xE922-3GR Starting Guide

1VV0301316 Rev.1- 2017-07-04

Making machines talk.

APPLICABILITY TABLE

PRODUCT
HE922-3GR
WE922-3GR

APPLICABILITY TABLE 1

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

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Contents

1. Introduction

1.1. Scope

The aim of this document is to introduce Telit xE922-3GR modules and allow user to start working with Telit xE922-3GR Evaluation Board (EVB). All the detailed features and solutions are applicable to all xE922-3GR products, where "xE922-3GR" refers to the modules listed in the applicability table.

If a specific feature is applicable to a specific product, it will be clearly highlighted.

NOTICE:

The description text "xE922-3GR" refers to all module variants listed in the APPLICABILITY TABLE 1.

1.2. Audience

This document is intended to any person who needs to work with Telit xE922-3GR modules, such as software engineers, hardware engineers, and those who want to be able to build applications and run them on Telit xE922-3GR modules. This document is intended to Telit customers, especially system integrators, about to implement their applications using Telit xE922-3GR modules.

1.3. Contact Information, Support

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

TS-EMEA@telit.com
TS-AMERICAS@telit.com
Email subject should start with "xE922-3GR", "HE922-3GR" or "WE922-3GR"

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's 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 about the information provided.

1.4. 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.

1.5. Related Documents

- 1VV0301272_xE922-3GR Hardware User Guide.pdf
- 1VV0301249_ EVB User Guide.pdf
- 1VV0301285_Interface Board HW User Guide xE922-3GR.pdf
- 1VV0301324_MMI EXT CARD HW User Guide.pdf

1.6. Product Variants

xE922-3GR is available in the following hardware variants:

Type Number	Description
HE922-3GR	GSM/GPRS/EGPRS/WCDMA/HSPA+/WiFi/BT/GNSS
WE922-3GR	WiFi/BT/GNSS

1.7. Abbreviations

Term	Definition
ABB	Analog baseband
ADC	Analog-to-digital converter
AE	Application-Enabled

AFE	Audio FrontEnd
CABC	Content Adaptive Backlight Control
CDP (USB)	Charging downstream port
CSI	Camera serial interface
DAC	Digital-to-analog converter
DBB	Digital baseband
DCP (USB)	Dedicated charging port
DBP	dead battery provision
DSI	Display serial interface
DSDS	Dual Sim Dual Standby
EOC	End of charge
EVB	Evaluation Board
FDD	Frequency division duplex
GLONASS	Global orbiting navigation satellite system
GNSS	Global navigation satellite system
GPIO	General-purpose input/output
GPRS	General packet radio services
GPS	Global positioning system
GSM	Global system for mobile communications
I2C	Inter-integrated circuit
IDI	Inter die interface
IFBD	Interface Board
LE	Low Energy
LVDS	Low Voltage Differential Signaling
MIPI	Mobile Industry Processor Interface
PMU	Power management unit
SD	Secure digital
SDP (USB)	Standard downstream port
SIM	Subscriber identity module
SOC	System-On-Chip
SOC	State of charge
SPI	Serial peripheral interface
TE	Tearing effect
UART	Universal asynchronous receiver transmitter
UMTS	Universal mobile telecommunications system
USB	Universal serial bus
USIF	Universal serial interface
VMM	Virtual machine manager
WCDMA	Wideband code division multiple access

2. General Product Description

2.1. Overview

Telit's xE922-3GR module family is a highly integrated 3G entry platform running Android Marshmallow (Android 6.0) or Yocto Linux (3.14.55) operating system and 3GPP Release 9 Cellular Protocol Stack. The platform consists of:

- ATOM X3 SoC – The Digital Baseband based on Intel® Atom™ x3 Quad Core processor
- A-GOLDTM620 – The Analog Baseband

DBB: SoC Atom x3

- CPU: Quad Core (Silvermont) 1.2GHz (android 32bit, linux 64bit)
- GPU: GFX core modified Mali-450 MP4
- Media Encode/Decode Engine: modified VeriSilicon Media Engine (dec G1/enc H1)

ABB: AGOLD 620

- 2G/3G RF transceiver
- WLAN
- Bluetooth
- GNSS
- Audio
- Analog measurement
- Power management

The module incorporates the following key technologies:

- 2G/3G cellular subsystem
- GNSS subsystem
- Wi-Fi and Bluetooth subsystem
- Display subsystem
- Camera subsystem
- Audio subsystem
- Energy management

xE922-3GR modules are designed for commercial market quality needs (0°C to70°C) and for industrial market quality needs (extended temperature -40°C to +85°C).

In its most basic use case, xE922-3GR can be applied as a wireless communication front-end for M2M products, offering GNSS and mobile communication features to an external host CPU through its rich interfaces.

xE922-3GR modules can further support customer software applications and security features. xE922-3GR modules provide software application environment with sufficient system resources for creating rich on-board applications. Thanks to a dedicated application processor and embedded security resources, product developers and manufacturers can create products which guarantee fraud prevention and tamper evidence without extra effort for additional security precautions.

xE922-3GR modules can be self-sufficient and serve as fully integrated IoT solutions. In such cases, customer would simply complement the module with a power supply, speaker amplifier, microphone, antennae and an HMI (if applicable).

xE922-3GR is offered with different variants per the list in Section 1.6:

- **HE922-3GR:** Cellular / Wi-Fi / BT / GNSS
- **WE922-3GR:** Wi-Fi / BT / GNSS

Telit does not provide the software (Android or Yocto) for xE922-3GR modules.

The official software deliveries must be requested to Intel or to the following ISVs (Independent Software Vendors):

Vendor	Contact	E-Mail / Phone No.
AMI (American Megatrends)	PaiLin Huang	pailinhuang@ami.com.tw
		+886-2-2516-8887 x2345
ArcherMind	Stephen Hwang	steven.huang@archermind.com
		+886-939-703-513
Mentor Graphics	Kalpesh Gala	kalpesh_gala@mentor.com
		+1 (512) 219-1900
Wind River Systems	Rick Anderson	rick.anderson@windriver.com
		+1 (503) 924-1855
	Ean Hsu	ean.hou@windriver.com
		+886-2-2345-2765 x503

2.2. Hardware overview

The below Figure 1 provides an overview of the internal architecture of the xE922-3GR modules.

One can observe the following sub-functions:

- DBB Atom x3 SOC (QuadCore CPU / GPU)
- ABB AG620 + RF front end (GNSS / Wi-Fi / BT / Cellular).
  → Cellular applies only to HE922-3GR variant
- Analog Audio codec.
- Rich IO interfaces.
  Depending on which xE922-3GR software features are enabled, some interfaces that are exported due to multiplexing may be used internally and thus may not be usable by the application.

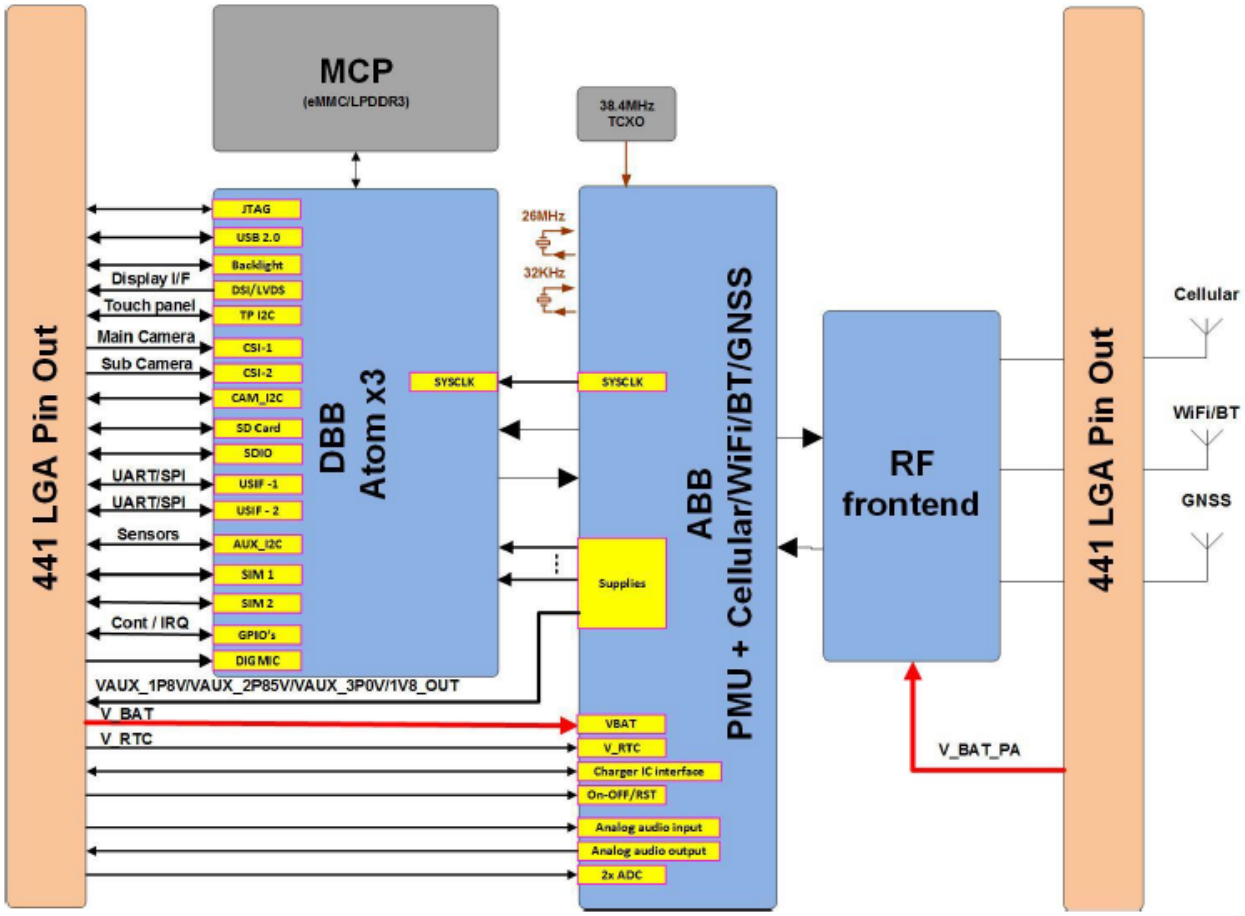


Figure 1: Hardware block diagram

2.3. Software overview

The below Figure 2 briefly describes the xE922-3GR module software architecture for Android OS:

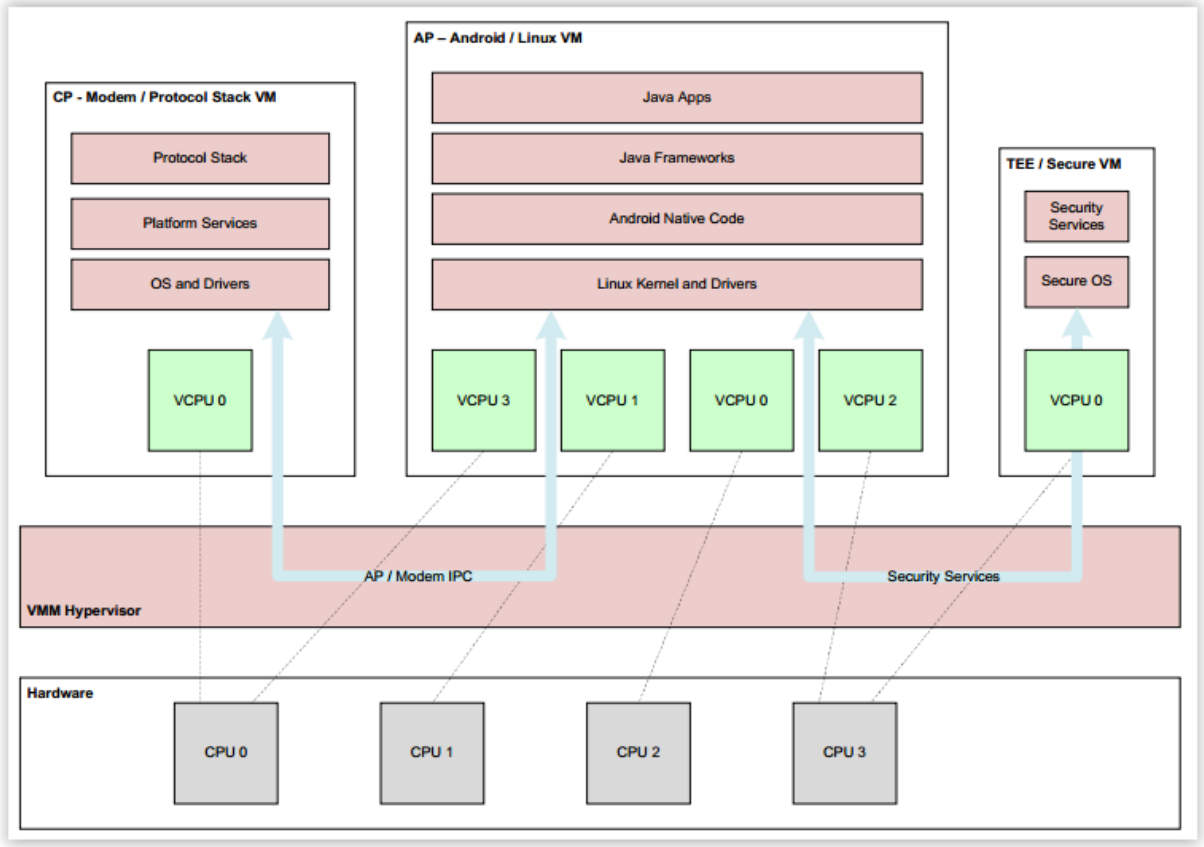


Figure 2: Software architecture

The system software consists of the following main subsystems:

- Atom x3 MobileVisor – Hypervisor for hardware resource shared between Android and Modem
- Modem VM – Modem system with a running RTOS providing modem services to Android
- Android VM – The main smartphone OS which sits on top of a Linux Kernel.
- Security VM – Provides security services to the other VMs which run in a separate isolated and trusted environment.

The virtualized system allows both Modem and Android to concurrently run on the same Intel® Atom™ Quad Core processor. Additionally, the MobileVisor provides an IPC Framework to allow VMs (Modem and Android systems) to communicate between each other.

The MobileVisor provides the following services:

- Host of several guest OS's on the same CPU (single or multi-core).
- Configuration of guest OS's independently, including boot parameters, memory partitioning, and devices.
- Provide a choice of guest OS scheduling policy: priority-based scheduling by default.
  If the RTOS is present, it always runs at a higher priority than Android, preserving its real-time characteristics.
- Management of the dispatching of interrupts
- Provide shared memory and cross interrupt mechanism for implementing shared device drivers and efficient IPC (Inter-Processor Communication)
- Tracing and profiling capabilities

The Modem VM provides Protocol Stack functionality and Platform services to insure functionalities such as IO, memory, RTC, boot operations, IP data transfer…

Linux/Android VM is the VM where both Linux kernel and Android are hosted. The Figure 4 depicts the Android System architecture.

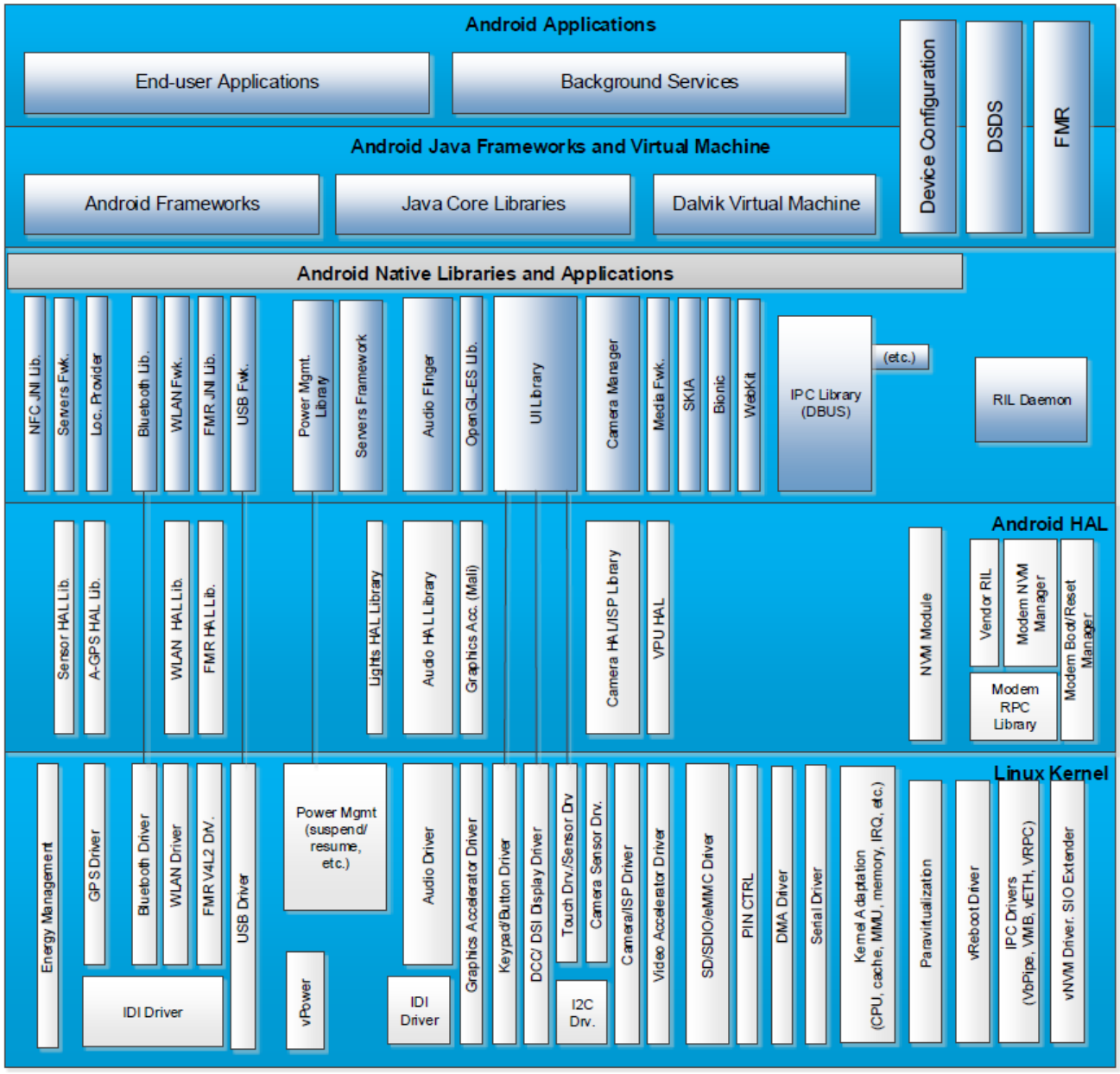


Figure 1: Android System Architecture

3. xE922-3GR Development Kit Content

The xE922-3GR Development Kit includes both hardware and software as well as some further supporting resources.

3.1. Development kit material content

1. EVB Motherboard
2. MMI Board (Multimedia board)
3. xE922-3GR Interface Board
4. Power Supply
5. Cable USB3.0 A to Micro B
6. Cable USB A / Mini USB
7. Cellular Antenna

3.2. Telit EVB and HE922-3GR IFBD

This section briefly provides an overview of HE922-3GR Interface Board plugged on top of EVB Motherboard. More detailed information (pinout, electrical, connectivity…) are described in the following documents:

- 1VV0301249_ EVB User Guide.pdf
- 1VV0301285_Interface Board HW User Guide xE922-3GR.pdf

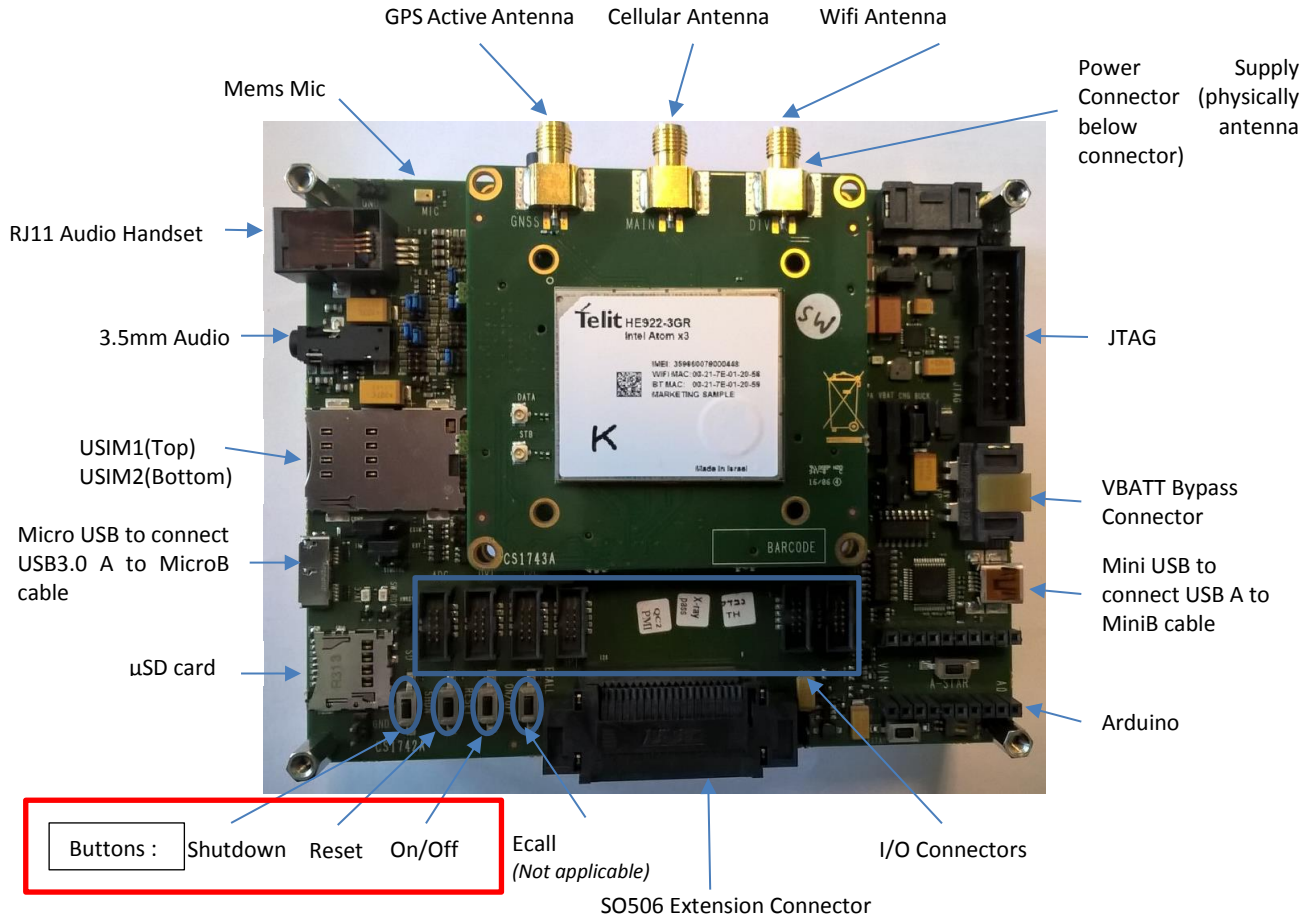


Figure 2: EVB with HE922-3GR IFBD

4. Getting started

4.1. Training package

All documentations, firmware binaries and software tools are provided in four zip files at following URL: http://www.telit.com/3gr-devkit/.

xE922-3GR Development Kit

Contact us

Below you can find the available set of user guides to be used in conjunction with Telit development kit, interface board and MMI, in order to thoroughly test the performance of Telit module xE922-3GR.

Please refer to the appropriate documentation in order to connect and operate correctly with Telit devices.

DOWNLOADS

Firmware

- xE922-3GR_Starting_Package_pt1
- xE922-3GR_Starting_Package_pt2
- xE922-3GR_Starting_Package_pt3
- xE922-3GR_Starting_Package_pt4

User Guides

Download **ALL** these files and put them in the same location.
Open the ***xE922-3GR_Starting_Package.zip.001*** file and extract the top folder

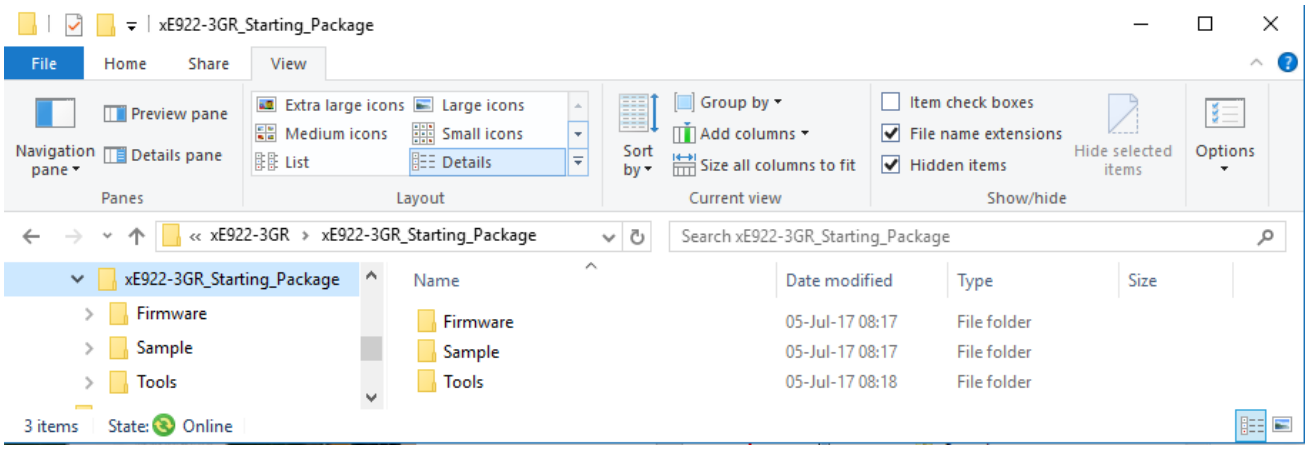


Figure 3: xE922-3GR starting package contents

- **Firmware folder:**
  This folder contains binaries files to be flashed on xE922-3GR module:
  - Android MR3.0 Official Release
  - Linux-Yocto MR3.2 Official Release

Android and Yocto binaries cannot be used at the same time, either one, or the other.

These two binaries are provided as reference to enable starting of the development kit. For any other use, the official software deliveries must be requested to Intel and/or the ISVs listed in chapter "2.1 Overview".

- **Samples folder:**
  This folder contains basic sample applications source code and samples APK for Android version

- **Tools folder:**
  This folder contains all required tools allowing to connect, communicate, flash xE922-3GR module, and build and debug applications

Note that tools provided in this Starting Guide represents the current version of Intel tools when this document was produced. Telit doesn't provide any support for these tools. Consequently, any other versions or updates for these tools should be asked to Intel support

4.2. xE922-3GR Development Kit setup

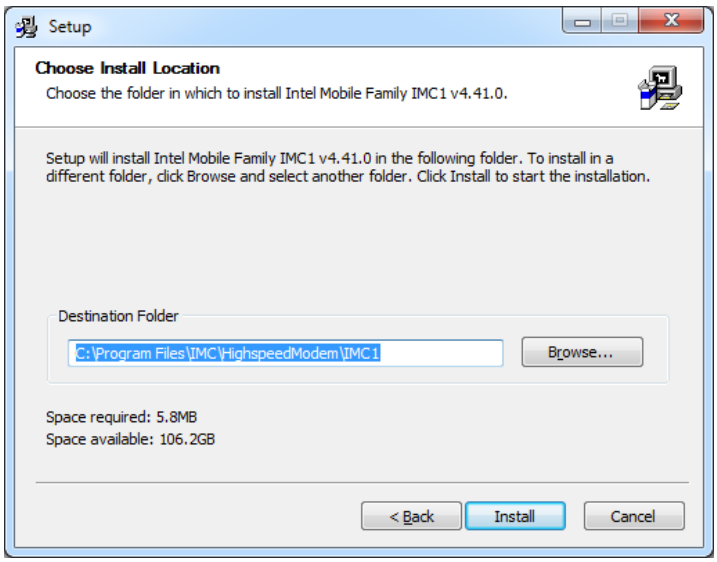
For the following instructions, please refer to Section 3.1 "Development Kit material content" and to Figure 2. To setup the development kit, please follow the below instructions:

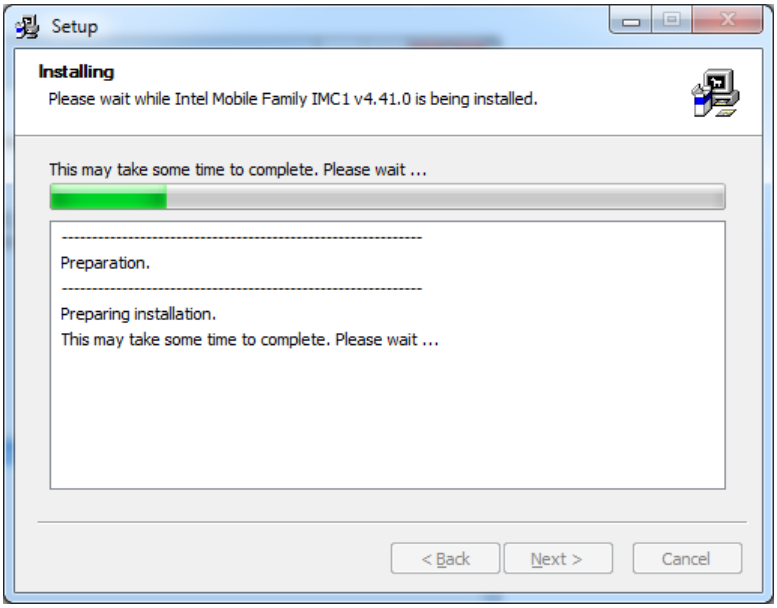
- Connect Power Supply cable to the Main Power Supply connector.
- Connect USB3.0 A to MicroB cable to USB3.0 A to MicroB connector.
- Connect USB A to MiniB cable to USB A to MiniB connector.
- Connect each antenna to its respective connector.
- Insert a functional SIM card in USIM1 connector.
- Press ON/OFF button until INTEL splash screen appears on the MMI EXT display. After several seconds of xE922-3GR booting, "Intel Inside" logo will pop up.

At this stage, it is possible that your Windows OS recognize xE922-3GR USB ports as "Unknown Devices" and propose to install drivers.
You can decline this proposition – drivers will be installed in next section.

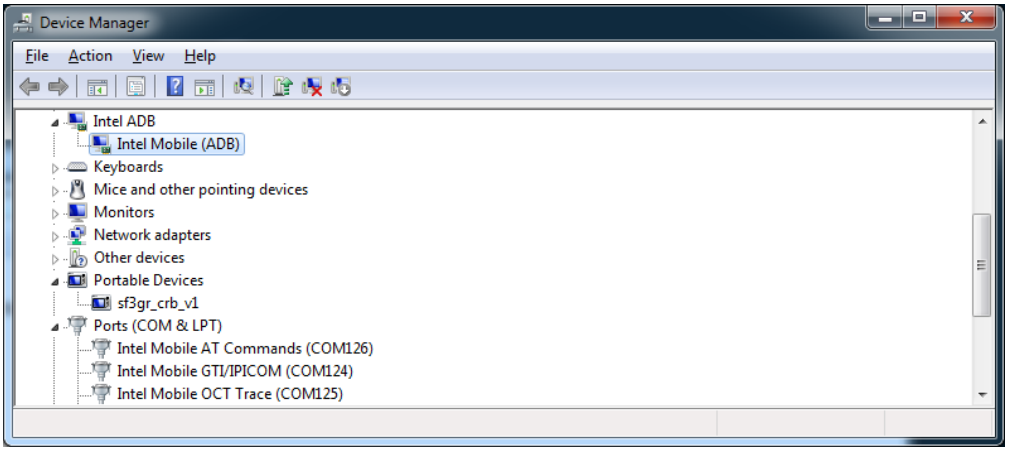
4.3. Install Intel Mobile Family USB drivers

For your Windows OS to recognize and use xE922-3GR USB and UART ports, Intel Mobile Family USB drivers must be installed.
Run ***setup.exe*** from ***Tools\Usb\Windows_Host_Driver\WMC_imc1_v4.41.0\setup_disk***

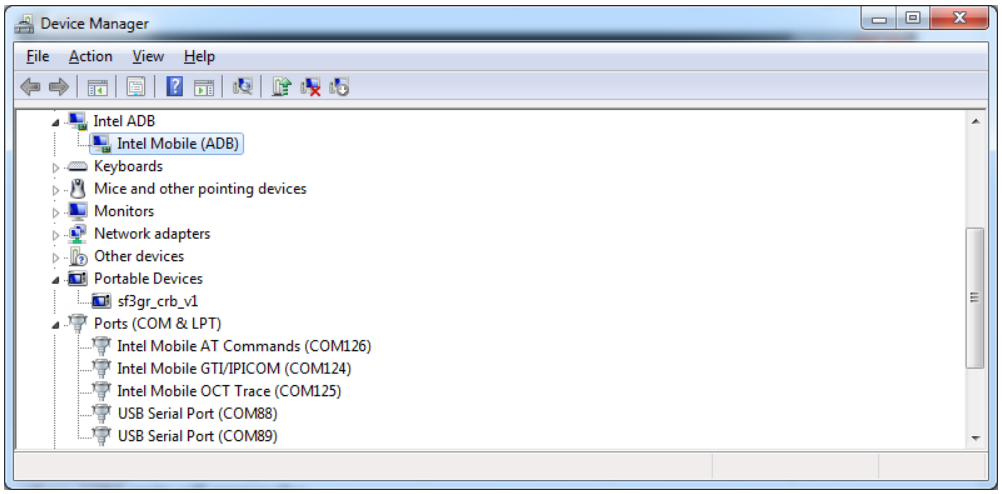




From here, when connecting Micro USB from USB 2.0/3.0 of xE922-3GR to your host Windows system, following ports will appear in the device manager:



Additionally, when connecting Mini USB from UART port of xE922-3GR to your host Windows system, two others COM ports will appear:



In the above picture, COM89 is the Linux console. A TeraTerm can be opened on this port to get logs from the xE922-3GR module.

xE922-3GR is now ready to be flashed with latest Android binaries in next section.

From this point, required tools will be installed on your Windows laptop Pay attention that xE922-3GR Telit EVB is still powered on with USB cables connected.

For the following sections of present document, at any point of tools installation, if something goes wrong or for any reason doesn't match with sections description, user should contact Telit's Technical Support Center (TTSC) to the following email address:

TS-EMEA@telit.com

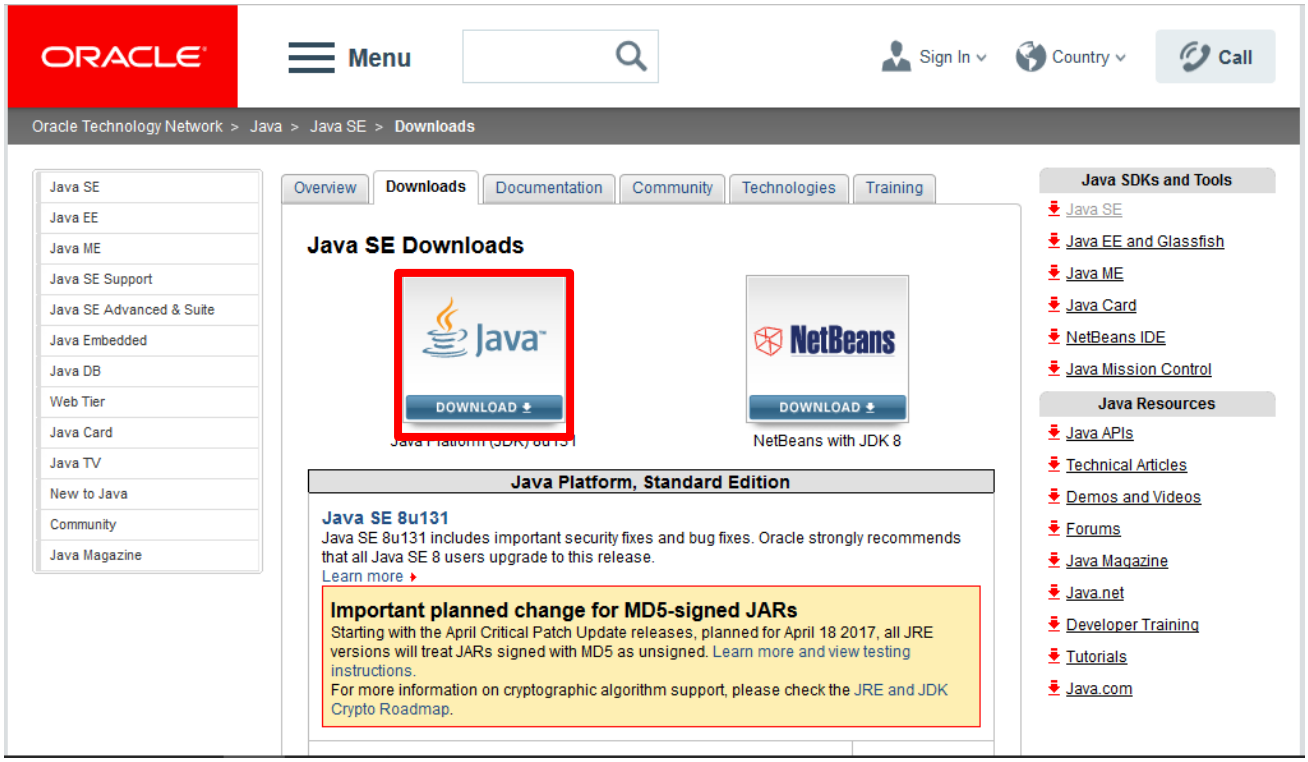
TS-AMERICAS@telit.com

Email subject should start with "xE922-3GR", "HE922-3GR" or "WE922-3GR"

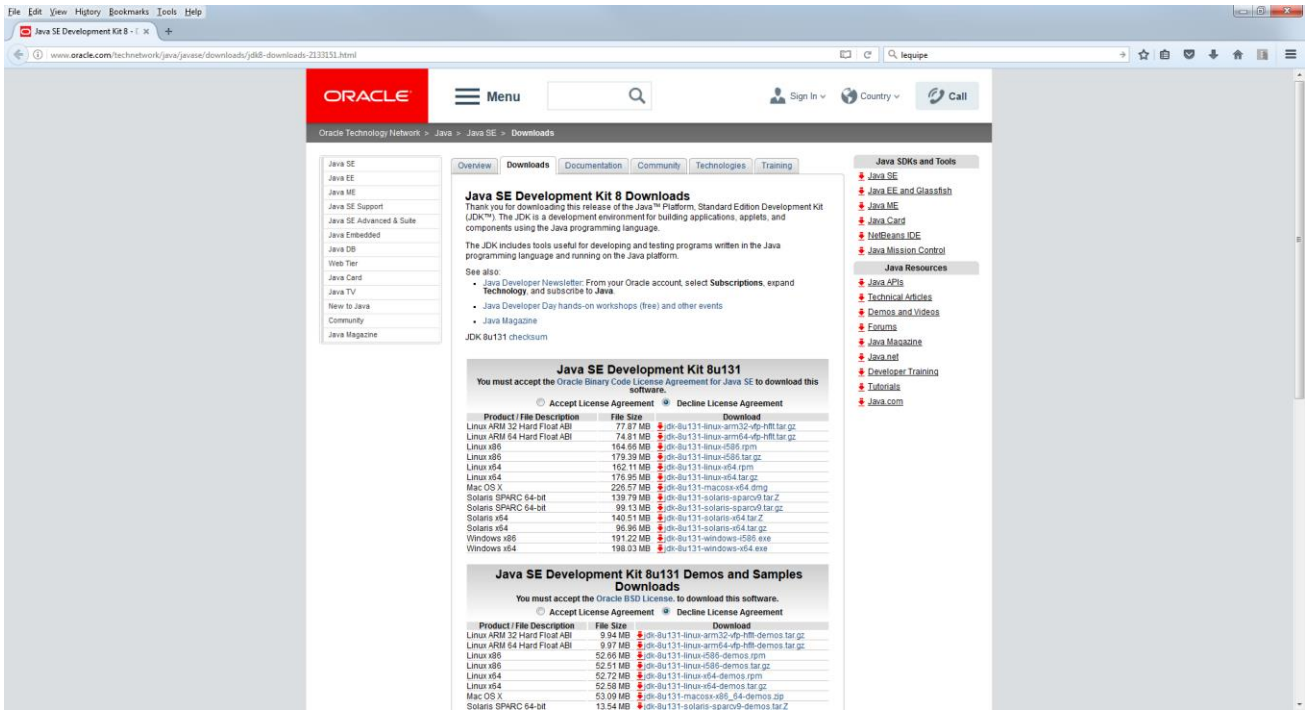
4.4. Required Tools Installation

4.4.1. Java SE8 Development Kit

Android Studio relies on Java SE8 or greater version.
Download latest JDK SE Kit8 (32bits or 64bits) corresponding to your host system from
http://www.oracle.com/technetwork/java/javase/downloads/index.html



Click on the Java logo (highlighted in red)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The JDK includes tools useful for developing and testing programs written in the Java programming language and running on the Java platform.
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The JDK includes tools useful for developing and testing programs written in the Java programming language and running on the Java platform.

See also:

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- Java Developer Day hands-on workshops (free) and other events
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JDK 8u131 checksum

Java SE Development Kit 8u131

You must accept the Oracle Binary Code License Agreement for Java SE to download this software.

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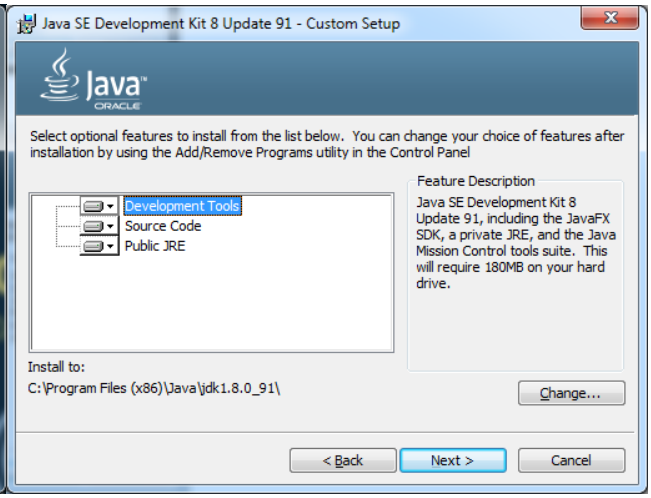
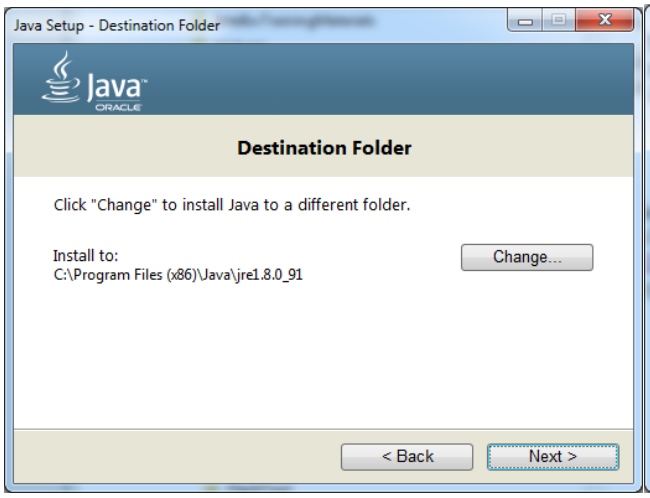
Product / File Description	File Size	Download
Linux ARM 32 Hard Float ABI	77.87 MB	jdk-8u131-linux-arm32-vfp-hflt.tar.gz
Linux ARM 64 Hard Float ABI	74.81 MB	jdk-8u131-linux-arm64-vfp-hflt.tar.gz
Linux x86	164.66 MB	jdk-8u131-linux-i586.rpm
Linux x86	179.39 MB	jdk-8u131-linux-i586.tar.gz
Linux x64	162.11 MB	jdk-8u131-linux-x64.rpm
Linux x64	176.95 MB	jdk-8u131-linux-x64.tar.gz
Mac OS X	226.57 MB	jdk-8u131-macosx-x64.dmg
Solaris SPARC 64-bit	139.79 MB	jdk-8u131-solaris-sparcv9.tar.Z
Solaris SPARC 64-bit	99.13 MB	jdk-8u131-solaris-sparcv9.tar.gz
Solaris x64	140.51 MB	jdk-8u131-solaris-x64.tar.Z
Solaris x64	96.96 MB	jdk-8u131-solaris-x64.tar.gz
Windows x86	191.22 MB	jdk-8u131-windows-i586.exe
Windows x64	198.03 MB	jdk-8u131-windows-x64.exe

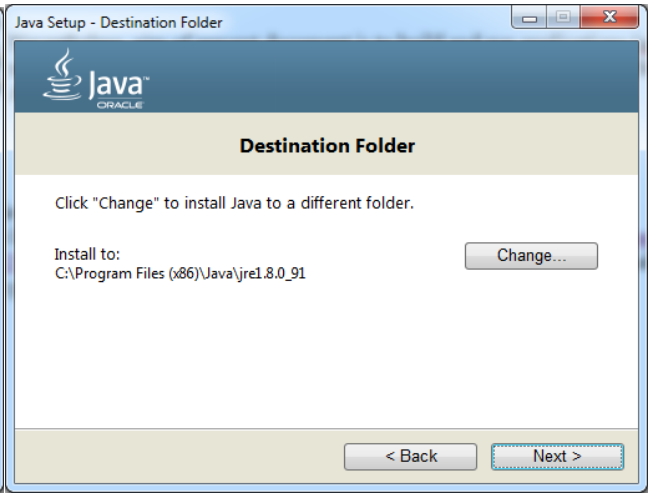
Tick “Accept Licence Agreement” and choose the one corresponding to your Windows OS type exe file In the screenshot below, users with Windows10 operating on 64bits processor will download the jdk-***xxx***-windows-x64.exe e.g. jdk-8u131-windows-x64.exe file for this version.

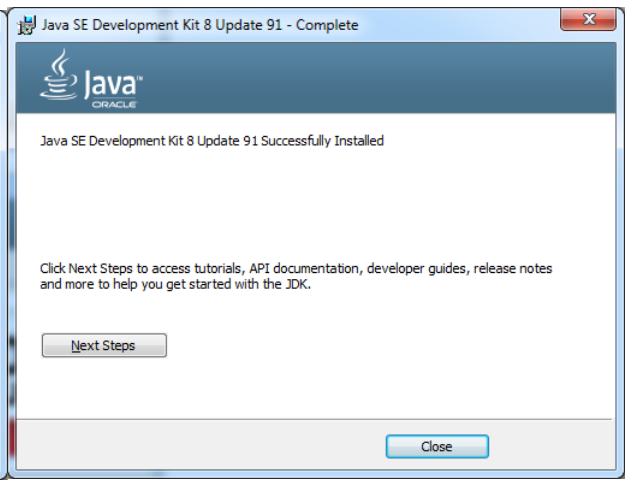
Once downloaded, execute this JDK installer.

Note that following screenshots depicts the jdk-8u131-windows-x64.exe execution, but execution of the downloaded file should not differ much from this one, except paths for instance.





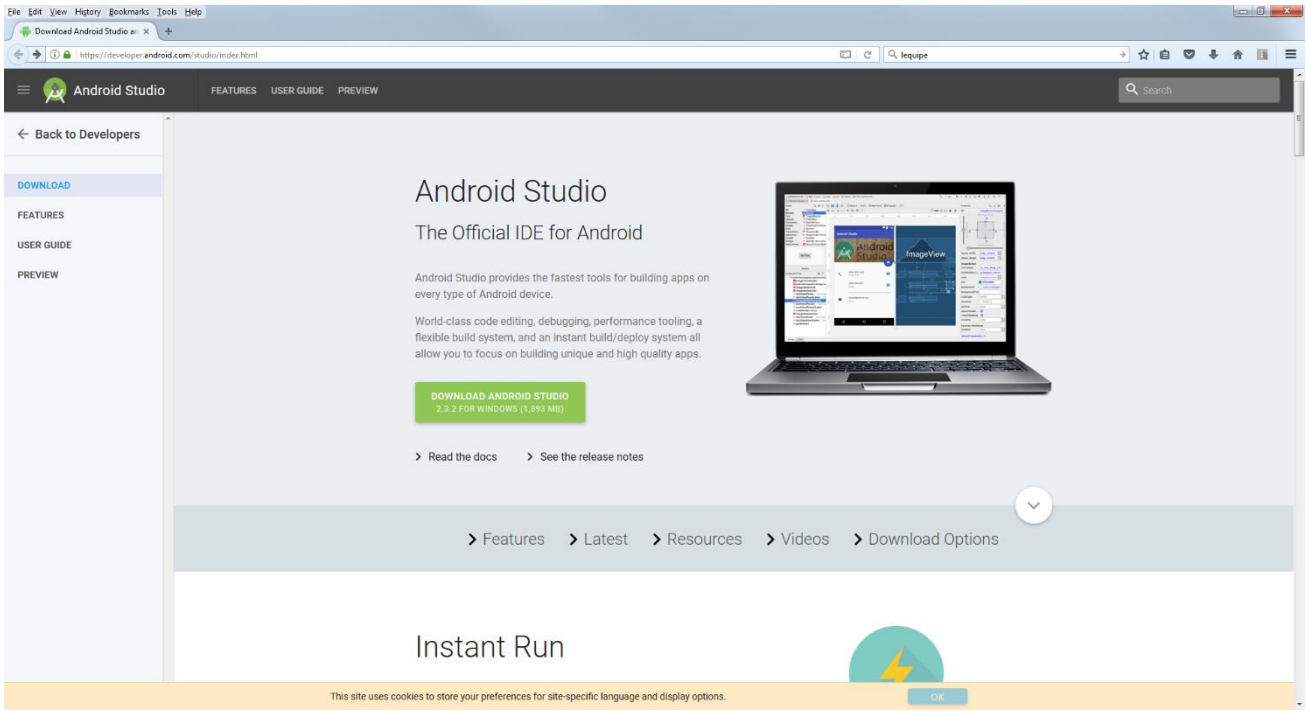




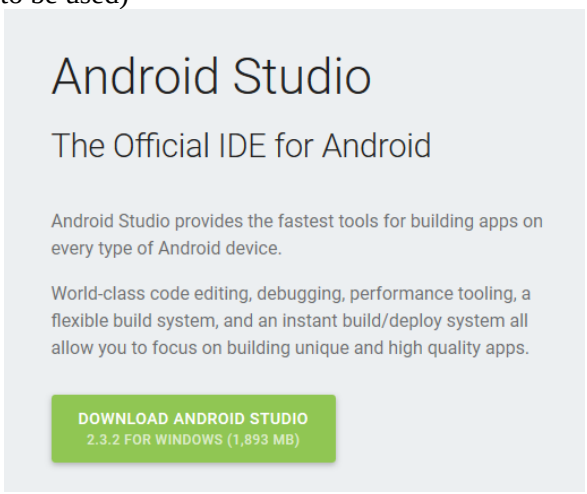
4.4.2. Android Studio

Android Studio is the Android's official IDE. It speeds up your development and helps you build the highest-quality apps for every Android devices.
It offers custom-tailored tools for Android developers, including rich code editing, debugging, testing, and profiling tools.

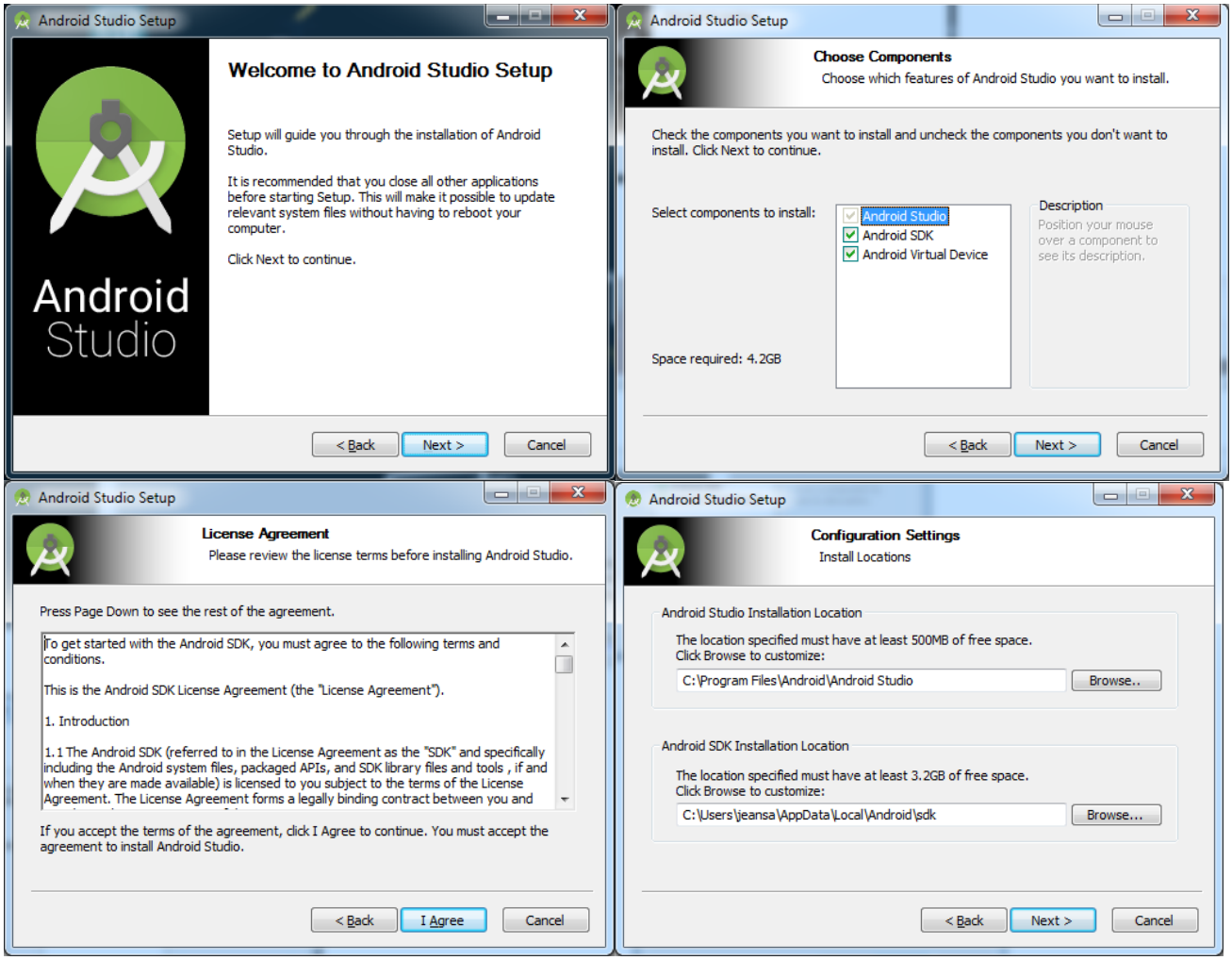
You can download the **latest** Android Studio from https://developer.android.com/studio/index.html (for instance *android-studio-bundle-162.3934792-windows.exe*)



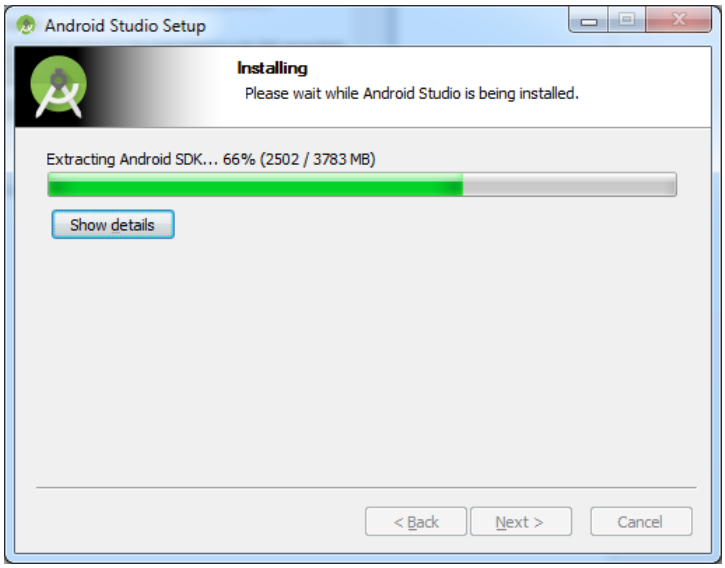
Click on the "DOWNLOAD ANDROID STUDIO" button (in this example, it is version 2.3.2 but the latest available one is to be used)



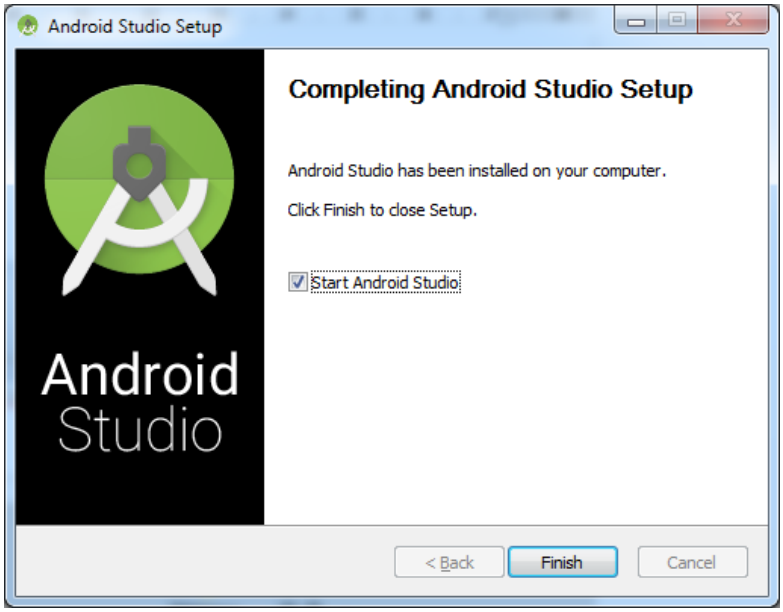
Once downloaded, execute this Android Studio installer:



Click “Next” to start the installation.



After several minutes, installation is complete:

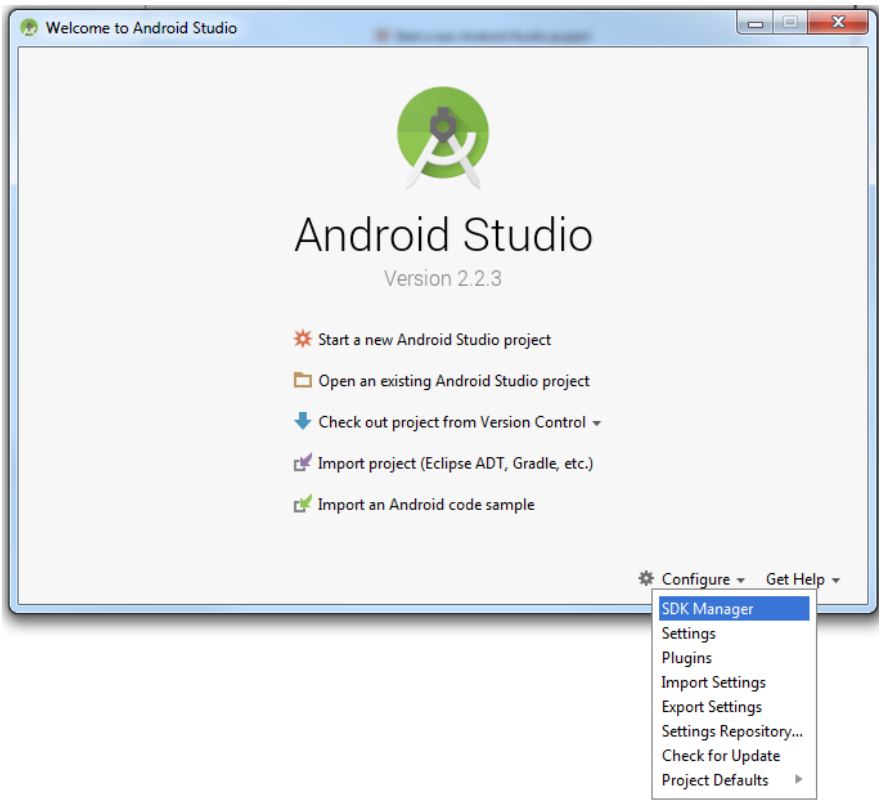


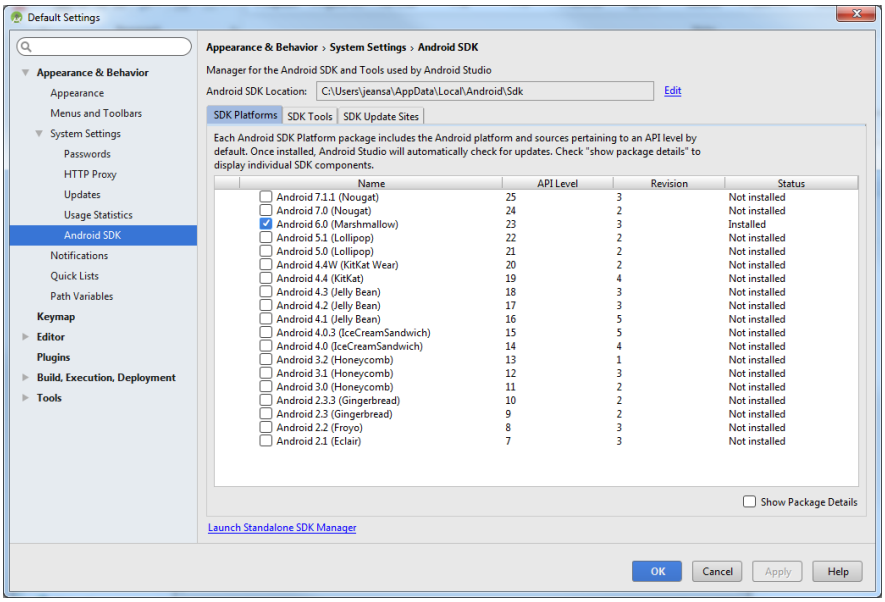
Android Debug Bridge (ADB) is a versatile command line tool allowing communication with an emulator instance or with a connected Android-powered device. It is a client-server program that includes three components:

- A client, which runs on your development machine. You can invoke a client from a shell by issuing an ADB command. Other Android tools such as DDMS also create ADB clients.
- A server, which runs as a background process on your development machine. The server manages communication between the client and the ADB daemon running on an emulator or device.
- A daemon, which runs as a background process on each emulator or device instance.

Fastboot is a diagnostic protocol included with the Android SDK package and used to modify the flash filesystem via an USB connection from host computer. It requires for the device to be started in a bootloader mode.

Once Android Studio is opened, choose ***SDK Manager*** in the ***Configure*** menu :



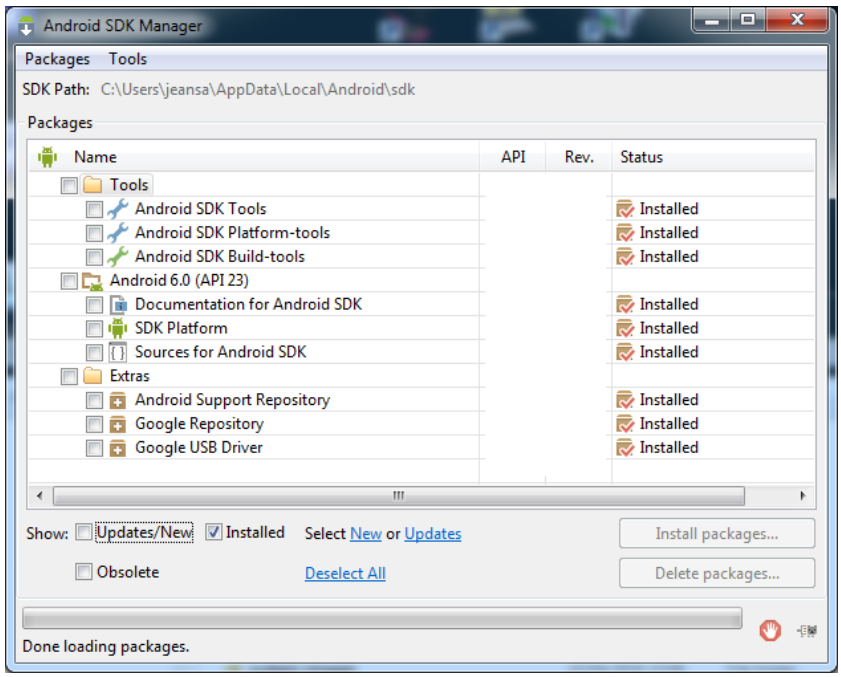


Android 6.0(Marshmallow) checkbox should be ticked indicating it has been installed.
Note that C:\<ANDROID_SDK> is the path displayed in Android SDK Location of this window.

Open the SDK Manager, by clicking ***Launch Standalone SDK Manager*** and install the following packages in their latest version (the one corresponding to your Android Studio):

- In Tools part:
  - Android SDK Tools
  - Android SDK Platform-tools
  - Android SDK Build-tools
- In Android 6.0 (API xx) part:
  - Documentation for Android SDK
  - SDK Platform
  - Sources for Android SDK
- In Extras part:
  - Android Support Repository
  - Google Repository
  - Google USB Driver

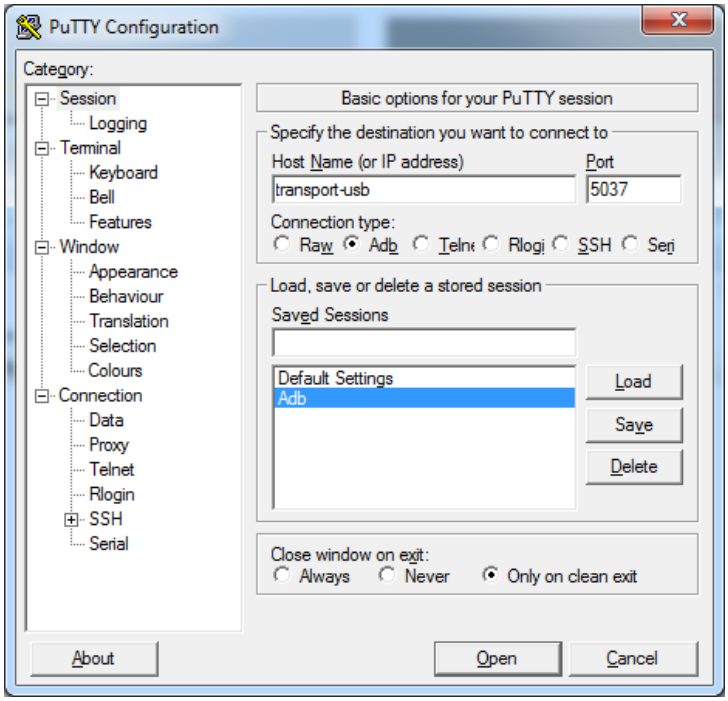
When all these packages are installed, tick only the "***Installed***" checkbox in Android SDK Manager and check that resulting window contains all packages installed as shown in below screenshot:



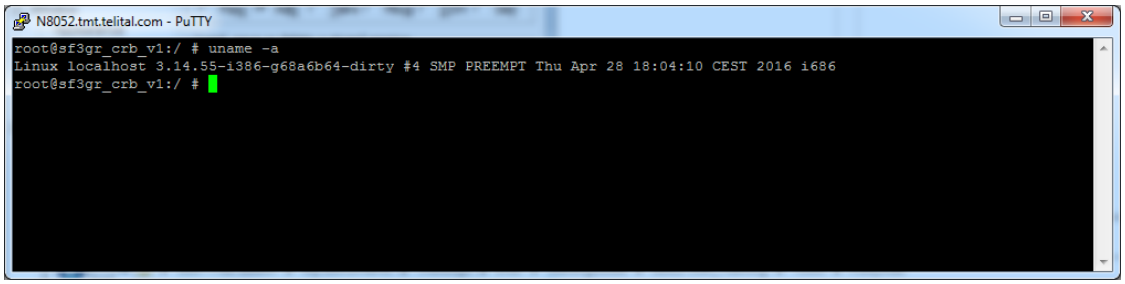
Finally, modify your Windows path by adding following paths to Windows path: ***C:\<ANDROID_SDK>\tools and C:\<ANDROID_SDK>\platform-tools***
Then reboot the computer.

4.4.3. PuttyADB Tool

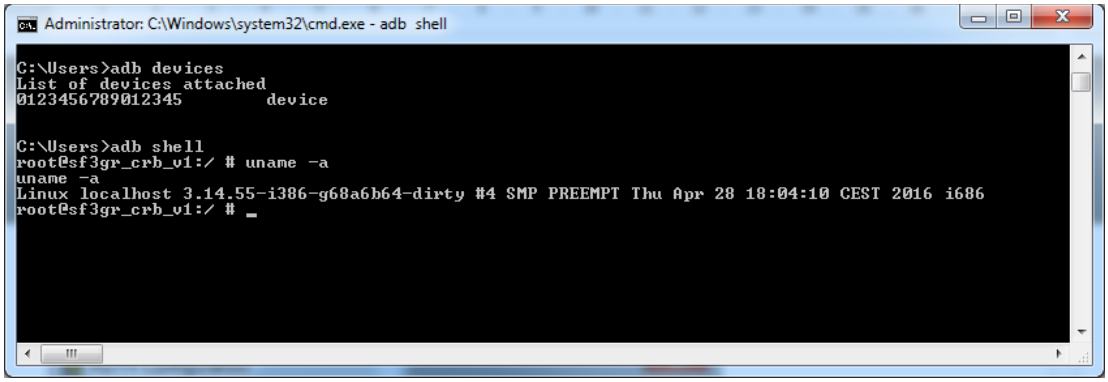
Another way to connect to xE922-3GR module is to use Intel Mobile(ADB) with PuttyADB tool.
Start ***putty_adb.exe*** from ***Tools\PuttyAdb and follow howto.txt instructions***



Press open and PuttyADB will give you access to xE922-3GR shell:

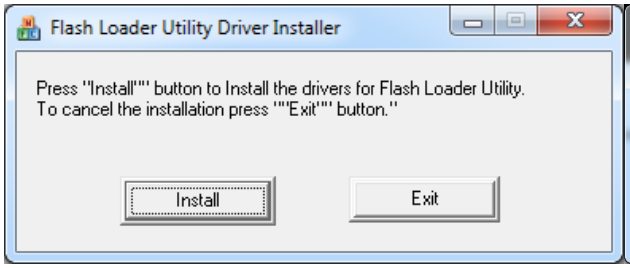


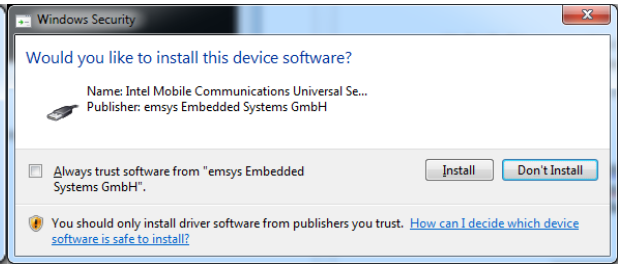
Note that same behavior can be obtained with Cmd Windows

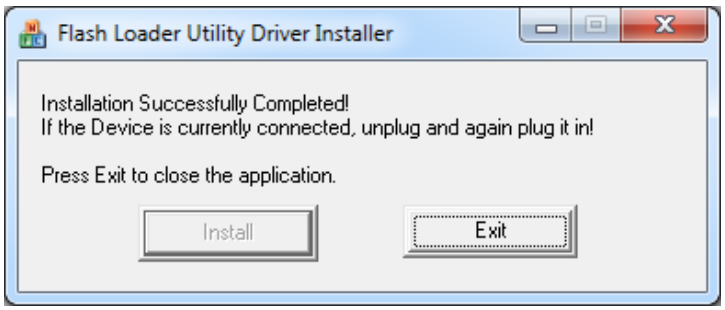


4.4.4. USB Driver for Flash Loader Utility

Start setup.exe from ***Tools\FlashUSB_Driver_1_0_1_1\(x64 or x86)***



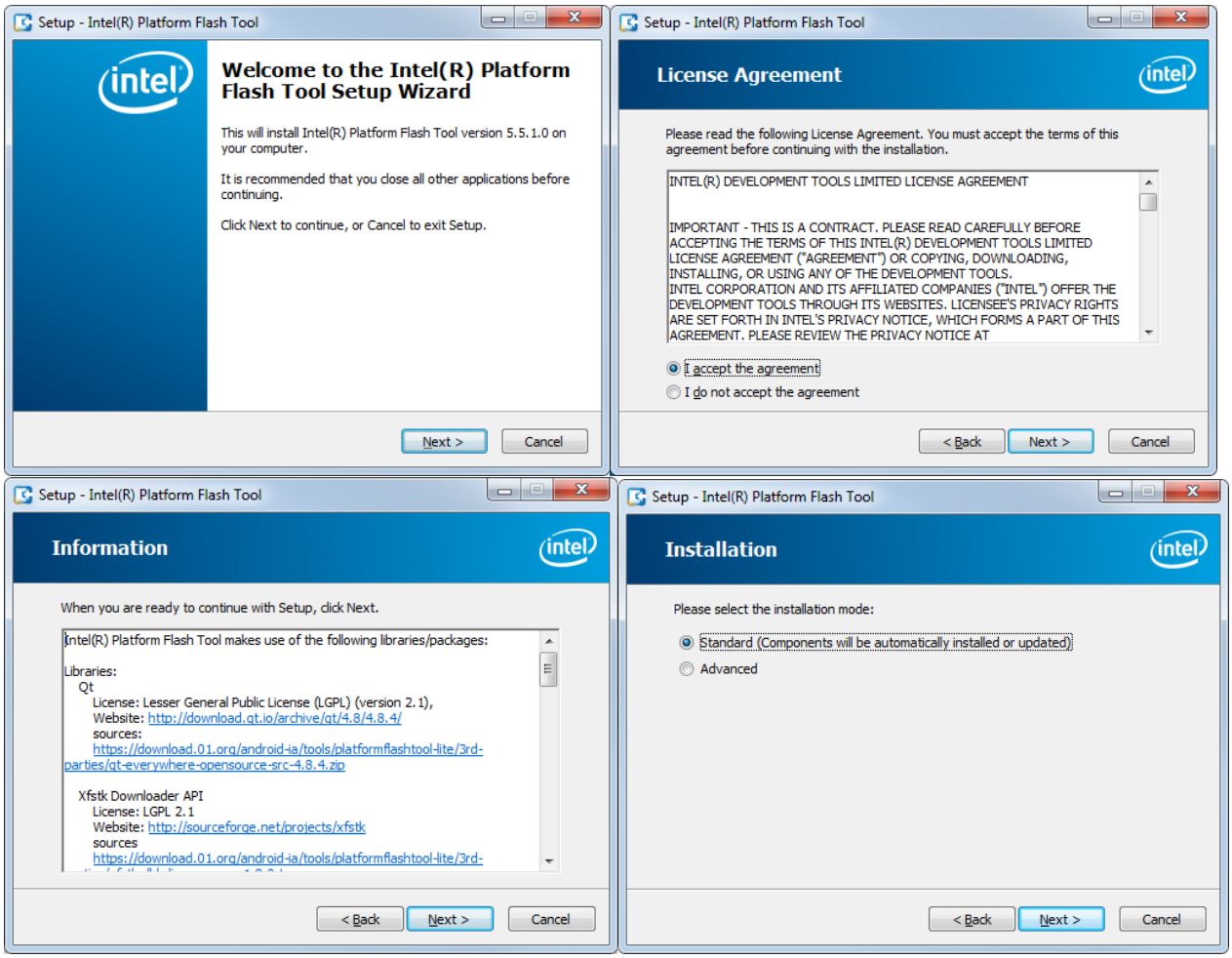


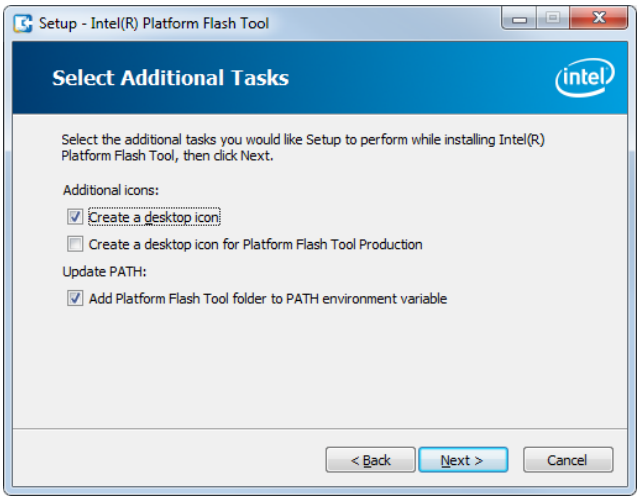


4.4.5. PlatformFlashTool

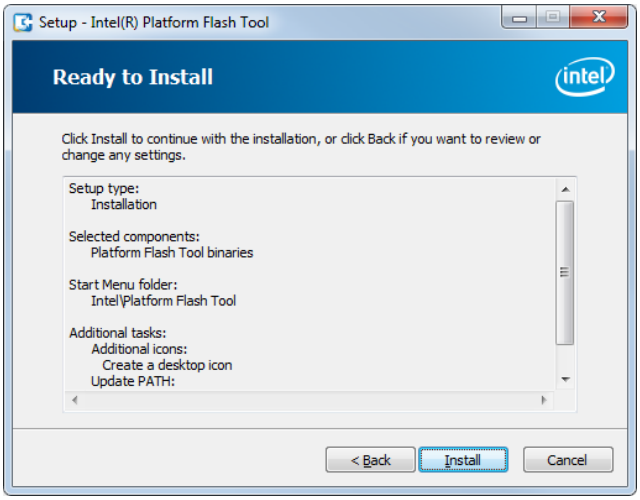
PlatformFlashTool is used as the verified flashing tool for xE922-3GR modules.
Start ***PlatformFlashTool_5.5.1.0_win32.exe*** from ***Tools\PlatformFlashTool_5.5.1.0_win32***

Press “Next” on each following screen:





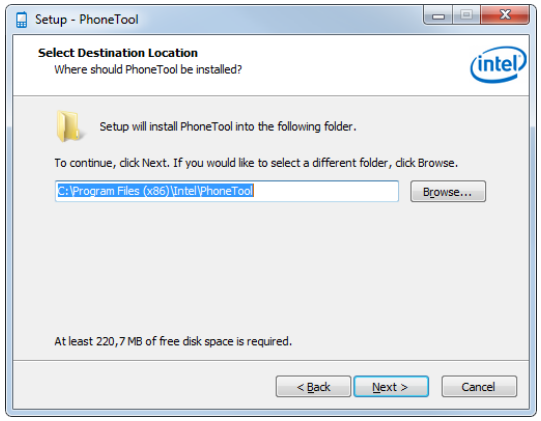
Press “Install” to start the installation.

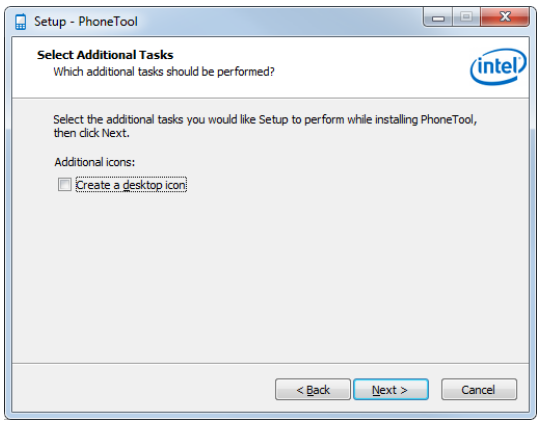


4.4.6. Intel PhoneTool

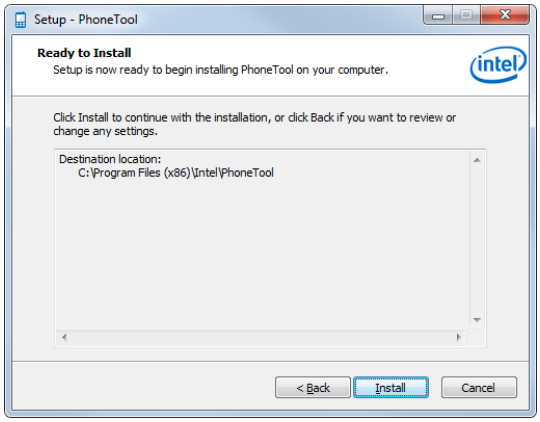
Intel Phone is used as the verified tool on xE922-3GR modules to configure it while in Production Mode.

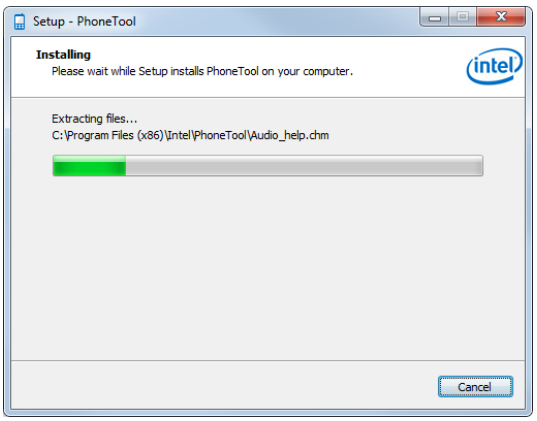
Start ***PhoneTool_setup.exe*** from ***Tools\PhoneTool***





Press « ***Install*** » button in next screenshot:

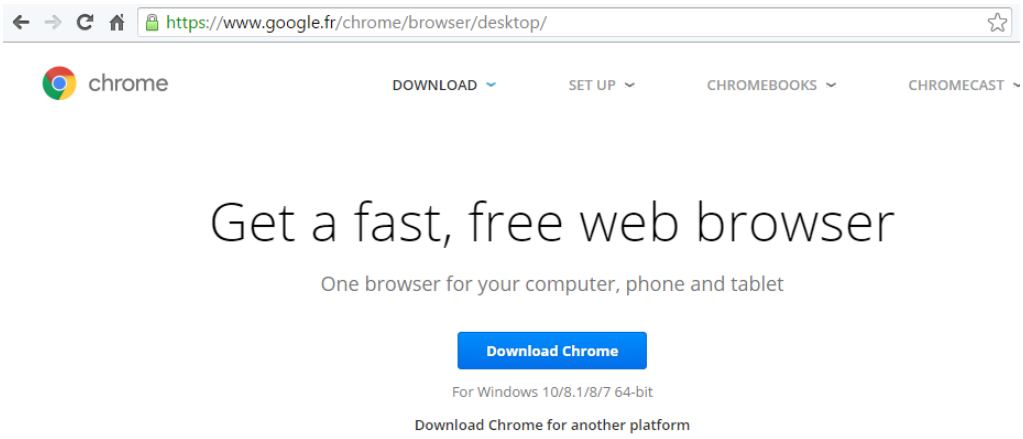




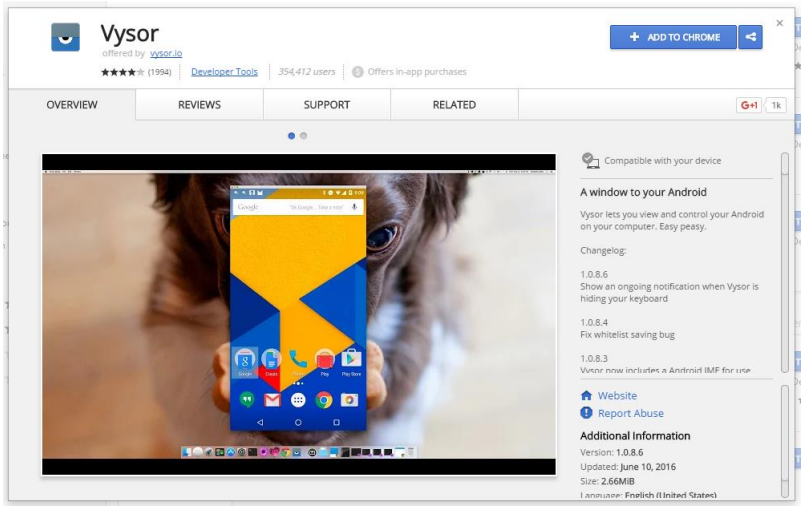
4.4.7. Vysor

As a Google Chrome extension, Vysor puts a fully controllable window of your Android on your desktop. Vysor allows to get the same full view of xE922-3GR display interface as if Telit MMI board was connected to the xE922-3GR module.

To install it on your laptop, you first need to have Google Chrome browser installed. You can download it from following URL: https://www.google.fr/chrome/browser/desktop/



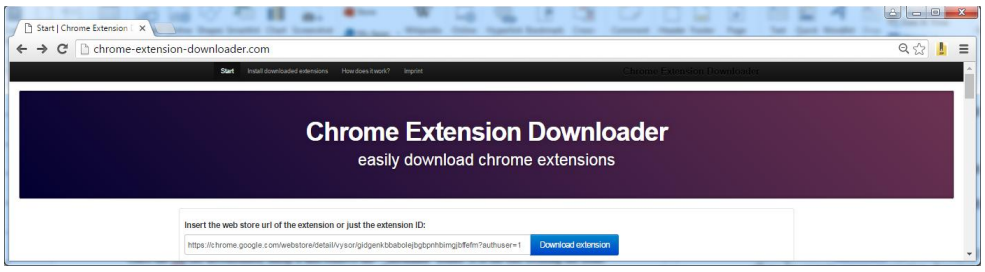
Then, you need to download the Vysor extension. It can be downloaded from following URL: https://chrome.google.com/webstore/detail/vysor/gidgenkbbabolejbgbpnhbimgjbffefm?authuser=1



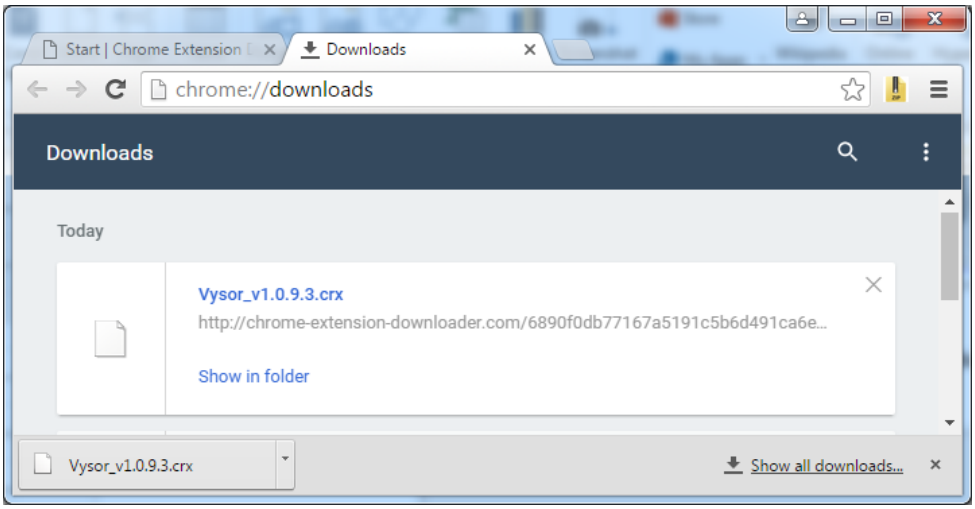
You just have to click on the "***ADD TO CHROME***" button on the top right side of the window.

Remark: ***An error could occur when installing the extension (could not unzip the extension). It is due to an invalid character present in a folder's name of the extension pack.***

Solution: ***Download the Vysor extension (.crx file) at http://chrome-extension-downloader.com/. Paste the same URL: https://chrome.google.com/webstore/detail/vysor/gidgenkbbabolejbgbpnhbimgjbffefm?authuser=1 and press "Download Extension".***



When download is finished, open 'chrome://downloads' tab and click "Show in folder".



Once the .crx file is downloaded, unzip it in a dedicated folder and remove the "***_metadata***" folder. It is the one creating the issue.

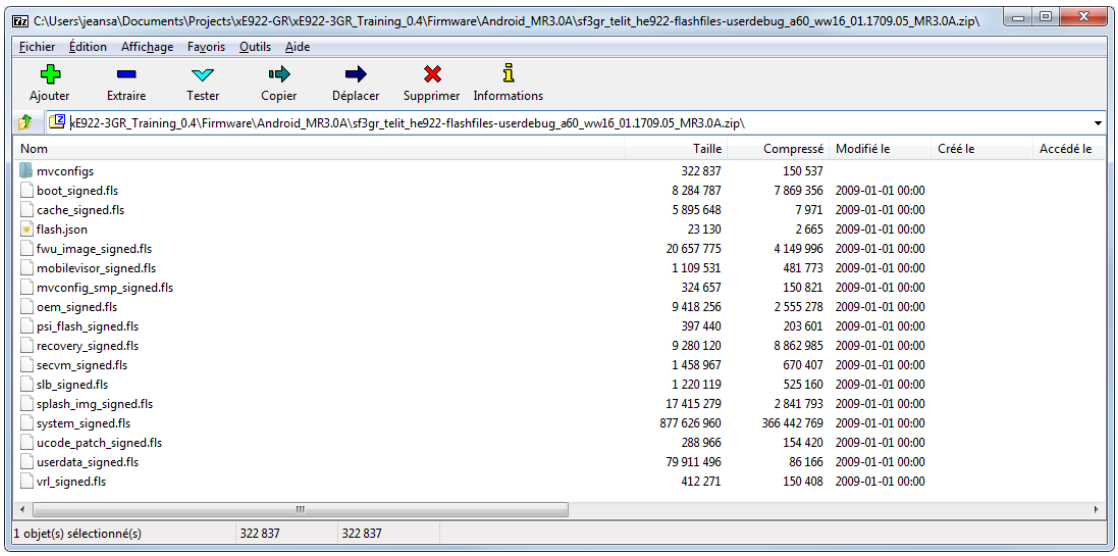
Finally, in '***chrome://extensions/***' tab, choose "***Load unpacked extension…***", browse to the dedicated Vysor folder. Vysor extension will appear, just tick "***Enabled***" to finish the installation.

5. First xE922-3GR powerOn

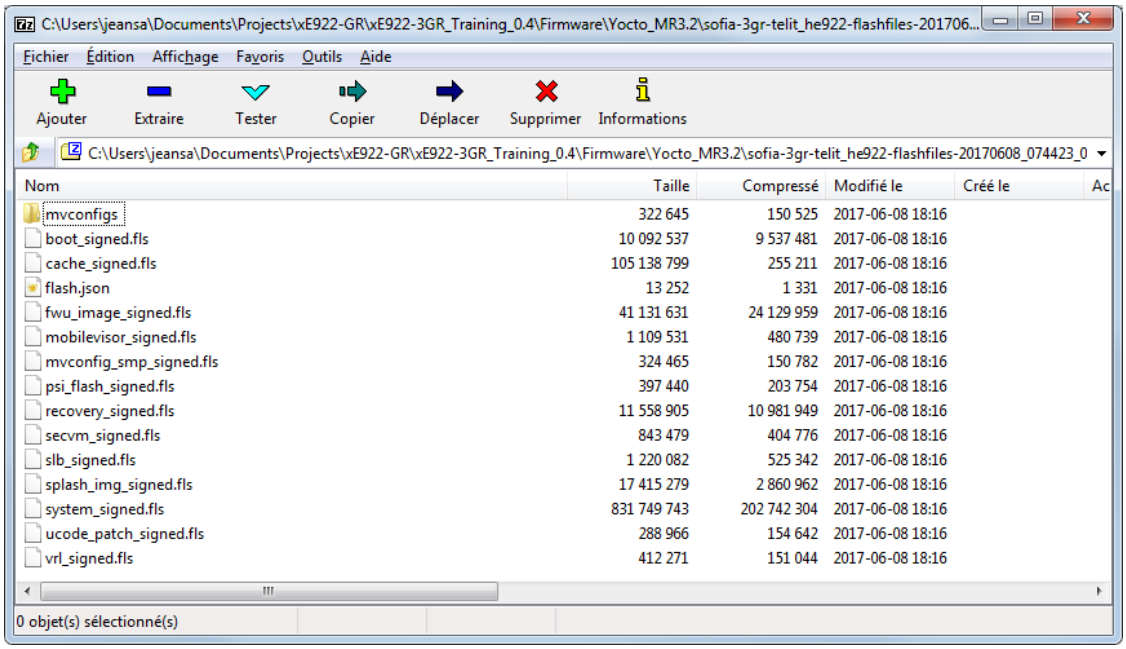
5.1. Flashing Image on xE922-3GR

Yocto Linux binaries can be flashed only after an Android version has been previously flashed.

The flash files for flashing Android software firmware are in ***Firmware\ Android_MR3.0A\ sf3gr_telit_he922-flashfiles-userdebug_a60_ww16_01.1709.05_MR3.0A.zip***

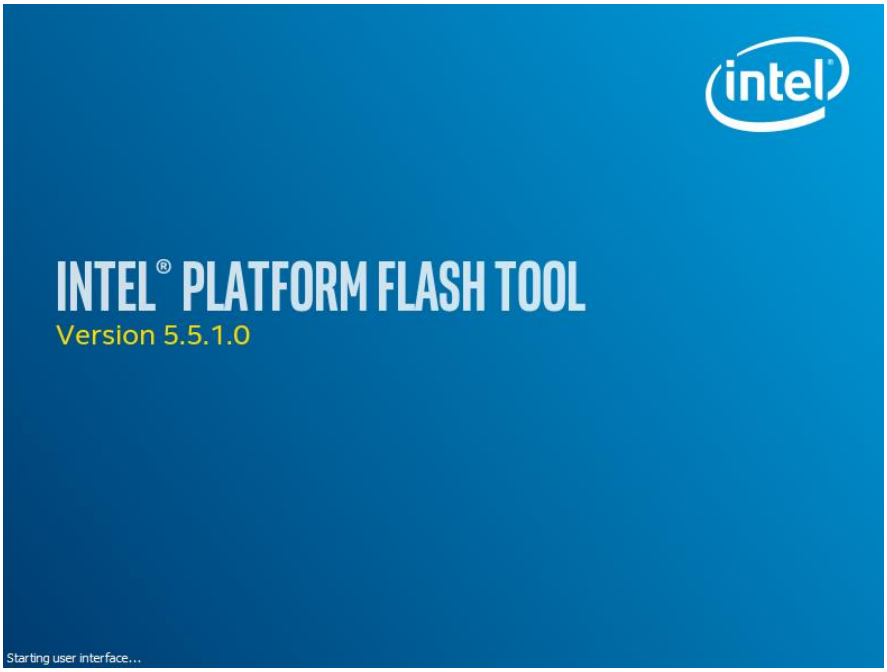


The flash files for flashing Yocto software firmware are in ***Firmware\ Yocto_MR3.2\sofia-3gr-telit_he922-flashfiles-20170608_074423_01.1709.05_MR3.2.zip***

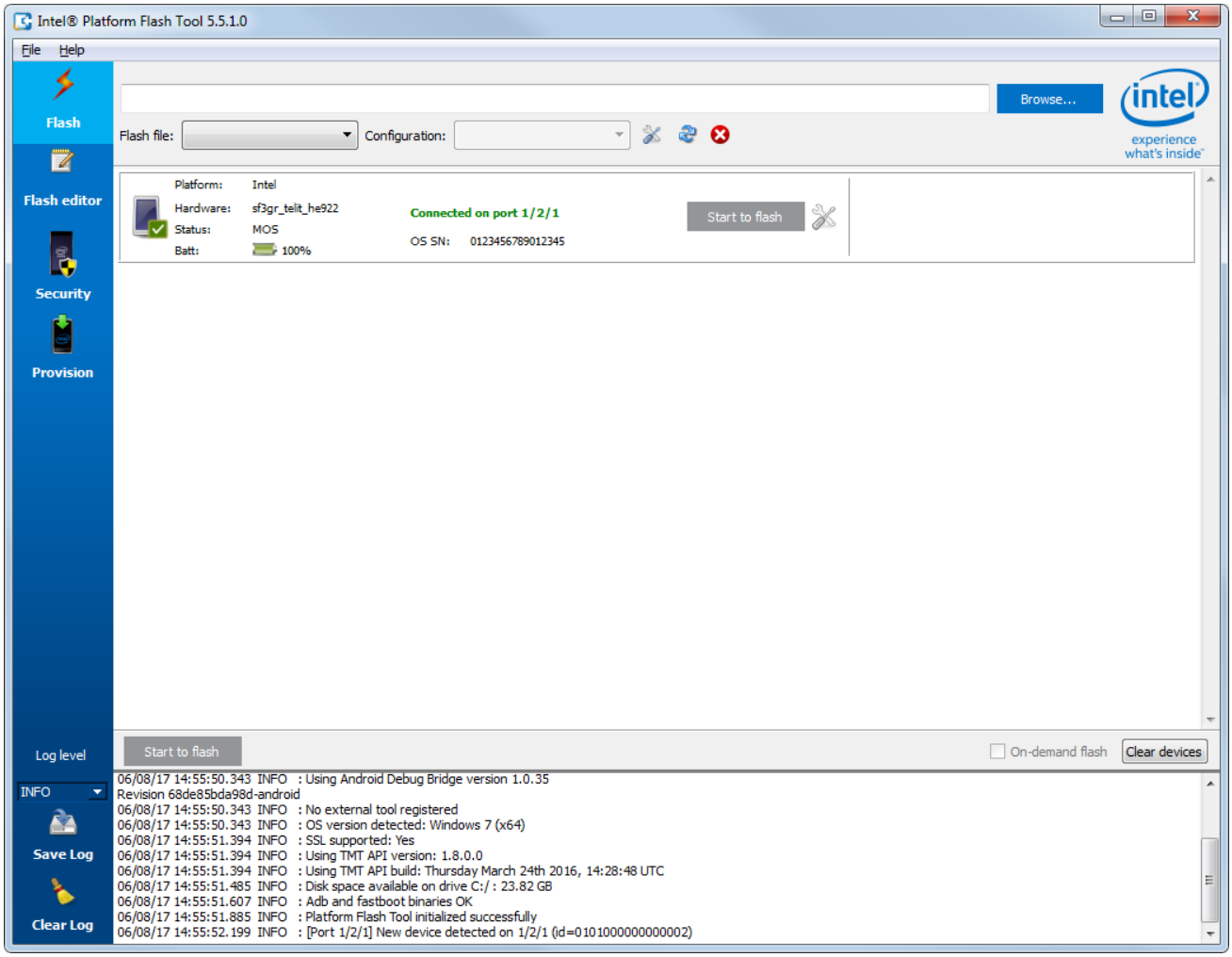


Follow the steps below on the Windows machine to proceed to flash the Target Platform.
Screenshots will depict Android MR3.0A software flashing

Open the ***PlatformFlashTool*** from Windows start menu.



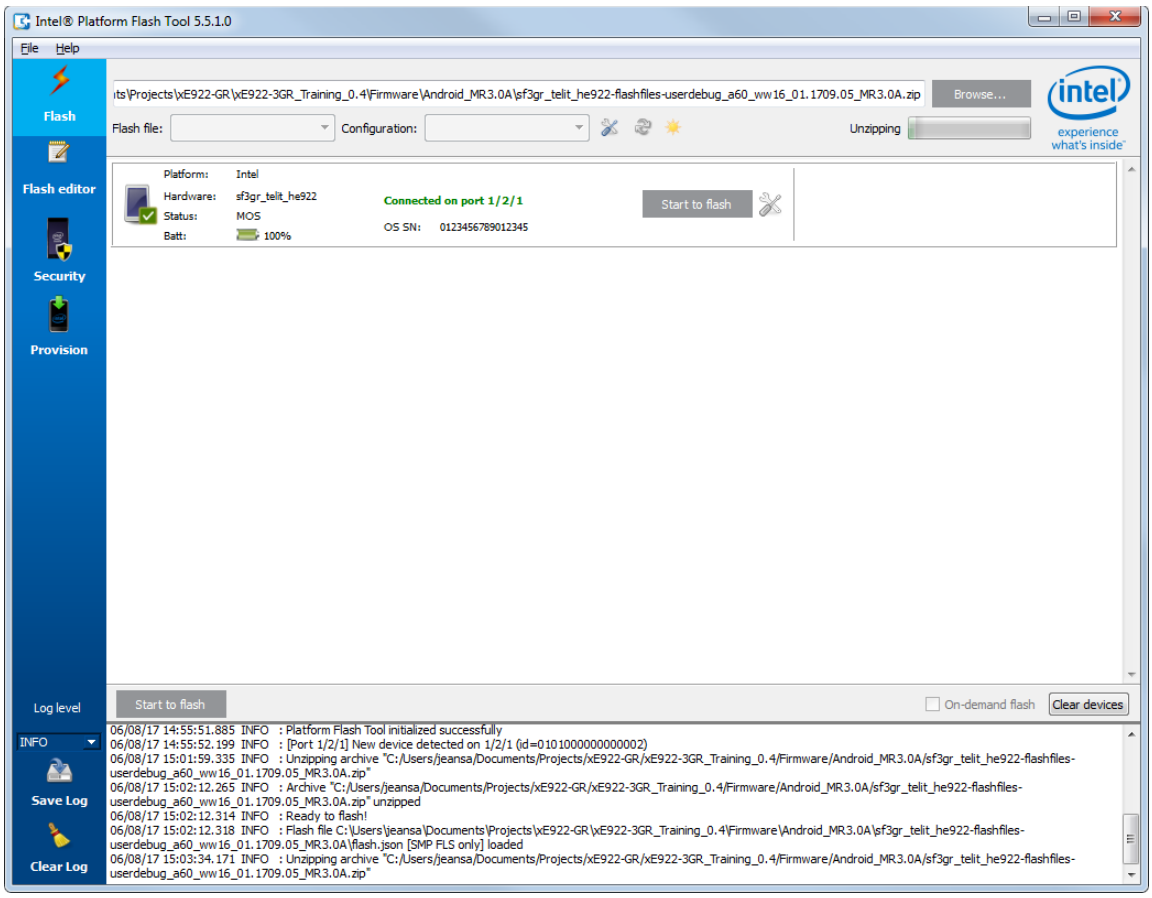
On the ***PlatformFlashTool*** window, verify the used version of the ***PlatformFlashTool*** and check it is like the recommended version (v.5.5.1.0). The flash tool version is printed on the top left of the ***PlatformFlashTool*** window, as highlighted in next figure.



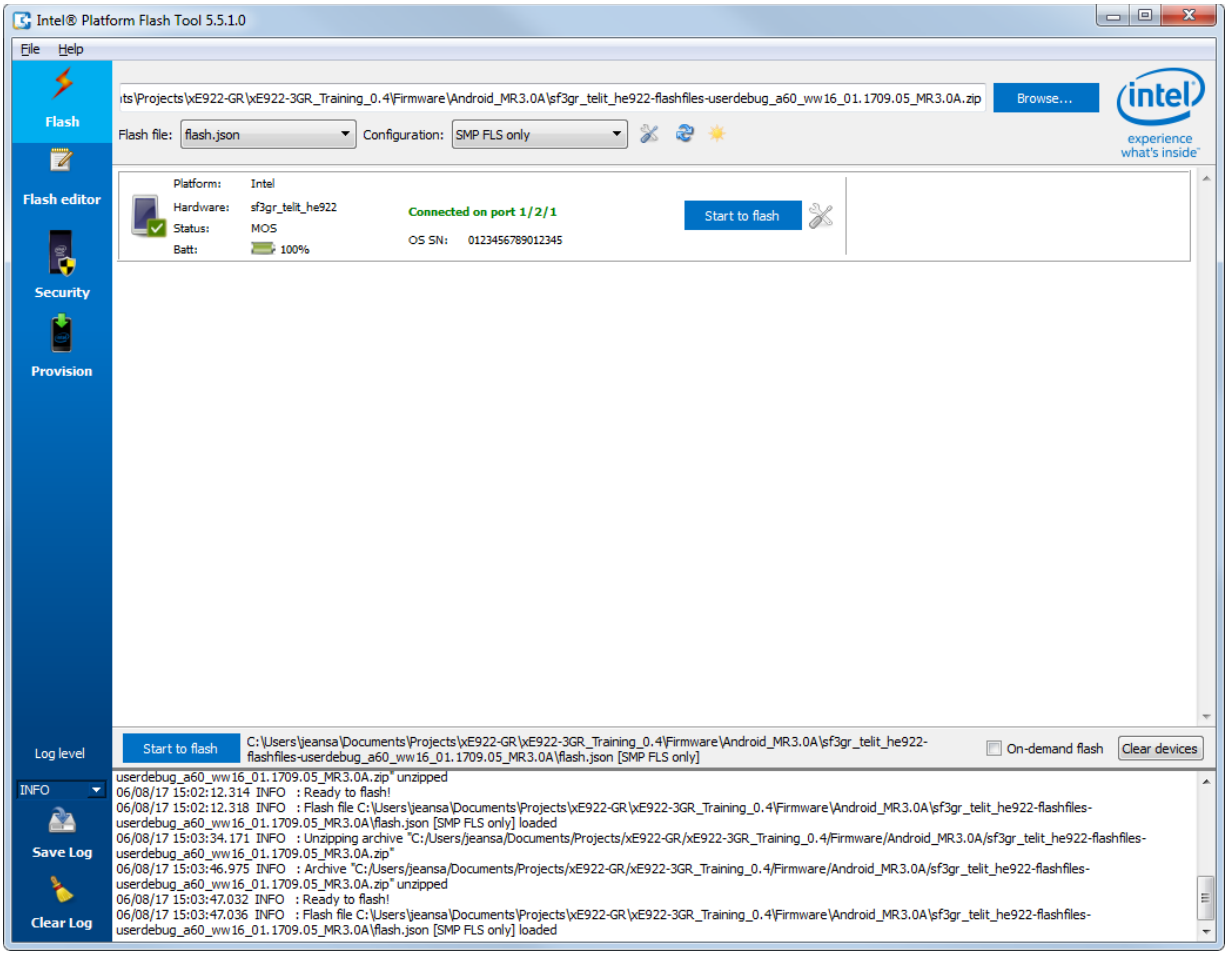
Check that ***PlatformFlashTool*** has detected xE922-3GR module as shown in above screenshot, on the left of "Start to flash" button. If it is not the case, that means the USB ports of xE922-3GR are not detected and consequently no flash procedure could be successful. Report to section 4.2 to successfully power up Telit xE922-3GR EVB.

Click on "Browse" button and choose the ***sf3gr_telit_he922-flashfiles-userdebug_a60_ww16_01.1709.05_MR3.0A.zip*** file and click on "***Open***".

PlatformFlashTool will unzip the file:

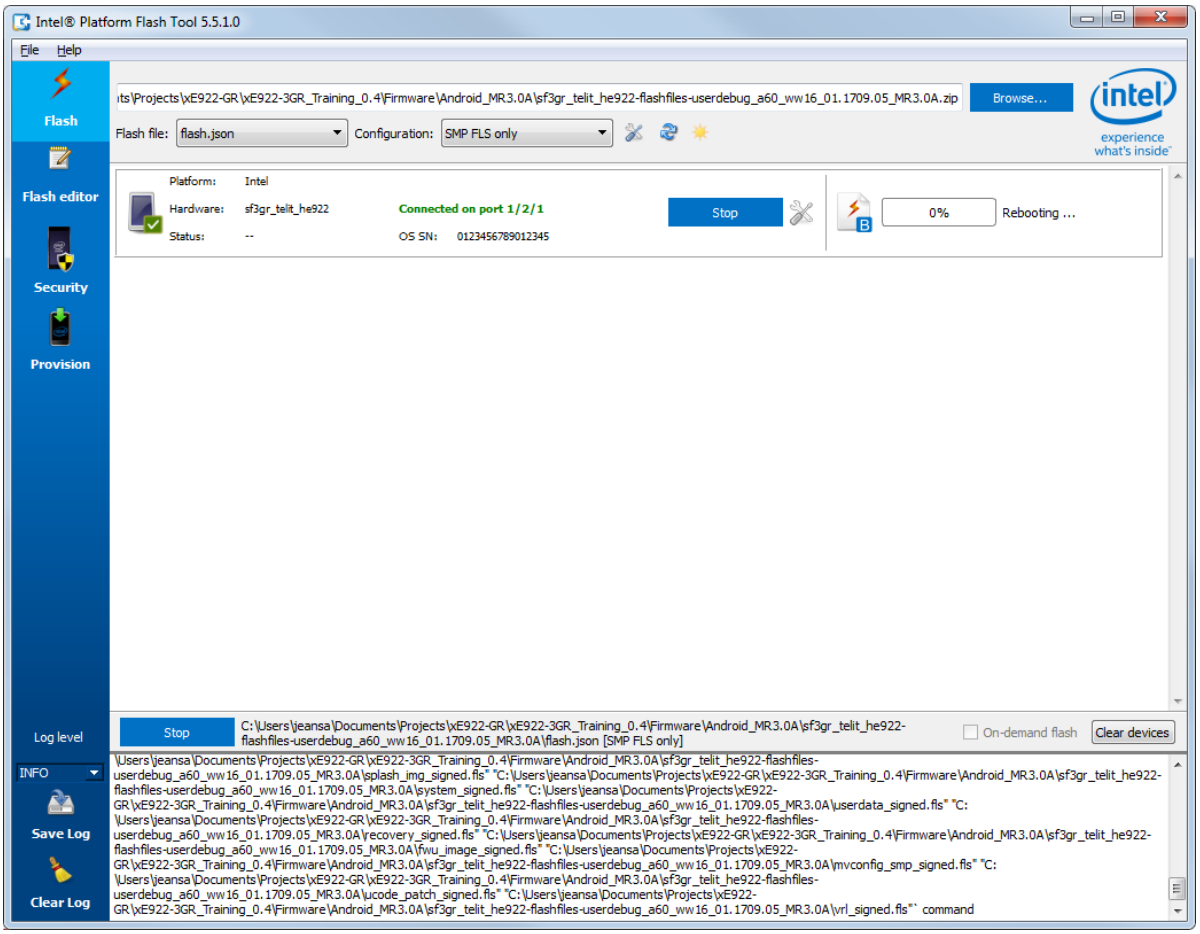


Once finished, ***PlatformFlashTool*** window should appear as shown below:

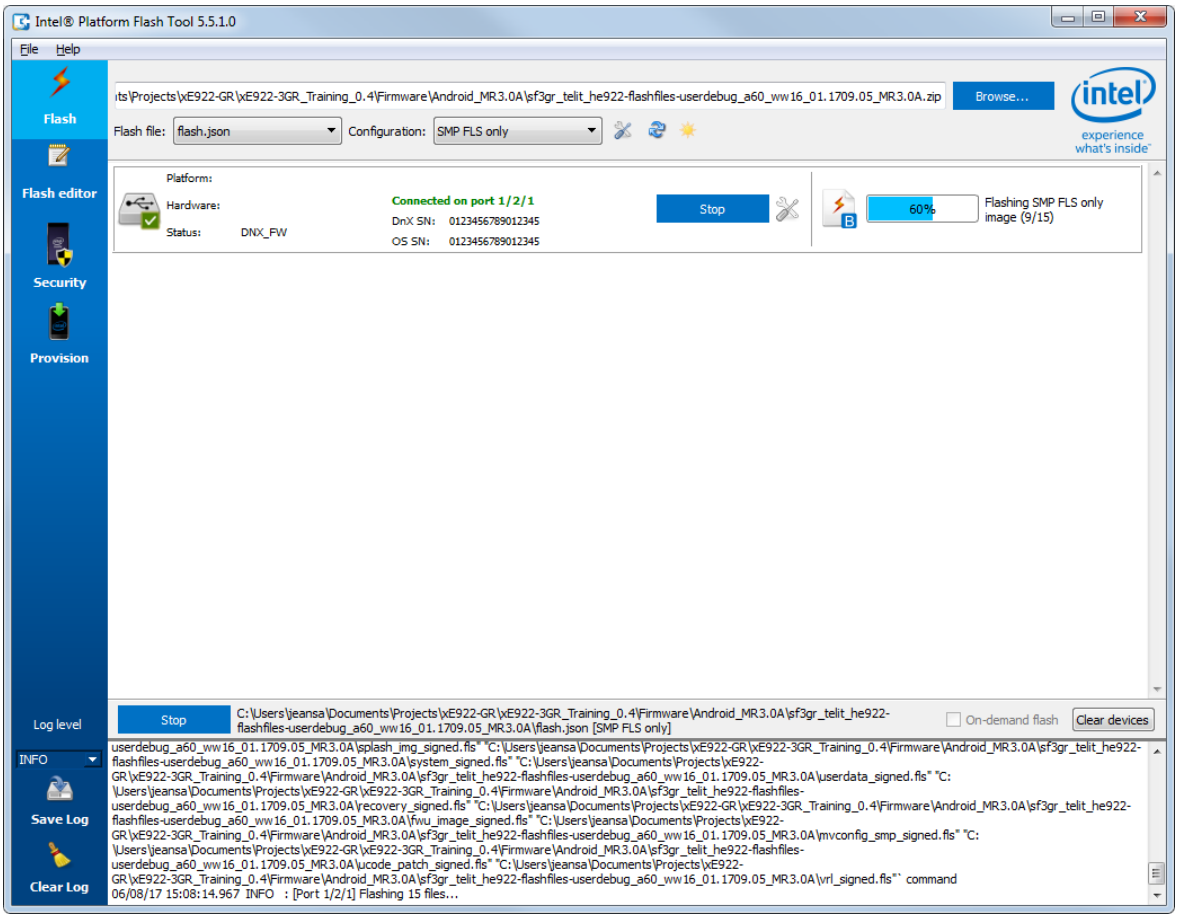


Carefully check that Configuration is set to "SMP FLS only".

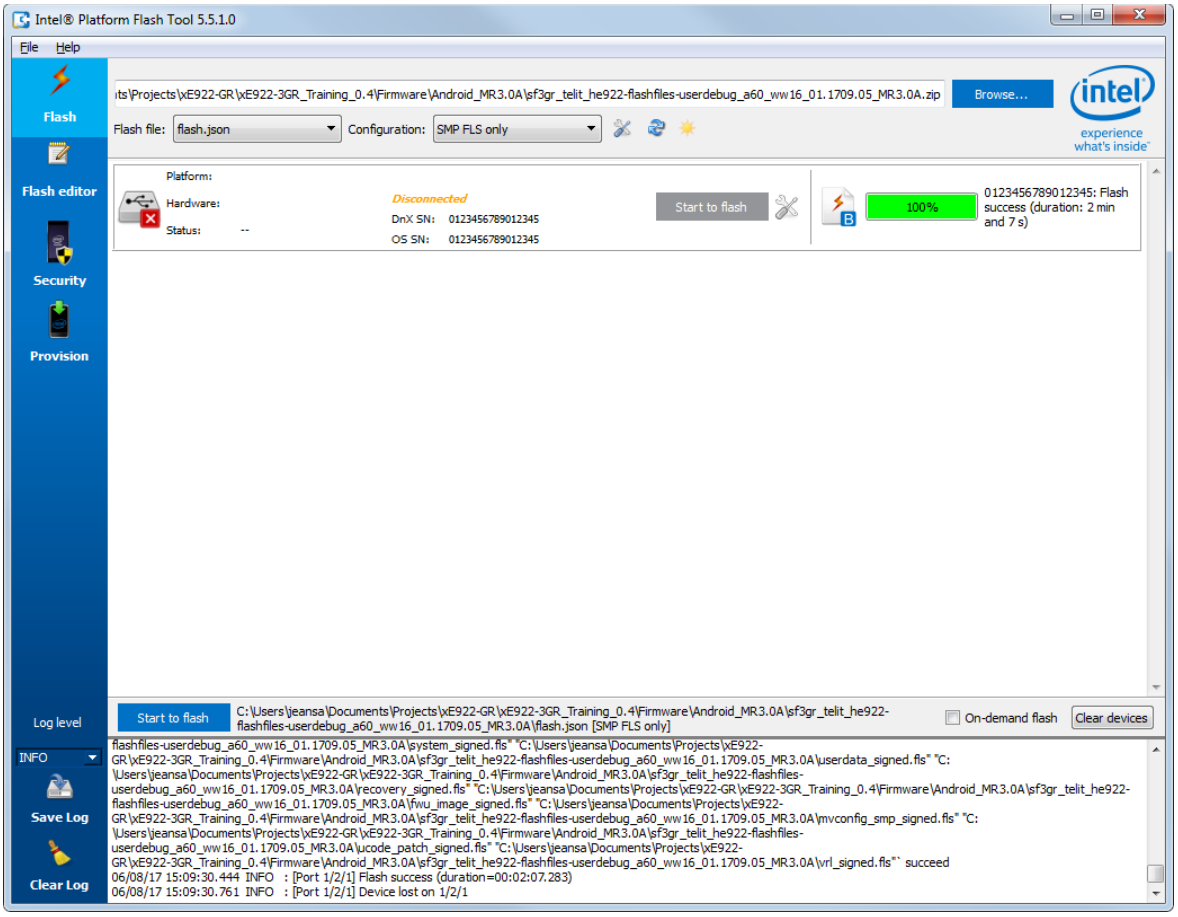
If not, select this Configuration option before to continue flashing process



Press "***reset***" button of Telit xE922-3GR EVB (refer to Figure 2) in order for ***PlatformFlashTool*** to proceed to the flashing.



When procedure is successfully ended, ***PlatformFlashTool*** should appear as shown below:

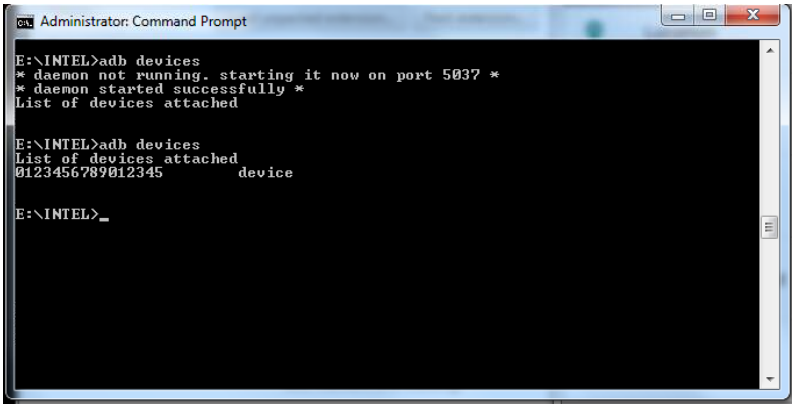


Now ***PlatformFlashTool*** can be closed.

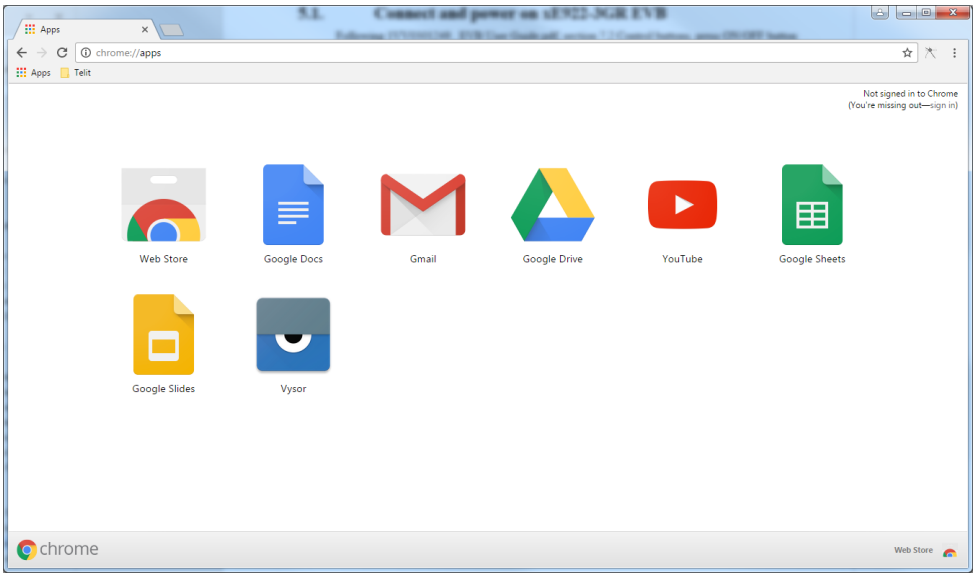
Note that when flashing Android software, the first reboot after the flashing takes longer than usual one because Android has to configure and initialize more items than usual.

5.1.1. Using Vysor

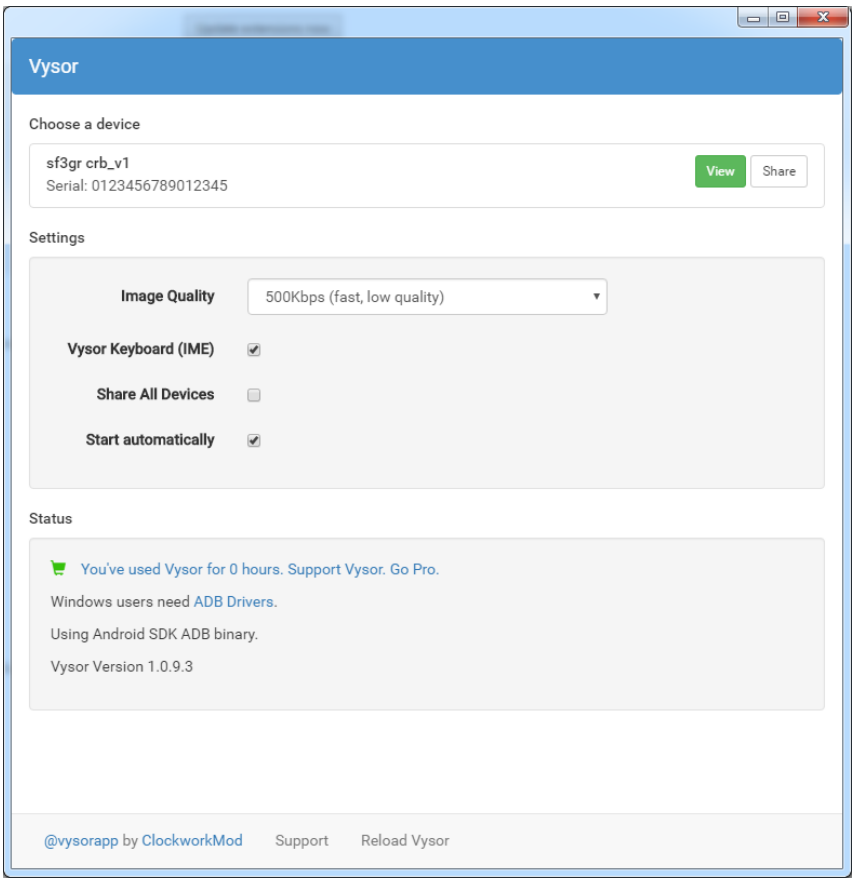
To use Vysor, you first need to connect the module via USB and start an ADB daemon.



In Google Chrome browser, go to “chrome://apps” and launch Vysor:



Vysor window will appear with "***sf3gr crb_v1 device***". Click on "***View***":



The xE922-3GR Display emulator will appear as shown below:

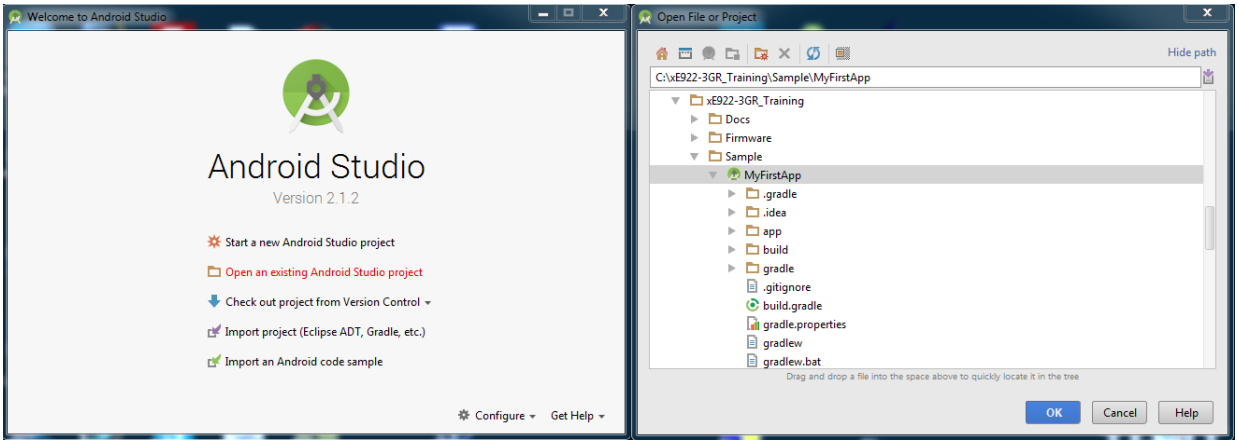
When using Vysor or Add-On Display board, both display interfaces will print the same UI.

6. First application with Android Studio

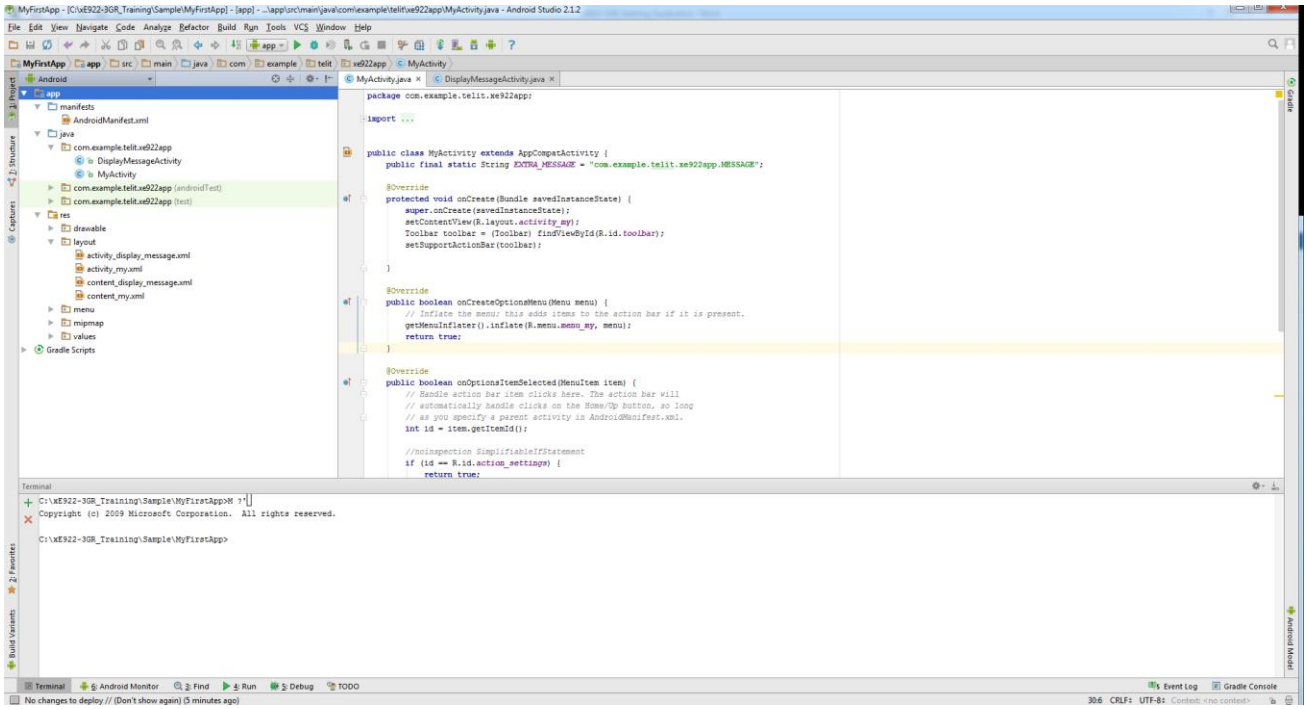
The "***Getting Started***" Android web page is a powerful way to start with Android applications. (https://developer.android.com/training/index.html)

The aim of this section is to describe how to build an existing project and how to run and debug this application on xE922-3GR module with Android MR3.0A software embedded.

Open Android Studio. On the Welcome screen, choose "***Open an existing android Studio project***" and browse into ***Sample*** folder to select "***MyFirstApp***".



"***MyFirstApp***" project is opened into Android Studio:



"***MyFirstApp***" is a simple application with a main Activity in a ***LinearLayout***.

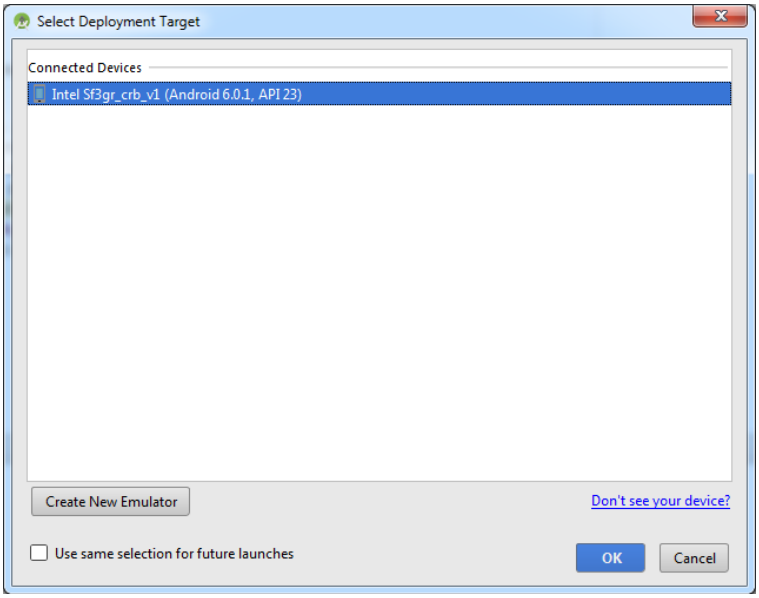
Main activity invites to enter a message in a textbox and to press the ***Send*** button.

When the ***Send*** button is pressed, main activity starts a ***DisplayMessage*** Activity through a ***RelativeLayout*** and transfers the message entered by the user.

Then, ***DisplayMessage*** activity displays the message and an xE922-3GR picture.

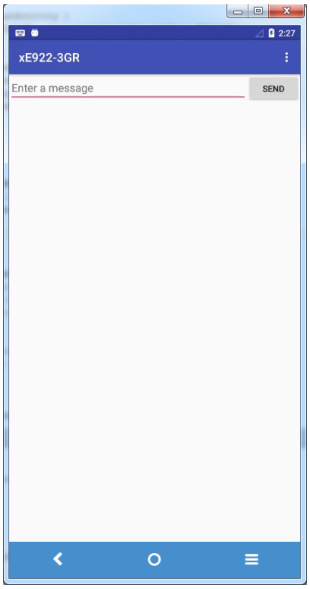
6.1. Download and run MyFirstApp on xE922-3GR

In Run menu, choose "***Run App***". The following window with "***Sf3gr_crb_vi***" Connected Devices appears:



Press 'OK'.
MyFirstApp is downloaded to xE922-3GR thanks to ADB commands.

Vysor extensions will show the following:



xE922-3GR can possibly be in idle state. In that case, just press the Home button and slide the screen to see MyFirstApp on it.

Enter “Hello world” in the ***TextBox*** and press ***Send*** button.
RelativeLayout will display your message:

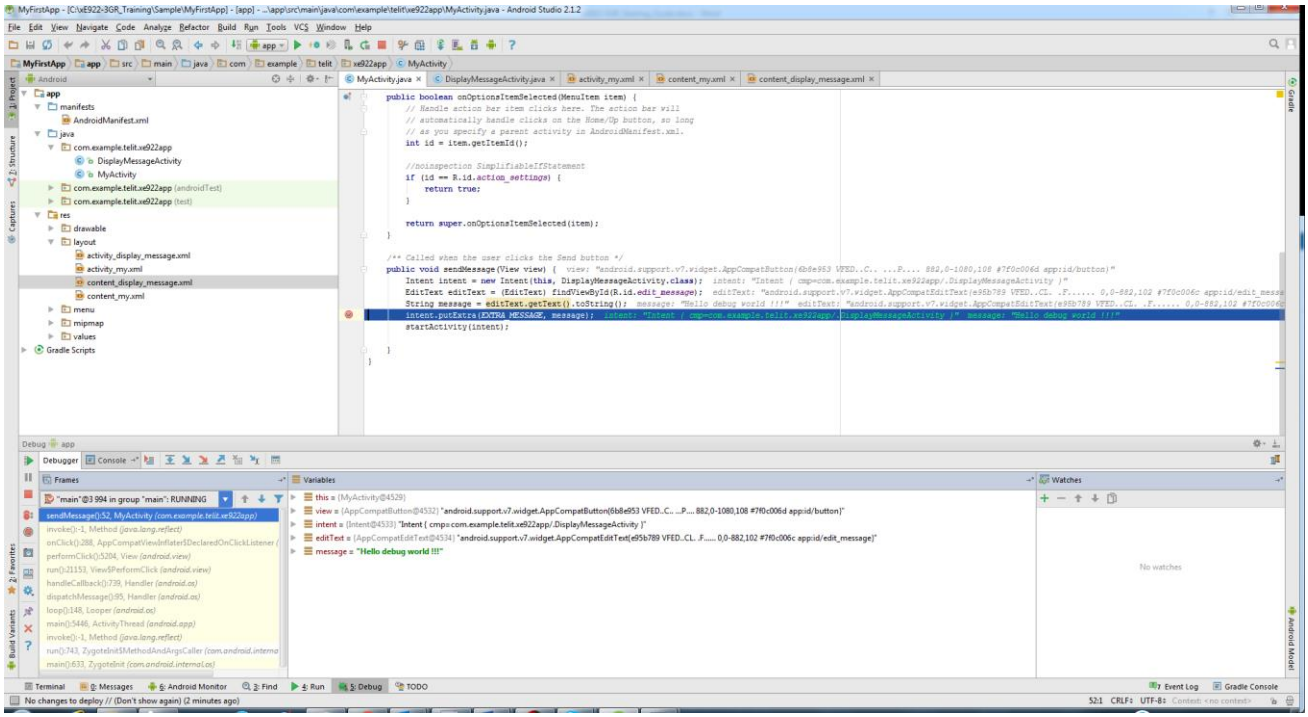
DisplayMessageActivity can be closed by pressing back key and a new message can be typed in ***TextBox***. To stop ***MyFirstapp***, press the ***Stop*** button in ***AndroidStudio***.

6.2. Download and debug MyFirstApp on xE922-3GR

First, set a breakpoint in ***Myactivity.java*** file in the following code line:
`intent.putExtra(EXTRA_MESSAGE, message);`

In the ***Run*** menu, choose "***Debug App***" and choose again "***Sf3gr_crb_vi***" as Connected Devices.

Enter "Hello debug world !!!" in the ***TextBox*** and press ***Send*** button.
The execution in AndroidStudio will stop at the breakpoint, offering a common debug view.



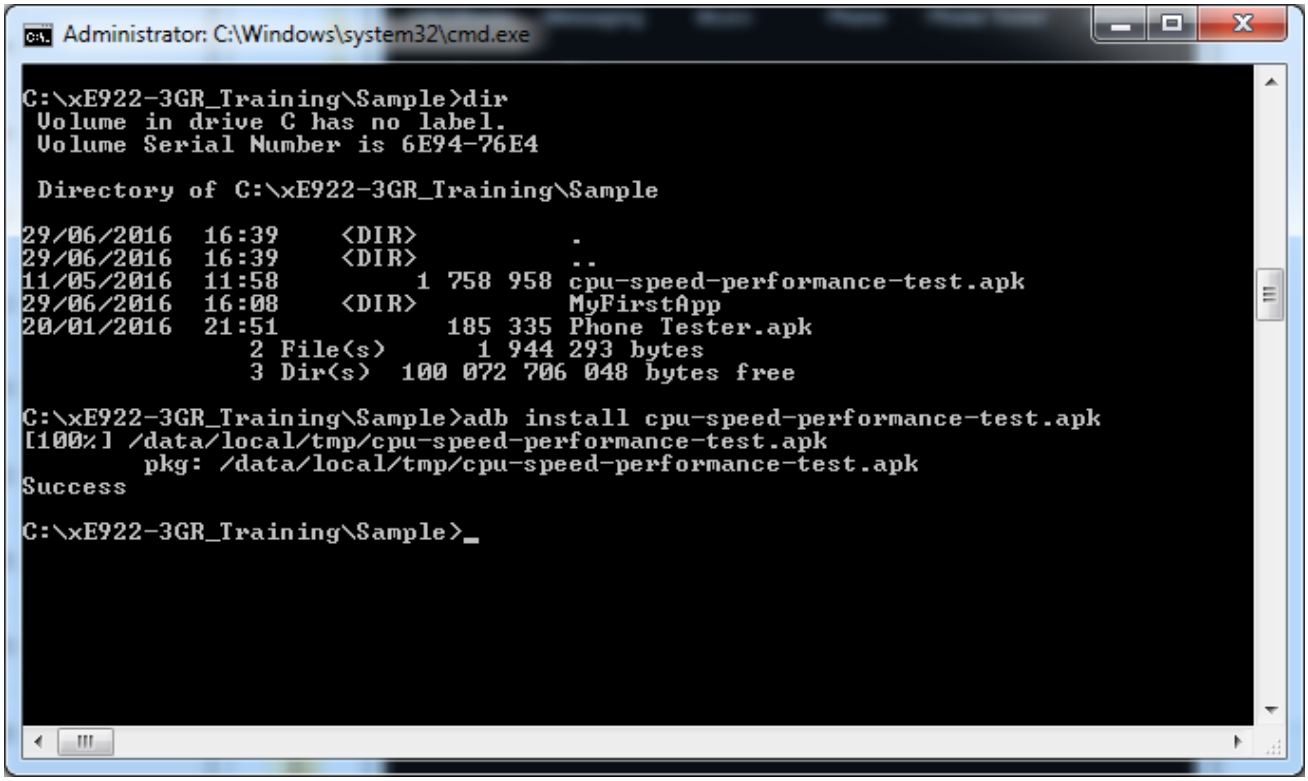
To resume program execution, press F9 key (resume program).
Thus, Vysor enters in ***DisplayMessageActivity***.

To stop ***MyFirstapp***, press the ***Stop*** button in ***AndroidStudio.***
AndroidStudio can now be closed.

Note that MyFirstApp is permanently installed on xE922-3GR after this session. Pressing the Vysor application button will show the xE92-3GR icon allowing to run application again.

7. APK Installation

This section describes how to install already-built applications (apk packages).
Open Cmd window and browse to the ***Sample*** folder.
Enter "*adb install cpu-speed-performance-test.apk*".



Then start the "***CPU Speed Test***" application with Vysor.

8. Debug and Trace

Telit can ask customers to provide log files and traces from the module for problem analysis. This section describes debugging facilities available on xE922-3GR and how to use them.

8.1. Embedded Debug Utilities

The first stage of debugging consists in three embedded commands in Linux/Android stack.

8.1.1. Dmesg

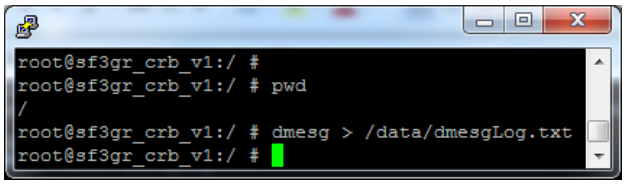
dmesg is a command on most Unix-like operating systems that prints or controls the Kernel Ring Buffer. The output of this command typically contains the messages produced by the device drivers and the kernel itself.

Use:

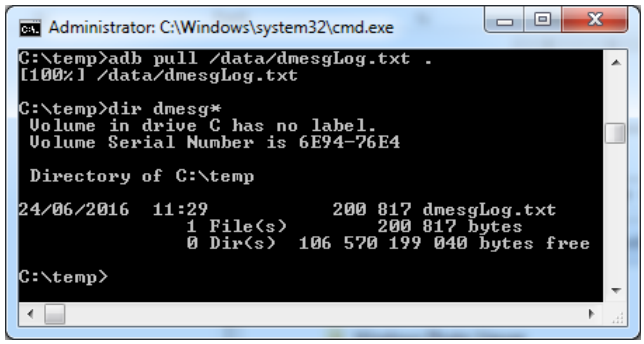
1. Get ***dmesg*** buffer from xE922-3GR filesystem:
   Either on Uart Linux console or under ADB shell, enter ***dmesg > <path>/dmesgLog.txt***
   In Cmd window, enter ***adb shell "dmesg > <path>/dmesgLog.txt"***
2. Download ***dmesgLog.txt*** from xE922-3GR to the host:
   Enter following command in cmd window: ***adb pull <path>/dmesgLog.txt <Host path>***

Examples:

1. PuttyAdb



2. Cmd window:



8.1.2. Logcat

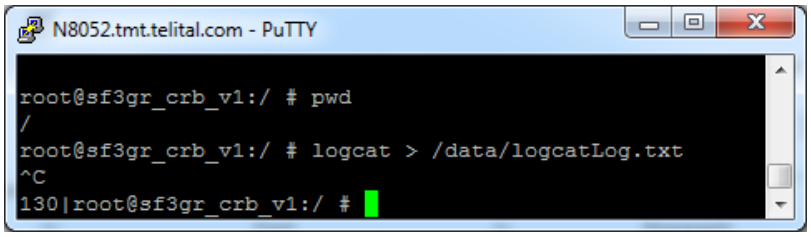
logcat is an Android command-line tool that dumps a log of system messages, including stack traces when the device throws an error and messages that you have written from your app with the `Log` class.

Use:

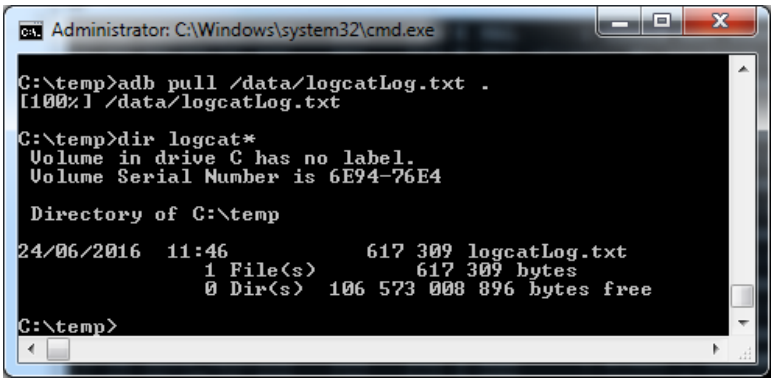
1. Get logcat buffer from xE922-3GR filesystem:
   Either on Uart Linux console or under ADB shell, enter ***logcat > <path>/logcatLog.txt***
   After a while, press Ctrl+C to stop logcat.
   In Cmd window, enter ***adb shell "logcat > <path>/ logcatLog.txt"***
2. Download ***logcatLog.txt*** from xE922-3GR to the host:
   Enter the following command in cmd window: ***adb pull <path>/ logcatLog.txt <Host path>***

Examples:

1. PuttyAdb



2. Cmd window:



8.1.3. Dumpsys

dumpsys Android tool runs on xE922-3GR and provides information about the status of system services.
It provides information for many Android services (try ***dumpsys –l*** for exhaustive list), but most commonly used ***dumpsys*** services are for:

- Viewing Input Diagnostics (dumpsys input)
- Viewing RAM Usage Data (dumpsys procstats)
- Viewing Network Data (dumpsys netstats)
- Viewing Battery Usage Data (dumpsys batterystats)

To get ***dumpsys*** information, follow the same steps as described for ***dmesg*** and ***logcat*** in the previous chapters.

9. Document History

Revision	Date	Changes
0.1	2016-04-15	First Draft
0.2	2016-08-16	Corrections and Updates
1	2017-07-04	Reworked Starting Guide with more details and information.