be used. To be set before of the first operation
AT+CMGF=0	OK	Set the PDU mode as the format that will be used. To be set before of the first operation
AT+CMGS="0171112233"<CR> "This is the text"<ctrl-Z>	CMGS: <mr>[,<scts>]	
if PDU mode (+CMGF=0): +CMGS=<length><CR>PDU is	CMGS: <mr>[,<ackpdu>]	
given<ctrl-Z/ESC>	OK or CMS ERROR: <error>	
Test command AT+CMGS=?	OK	

5 Safety Recommendations

READ CAREFULLY

Be sure the use of this product is allowed in the country and in the environment required. The use of this product may be dangerous and has to be avoided in the following areas:

- Where it can interfere with other electronic devices in environments such as hospitals, airports, aircrafts, etc.
- Where there is risk of explosion such as gasoline stations, oil refineries, etc. It is responsibility of the user to enforce the country regulation and the specific environment regulation.

Do not disassemble the product; any mark of tampering will compromise the warranty validity. We recommend following the instructions of the hardware user guides for a correct wiring of the product. The product has to be supplied with a stabilized voltage source and the wiring has to be conforming to the security and fire prevention regulations. The product has to be handled with care, avoiding any contact with the pins because electrostatic discharges may damage the product itself. Same cautions have to be taken for the SIM, checking carefully the instruction for its use. Do not insert or remove the SIM when the product is in power saving mode.
The system integrator is responsible of the functioning of the final product; therefore, care has to be taken to the external components of the module, as well as of any project or installation issue, because the risk of disturbing the GSM network or external devices or having impact on the security. Should there be any doubt, please refer to the technical documentation and the regulations in force. Every module has to be equipped with a proper antenna with specific characteristics. The antenna has
to be installed with care in order to avoid any interference with other electronic devices and has to guarantee a minimum distance from the body (20 cm). In case of this requirement cannot be satisfied, the system integrator has to assess the final product against the SAR regulation.

The European Community provides some Directives for the electronic equipments introduced on the market. All the relevant information’s are available on the European Community website:

http://ec.europa.eu/enterprise/sectors/rtte/documents/

The text of the Directive 99/05 regarding telecommunication equipments is available, while the applicable Directives (Low Voltage and EMC) are available at:

http://ec.europa.eu/enterprise/sectors/electrical/

6 Document History

Revision	Date	Changes
0	2013-12-29	First issue