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D2.4.2 First STE U8500-based Platform baseline delivery, implementing WP2

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</tr>
</tbody>
</table>
# Table of Contents

Summary of the document.................................................................................................................. 2

Document Control Page ......................................................................................................................... 3

Change history ....................................................................................................................................... 3

Executive Summary ............................................................................................................................... 5

Scope ................................................................................................................................................... 5

Audience ............................................................................................................................................... 5

Summary ............................................................................................................................................. 5

Structure ............................................................................................................................................ 5

1. U8500 hardware reference platform ............................................................................................... 5

1.1 Logistic information ....................................................................................................................... 5

1.2 Platform overview ......................................................................................................................... 6

2. Android WP2 software stack .......................................................................................................... 8

2.1 Pre-built image flashing .............................................................................................................. 9

3. Augmented Reality framework – Creator Mobile for VENTURI .................................................. 10

4. Useful hints ..................................................................................................................................... 11

4.1 Battery switch configuration ....................................................................................................... 11

4.2 Enabling ADB on Windows ........................................................................................................ 12

4.3 Enabling ADB on Linux ............................................................................................................... 13
Executive Summary

Scope
This document describes how to obtain and operate existing U8500 hardware and software platforms as well as existing Augmented Reality framework.

Audience
This deliverable is restricted and it is addressed to all VENTURI partners. It is assumed that the readers of this document are skilled with Android SDK basics for mobile phones and tablets. For more information about Google’s Android SDK, please refer to the following link: http://developer.android.com/sdk/index.html

Summary
In this report all the necessary steps needed to setup the First STE U8500-based platform are described. The report includes instructions for:

- Obtaining the ST-Ericsson U8500 reference hardware platform
- Obtain and install ST-Ericsson U8500-based platform Android stack
- Operate WP2 Augmented Reality software stack

For further instructions, questions and help a dedicated wiki for has been setup at the following link: https://www.steerforge.com/wiki/index.php?group_id=197&pagename=WP2

Structure
This deliverable is structured as follows: Section 1 describes how to obtain U8500 hardware platform from ST-Ericsson and gives a brief overview of it. Section 2 introduces the process for downloading ST-Ericsson U8500-based platform Android stack from the VENTURI servers. Section 3 describes Metaio’s Augmented Reality Framework - Creator Mobile for VENTURI. Section 4 gives some useful hints derived from Partners’ experience after the previous “D2.4.1 STE U8500-based platform baseline delivery, integrating existing AR framework” delivery.

1. U8500 hardware reference platform

1.1 Logistic information
In order to facilitate technical and logistic communications among VENTURI partners, a dedicated portal managed by ST-Italy and ST-Ericsson has been setup, with restricted access to VENTURI partners, at the following address:

https://www.steerforge.com/plugins/docman/?group_id=197&action=show&id=1465

An Excel sheet can be edited to inform ST-Ericsson about U8500 reference boards delivery details, namely:

- Partner name
- Number of boards requested
- Shipment address #1
- Shipment address #2

ST-Ericsson provides partners with shipment tracking number.
1.2 Platform overview

In order to facilitate platform usage by the VENTURI partners, this section gives a brief overview of the different elements that compose the hardware reference platform. This information, and that contained in the next sections, will be useful to flash the prebuilt Android image and to start working with it. Figure 1 shows a global view of the VENTURI reference board running the provided Android based software image. This image, as explained in the next section, also includes the existing VENTURI AR framework. From Figure 1 the position of the external connector of the debug serial interface and the position of the camera can be inferred. The camera, shown in detail in Figure 2, can be both connected as a front or as a rear camera using, or not using, the provided adapter. Finally, the VENTURI reference board is equipped with a 6x3 keyboard. A different function can be assigned to each key (note: some keys are unused). Details are in Figure 3.

**Figure 1** VENTURI reference board

**Figure 2** Front-rear camera

<table>
<thead>
<tr>
<th></th>
<th>Left</th>
<th>Vol+</th>
<th>Back</th>
<th>Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Down</td>
<td>Up</td>
<td>Search</td>
<td>Enter</td>
<td>Menu</td>
</tr>
<tr>
<td></td>
<td>Right</td>
<td>Vol-</td>
<td>Home</td>
<td>Sleep</td>
</tr>
</tbody>
</table>
Figure 4 shows connectors and buttons available on the left and right sides of the VENTURI reference board. Most of them are self-explanatory, but with a few, some clarification is needed. Starting from the left side, a HDMI connector can have a different shape on some boards and, in any case, it is not enabled in the provided prebuilt Android based software image. On the left side, the External keypad connector is not present on all VENTURI reference boards and finally, on the right side, the RJ45 Ethernet connector, if present, is in any case not enabled.

Figure 5 shows the rear side of the VENTURI reference board. The two RF connectors are not needed to run the provided prebuilt Android based software image while the “Charger connector” can be used to charge the on-board battery. For doing this, the supplied 5Volts “mobile phone like” charger is needed, “Battery type selection...
“switches must be set according to the following configuration: 1=ON, 2=OFF, 3=OFF, 4=OFF and the battery must be connected on the back side of the VENTURI reference board, in the slot over the SIM reader. Alternatively to the on-battery, the board can be directly powered by the supplied 4Volts power supply. For doing this the battery must be removed and the 4Volts power supply needs to be plugged into the connector that becomes, in this way, available on the back (see Figure 6).

![Figure 6 Battery/power supply slot on the back side of VENTURI reference board](image)

Finally, Figure 7 shows how the External connector for the debug serial interface. Attention must be paid to the red wire orientation to avoid damage to the board.

![Figure 7 External serial connector detail](image)

2. Android WP2 software stack

The Android WP2 software stack is released as a pre-built image that is ready to be flashed on the VENTURI reference boards. This image has been produced by ST by merging the original one provided by STEricsson with the VENTURI AR framework – Creator Mobile for VENTURI provided by Metaio. As a result, the final released image includes the existing VENTURI AR framework – Creator Mobile for VENTURI that, in this way, is automatically in-
stalled on the VENTURI reference boards without the need for the partners to manually install the Augmented Reality framework.

The above images, together with board flashing tools, are available at the following addresses:

https://www.steerforge.com/file/download.php/197/93/p47_r59/ste_u9500_100_android_u9500_defconfig_d242_withmetaio_a

https://www.steerforge.com/file/download.php/197/94/p47_r59/ste_u9500_100_android_u9500_defconfig_d242_withmetaio_b

https://www.steerforge.com/file/download.php/197/95/p47_r59/ste_u9500_100_android_u9500_defconfig_d242_withmetaio_c

https://www.steerforge.com/file/download.php/197/96/p47_r59/ste_u9500_100_android_u9500_defconfig_d242_withmetaio_d

https://www.steerforge.com/file/download.php/197/97/p47_r59/ste_u9500_100_android_u9500_defconfig_d242_withmetaio_e

https://www.steerforge.com/file/download.php/197/98/p47_r59/ste_u9500_100_android_u9500_defconfig_d242_withmetaio_f

https://www.steerforge.com/file/download.php/197/99/p47_r59/ste_u9500_100_android_u9500_defconfig_d242_withmetaio_g

The image is split into seven chunks due to Steerforge hosting file sizes limitations. Once downloaded, join the above images using the following command (in Linux):

```bash
cat ste_u9500_100_android_u9500_defconfig_d242_withmetaio_* > ste_u9500_100_android_u9500_defconfig_d242_withmetaio.zip
```

Then uncompress `ste_u9500_100_android_u9500_defconfig_d242_withmetaio.zip` file. In this way you will obtain one top folder containing Android WP2 software stack named `ste_u9500_100_android_u9500_defconfig_d242_withmetaio`

### 2.1 Pre-built image flashing

According to the previous instructions, the pre-built image of Android software stack has been extracted to the `ste_u9500_100_android_u9500_defconfig_d242_withmetaio` folder. This folder contains the real binaries of the image and also the tools that are needed to physically install the image onto the VENTURI reference board.

For partners’ convenience, the minimalized steps to obtain a working installation on a VENTURI reference board are summarized in the following paragraphs.

In Linux, it is strongly recommended to work as “root” to avoid tricky permission problems with the USB stack.

Go to `ste_u9500_100_android_u9500_defconfig_d242_withmetaio` folder and launch

```bash
on Windows: ./flasher.bat -t <target-hw> -L -e -c

on Linux: ./flasher -t <target-hw> -L -e -c
```

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where \(<\text{target-hw}>\) is “hrefp_v20_v7x_db9500b0_secst_1ghz” for HREFP_V2.0_V72, HREFP_V2.1_V10 and 9500-100 RSTEP1_V2.2_V10 boards.

When prompted, connect the board to the PC with the provided USB cable. The board should turn on automatically and the installation procedure should start. Wait for the completion message.

3. Augmented Reality framework – Creator Mobile for VENTURI

The Creator Mobile enables the creation of tracking configurations for the VENTURI Y1 demonstrator on the VeDi device without the need of programming. The game organizer positions a set of markers in the neighborhood of the 3D game-board (the miniature city) and initiates the learning of the 3D environment appearance and geometry by moving the mobile device around the game-board. The markers are used to define the origin and the orientation of the coordinate system (see Figure 8). The markers also help to provide a reliable camera pose estimation during the 3D tracking configuration creation, the scale of the environment. In the case that more than one marker is used, an online inter-marker calibration is performed.

![Figure 8 GENERATION OF THE TRACKING CONFIGURATION USING THE CREATOR MOBILE](image)

The markers also help during the authoring process using the Creator since the point clouds are not an intuitive representation of the environment. Displaying the markers in the Creator tool (see Figure 9) helps the user in the task of positioning the virtual augmentations during the authoring.

![Figure 9 DISPLAYING THE MARKERS IN THE CREATOR TOOL HELPS THE AUTHORING OF THE AR SCENARIOS](image)

A special version of the official Creator Mobile has been created to adapt to the VeDi device constraints of Y1. Mostly, it takes into account the VeDi device specific changes to the rotated camera problem (soon to be patched) and handles the gravity sensor data differently (again will be patched soon).

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4. Useful hints
This section collects some hints that can be useful to work with the VENTURI reference board. They are the results of feedback received from partners after the previous “D2.4.1 STE U8500-based platform baseline delivery, integrating existing AR framework” and were originally collected on the following wiki page:

4.1 Battery switch configuration
Please check the switch configuration as seen in the picture below: Current configuration shown in the picture is:

1 = OFF
2 = OFF
3 = OFF
4 = ON

Correct configuration for charging and booting with the battery is:

1 = ON
2 = OFF
3 = OFF
4 = OFF

Figure 10 Battery switch details
4.2 Enabling ADB on Windows

The following information has been derived from this location and adapted for the STE platform. The Android SDK tools for Windows can be downloaded from this location and located in the directory which includes ADB drivers (android-sdk-windows/usb_driver for the 3.0 SDK release). Apply the following patch to the driver

--- U8500-driver/android_winusb.inf  2010-05-31 15:33:53.378835600 +0200
+++ usb_driver/android_winusb.inf  2011-04-08 17:16:34.580939800 +0200
@@ -26,6 +26,9 @@
  %ProviderName% = Google, NTx86, NTamd64

 [Google.NTx86]
  ;ST-Ericsson
  +%SingleAdbInterface% = USB_Install, USB\VID_04CC\PID_2323
  +%CompositeAdbInterface% = USB_Install, USB\VID_04CC\PID_2323\&MI_01
    ; HTC Dream
  %SingleAdbInterface% = USB_Install, USB\VID_0BB4\&PID_0C01
  %CompositeAdbInterface% = USB_Install, USB\VID_0BB4\&PID_0C02\&MI_01
@@ -44,6 +47,9 @@
  %CompositeAdbInterface% = USB_Install, USB\VID_18D1\&PID_4E12\&MI_01

 [Google.NTamd64]
  ;ST-Ericsson
  +%SingleAdbInterface% = USB_Install, USB\VID_04CC\&PID_2323
  +%CompositeAdbInterface% = USB_Install, USB\VID_04CC\&PID_2323\&MI_01
    ; HTC Dream
  %SingleAdbInterface% = USB_Install, USB\VID_0BB4\&PID_0C01
  %CompositeAdbInterface% = USB_Install, USB\VID_0BB4\&PID_0C02\&MI_01

The patch is available here. Now, go into the .android directory in your Windows home (e.g. c:/Documents and Settings/username/.android) and issue:

`echo 0x4cc >> adb_usb.ini`
4.3 Enabling ADB on Linux

**ADB over USB**

The following process refers to an Ubuntu Linux installation. Login as root and create/edit the file `/etc/udev/rules.d/50-android.rules` as follows:

```
SUBSYSTEM=="usb_device", SYSFS{idVendor}=="04cc", MODE="0666"
```

Now execute:

```
chmod a+rx /etc/udev/rules.d/50-android.rules
```

Restart `udev` to make the rule active.

```
sudo /etc/init.d/udev restart
```

Copy the following file under:

```
<user home>/.android
```

If started, kill the ADB server with:

```
adb kill-server
```

And check the device is connected through:

```
adb devices
```

**ADB over Ethernet**

Firstly, establish an Ethernet connection over USB as follows:

Using the UART console, assign an IP address to the device:

```
ifconfig usb0 192.168.1.10
```

Assign an address to the host as well:

```
ifconfig usb0 192.168.1.1
```

Enable ADB over Ethernet on the device:

```
setprop service.adb.tcp.port 5555
```
stop adbd
start adbd

Connect to the device from the host

adb connect 192.168.1.10:5555
adb devices