MTK Linux Wi-Fi SoftAP Driver Software Porting Guide

Version: 1.2
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Document Revision History

Revision	Date	Author	Description
1.0	2012/11/14	Pan Liu	Initial Version
1.1	2012/11/15	Pan Liu	Update profile default path for APSoc
1.2	2013/03/07	Pan Liu	Add iNIC porting section

Table of Contents

1 Introduction

The Linux Wi-Fi SoftAP software porting guide includes software configuration, driver installation, profile setting, and FQA. This document aims to help the software programmer to adapt Ralink (A Mediatek company) Wi-fi chipset driver on a Linux platform.

2 Software Configuration

2.1 Environment Preparation

Linux Wireless-tool package is a must for using Mediatek WLAN driver.
Please install “iwconfig” and “iwpriv” on the target platform before starting install the WLAN driver.

For more detailed information about wireless-tool, please refer to below URL.
http://en.wikipedia.org/wiki/Wireless_tools_for_Linux

2.2 Configuration file for SoftAP driver

In non-APSoC solution:
“config.mk” is the software configuration for Wi-Fi SoftAP driver. This configuration file could be found within the SoftAP driver’s source code root folder.

In APSoC Solution:
Use “make menuconfig” to select Ralink SoftAP driver software configuration.

iNIC Solution: No configuration file.

2.2.1 Default settings of config.mk

To enable one specific, change the option to “y”.
To disable one specific, change the option to “n”
Sentence after “#” sign is comment.

For example:

```
#Enable ATE support.
HAS_ATE=y

#Disable ATE support
HAS_ATE=n
```

Below list is the default Linux Wi-Fi STA Driver’s software configuration.
Note:

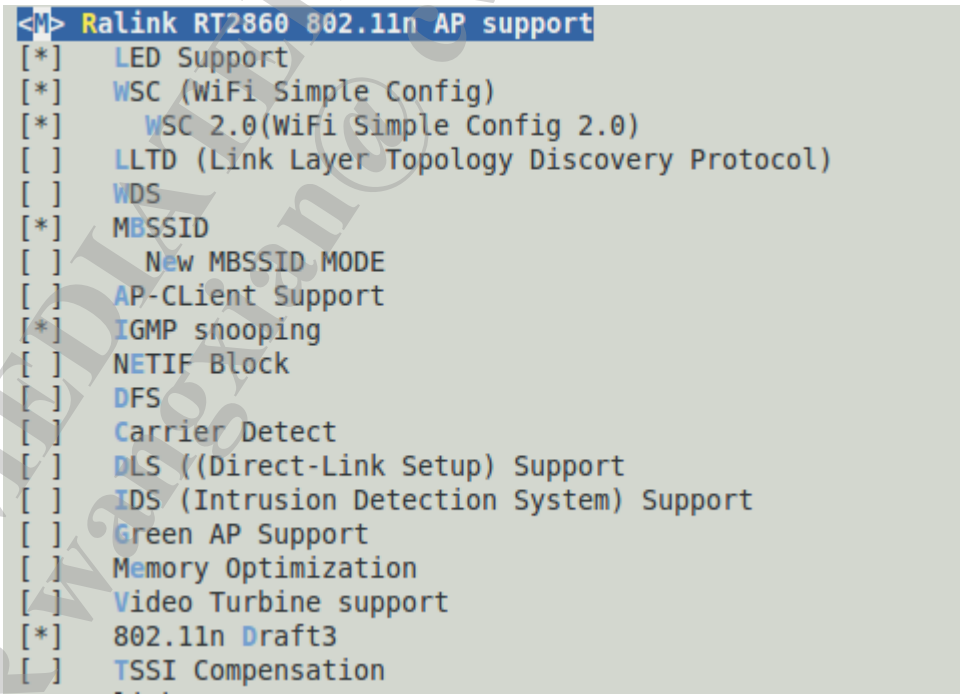
1. Software configuration options may be add or remove without any notice.
2. Change default settings may cause the failure of Wi-Fi certification.

```
================================================================================
# Support ATE function
HAS_ATE=y
# Support QA ATE function
HAS_QA_SUPPORT=y
# Support RSSI FEED Back function ( only Ralink to Ralink)
```

```
HAS_RSSI_FEEDBACK=n
# Support XLINK mode (SoftAP not support)
HAS_XLINK=n
# Support WSC function
HAS_WSC=y
HAS_WSC_V2=n
HAS_WSC_LED=n
# Support LLTD function
HAS_LLTD=n
# Support WDS function
HAS_WDS=n
# Support AP-Client function
HAS_APCLI=n
#Support Net interface block while Tx-Sw queue full
HAS_BLOCK_NET_IF=n
#Support IGMP-Snooping function.
HAS_IGMP_SNOOP_SUPPORT=n
#Support DFS function
HAS_DFS_SUPPORT=n
#Support Carrier-Sense function
HAS_CS_SUPPORT=n
# Support user specific transmit rate of Multicast packet.
HAS_MCAST_RATE_SPECIFIC_SUPPORT=n
# Support for Multiple Cards
HAS_MC_SUPPORT=n
#Support for PCI-MSI  (SoftAP not support)
HAS_MSI_SUPPORT=n
#Support for IEEE802.11e DLS
HAS_QOS_DLS_SUPPORT=n
#Support for EXT_CHANNEL
HAS_EXT_BUILD_CHANNEL_LIST=n
#Support for IDS
HAS_IDS_SUPPORT=n
#Support for Net-SNMP
HAS_SNMP_SUPPORT=n
#Support features of 802.11n Draft3
HAS_DOT11N_DRAFT3_SUPPORT=y
#Support features of Single SKU.
HAS_SINGLE_SKU_SUPPORT=n
#Support features of 802.11n
HAS_DOT11_N_SUPPORT=y
#Support for WAPI
HAS_WAPI_SUPPORT=n
#Support for 2860/2880 co-exist
HAS_RT2880_RT2860_COEXIST=n
#Support Kernel thread support
HAS_KTHREAD_SUPPORT=n
#Support for Auto channel select enhance
HAS_AUTO_CH_SELECT_ENHANCE=n
#Support statistics count
HAS_STATS_COUNT=y
#Support TSSI Antenna Variation
HAS_TSSI_ANTENNA_VARIATION=n
#Support USB_BULK_BUF_ALIGMENT
HAS_USB_BULK_BUF_ALIGMENT=n
#Support for USB_SUPPORT_SELECTIVE_SUSPEND
HAS_USB_SUPPORT_SELECTIVE_SUSPEND=n
```

```
#Support USB load firmware by multibyte
HAS_USB_FIRMWARE_MULTIBYTE_WRITE=n
#Support ANDROID_SUPPORT (SoftAP not support)
HAS_ANDROID_SUPPORT=n
#HAS_IFUP_IN_PROBE_SUPPORT (SoftAP not support)
HAS_IFUP_IN_PROBE_SUPPORT=n
#Support TXRX SW Antenna Diversity (SoftAP not support)
HAS_TXRX_SW_ANTDIV_SUPPORT=n
#Client support WDS function (SoftAP not support)
HAS_CLIENT_WDS_SUPPORT=n
#Support for Bridge Fast Path & Bridge Fast Path function open to other module
HAS_BGFP_SUPPORT=n
HAS_BGFP_OPEN_SUPPORT=n
# Support HOSTAPD function (SoftAP not support)
HAS_HOSTAPD_SUPPORT=n
#Support GreenAP function
HAS_GREENAP_SUPPORT=n
#Support MAC80211 LINUX-only function (SoftAP not support)
#Please make sure the version for CFG80211.ko and MAC80211.ko is same as the one
#our driver references to.
HAS_CFG80211_SUPPORT=n
#Support RFKILL hardware block/unblock LINUX-only function (SoftAP not support)
HAS_RFKILL_HW_SUPPORT=n
#Support AP Client WPA Supplicant support
HAS_APCLI_WPA_SUPPLICANT=n
#Support EEPROM on Platform FLASH  (Only for MTK/Ralink Platform)
HAS_RTMP_FLASH_SUPPORT=n
#Support LED control
HAS_LED_CONTROL_SUPPORT=y
================================================================================
```

2.2.2 Default Software configuration of APSoc Linux Wi-Fi SoftAP driver



Note:

1. Software configuration options may be add or remove without any notice.
2. Change default settings may cause the failure of Wi-Fi certification.

3 Driver Installation

This section introduces how to build Ralink Wi-Fi Linux SoftAP driver.

3.1 Untar the Wi-Fi SoftAP driver

Example:

#tar xvf 20120815_RT5572_RT5372_Linux_AP_V2.7.1.0.tar.bz2

3.2 Copy Wlan driver profile into /etc/Wirless/RT2870AP

Example:

1. Non-APSoc

#mkdir /etc/Wireless/RT2870AP

#cp ./20120815_RT5572_RT5372_Linux_AP_V2.7.1.0_DPA/MODULE/RT2870AP.dat /etc/Wireless/RT2870AP/

Note: PCIe solution the profile name is RT2860AP.dat.
iNIC solution the profile name is iNIC_ap.dat
APSoc the profile name is RT2860.dat
Make RT2870AP.dat is readable and writable.

3.3 Multi-Card support Profile (Only for APSoc solutions)

After driver version: v2.7.1.3 default WLAN profile path has been changed to as below.

```
#ifdef MULTIPLE_CARD_SUPPORT
#define PROFILE_PATH_1          "/etc/Wireless/RT2860/RT2860.dat"
#define PROFILE_PATH_2          "/etc/Wireless/iNIC/iNIC_ap.dat"
#endif /* MULTIPLE_CARD_SUPPORT */
```

Note: RT2860APCard.dat is no longer been used in the driver.

3.4 Enter Wlan driver directory and Modify config.mk & Makfile

A. Modify config.mk and select software configuration options.
B. Modify Makefile.inc or Makefile to meet the target host platform.

For the target host platform is Linux PC (X86), no need to change anything.

Example:

..
#PLATFORM: Target platform
PLATFORM = PC
…
..

For embedded system compiling, modify the toolchain and kernel source accordingly.

Example:

```
PLATFORM = MSTAR
..
..
ifeq ($(PLATFORM),MSTAR)
LINUX_SRC = /opt/yuksel/Thorium/Linux_Mboot/RedLion/2.6.28.9
LINUX_SRC_MODULE= /opt/yuksel/Thorium/Linux_Mboot/RedLion/2.6.28.9/drivers/net/wireless/
CROSS_COMPILE = /opt/mstar/mips-4.3/bin/mips-linux-gnu-
Endif
…
```

Note:

1. Don't modify **CHIPSET** in the Makefile.in or Makefile, it will cause Wi-Fi driver abnormal. If the target platform is big endian, **DRT_BIG_ENDIAN** build flag is required.
2. Extra build flags may require for a successful driver compiling. Please consult with the target platform vendor.

3.5 Build Wlan driver and install to OS

How to build WLAN ko files.
#make

Three KO files will be generated in

1. WLAN directory/MODULE/os/linux/rt5572ap.ko
2. WLAN directory/NETIF/os/linux/rtnet5572ap.ko
3. WLAN directory/UTIL/os/linux/rtutil5572ap.ko

3.6 How to install WLAN driver

Insert Module: (Order must be exact)

#insmod WLAN directory/UTIL/os/linux/rtutil5572ap.ko
#insmod WLAN directory/MODULE/os/linux/rt5572ap.ko
#insmod WLAN directory/NETIF/os/linux/rtnet5572ap.ko

After modules are loaded, use "ifconfig" or "iwconfig" to check a new WLAN interface "ra0" should be created successfully.

3.7 How to configure SoftAP

1. Use WLAN profile setting. (Please refer to WLAN driver programming guide)
2. Use iwpriv command. (Please refer to WLAN driver programming guide)
   Example: Security mode: OPEN/NONE, SoftAP name is XXXX.
   Bridge WLAN interface with eth0.
   aaa.bbb.ccc.ddd is the IP address

#ifconfig ra0 up

#brctl addbr br0
#brctl addif br0 eth0
#brctl addif br0 ra0
#ifconfig br0 aaa.bbb.ccc.ddd
#iwpriv ra0 set AuthMode=OPEN
#iwpriv ra0 set EncrypType=NONE
#iwpriv ra0 set SSID=XXXX

USE WLAN client to connect with XXXX softAP and ping it.
#ping aaa.bbb.ccc.ddd

Note: Detailed WLAN profile setting and iwpriv commands please refer to the WLAN Driver programming guide.

3.8 How to unload WLAN driver

Remove Module: (Order must be exact)

#ifconfig ra0 down
#rmmod WLAN directory/UTIL/os/linux/rtnet5572ap.ko
#rmmod WLAN directory/MODULE/os/linux/rt5572ap.ko
#rmmod WLAN directory/NETIF/os/linux/rtutil5572ap.ko

4 iNIC Driver Porting

This section describes how to install and build Ralink (A Mediatek Company) iNIC Wi-Fi solution.

4.1 UnZip Driver source code

There are two separate packages for porting iNIC solution.

1. iNIC Driver FW package.
2. iNIC Host Driver package.

4.1.1 iNIC Driver FW package

The iNIC driver FW will be uploaded to iNIC chipset and boot-up the iNIC system.

iNIC FW name: iNIC_ap.bin or iNIC_sta.bin

4.1.2 iNIC Host Driver package

The iNIC host driver is the kernel module which will be loaded/unload on Linux kernel system. This driver acts as an agent to communicate iNIC chipset with the host.

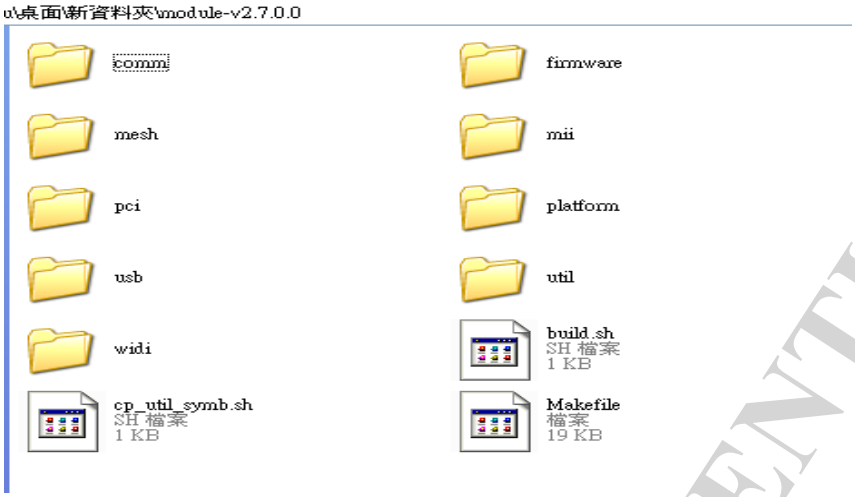
Example: unzip host module source code into the compiling environment.

Host driver file name: module-v2.7.0.0.rar

Version: v2.7.0.0

iNIC WLAN profile name: iNIC_ap.dat or iNIC_sta.dat

iNIC WLAN profile is located @ “firmware” folder.



4.1.3 Install iNIC FW and profile

Install iNIC FW and WLAN profile to the predefined folder.

Default folder :

/etc/Wireless/RT[CHIP_NAME](USB)/

For example:

RT3662 MII or PCI:

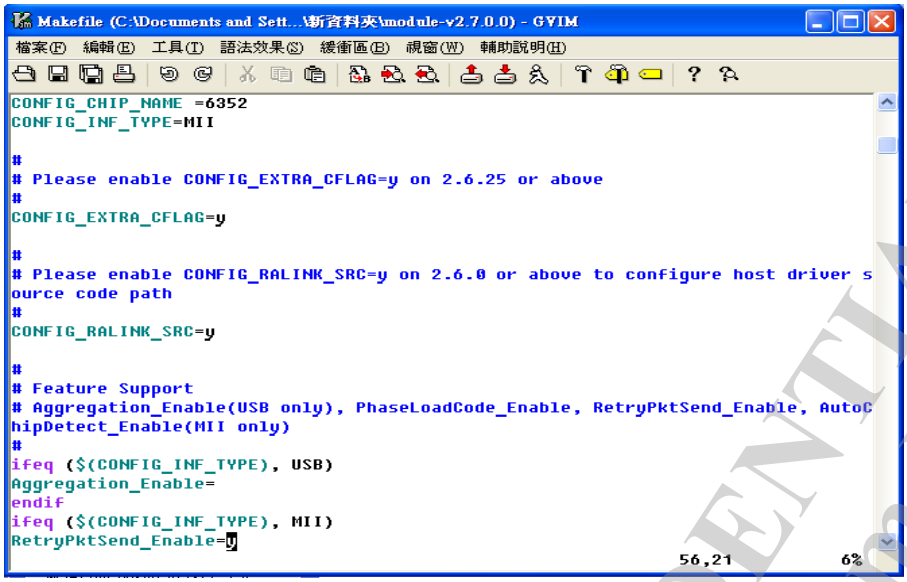
#cp iNIC_ap.dat /etc/Wireless/RT3662/
#cp iNIC_ap.bin /etc/Wireless/RT3662/

RT3662 USB:

#cpiNIC_ap.dat /etc/Wireless/RT3662USB/
#cp iNIC_ap.bin /etc/Wireless/RT3662USB/

4.1.4 iNIC Host Module Build Options

Edit “Makefile” to select chipset and target platform dependencies.



For the target host platform is Linux PC (X86), no need to change anything.

Example:

..

#PLATFORM: Target platform

PLATFORM = PC

…

..

For embedded system compiling, modify the toolchain and kernel source accordingly.

Example:

PLATFORM = MSTAR

..

..

ifeq ($(PLATFORM),MSTAR)

LINUX_SRC = /opt/yuksel/Thorium/Linux_Mboot/RedLion/2.6.28.9

LINUX_SRC_MODULE= /opt/yuksel/Thorium/Linux_Mboot/RedLion/2.6.28.9/drivers/net/wireless/

CROSS_COMPILE = /opt/mstar/mips-4.3/bin/mips-linux-gnu-

Endif

…

Note:

1.When the target platform is big endian, **DRT_BIG_ENDIAN** build flag is required.

2.Extra build flags may require for a successful driver compiling. Please consult with the target platform vendor.

4.2 How to build the iNIC Host Driver

How to build the iNIC host driver:

#make

After compilation, there will be one kernel module be generated, the module will be named according to the definition of CONFIG_CHIP_NAME in the Makefile.

For example:
CONFIG_CHIP_NAME=RT3662

iNIC kernel Module:
rt3662_iNIC.ko

4.3 How to install iNIC Host Driver

For AP mode:

insmod rt3662_iNIC.ko mode=ap mac=xx:xx:xx:xx:xx:xx

Support three module parameters:

mode=ap or sta (default ap)

bridge=0 or 1 (default 1)
i. 0: disable built-in bridge of iNIC
ii. 1: enable built-in bridge of iNIC (iNIC take care bridge decision between MBSS)

mac= --assign mac address into iNIC
i. mac=xx:xx:xx:xx:xx:xx
ii. iNIC will return mac address in eeprom if there are not mac module parameter.

After modules are loaded, use "ifconfig" or "iwconfig" to check a new WLAN interface "ra0" should be created successfully.

4.4 How to configure SoftAP

1. Use WLAN profile setting. (Please refer to WLAN driver programming guide)
2. Use iwpriv command. (Please refer to WLAN driver programming guide)

Example: Security mode: OPEN/NONE, SoftAP name is XXXX.
Bridge WLAN interface with eth0.
aaa.bbb.ccc.ddd is the IP address

```
#ifconfig ra0 up
#brctl addbr br0
#brctl addif br0 eth0
#brctl addif br0 ra0
#ifconfig br0 aaa.bbb.ccc.ddd
#iwpriv ra0 set AuthMode=OPEN
#iwpriv ra0 set EncrypType=NONE
#iwpriv ra0 set SSID=XXXX

USE WLAN client to connect with XXXX softAP and ping it.
#ping aaa.bbb.ccc.ddd
```

Note: Detailed WLAN profile setting and iwpriv commands please refer to the WLAN Driver programming guide.

4.5 How to unload WLAN driver

Remove Module:

```
#ifconfig ra0 down
#rmmod rt3662_iNIC.ko
```

5 FAQ

FAQ1: How to change WLAN interface name?

Change default setting in rtmp_def.h
#define INF_MAIN_DEV_NAME "ra"

FAQ2: Can I change WLAN profile default path?

Yes, WLAN profile path is defined in rt_linux.h.
#define AP_PROFILE_PATH "/etc/Wireless/RT2870AP/RT2870AP.dat"

FAQ3: Can the WLAN driver support big endian system?

Yes, the WLAN driver can support big endian system. Need to add DRT_BIG_ENDIAN for extra build flag in config.mk