INTERNAL USE

MTK AOSP Build

Prerequisites

- MTK release requires the same build environment as AOSP (For Android 4.4.x, KitKat)
  - Ubuntu 10.04 64-bit
  - Sun JDK 1.6.0_45
  - Other packages listed in http://source.android.com/source/initializing.html

Code tree

Turnkey AOSP Code tree

Turnkey ABS	Turnkey AOSP
alps/**mediatek**/	alps/**vendor**/**mediatek**/**proprietary**/
alps/**mediatek**/**build**/	alps/**device**/**mediatek**/**build**/**build**/
alps/mediatek/config/common/**ProjectConfig.mk** alps/mediatek/config/${Platform}/**ProjectConfig.mk** alps/mediatek/config/${Project}/**ProjectConfig.mk** alps/mediatek/config/out/${Project}/**ProjectConfig.mk**	alps/device/${Company}/${Project}/**ProjectConfig.mk** **Example:** **alps/device/mediatek/mt6572v1_phone/ProjectConfig.mk** ***[Hint] No hierarchy in Turnkey AOSP's ProjectConfig.mk***
alps/mediatek/**preloader**/	alps/bootable/bootloader/**preloader**/
alps/**kernel**/ alps/mediatek/**kernel**/ alps/mediatek/platform/${Platform}/**kernel**/ alps/mediatek/custom/common/**kernel**/	alps/**kernel-3.4**/

Turnkey AOSP Code tree (Cont.)

Turnkey ABS	Turnkey AOSP
alps/vendor/**mediatek**/**${Project}**/**artifacts**/	alps/vendor/**mediatek**/**libs**/**${Project}**/
alps/mediatek/config/common/***.rc** alps/mediatek/config/${Platform}/***.rc** alps/mediatek/config/${Project}/***.rc**	alps/device/${Company}/${Platform}/***.rc** alps/device/${Company}/${Project}/***.rc**

Folder structure

- All MTK's **build-environment** files are located under device/mediatek/**build**/
- All Android **project configurations** are located under device/$Company/$Project/
  - No custgen to combine custom folders and ProjectConfig.mk in build time.
- All MTK **customization files** are located under *vendor/mediatek/proprietary/custom/$Project/*
  - MODEM files are located under *vendor/mediatek/proprietary/custom/$Project/***modem**/$CUSTOM_MODEM/

Folder structure (Cont.)

- All MTK **proprietary** is located under **vendor**/mediatek/**proprietary**/.
- All **kernel** files were located under kernel-3.4, not under mediatek/kernel/ folder.

Folder structure (Cont.)

- Configuration related

Turnkey ABS	Turnkey AOSP
alps/build/target/product/**common.mk** alps/build/target/product/**$Project.mk** *- Define PRODUCT_PACKAGES, PRODUCT_COPY_FILES, PRODUCT_PROPERTY_OVERRIDES, etc.*	alps/device/mediatek/**common**/**device.mk** alps/device/mediatek/**$Platform**/**device.mk** alps/device/mediatek/**$Project**/**device.mk** *- Define PRODUCT_PACKAGES, PRODUCT_COPY_FILES, PRODUCT_PROPERTY_OVERRIDES, etc.*

```
# META
PRODUCT_COPY_FILES += device/mediatek/mt6572v1_phone/advanced_meta_init.rc:root/advanced_meta_init.rc

# USB
PRODUCT_COPY_FILES += device/mediatek/mt6572v1_phone/init.mt6572usb.rc:root/init.mt6572usb.rc

PRODUCT_AAPT_CONFIG := normal ldpi mdpi hdpi xhdpi xxhdpi
PRODUCT_AAPT_PREF_CONFIG := hdpi
```

```
165 PRODUCT_COPY_FILES += device/mediatek/mt6572v1_phone/init.mt6572usb.rc:root/init.mt
166
167 PRODUCT_AAPT_CONFIG := normal ldpi mdpi hdpi xhdpi xxhdpi
168 PRODUCT_AAPT_PREF_CONFIG := hdpi
169
170 # inherit 6572 platform
171 $(call inherit-product, device/mediatek/mt6572/device.mk)
172
173 $(call inherit-product-if-exists, vendor/mediatek/libs/mt6572v1_phone/device-vendor.mk)
```

Ex. call inherit-product要放在$Project/device.mk和$Platform/device.mk的最後面,才會有Project > Platform > Common的效果

Folder structure (Cont.)

- All MTK released libraries will be located under vendor/mediatek/**libs**/$Project/

Turnkey AOSP build

Turnkey AOSP build

- *Step 1:* ***source build/envsetup.sh***

```
$ source build/envsetup.sh
including device/generic/armv7-a-neon/vendorsetup.sh
including device/generic/armv7-a/vendorsetup.sh
including device/generic/mips/vendorsetup.sh
including device/generic/x86/vendorsetup.sh
including device/mediatek/mt6572v1_phone/vendorsetup.sh
including device/mediatek/muse72_m2_jb3/vendorsetup.sh
including sdk/bash_completion/adb.bash
```

- *Step 2:* ***lunch*** *& select ${Project}*

```
$ lunch

You're building on Linux

Lunch menu... pick a combo:
     1. full-eng
     2. full_x86-eng
     3. vbox_x86-eng
     4. full_mips-eng
     5. mini_armv7a_neon-userdebug
     6. mini_armv7a-userdebug
     7. mini_mips-userdebug
     8. mini_x86-userdebug
     9. full_mt6572v1_phone-eng
     10. full_mt6572v1_phone-userdebug
     11. full_muse72_m2_jb3-eng
     12. full_muse72_m2_jb3-userdebug

Which would you like? [full-eng] 9
```

```
============================================
PLATFORM_VERSION_CODENAME=REL
PLATFORM_VERSION=4.2.2
TARGET_PRODUCT=full_mt6572v1_phone
TARGET_BUILD_VARIANT=eng
TARGET_BUILD_TYPE=release
TARGET_BUILD_APPS=
TARGET_ARCH=arm
TARGET_ARCH_VARIANT=armv7-a-neon
HOST_ARCH=x86
HOST_OS=linux
HOST_OS_EXTRA=Linux-2.6.38-16-generic-x86_64-with-Ubuntu-10.04-lucid
HOST_BUILD_TYPE=release
BUILD_ID=JDQ39
OUT_DIR=out
============================================
```

Turnkey AOSP build (Cont.)

- *Step 2:* ***lunch ${Project}*** *also works*

```
$ lunch full_mt6572v1_phone-eng
```

```
============================================
PLATFORM_VERSION_CODENAME=REL
PLATFORM_VERSION=4.2.2
TARGET_PRODUCT=full_mt6572v1_phone
TARGET_BUILD_VARIANT=eng
TARGET_BUILD_TYPE=release
TARGET_BUILD_APPS=
TARGET_ARCH=arm
TARGET_ARCH_VARIANT=armv7-a-neon
HOST_ARCH=x86
HOST_OS=linux
HOST_OS_EXTRA=Linux-2.6.38-16-generic-x86_64-with-Ubuntu-10.04-lucid
HOST_BUILD_TYPE=release
BUILD_ID=JDQ39
OUT_DIR=out
============================================
```

- *Step 3:* ***source mbldenv.sh***
  - *To setup MTK internal build environment parameters.*

```
$ source mbldenv.sh
```

Customers need to modify this file according to customers' build environments.

Step 3': ***PATH=/mtkoss/jdk/jdk1.6.0_45/bin:$PATH***

◆ If you cannot find alps/mbldenv.sh, please execute Step 3' instead.

Turnkey AOSP build (Cont.)

- **Step 4**: *make -j24 2>&1 | tee build.log*
  - -j24: depend on CPU numbers on your build machine.
    - Execute "***cat /proc/cpuinfo | grep processor | wc -l***" to get CPU numbers on your build machine.
    - If your machine has 8 CPUs, the suggested argument is "-j8".
- preloader, lk and kernel will be built in the above command.

Turnkey AOSP build (Cont.)

- [Difference from ABS] NOT specify the project name in command line.
  - Project name was specified when executing **lunch** or **choosecombo**.

ABS	AOSP
… ./mk mt6572v1_phone new	… lunch full_mt6572v1_phone-eng make -j36

- How to get build project?
  - get_build_var TARGET_DEVICE

```
mtk01760@mtksh1t010 13:49:15 ~/ws_frank.wu_alps/ALPS_SW/TRUNK/KK.AOSP/alps
$ get_build_var TARGET_DEVICE
mt6572v1_phone
```

Turnkey AOSP build (Cont.)

- [Difference from ABS] NOT use ./mk or ./makeMtk to wrap the build command.
  - Use the native build command with MTK's pregen and MTK's special build flows (Ex. customimage).
- Enable a feature option in build time
  - **ABS**: ./mk -o=MTK_AUTO_TEST=yes
  - **AOSP**: make MTK_AUTO_TEST=yes -j24

All build systems can be built independently

- preloader, lk, kenerl and Android can be built **independently**.
  - They can be built **without others**.
  - Example:
    - They **cannot share** the same device/$Company/$Project/***ProjectConfig.mk***

Build system	Project Configuration
preloader	Bootable/bootloader/preloader/custom/$Project/$Project.mk
lk	bootable/bootloader/lk/project/$Project.mk
kernel	kernel-3.4/arch/arm/configs/$Project_debug_defconfig
Android	device/$Company/$Project/ProjectConfig.mk

All build systems can be built independently (Cont.)

- They can be build from Android.
  - preloader
    - make -j24 pl 2>&1 | tee build.log
  - lk
    - make -j24 lk 2>&1 | tee build.log
  - kernel
    - make -j24 kernel 2>&1 | tee build.log

All build systems can be built independently (Cont.)

- They can be build independently.
  - preloader
    - cd bootable/bootloader/preloader
    - TARGET_PRODUCT=$project ./build.sh 2>&1 | tee build.log
  - lk
    - cd bootable/bootloader/lk
    - make -j24 $project 2>&1 | tee build.log
  - kernel
    - cd kernel-3.4
    - mkdir out
    - make O=out $project_defconfig
    - make -j24 -k O=out zImage modules

Android partial build command

- **Build android module**
  - **mmm** <directory>
  - example: **mmm** frameworks/base
- **Rebuild android module**
  - mmm **-B** <directory>
  - example: mmm **-B** frameworks/base
- **Build android module by name**
  - make -j24 <module name>
  - example: make -j24 libjpeg

Clean commands

- Clean all
  - make **clean**
- Clean preloader
  - make **clean-pl**
- Clean lk
  - make **clean-lk**
- Clean kernel
  - make **clean-kernel**

Project Configuration

Project Configuration

- MTK's ***ProjectConfig.mk*** was kept and located at device/$Company/$Project/
  - $Project is unique under different $Company folders.
  - **Example**
    - device/mediatek/mt6572v1_phone/**ProjectConfig.mk**
  - ProjectConfig.mk's contexts are the same with ABS's.
  - ProjectConfig.mk didn't support hierarchy.
    - **No custgen** to generate the combined ProjectConfig.mk.

Project Configuration (Cont.)

- ***MTK's global compile options were kept.***
- ***ProjectConfig.mk*** will be included by device/$Company/$Project/BoardConfig.mk and device.mk
- **BoardConfig.mk**
  - Export compile options from **ProjectConfig.mk**

```
include device/mediatek/$(MTK_TARGET_PROJECT)/ProjectConfig.mk

MTK_INTERNAL_CDEFS := $(foreach t,$(AUTO_ADD_GLOBAL_DEFINE_BY_NAME),$(if $(filter-out no NO none NONE false FALSE,$($(t))),
MTK_INTERNAL_CDEFS += $(foreach t,$(AUTO_ADD_GLOBAL_DEFINE_BY_VALUE),$(if $(filter-out no NO none NONE false FALSE,$($(t)))
MTK_INTERNAL_CDEFS += $(foreach t,$(AUTO_ADD_GLOBAL_DEFINE_BY_NAME_VALUE),$(if $(filter-out no NO none NONE false FALSE,$($

COMMON_GLOBAL_CFLAGS += $(MTK_INTERNAL_CDEFS)
COMMON_GLOBAL_CPPFLAGS += $(MTK_INTERNAL_CDEFS)
```

Project Configuration (Cont.)

- **Global compile options may be removed in the future because they didn't follow AOSP rules.**
- **These compile options should be defined in module Android.mk individually.**

Project Configuration (Cont.)

- device/$Company/$Project/**device.mk**,
  device/mediatek/$platform/**device.mk**,
  device/mediatek/common/**device.mk**
  - You can use ***ProjectConfig.mk's*** feature options to wrap PRODUCT_COPY_FILES, PRODUCT_PROPERTY_OVERRIDES, PRODUCT_PACKAGES, etc.

```
85 # GPS relative file
86 ifeq ($(MTK_GPS_SUPPORT),yes)
87   PRODUCT_COPY_FILES += frameworks/native
88 endif
```

  - **Platform** and **common device.mk** were located under **device/mediatek** folder and **shared** for **all customers**.

Pregen

Keep pregen with the build process in Turnkey AOSP (Under construction)

- Goal
  - To integrate MTK's pregen processes into AOSP build flows.
    - Follow **AOSP rules**.
    - Modify **less** native build scripts.
    - To generate files under ***out*** folder.

Keep pregen with the build process in Turnkey AOSP (Cont.) - ptgen

- **ptgen** was integrated with build flow already.
- Different build systems have their own ptgen output files.
  - **Input**
    - device/mediatek/build/build/tools/ptgen/$Platform/partition_table_$Platform.xls

Keep pregen with the build process in Turnkey AOSP (Cont.) - ptgen

- **Output**

Build system	ptgen output
preloader	out/target/product/$Project/obj/BOOTLOADER_OBJ/inc/mt_partition.h
lk	out/target/product/$Project/obj/BOOTLOADER_OBJ/inc/part_private.h out/target/product/$Project/obj/BOOTLOADER_OBJ/inc/partition_define.h out/target/product/$Project/obj/BOOTLOADER_OBJ/inc/pmt.h
kernel	out/target/product/$Project/KERNEL_OBJ/PTGEN/inc/partition_define.h out/target/product/$Project/obj/KERNEL_OBJ/PTGEN/inc/partition_dumchar.h out/target/product/$Project/obj/KERNEL_OBJ/PTGEN/inc/pmt.h
Android	out/target/product/$Project/MBR out/target/product/$Project/EBR1 out/target/product/$Project/EBR2 out/target/product/$Project/$Platform_Android_scatter.txt out/target/product/$project/obj/PTGEN/partition_size.mk

Keep pregen with the build process in Turnkey AOSP (Cont.) - emigen

- **emigen** was a standalone tool temporally.
  - **Command**
    - *make PLATFORM=$Platform PROJECT=$Project -f device/mediatek/build/build/tools/emigen/emigen.mk*
      - Eg. *make PLATFORM=MT6572 PROJECT=mt6572v1_phone -f device/mediatek/build/build/tools/emigen/emigen.mk*
  - **Input**
    - bootable/bootloader/preloader/custom/${Project}/inc/custom_MemoryDevice.h
    - device/mediatek/build/build/tools/emigen/MT6572/MemoryDeviceList_MT6572.xls (Example)

Keep pregen with the build process in Turnkey AOSP (Cont.) - emigen

- **Output**
  - bootable/bootloader/preloader/custom/${Project}/custom_emi.c
  - bootable/bootloader/preloader/custom/${Project}/MTK_Loader_Info.tag
  - bootable/bootloader/preloader/custom/${Project}/inc/custom_emi.h

Keep pregen with the build process in Turnkey AOSP (Cont.) - drvgen

- **drvgen** was a standalone tool temporally.
- **Command**
  - *make PROJECT=$Project PLATFORM=$Platform -f mediatek/build/build/tools/drvgen/drvgen.mk*
    - Ex. *make PROJECT=mt6572v1_phone PLATFORM=mt6572 -f mediatek/build/build/tools/drvgen/drvgen.mk*
- **Input**
  - kernel-3.4/arch/arm/mach-<PLATFORM>/<PROJECT>/dct/<CUSTOM_KERNEL_DCT>/codegen.dws
  - （CUSTOM_KERNEL_DCT is from ProjectConfig.mk）

Keep pregen with the build process in Turnkey AOSP (Cont.) - drvgen

- **Output**

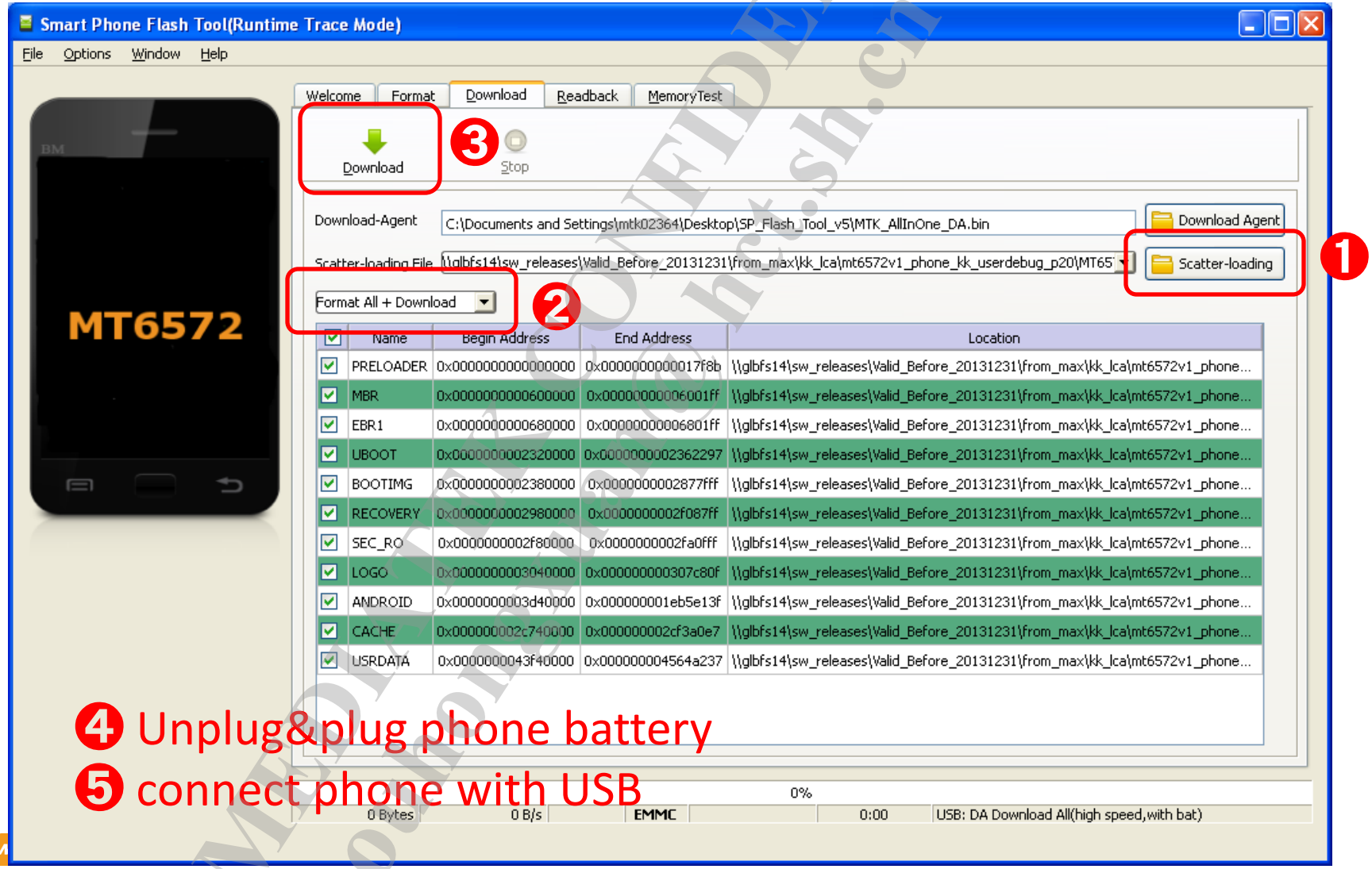
Build System	Output files
preloader	bootable/bootloader/preloader/custom/<project>/inc/cust_kpd.h bootable/bootloader/preloader/custom/<project>/inc/cust_eint.h bootable/bootloader/preloader/custom/<project>/inc/custo_gpio_boot.h bootable/bootloader/preloader/custom/<project>/inc/cust_gpio_usage.h
lk	bootable/bootloader/lk/target/<project>/inc/cust_eint/h bootable/bootloader/lk/target/<project>/inc/cust_kpd.h bootable/bootloader/lk/target/<project>/inc/cust_gpio_usage.h
kernel	kernel-3.4/arch/arm/mach- <platform>/<project>/dct/<CUSTOM_KERNEL_DCT>/*
Android	vendor/mediatek/proprietary/custom/<project>/kernel/dct/*

Keep pregen with the build process in Turnkey AOSP (Cont.) - cgen

- **cgen** was a standalone tool temporally.
- **Command**
  - *make -f device/mediatek/build/build/libs/codegen.mk TARGET_DEVICE=${TARGET_DEVICE}* ***btcodegen cgen***
    - Eg. *make -f device/mediatek/build/build/libs/codegen.mk TARGET_DEVICE=mt6572v1_phone* ***btcodegen cgen***
- **Output**
  - device/mediatek/build/**cgen**/$Project/
  - Example:
    - device/mediatek/build/**cgen**/mt6572v1_phone/

MTK Flash Tool

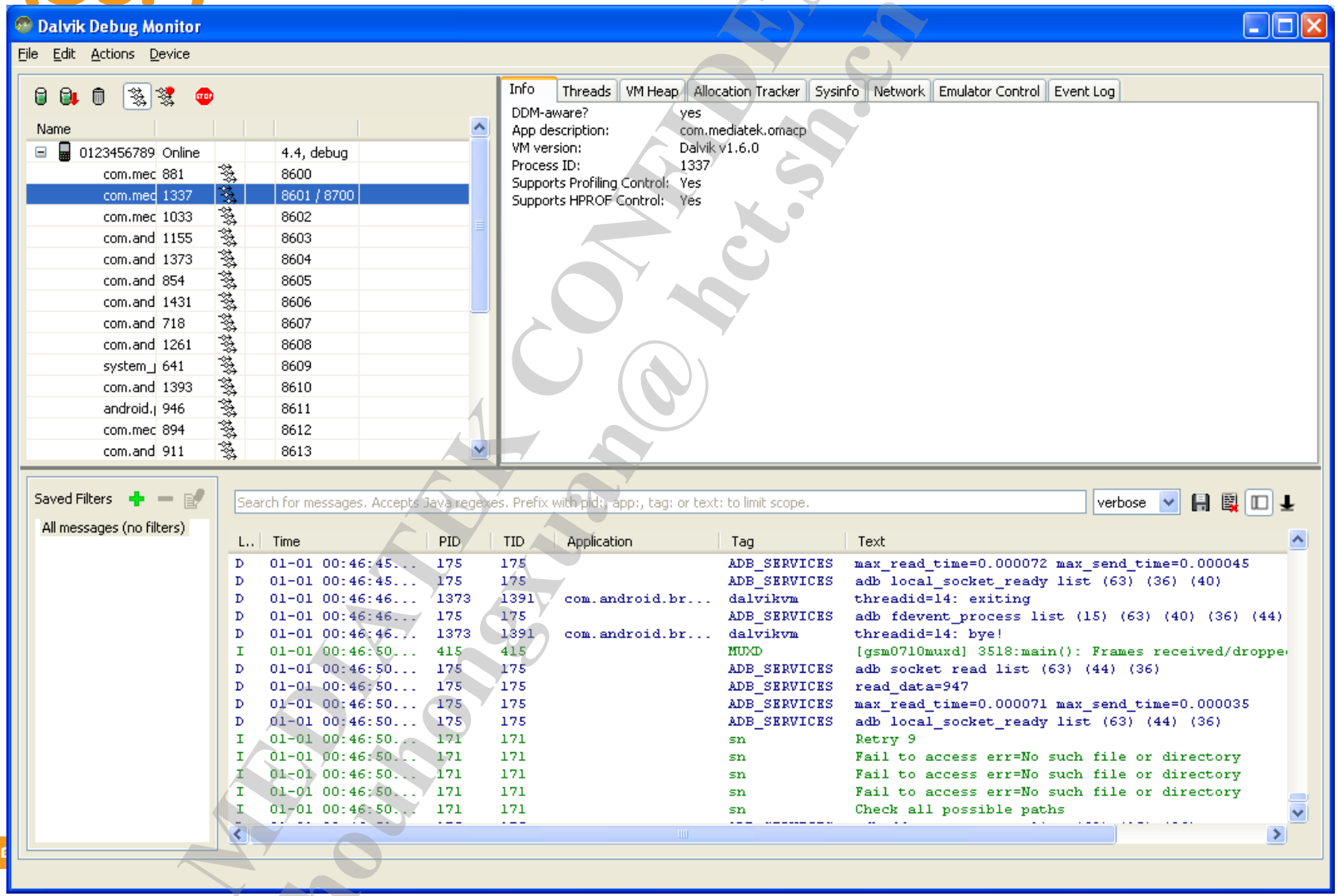
MTK Flash Tool



❹ Unplug&plug phone battery

❺ connect phone with USB

Use DDMS to catch log (the same as AOSP)



everyday genius