MTK Linux Wi-Fi STA Driver Software Porting Guide

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Document Revision History

Revision	Date	Author	Description
1.0	2012/10/23	Pan Liu	Initial Version
1.1	2012/10/24	Pan Liu	Correct wording and Update FAQ

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1 Introduction

The Linux Wi-Fi STA 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 Configuration file for STA driver

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

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

iNIC Solution: No configuration file.

2.1.1 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=n
# Support QA ATE function
HAS_QA_SUPPORT=n
#Support RSSI feedback function (Ralink to Ralink only)
HAS_RSSI_FEEDBACK=n
# Support XLINK mode
HAS_XLINK=n
# Support WSC function
HAS_WSC=y
HAS_WSC_V2=y
HAS_WSC_LED=n
HAS_IWSC_SUPPORT=n
# Support LLTD function
HAS_LLTD=n
# Support AP-Client function (STA driver not support)
```

```
HAS_APCLI=n
# Support Wpa_Supplicant
# i.e. wpa_supplicant -Dralink
HAS_WPA_SUPPLICANT=y
# Support Native WpaSupplicant for Network Maganger
# i.e. wpa_supplicant -Dwext
# what if user want to use wpa_supplicant to serve P2P function/feature,
# in case, it must use Ralink Proprietary wpa_supplicant to do.
# and this compile flag will report P2P Related Event to Ralink wpa_supplicant.
HAS_NATIVE_WPA_SUPPLICANT_SUPPORT=y
#Support Net interface block while Tx-Sw queue full
HAS_BLOCK_NET_IF=n
#Support IGMP-Snooping function. (STA driver not support)
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. (STA driver not support)
HAS_MCAST_RATE_SPECIFIC_SUPPORT=n
# Support for Multiple Cards  (STA driver not support)
HAS_MC_SUPPORT=n
#Support for PCI-MSI (Only PCI Interface 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  (STA driver not support)
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 (Not support )
HAS_RT2880_RT2860_COEXIST=n
#Support Kernel Thread function
HAS_KTHREAD_SUPPORT=n
#Support for dot11z TDLS
HAS_DOT11Z_TDLS_SUPPORT=n
#Support for WiFi-Driect(Peer to Peer) (SoftAP driver not support)
HAS_P2P_SUPPORT=y
HAS_P2P_ODD_MAC_ADJUST=n
# this compile flag is use to identify P2P Customization event content,
# to Ralink wpa_supplicant.
# Ralink wpa_supplicant need to parse related event by wpa_supplicant compile flag.
# to decide which information it needs by project requirement.
HAS_P2P_SPECIFIC_WIRELESS_EVENT=n
#Support for WiFi Display (SoftAP driver not support)
HAS_WFD_SUPPORT=y
#Support for Auto channel select enhance (STA driver not support)
```

```
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 (Only USB interface)
HAS_USB_SUPPORT_SELECTIVE_SUSPEND=n
#Support USB load firmware by multibyte
HAS_USB_FIRMWARE_MULTIBYTE_WRITE=n
#Support ANDROID_SUPPORT
HAS_ANDROID_SUPPORT=n
#HAS_IFUP_IN_PROBE_SUPPORT
HAS_IFUP_IN_PROBE_SUPPORT=n

#Support TXRX SW Antenna Diversity
HAS_TXRX_SW_ANTDIV_SUPPORT=n
#Client support WDS function
HAS_CLIENT_WDS_SUPPORT=n
#Support for Bridge Fast Path & Bridge Fast Path function open to other module (STA driver not support)
HAS_BGFP_SUPPORT=n
HAS_BGFP_OPEN_SUPPORT=n
# Support HOSTAPD function (STA driver not support)
HAS_HOSTAPD_SUPPORT=n
#Support GreenAP function (STA driver not support)
HAS_GREENAP_SUPPORT=n
#Support MAC80211 LINUX-only function
#please makes 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
HAS_RFKILL_HW_SUPPORT=n
#Support ICE WIFI support  (STA driver not support)
HAS_ICE_WIFI_SUPPORT=n
#WPA_SUPPLICANT supports for apcli(STA driver not support)
HAS_APCLI_WPA_SUPPLICANT=n
#Support EEPROM on host's FLASH  (only on Ralink host platform)
HAS_RTMP_FLASH_SUPPORT=n
#Support LED control
HAS_LED_CONTROL_SUPPORT=y
#Support WIDI feature (SoftAP driver not support)
#Must enable HAS_WSC at the same time.
HAS_STREAM_MODE_SUPPORT=n
HAS_NEW_RATE_ADAPT_SUPPORT=n
#Support RT5572 RT5592 TSO (RT28xx, RT3xxx not support)
HAS_TSO_SUPPORT=n
#Support switch Channel offload  (SoftAP driver not support)
HAS_SWITCH_CHANNEL_OFFLOAD=n
#Support pre-allocation resource
HAS_RESOURCE_PRE_ALLOC=n
#Support resource allocate at boot time
HAS_RESOURCE_BOOT_ALLOC=n
#Support new MBSSID (RT28xx, RT3xxx not support)
HAS_NEW_MBSSID_MODE=y
#Support P2P Multi-Channel(SoftAP driver not support)
HAS_MULTI_CHANNEL=n
```

==========

2.1.2 Default Software configuration of APSoc Linux Wi-Fi STA driver

```
<M> Ralink RT2860 802.11n STA support
[ ]   WPA Supplicant
[*]   LED Support
[*]   WSC (WiFi Simple Config)
[*]     WSC 2.0(WiFi Simple Config 2.0)
[ ]   DLS ((Direct-Link Setup) Support
[ ]   Video Turbine support
[*]   TSSI Compensation
[*]   802.11n Draft3
[ ]   Wireless Direct(P2P)
```

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 STA driver.

3.1 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

3.2 Untar the Wi-Fi STA driver

Example:
#tar xvf 20121022_RT5572_STA_v2.6.1.3_DPA.tar.bz2

3.3 Copy Wlan driver profile into /etc/Wirless/RT2870STA

Example:

1. Non-APSoc

#mkdir /etc/Wireless/RT2870STA
#cp ./ 20121022_RT5572_STA_v2.6.1.3_DPA/MODULE/RT2870STA.dat /etc/Wireless/RT2870STA/

Note: PCIe solution the profile name is RT2860STA.dat.
iNIC solution the profile name is iNIC_sta.dat
APSoc the profile name is RT2860.dat
Make RT2870STA.dat is readable and writable.

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/rt5572sta.ko
2. WLAN directory/NETIF/os/linux/rtnet5572sta.ko
3. WLAN directory/UTIL/os/linux/rtutil5572sta.ko

3.6 How to install WLAN driver

Insert Module: (Order must be exact)

#insmod WLAN directory/UTIL/os/linux/rtutil5572sta.ko
#insmod WLAN directory/MODULE/os/linux/rt5572sta.ko
#insmod WLAN directory/NETIF/os/linux/rtnet5572sta.ko

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

3.7 How to connect to SoftAP

1. Use wpa_supplicant (HAS_WPA_SUPPLICANT=y, HAS_NATIVE_WPA_SUPPLICANT_SUPPORT=y)
2. Use WLAN profile setting.
3. Use iwpriv command.
   Example: Security mode: OPEN/NONE, SoftAP name is XXXX.
   aaa.bbb.ccc.ddd is the IP address

```
#ifconfig ra0 up
#iwpriv ra0 set SSID=XXXX
#ifconfig ra0 aaa.bbb.ccc.ddd
```

#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/rtnet5572sta.ko
#rmmod WLAN directory/MODULE/os/linux/rt5572sta.ko
#rmmod WLAN directory/NETIF/os/linux/rtutil5572sta.ko

4 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 STA_PROFILE_PATH "/etc/Wireless/RT2870STA/RT2870STA.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