NAME

ral - Ralink Technology IEEE 802.11a/g/n wireless network device

SYNOPSIS

To compile this driver into the kernel, place the following lines in your kernel configuration file:

device ral
device ralfw
device wlan
device wlan_amrr
device firmware

Alternatively, to load the driver as a module at boot time, place the following line in loader.conf(5):

if_ral_load="YES"

DESCRIPTION

The **ral** driver supports PCI/PCIe/CardBus wireless adapters based on the Ralink RT2500, RT2501, RT2600, RT2700, RT2800, RT3090 and RT3900E chipsets.

The RT2500 chipset is the first generation of 802.11b/g adapters from Ralink. It consists of two integrated chips, an RT2560 MAC/BBP and an RT2525 radio transceiver.

The RT2501 chipset is the second generation of 802.11a/b/g adapters from Ralink. It consists of two integrated chips, an RT2561 MAC/BBP and an RT2527 radio transceiver. This chipset provides support for the IEEE 802.11e standard with multiple hardware transmission queues and allows scatter/gather for efficient DMA operations.

The RT2600 chipset consists of two integrated chips, an RT2661 MAC/BBP and an RT2529 radio transceiver. This chipset uses the MIMO (multiple-input multiple-output) technology with multiple radio transceivers to extend the operating range of the adapter and to achieve higher throughput. However, the RT2600 chipset does not support any of the 802.11n features.

The RT2700 chipset is a low-cost version of the RT2800 chipset. It supports a single transmit path and two receiver paths (1T2R). It consists of two integrated chips, an RT2760 or RT2790 (PCIe) MAC/BBP and an RT2720 (2.4GHz) or RT2750 (2.4GHz/5GHz) radio transceiver.

The RT2800 chipset is the first generation of 802.11n adapters from Ralink. It consists of two integrated chips, an RT2860 or RT2890 (PCIe) MAC/BBP and an RT2820 (2.4GHz) or RT2850 (2.4GHz/5GHz) radio transceiver. The RT2800 chipset supports two transmit paths and up to three receiver paths

(2T2R/2T3R). It can achieve speeds up to 144Mbps (20MHz bandwidth) and 300Mbps (40MHz bandwidth.)

The RT3090 chipset is the first generation of single-chip 802.11n adapters from Ralink. **ral** supports **station**, **adhoc**, **hostap**, **mesh**, **wds**, and **monitor** mode operation. Only one **hostap** or **mesh** virtual interface may be configured at a time. Any number of **wds** virtual interfaces may be configured together with a **hostap** interface. Multiple **station** interfaces may be operated together with a **hostap** interface to construct a wireless repeater device.

The RT3900E chipset is a single-chip 802.11n adapters from Ralink. The MAC/Baseband Processor can be an RT5390 or RT5392. The RT5390 chip operates in the 2GHz spectrum and supports 1 transmit path and 1 receiver path (1T1R). The RT5392 chip operates in the 2GHz spectrum and supports up to 2 transmit paths and 2 receiver paths (2T2R).

The transmit speed is user-selectable or can be adapted automatically by the driver depending on the number of hardware transmission retries. For more information on configuring this device, see ifconfig(8).

HARDWARE
The **ral** driver supports PCI/PCIe/CardBus wireless adapters based on Ralink Technology chipsets, including:

Card	MAC/BBP	Bus
A-Link WL54H	RT2560	PCI
A-Link WL54PC	RT2560	CardBus
AirLink101 AWLC5025	RT2661	CardBus
AirLink101 AWLH5025	RT2661	PCI
Amigo AWI-914W	RT2560	CardBus
Amigo AWI-922W	RT2560	mini-PCI
Amigo AWI-926W	RT2560	PCI
AMIT WL531C	RT2560	CardBus
AMIT WL531P	RT2560	PCI
AOpen AOI-831	RT2560	PCI
ASUS WL-107G	RT2560	CardBus
ASUS WL-130g	RT2560	PCI
Atlantis Land A02-PCI-W54	RT2560	PCI
Atlantis Land A02-PCM-W54	RT2560	CardBus
Belkin F5D7000 v3	RT2560	PCI
Belkin F5D7010 v2	RT2560	CardBus
Billionton MIWLGRL	RT2560	mini-PCI

Canyon CN-WF511	RT2560	PCI
Canyon CN-WF513	RT2560	CardBus
CC&C WL-2102	RT2560	CardBus
CNet CWC-854	RT2560	CardBus
CNet CWP-854	RT2560	PCI
Compex WL54G	RT2560	CardBus
Compex WLP54G	RT2560	PCI
Conceptronic C54RC	RT2560	CardBus
Conceptronic C54Ri	RT2560	PCI
D-Link DWA-525 rev A2	RT5392	PCI
Digitus DN-7001G-RA	RT2560	CardBus
Digitus DN-7006G-RA	RT2560	PCI
E-Tech WGPC02	RT2560	CardBus
E-Tech WGPI02	RT2560	PCI
Edimax EW-7108PCg	RT2560	CardBus
Edimax EW-7128g	RT2560	PCI
Eminent EM3036	RT2560	CardBus
Eminent EM3037	RT2560	PCI
Encore ENLWI-G-RLAM	RT2560	PCI
Encore ENPWI-G-RLAM	RT2560	CardBus
Fiberline WL-400P	RT2560	PCI
Fibreline WL-400X	RT2560	CardBus
Gigabyte GN-WI01GS	RT2561S	mini-PCI
Gigabyte GN-WIKG	RT2560	mini-PCI
Gigabyte GN-WMKG	RT2560	CardBus
Gigabyte GN-WP01GS	RT2561S	PCI
Gigabyte GN-WPKG	RT2560	PCI
Hawking HWC54GR	RT2560	CardBus
Hawking HWP54GR	RT2560	PCI
iNexQ CR054g-009 (R03)	RT2560	PCI
JAHT WN-4054P	RT2560	CardBus
JAHT WN-4054PCI	RT2560	PCI
LevelOne WNC-0301 v2	RT2560	PCI
LevelOne WPC-0301 v2	RT2560	CardBus
Linksys WMP54G v4	RT2560	PCI
Micronet SP906GK	RT2560	PCI
Micronet SP908GK V3	RT2560	CardBus
Minitar MN54GCB-R	RT2560	CardBus
Minitar MN54GPC-R	RT2560	PCI
MSI CB54G2	RT2560	CardBus

MSI MP54G2	RT2560	mini-PCI
MSI PC54G2	RT2560	PCI
OvisLink EVO-W54PCI	RT2560	PCI
PheeNet HWL-PCIG/RA	RT2560	PCI
Planex GW-NS300N	RT2860	CardBus
Pro-Nets CB80211G	RT2560	CardBus
Pro-Nets PC80211G	RT2560	PCI
Repotec RP-WB7108	RT2560	CardBus
Repotec RP-WP0854	RT2560	PCI
SATech SN-54C	RT2560	CardBus
SATech SN-54P	RT2560	PCI
Sitecom WL-112	RT2560	CardBus
Sitecom WL-115	RT2560	PCI
SMC SMCWCB-GM	RT2661	CardBus
SMC SMCWPCI-GM	RT2661	PCI
SparkLAN WL-685R	RT2560	CardBus
Surecom EP-9321-g	RT2560	PCI
Surecom EP-9321-g1	RT2560	PCI
Surecom EP-9428-g	RT2560	CardBus
Sweex LC500050	RT2560	CardBus
Sweex LC700030	RT2560	PCI
TekComm NE-9321-g	RT2560	PCI
TekComm NE-9428-g	RT2560	CardBus
Unex CR054g-R02	RT2560	PCI
Unex MR054g-R02	RT2560	CardBus
Zinwell ZWX-G160	RT2560	CardBus
Zinwell ZWX-G360	RT2560	mini-PCI
Zinwell ZWX-G361	RT2560	PCI
Zonet ZEW1500	RT2560	CardBus
Zonet ZEW1600	RT2560	PCI

EXAMPLES

Join an existing BSS network (i.e., connect to an access point):

    ifconfig wlan create wlandev ral0 inet 192.168.0.20 netmask 0xffffff00

Join a specific BSS network with network name "my_net":

    ifconfig wlan create wlandev ral0 inet 192.168.0.20 \
        netmask 0xffffff00 ssid my_net

Join a specific BSS network with 40-bit WEP encryption:

      ifconfig wlan create wlandev ral0 inet 192.168.0.20 \
         netmask 0xffffff00 ssid my_net \
         wepmode on wepkey 0x1234567890 weptxkey 1

Join a specific BSS network with 104-bit WEP encryption:

      ifconfig wlan create wlandev ral0 inet 192.168.0.20 \
         netmask 0xffffff00 ssid my_net \
         wepmode on wepkey 0x0102030405060708091011121 3 weptxkey 1

DIAGNOSTICS

ral%d: could not load 8051 microcode An error occurred while attempting to upload the microcode to the onboard 8051 microcontroller unit.

ral%d: timeout waiting for MCU to initialize The onboard 8051 microcontroller unit failed to initialize in time.

ral%d: device timeout A frame dispatched to the hardware for transmission did not complete in time. The driver will reset the hardware. This should not happen.

SEE ALSO

cardbus(4), intro(4), wlan(4), wlan_ccmp(4), wlan_tkip(4), wlan_wep(4), wlan_xauth(4), hostapd(8), ifconfig(8), wpa_supplicant(8)

HISTORY

The **ral** driver first appeared in OpenBSD 3.7. Support for the RT2501 and RT2600 chipsets was added in OpenBSD 3.9. Support for the RT2800 chipset was added in OpenBSD 4.3. Support for the RT2700 chipset was added in OpenBSD 4.4. Support for the RT3090 chipset was added in OpenBSD 4.9.

AUTHORS

The original **ral** driver was written by Damien Bergamini <*damien@openbsd.org*>.

CAVEATS

The **ral** driver does not make use of the hardware cryptographic engine.

The **ral** driver does not support any of the 802.11n capabilities offered by the RT2700 and RT2800 chipsets. Additional work is required in before those features can be supported.

Host AP mode does not support power saving. Clients attempting to use power saving mode may experience significant packet loss (disabling power saving on the client will fix this).

Some PCI **ral** adapters strictly require a system supporting PCI 2.2 or greater. Check the board's PCI version before purchasing the card as it is likely these adapters will not work in systems based on older revisions of the PCI specification.