

RALINK TECHNOLOGY, CORP.

RALINK RT3883 Concurrent iNIC

NOTES & USER'S GUIDE

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Ralink Technology Corporation (Taiwan)

5F, No.5, Tai-Yuen 1st Street,

Chupei City

HsinChu Hsien 302, Taiwan, ROC

Tel +886-3-560-0868

Fax +886-3-560-0818

Sales Taiwan: Sales@ralinktech.com.tw

Technical Support Taiwan: FAE@ralinktech.com.tw

<http://www.ralinktech.com/>

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1. Introduction

The RT3883 SOC has the capability of working RT3883 and RT309x/RT539x wireless interfaces concurrently.

- A. The interface1 (ra0): RT3883 (5G)
- B. The interface 2 (rai0): RT3090/RT5392 (2.4G)

Station can associate and execute WPS connection for any wireless interface. Moreover, user can configure the settings of any wireless interface by Web GUI.

You can refer to Ralink_AP_SDK_User's_Manual for the Detail information.

2. Setup

2.1 Install

If your SDK does not include RT309x/RT539x support, please refer the following steps to install it.

Requirement:

- RT288x_SDK
- RT3090/RT5392 WiFi driver
- RT3090/RT5392 EEPROM binary files

Procedure:

Step1.

Please copy RT309x/RT539x WiFi driver to RT288x_SDK/linux-2.6.xx.x/drivers/net/wireless

ex:

```
$cp RT3090_ap RT288x_SDK/linux-2.6.xx.x/drivers/net/wireless
$cp RT5392_ap RT288x_SDK/linux-2.6.xx.x/drivers/net/wireless
```

Step2.

Please modify RT288x_SDK/linux-2.6.xx.x/drivers/net/wireless/Makefile

ex:

```
...
ifneq ($(CONFIG_RT2860V2_AP),)
obj-$(CONFIG_RT2860V2_AP) += rt2860v2_ap/
endif
ifneq ($(CONFIG_RT2860V2_STA),)
obj-$(CONFIG_RT2860V2_STA) += rt2860v2_sta/
endif
ifneq ($(CONFIG_RT3090_AP),)
obj-$(CONFIG_RT3090_AP) += RT3090_ap/
endif
ifneq ($(CONFIG_RT5392_AP),)
obj-$(CONFIG_RT5392_AP) += RT5392_ap/
endif
...
```

Step3.

Please modify RT288x_SDK/linux-2.6.xx.x/ralink/Kconfig

ex:

```
...
source "drivers/net/wireless/rt2860v2_ap/Kconfig"
source "drivers/net/wireless/rt2860v2_sta/Kconfig"
```

```
config RA_CLASSIFIER

    tristate "Ralink Flow Classifier"

    depends on RT2860V2_AP_VIDEO_TURBINE || RT2860V2_STA_VIDEO_TURBINE

    default n

#source "drivers/net/wireless/rt2860v2_apsta/Kconfig"

source "drivers/net/wireless/RT3090_ap/Kconfig"

source "drivers/net/wireless/RT5392_ap/Kconfig"

...

config RTDEV_PCI

bool

default y if RT2880v2_INIC_PCI || RT3090_AP || RT5392_AP

...
```

Step4.

Please copy EEPROM binary file to RT288x_SDK/source/vendors/Ralink/RT3883

ex:

```
$cp RT3092_PClE_LNA_2T2R_ALC_V1_2.bin RT288x_SDK/source/vendors/Ralink/RT3883

$cp RT5392_PClE_2T2R_ALC_V1_2.bin RT288x_SDK/source/vendors/Ralink/RT3883
```

Step5.

Please modify RT288x_SDK/source/vendors/Ralink/RT3883Makefile

ex:

```
...
$(ROMFSINST) -e CONFIG_RALINK_RT3883_3T3R RT2860_default_novlan_3s /etc_ro/Wireless/RT2860AP/RT2860_default_novlan
$(ROMFSINST) -e CONFIG_RALINK_RT3883_3T3R RT2860_default_vlan_3s /etc_ro/Wireless/RT2860AP/RT2860_default_vlan
$(ROMFSINST) -e CONFIG_RALINK_RT3662_2T2R /etc_ro/Wireless/RT2860AP/RT2860_default_novlan
$(ROMFSINST) -e CONFIG_RALINK_RT3662_2T2R /etc_ro/Wireless/RT2860AP/RT2860_default_vlan

$(ROMFSINST) -e CONFIG_RT3090_AP /etc_ro/Wireless/INIC/RT2860AP.dat
$(ROMFSINST) -e CONFIG_RT3090_AP /etc_ro/Wireless/RT2860AP/RT3092_PClE_LNA_2T2R_ALC_V1_2.bin

$(ROMFSINST) -e CONFIG_RT3090_AP /etc_ro/Wireless/INIC/RT2860AP.dat
$(ROMFSINST) -e CONFIG_RT5392_AP /etc_ro/Wireless/RT2860AP/RT5392_PClE_2T2R_ALC_V1_2.bin
...
```

Step6.

Please modify RT288x_SDK/source/user/rt2880_app/scripts/internet.sh

ex:

```
...
# RTDEV_PClE support
```

```
if [ "$CONFIG_RTDEV_PCI" != "" ]; then
    ralink_init make_wireless_config rtdev
    if [ "$RT2880v2_INIC_PCI" != "" ]; then
        rmmod iNIC_pci
        insmod -q iNIC_pci
    elif [ "$CONFIG_RT3090_AP" != "" ]; then
        rmmod RT3090_ap_net
        rmmod RT3090_ap
        rmmod RT3090_ap_util
        insmod -q RT3090_ap_util
        insmod -q RT3090_ap
        insmod -q RT3090_ap_net
    elif [ "$CONFIG_RT5392_AP" != "" ]; then
        rmmod RT5392_ap
        insmod -q RT5392_ap
    fi
fi
# RTDEV_USB support
elif [ "$CONFIG_RTDEV_USB" != "" ]; then
...
```


2.2 Compile Configuration

You must switch directory to RT2888x_SDK/source and execute “make menuconfig,” like below:

[illegible]

Please choose “Select the Product you wish to target” option to configure the main settings of your target platform.

[illegible][illegible]

And then, please exit “Select the Product you wish to target” option and enter “Kernel/Library/Defaults Selection” option.


```
[screen 1: bash] chhung@compiler:~/RT288x_SDK/source
Ralink Linux SDK 3.3.3.1 Configuration
Main Menu
Arrow keys navigate the menu. <Enter> selects submenus ---. Highlighted letters are
hotkeys. Pressing <Y> includes, <N> excludes, <M> modularizes features. Press
<Esc><Esc> to exit, <?> for Help. Legend: [*] built-in [ ] excluded <M> module < >
module capable
Select the Product you wish to target ---
Kernel/Library/Defaults Selection ---
Load an Alternate Configuration File
Save Configuration to an Alternate File
<Select> < Exit > < Help >
```

You must select “Default all settings” option to load default configuration first and select “Customize Kernel Settings” options to turn on 2nd interface.

```
Ralink Linux SDK Configuration
Kernel/Library/Defaults Selection
Arrow keys navigate the menu. <Enter> selects submenus ---. Highlighted letters are hotkeys. Pressing <Y> includes, <N> excludes,
<M> modularizes features. Press <Esc><Esc> to exit, <?> for Help.
Legend: [*] built-in [ ] excluded <M> module < > module capable
(2.6.21) Linux Kernel Version
Cross Compiler Path: "/opt/buildroot-gcc342/bin"
[*] Default all settings (lose changes)
[*] Customize Kernel Settings (NEW)
Customize Vendor/User Settings
Customize Busybox Settings
Customize uClibc Settings
Customize uClibc++ Settings
<Select> < Exit > < Help >
```

```
[screen 1: bash] chhung@compiler:~/RT288x_SDK/source
Ralink Linux SDK 3.3.3.1 Configuration
Do you wish to save your new kernel configuration?
< Yes > < No >
```

After load default, you can enter kernel configured main menu.

Please enter “Machine selection” and choice” RT3883 PCI architecture” to “PCIE RC ONLY” mode.

```
System type (Ralink RT3883 board) --->
Soc Hardware Type (RT3883/RT3662-ASIC) --->
RT3883 PCI architecture (PCIE RC ONLY) --->
DRAM Size (64M) --->
Flash Type (NOR) --->
[ ] Dual Image
Root File System Type (RootFS_in_RAM) --->
(16384) Default RAM disk size
[*] Compress ramdisk by lzma instead of gzip
[ ] Ralink DFS Timer
```

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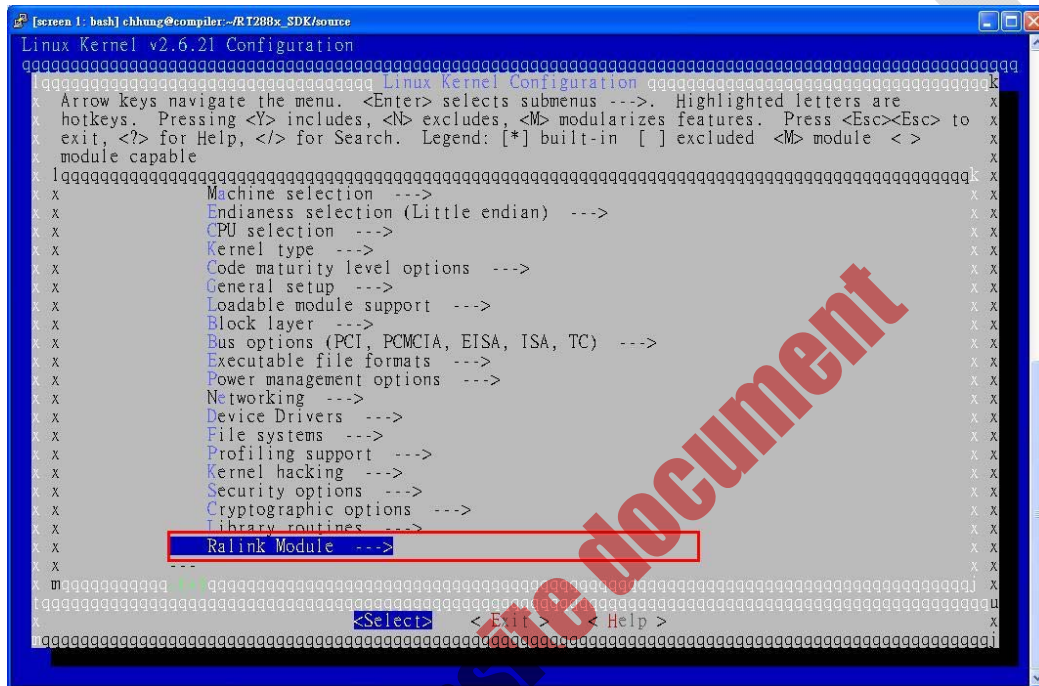
Leave "Machine selection" option.

Please enter "Bus options (PCI, PCMCIA, EISA, ISA, TC)" option and check whether PCI/PCIE support or not, like below:

```
[*] Support for PCI controller
[*]   PCI Express support
      PCCARD (PCMCIA/CardBus) support --->
      PCI Hotplug Support --->
```

Leave "Bus options (PCI, PCMCIA, EISA, ISA, TC)" option.

Please enter "Ralink Module" option



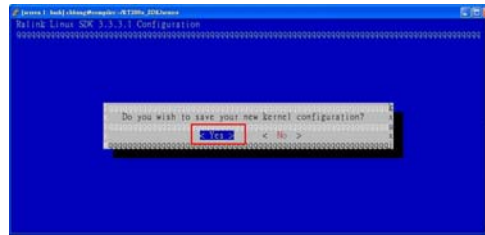
```
Linux Kernel v2.6.21 Configuration
Arrow keys navigate the menu. <Enter> selects submenus --->. Highlighted letters are
hotkeys. Pressing <Y> includes, <N> excludes, <M> modularizes features. Press <Esc><Esc> to
exit, <?> for Help, </> for Search. Legend: [*] built-in [ ] excluded <M> module < >
module capable
Machine selection --->
Endianness selection (Little endian) --->
CPU selection --->
Kernel type --->
Code maturity level options --->
General setup --->
Loadable module support --->
Block layer --->
Bus options (PCI, PCMCIA, EISA, ISA, TC) --->
Executable file formats --->
Power management options --->
Networking --->
Device Drivers --->
File systems --->
Profiling support --->
Kernel hacking --->
Security options --->
Cryptographic options --->
Library routines --->
Ralink Module --->
```

You can select RT3090 or RT5392 module to act 2nd WiFi interface, but one of them could be selected.



```
Linux Kernel v2.6.21 Configuration
Ralink Module
Arrow keys navigate the menu. <Enter> selects submenus --->. Highlighted letters are hotkeys. Pressing
<Y> includes, <N> excludes, <M> modularizes features. Press <Esc><Esc> to exit, <?> for Help, </> for
Search. Legend: [*] built-in [ ] excluded <M> module < > module capable
[*] USB Support
[*] USB AP Support
[*] Memory Optimization
[*] Video Turbine support
[*] 802.11n Draft3
[*] Auto Provision
[*] Intelligent Rate Adaption
[*] TSSI Compensation
[*] Ralink RT2860 802.11n STA support
[*] WPA Supplicant
[*] DPB Support
[*] WMM ACM Support
[*] LED Support
[*] IDS (Intrusion Detection System) Support
[*] WSC (WiFi Simple Config)
[*] Carrier Sense Support
[*] DLS ((Direct-Link Setup) Support
[*] MESH Support
[*] Antenna Diversity Support
[*] VAPI Support
[*] Video Turbine support
[*] Intelligent Rate Adaption
[*] TxBF support (Only 2883/3883)
[*] TSSI Compensation
< > Ralink RT3090 802.11n AP support
< > Ralink RT5392 802.11n AP support (EW)
< > Ralink RT5392 802.11n AP support
< > Ralink RT2880 Mii INIC support
< > Ralink RT3090x Mii INIC support
Ralink NAT Type (None) --->
```

Leave "Ralink Module" option and then exit "Linux Kernel Configuration".



Final, you can execute “**make dep**” and “**make**” to build image under the RT288x_SDK/source.

```
$make dep
```

```
$make
```

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3. Usage

If the firmware is built successfully, you can upgrade it into your RT3883 reference board by TFTP Server or Web GUI.

After firmware upgrade, you can use “lsmod” and “ifconfig” commands to check if RT3090_ap is successfully inserted and brought up or not.

2nd WiFi interface module: RT3090_ap / RT5392_ap

RT3883 interface name: ra0

RT3090/RT5392 interface name: rai0

RT3883 profile is located on /etc/Wireless/RT2860/RT2860.dat and RT3090/RT5392 profile is located on /etc/Wireless/iNIC/iNIC_ap.dat. To change RT309x wireless settings, you can edit its profile and re-bring up it, like RT3883.

Certainly, RT3883 and RT3090/RT5392 are shown their detail information or configured settings by iwpriv command, for example:

RT3883:

```
#iwpriv ra0 set SSID=RT3883AP
```

```
#iwpriv ra0 stat
```

```
...
```

RT3092:

```
#iwpriv rai0 set SSID=RTDEV_AP
```

```
#iwpriv rai0 stat
```

```
...
```