AN995: WF111 ANDROID DRIVER INSTALLATION

APPLICATION NOTE

Friday, 1 February 2013

Version 1.0

SILICON LABS

Contents

1 Introduction

This document describes how to compile and install the device drivers for Bluegiga WF111 802.11 b/g/n module to Android 2.3 system and how to verify the driver functionality. This application note is made for Freescale i.MX53 Quick Start Board. We show in examples how to use Adaneo Embedded i.MX53 Android Source BSP version 4.3 but instructions should give you an overview how WF111 could be added to Android.

2 Prerequisites

2.1 Prerequisites

- Android MMC/SD/SDIO driver support requires Linux kernel version 2.6.24 up to 3.2. Your systems kernel version can be checked by:

```
uname -a
Linux localhost 2.6.35.3-01162-g42460fa-dirty #2 PREEMPT Mon Jan 30 13:44:15
PST 2012 armv7l unknown
```

In case you don't have ***uname*** command available, you might try "***busybox uname -a***".

2.6.35.3-01162-g42460fa-dirty is the default kernel version in the Android BSP used in this application note.

In the Linux kernel configuration you must have the following options enabled:

- CONFIG_WIRELESS_EXT
- CONFIG_MODULES
- CONFIG_FW_LOADER

These are enabled by default in kernel configuration of Android BSP used in this application note.

- For client mode (STA) support requires:
  - wpa_supplicant (0.5.11, 0.6.8 or 0.7.3). We used version 0.5.11. This can be checked using the command "***wpa_supplicant -v***".
- Internet connection
  - Android BSP will download few gigabytes of data from Internet

2.1.1 Needed files

Number 17 in file names reports build number and thus can be different in final release.

File	Description
i.MX53-QSB-Android-Gingerbread-Release4.3.tar.bz2	Adaneo Embedded i.MX53 Android Source BS downloaded from http://www.adeneo.com/Products/Board-Suppo
i.MX53-QSB-Android-Gingerbread-Release4.3-wf111.patch	WF111 configuration files and various fixes to g modern Ubuntu. Can be downloaded from http:
wf111-driver-5.1.0-17-gingerbread-armv7.tar.gz	WF111 Linux kernel module source and WF111 ARMv7. Can be downloaded from http://techfor • Source code for **unifi_sdio.ko** • **unififw** - The script that runs unifi_helper when a WF111 module is detected. This kernel module to start the unifi_helper. • **unifi_helper** - User-space helper daemo the unififw. • **unifi_config** - Configuration and status r configure power saving modes. • **staonly.xbv** - Station firmware executed • **ap.xbv** - Access Point mode firmware ex Currently not used. • **ufmib.dat** - Firmware file that contains c it is mib111_drv_led.dat, replace with cor

3 Compiling and installing WF111 driver

3.1.2 .2 Extracting Android BSP

Extract Android BSP sources using following command:

```
tar xvf i.MX53-QSB-Android-Gingerbread-Release4.3.tar.bz2
```

Now you should have i.MX53-QSB-Android-Gingerbread-Release4.3 directory.

3.1.3 .3 Setting up environment

Please read Release Notes r4.3.pdf file that you can find in doc directory. Especially Software prerequisites chapter contains information that you must follow. Compiling WF111 drivers seems to work with OpenJDK version 6 also but to compile whole Android environment you should consider installing official JDK from Oracle.

3.1.4 .4 Getting and setting up rest of Android BSP

Download rest of Android BSP and configure it using following commands. This will take a while. U-Boot is needed for mkimage tool that is needed for other build targets.

```
cd i.MX53-QSB-Android-Gingerbread-Release4.3/scripts
./download_android.sh
./patch_android.sh
./apply_qsb_patch.sh
cd ../src
patch -p1 < i.MX53-QSB-Android-Gingerbread-Release4.3-wf111.patch
cd ../scripts
./build_android.sh --board=imx53_qsb --build-choice=uboot --lunch-type=eng
./build_android.sh --board=imx53_qsb --build-choice=kernel --lunch-type=eng
```

3.1.5 .5 Copying driver source code

In this step we copy WF111 driver souce code to correct place. Issue following commands to extract the driver source code, userspace applications and needed firmware files.

```
cd ../src/external
tar xvf wf111-driver-5.1.0-17-gingerbread-armv7.tar.gz
```

MIB file included in Android package is mib111_drv_led.dat. In case you like to use different MIB file, change csr_wifi_5.1.0/csr/firmware/ufmib.dat to the desired one.

3.1.6 .6 Building kernel modules for Android Linux kernel

Now we are ready to compile actual driver module. CSR build environment assumes that unifi_sdio.ko kernel module is prebuilt so we have to build it before building whole Android. Issue the following commands to compile the kernel module.

```
cd csr_wifi_5.1.0/csr/os_linux/driver
SDIO_DRIVER=mmc SME=wext_ap ./build android-arm ARCH=arm
KDIR=$(pwd)/../../../../../kernel_imx/
CROSS_COMPILE=$(pwd)/../../../../../prebuilt/linux-x86/toolchain/arm-eabi-4.4.0/
USER_TOOLS=clean
```

3.1.7 .7 Building Android

Issue the following commands to compile the Android.

```
cd ../../../../../../scripts
./build_android.sh --board=imx53_qsb --build-choice=android --lunch-type=eng
```

3.1.8 .8 Overriding the MAC address

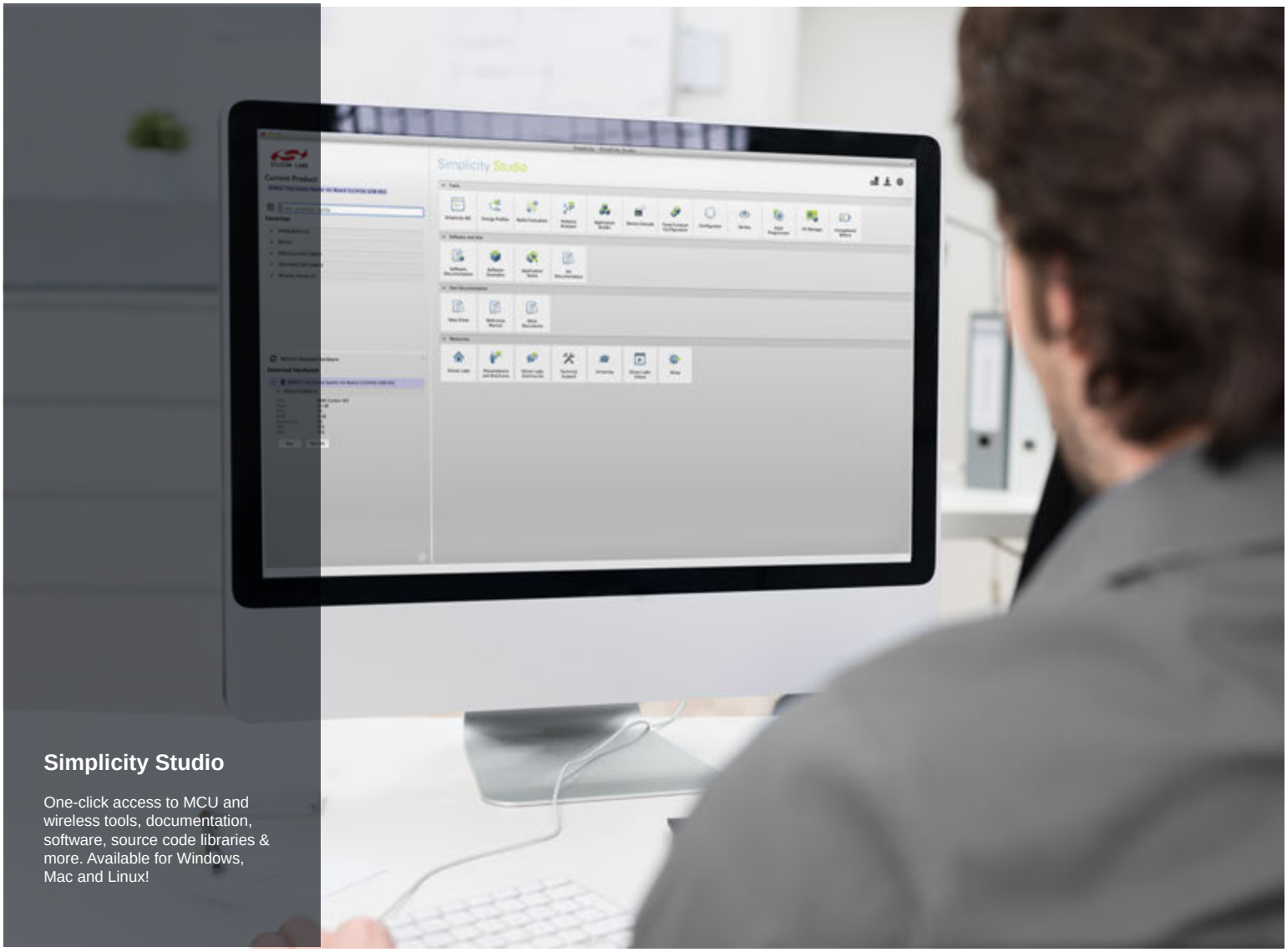
To override the MAC address you need to write a file called ***/system/etc/firmware/unifi-sdio-0/mac.txt***. If there is no need to override the MAC address, mac.txt should be deleted if exists. If you are using WF111 on second SDIO slot, use ***/system/etc/firmware/unifi-sdio-1/mac.txt*** instead. Full sized SDIO slot on Freescale i.MX53 Quick Start Board is seen as a second SDIO slot in Linux.

3.1.9 .9 Installing the Android

Now we are ready to copy Android filesystem to micro-SD card. Insert the card to a reader and issue following command replacing X with a letter of your micro-SD card.

```
./flash_android.sh /dev/sdX
```

By default the firmware files will be in ***/system/etc/firmware/unifi-sdio-0/*** which assumes the WF111 is connected to the host's first SDIO slot. However symbolic link from ***/system/etc/firmware/unifi-sdio-1/*** to ***/system/etc/firmware/unifi-sdio-0/*** makes sure that when the WF111 is connected to the second slot, it will work fine. Upon startup the driver will print out lines beginning with "***unifi0***:" if it is in the first slot and "***unifi1***:" if it is in the second slot.



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