



MTK-OpenWrt-2.6.36-SDK

Release Notes

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Document Revision History

Revision	Date	Author	Description
0.1	2013.12.2	Hua.Shao	Initial Draft
1.0	2014.1.20	Hua.Shao	1.0 release
1.1	2014.2.11	Hua.Shao	1.1 release
1.2	2014.2.28	Yuan Yang	1.2 release

Table of Contents

Document Revision History	2
Table of Contents	3
1 Introduction	4
1.1 About OpenWrt.....	4
1.2 About this SDK.....	4
2 Change History	5
2.1 20140228.....	5
2.2 20140211.....	5
2.3 20140120.....	5
2.4 20131202 Initial Release.....	6
3 SDK Files	7
4 Build the SDK	8
4.1 Setup Build Environment.....	8
4.2 SDK root folder.....	8
4.3 Config.....	8
4.4 Build.....	9
4.5 Install Firmware.....	10
5 Web Interface	11
5.1 LuCi.....	11
5.1.1 Install.....	11
5.1.2 Config & Build.....	11
5.1.3 Access.....	12
6 MTK/Ralink Property Packages	13
6.1 Applications.....	13
6.1.1 ated.....	13
6.1.2 ethstt.....	13
6.1.3 hwnat.....	13
6.1.4 reg.....	13
6.1.5 shdump.....	13
6.1.6 switch.....	13
6.1.7 gpio.....	13
6.2 Drivers.....	13
6.2.1 MT7610e.....	13
6.2.2 MT7620.....	13
6.2.3 MT76x2e.....	13

1 Introduction

About OpenWrt

OpenWrt (<http://www.openwrt.org/>) is an operating system / embedded operating system based on the Linux kernel, and primarily used on embedded devices to route network traffic. The main components are the Linux kernel, util-linux, uClibc and BusyBox. All components have been optimized for size, to be small enough for fitting into the limited storage and memory available in home routers.

About this SDK

This SDK is a MTK customized OpenWrt project.

We keep the OpenWrt framework up to date, and replace the OpenWrt kernel with MTK kernel (2.6.36).

To provide better compatibility and better stability, some OpenWrt drivers were replaced with MTK drivers, such as Ethernet, WiFi, SD Card, etc.

Brief Summary about this SDK:

- Linux Kernel: 2.6.36
- Toolchain: toolchain-mipsel_24kec+dsp_gcc-4.6-linaro_uClibc-0.9.33.2
- OpenWrt Code Base: `svn://svn.openwrt.org/openwrt/trunk@38659`
- MTK Linux SDK base: `MTK_Ralink_ApSoC_SDK_4200_20131106`
- Supported SoC Platforms: MT7620a, MT7621
- Supported WiFi Chips: MT7620, MT7610e, MT7602e, MT7612e

2 Change History

2.1 20140228

Features:

- Add uci2dat tool to support wireless uci
- Add a tool to check duplicates in ralink wifi profile
- Add gpio tool
- Support ate

Updates:

- Enable wps and wsc
- Fix atuo channel issue
- Change eth name from eth2 to eth0

2.2 20140211

Features:

- Add a user tool to get Ethernet port status (ethstt)
- Support MT7621 USB xHCI
- Support ppp series protocol
- Default save wifi EEPROM data to flash ("Factory" partition)

Updates:

- Add uboot source code
- Enable OpenWrt wireless-tools, wpa-supPLICANT
- Fix a mem leakage issue in tmpfs
- Unify all wifi scripts to support luci better.

2.3 20140120

Features:

- Add support for MT7621 SoC chip
- Introduce hardware NAT.
- Add support for MT7602e WiFi Chip.
- Add support for MT7612e WiFi Chip.
- Support firmware upgrade via LuCi.
- Support USB disk auto mount.

Updates:

- Add default profiles for various chip combinations.
- Support GBK and Big5.
- Fix WiFi init warning.
- Replace "swconfig" with mtk "switch"

20131202 Initial Release

Feature:

- Add support for MT7620a SoC chip
- Add support for MT7610e WiFi Chip.
- Ethernet driver Ready
- Flash driver ready
- PCI-e driver ready
- USB driver ready

3 SDK Files

- ✓ **MTK-OpenWrt-2.6.36-SDK-Release Notes.docx**
 - This document.
- ✓ **mtksdk-openwrt-2.6.36-{date}-{tag}.mini.tar.bz2**
 - SDK
- ✓ **openwrt-ramips-mt7620a-mt7620a_mt7610e-squashfs-sysupgrade.bin**
 - Prebuilt binaries for MT7620a SoC board, with MT7610e WiFi chip.
- ✓ **openwrt-ramips-mt7620a-mt7620a_mt7612e-squashfs-sysupgrade.bin**
 - Prebuilt binaries for MT7620a SoC board, with MT7612e WiFi chip.
- ✓ **openwrt-ramips-mt7620a-mt7621_mt7602e_mt7612e-squashfs-sysupgrade.bin**
 - Prebuilt binaries for MT7621 SoC board, with MT7602e and MT7612e WiFi chips.

4 Build the SDK

Setup Build Environment

To build this SDK, you should have a linux server (linux 2.6.x or later) as the build host.
The default build will take up to 6 GB disk space. Make sure you have enough space to hold it.

Prepare the source project:

```
tar xjvf mtksdk-openwrt-2.6.36-{date}-{tag}.mini.tar.bz2 -C /path/to/your/workspace
```

SDK root folder

This is what the SDK root folder looks like (Those folder names surrounded with red line are auto generated during build).

```
drwxr-xr-x.  3 shello shello  4096 1月 16 17:45 bin
-rw-rw-r--.  1 shello shello   179 1月 15 09:23 BSDmakefile
drwxr-xr-x.  4 shello shello  4096 1月 15 09:27 build_dir
-rw-rw-r--.  1 shello shello 14992 1月 15 09:23 Config.in
-rw-rw-r--.  1 shello shello 12293 1月 15 09:23 Config-kernel.in
lrwxrwxrwx.  1 shello shello    21 1月 15 09:24 dl -> ../shared_openwrt_dl/
drwxrwxr-x.  2 shello shello  4096 1月 15 09:23 docs
drwxrwxr-x. 12 shello shello  4096 1月 17 09:40 feeds
-rw-rw-r--.  1 shello shello   661 1月 15 09:23 feeds.conf.default
drwxrwxr-x.  3 shello shello  4096 1月 15 09:23 include
-rw-rw-r--.  1 shello shello 17992 1月 15 09:23 LICENSE
drwxrwxr-x.  3 shello shello  4096 1月 17 10:31 logs
-rw-rw-r--.  1 shello shello  3251 1月 15 09:23 Makefile
drwxrwxr-x. 12 shello shello  4096 1月 17 09:41 package
-rw-rw-r--.  1 shello shello  1259 1月 15 09:23 README
-rw-rw-r--.  1 shello shello 10382 1月 15 09:23 rules.mk
drwxrwxr-x.  4 shello shello  4096 1月 20 13:48 scripts
drwxrwxr-x.  5 shello shello  4096 1月 15 09:27 staging_dir
drwxrwxr-x.  6 shello shello  4096 1月 15 09:23 target
drwxrwxr-x.  3 shello shello  4096 1月 20 13:46 tmp
drwxrwxr-x. 12 shello shello  4096 1月 15 09:23 toolchain
drwxrwxr-x. 53 shello shello  4096 1月 15 09:23 tools
```

Config

Under SDK root folder, call:

```
make menuconfig
```

Then specify you configuration. For a default build, you need at least 3 items:

- Target System (Ralink Platform)
- Subtarget (Ralink SoC chip series)
- Target Profile (A specific model name)

We have provided a few default profiles, such as “MT7620a+MT7610e”, “MT7620a+MT7610e”.
You just need to choose the right chip combination.


```
.config - OpenWrt Configuration
OpenWrt Configuration
x Arrow keys navigate the menu. <Enter> selects submenus --->. Highlighted x
x letters are hotkeys. Pressing <Y> includes, <N> excludes, <M> modularizes x
x features. Press <Esc><Esc> to exit, <?> for Help, </> for Search. Legend: [*] x
x built-in [ ] excluded <M> module < > module capable x
x Target System (Ralink RT288x/RT3xxx) ---> x
x Subtarget (MT7620a based boards) ---> x
x Target Profile (MT7620a+MT7612e) ---> x
x Target Images ---> x
x Global build settings ---> x
x [ ] Advanced configuration options (for developers) ---> x
x [ ] Build the OpenWrt Image Builder x
x [ ] Build the OpenWrt SDK x
x [ ] Build the OpenWrt based Toolchain x
x [ ] Image configuration ---> x
x Base system ---> x
x Boot Loaders ---> x
x Development ---> x
x Kernel modules ---> x
x Languages ---> x
x Libraries ---> x
x LuCI ---> x
x Mail ---> x
x Multimedia ---> x
x Network ---> x
x Ralink Properties ---> x
x Utilities ---> x
x m x
x t x
x <Select> < Exit > < Help > < Save > < Load > x
x m x
```

After menuconfig done, you configuration will be saved in /SDK root/.config

Build

Under SDK root folder, call:

make

Or

make V=s # this will produce verbose build log

During build, the SDK will download many source code packages from Internet. So, make sure your build host can access the open Internet.

The first build will take hours, please be patient. After first build, your build will be ready in minutes.

If anything goes wrong during building, use “make V=s” to see what happened.

If everything is OK, the target image will be generated under “bin/ramips”.

```
bin/ramips/
├── md5sums
├── openwrt-ramips-mt7620a-mt7620a_mt7612e-squashfs-sysupgrade.bin
├── openwrt-ramips-mt7620a-root.squashfs
├── openwrt-ramips-mt7620a-uImage.bin
├── openwrt-ramips-mt7620a-vmlinux.bin
├── openwrt-ramips-mt7620a-vmlinux.elf
└── packages
    ├── 6relayd_2013-10-21-ad00c3dd9ee42f172870708724858ab502b3a689_ramips_24kec.ipk
    ├── ated_1_ramips_24kec.ipk
    ├── base-files_146-unknown_ramips_24kec.ipk
    ├── block-mount_2013-10-27-a9cb25c5c2b9d864f77033533fab9f2f8a6f94ab-1_ramips_24kec.ipk
    └── busybox_1.19.4-7_ramips_24kec.ipk
```

Install Firmware

OpenWrt firmware can be flashed into the target board using MTK bootloader option 2.

Note: Option 1 won't work, because the image does not support initram mechanism.

```
Please choose the operation:
 1: Load system code to SDRAM via TFTP.
 2: Load system code then write to Flash via TFTP.
 3: Boot system code via Flash (default).
 4: Entr boot command line interface.
 6: System Enter UBoot to Update Img or Bin.
 7: Load Boot Loader code then write to Flash via Serial.
 9: Load Boot Loader code then write to Flash via TFTP.
You choosed 2

raspi_read: from:40028 len:6

2: System Load Linux Kernel then write to Flash via TFTP.
Warning!! Erase Linux in Flash then burn new one. Are you sure?(Y/N)
Please Input new ones /or Ctrl-C to discard
Input device IP (192.168.1.1) ==:192.168.1.1
Input server IP (192.168.1.3) ==:192.168.1.3
```

After system reboot, you will see OpenWrt running.

```
BusyBox v1.19.4 (2014-01-15 14:12:13 CST) built-in shell (ash)
Enter 'help' for a list of built-in commands.

|_| W I R E L E S S   F R E E D O M

-----
BARRIER BREAKER (Bleeding Edge, r38659)
-----
* 1/2 oz Galliano           Pour all ingredients into
* 4 oz cold Coffee         an irish coffee mug filled
* 1 1/2 oz Dark Rum        with crushed ice. Stir.
* 2 tsp. Creme de Cacao
-----

root@OpenWrt:/#
```

5 Web Interface

OpenWrt does not build the web interface by default. Web interface is provided as a 3rd party package. Such as LuCi and XWRT.

LuCi

Install

Under SDK root folder, call:

```
scripts/feeds update -a  
scripts/feeds install luci
```

The LuCi package will be installed into SDK.

Config & Build

After installing LuCi, a submenu called “LuCi” will show up in “menuconfig”.

LuCi is not selected by default, choose “*” in “LuCi”->”Collection”->”luci” to enable LuCi by default. Then:

```
make V=s
```

You will see that LuCi get build along with the SDK.

```

lcccccccccccccccccccccccccccccccccccccccc OpenWrt Configuration ccccccccccccccccccccccccccccccccccccccccc
x Arrow keys navigate the menu. <Enter> selects submenus --->. Highlighted x
x letters are hotkeys. Pressing <Y> includes, <N> excludes, <M> modularizes x
x features. Press <Esc><Esc> to exit, <?> for Help, </> for Search. Legend: [*] x
x built-in [ ] excluded <M> module < > module capable x
x lcccccccccccccccccccccccccccccccccccccccc ccccccccccccccccccccccccccccccccccccccccccccccccccccccccccccccccc
x x Target System (Ralink RT288x/RT3xxx) ---> x x
x x Subtarget (MT7620a based boards) ---> x x
x x Target Profile (MT7620a+MT7612e) ---> x x
x x Target Images ---> x x
x x Global build settings ---> x x
x x [ ] Advanced configuration options (for developers) ---> x x
x x [ ] Build the OpenWrt Image Builder x x
x x [ ] Build the OpenWrt SDK x x
x x [ ] Build the OpenWrt based Toolchain x x
x x [ ] Image configuration ---> x x
x x Base system ---> x x
x x Boot Loaders ---> x x
x x Development ---> x x
x x Kernel modules ---> x x
x x Languages ---> x x
x x Libraries ---> x x
x x LuCI ---> x x
x x Mail ---> x x
x x Multimedia ---> x x
x x Network ---> x x
x x Ralink Properties ---> x x
x x Utilities ---> x x

```

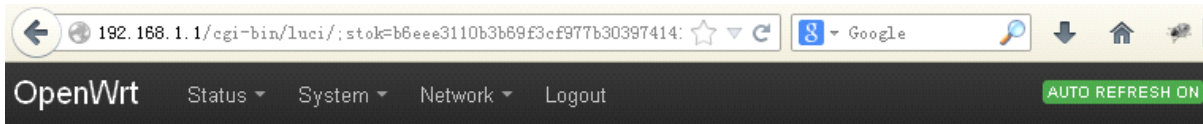
```
.config - OpenWrt Configuration
1. Collections
x Arrow keys navigate the menu. <Enter> selects submenus --->. Highlighted
x letters are hotkeys. Pressing <Y> includes, <N> excludes, <M> modularizes
x features. Press <Esc><Esc> to exit, <?> for Help, </> for Search. Legend: [*]
x built-in [ ] excluded <M> module < > module capable
x
x <*> luci
x < > luci-ssl..... Standard OpenWrt set with HTTPS support
x
```

Access

By default, You can access the web interface at <http://192.168.1.1/>.

Account = "root"

Password = ""



No password set!

There is no password set on this router. Please configure a root password to protect the web interface and enable SSH.

[Go to password configuration...](#)

Wireless Overview

	Generic WEXT 802.11abgn (mt7612) Channel: 44 (? GHz) Bitrate: 307.2 Mbit/s	Add
	SSID: OpenWrt-MT7602e Mode: Master 50% BSSID: 00:0C:43:27:51:34 Encryption: WPA2 PSK/NONE (WEP-40, WEP-104, TKIP, CCMP, AES-OCB, CKIP, NONE)	Disable Edit Remove
	Generic WEXT 802.11abgn (mt7620) Channel: 1 (? GHz) Bitrate: 147.456 Mbit/s	Add
	SSID: OpenWrt-MT7620 Mode: Master 50% BSSID: 00:0C:34:67:20:58 Encryption: WPA2 PSK/NONE (WEP-40, WEP-104, TKIP, CCMP, AES-OCB, CKIP, NONE)	Disable Edit Remove

6 MTK/Ralink Property Packages

Here's packages located under package/ralink.
Here is a brief introduction to them.

6.1 Applications

6.1.1 ated

ATE daemon. (not in use by default)

6.1.2 ethstt

A user tool to query switch port status.

6.1.3 hwnat

A user tool to debug hwnat module

6.1.4 reg

A user tool to debug system register

6.1.5 shdump

A user tool to dump a file in hex view

6.1.6 switch

A user tool to configure Ethernet switch

6.1.7 gpio

A user tool to configure gpio

6.2 Drivers

6.2.1 MT7610e

Driver for MT7610e (5G)

6.2.2 MT7620

Driver for MT7620 (2.4G, Which is bonded with MT7620 SoC chip)

6.2.3 MT76x2e

All in one driver for MT7610e (2.4G) and MT7612e (5G)