

AX900 无线网卡 Linux 驱动源码 安装指南

一、安装须知

1、系统权限

在安装过程中需要获取 root 权限，出现下面显示后，需要输入该用户名所对应的密码，才会继续进行安装

```
[sudo] password for linn:
```

2、注意事项

先安装驱动，再插入网卡，如果先插入网卡，安装成功后需要重新拔插网卡

二、安装步骤

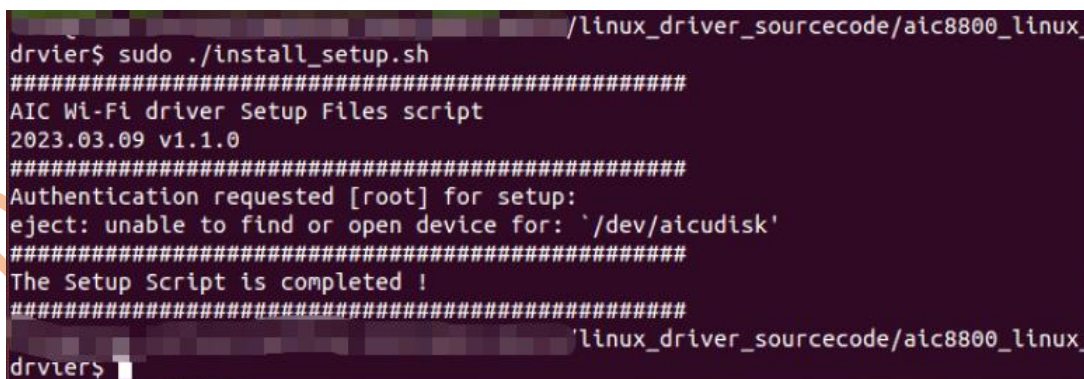
1、进入 linux_driver_sourcecode/aic8800_linux_driver 目录后，右键打开终端 Terminal:



2、执行指令 “sudo ./install_setup.sh”，进行脚本准备。

```
指令: sudo ./install_setup.sh
```

执行成功显示如下:



3、切换到 aic8800_linux_driver/drivers/aic8800 目录下，执行指令 “make” 编译驱动

```
指令: make
```

驱动编译成功显示如下：

```
LD [M] /mnt/hgfs/share/linux_driver_sourcecode/aic8800_linux_drvier/drivers/aic8800/aic8800_fdrv/aic8800_fdrv.ko
CC /mnt/hgfs/share/linux_driver_sourcecode/aic8800_linux_drvier/drivers/aic8800/aic_load_fw/aic_load_fw.mod.o
LD [M] /mnt/hgfs/share/linux_driver_sourcecode/aic8800_linux_drvier/drivers/aic8800/aic_load_fw/aic_load_fw.ko
make[1]: Leaving directory '/usr/src/linux-headers-4.4.0-142-generic'
/linux_driver_sourcecode/aic8800_linux_drvier/drivers/aic8800$
```

4、执行指令“`sudo make install`”加载驱动

指令：`sudo make install`

驱动加载成功显示如下：

```
linux_driver_sourcecode/aic8800_linux_drvier/drivers/aic8800$ sudo make install
mkdir -p /lib/modules/4.4.0-142-generic/kernel/drivers/net/wireless/aic8800
install -p -m 644 aic_load_fw/aic_load_fw.ko /lib/modules/4.4.0-142-generic/kernel/drivers/net/wireless/aic8800/
install -p -m 644 aic8800_fdrv/aic8800_fdrv.ko /lib/modules/4.4.0-142-generic/kernel/drivers/net/wireless/aic8800/
/sbin/depmod -a 4.4.0-142-generic
linux_driver_sourcecode/aic8800_linux_drvier/drivers/aic8800$
```

5、将无线网卡插入电脑的 USB 接口，电脑识别到无线网卡后您就可以连接 Wi-Fi 了。

三、驱动卸载

1、在驱动 `aic8800_linux_driver/drivers/aic8800` 目录下右键打开终端 Terminal，如下：

2、执行指令“`sudo rmmod aic8800_fdrv`”以及“`sudo rmmod aic_load_fw`”卸载 `aic8800_fdrv` 以及 `aic_load_fw` 模块（此时网卡一定要插在电脑上）

指令：`sudo rmmod aic8800_fdrv` 以及 `sudo rmmod aic_load_fw`

卸载模块成功如下显示：

```
linux_driver_sourcecode/aic8800_linux_drvier/drivers/aic8800$ sudo rmmod aic8800_fdrv
linn@linn-virtual-machine:/mnt/hgfs/share/linux_driver_sourcecode/aic8800_linux_drvier/drivers/aic8800$ sudo rmmod aic_load_fw
linux_driver_sourcecode/aic8800_linux_drvier/drivers/aic8800$
```

3、执行指令“`sudo make uninstall`”卸载驱动

指令：`sudo make uninstall`

卸载驱动成功如下显示：

```
drvier/drivers/aic8800$ sudo make install
mkdir -p /lib/modules/4.4.0-142-generic/kernel/drivers/net/wireless/aic8800
install -p -m 644 aic_load_fw/aic_load_fw.ko /lib/modules/4.4.0-142-generic/k
nel/drivers/net/wireless/aic8800/
install -p -m 644 aic8800_fdrv/aic8800_fdrv.ko /lib/modules/4.4.0-142-generic/k
ernel/drivers/net/wireless/aic8800/
/sbin/depmod -a 4.4.0-142-generic
drvier/drivers/aic8800$
```

四、注意事项

1、常见错误以及处理方法

问 1：无线网卡插入 Linux 主机的 USB 口后，系统识别显示 U 盘，怎么办？

执行命令“mount”查询识别 U 盘的名称（名称当中带 aic），查询到以后执行指令“sudo eject /dev/sdc1”弹出设备，其中“/dev/sdc1”表示 U 盘挂载在 sdc1 下，请根据实际输入，图片仅供参考。

指令：mount 以及指令：sudo eject /dev/sdc1

```
/dev/sdc1 on /media/aic/7277-20E5 type vfat (ro,nosuid,nodev,relatime,uid=1000,gid=1000,fmask=0
,shortname=ixlxd,showexec=utf8,flush,errors=remount-ro,uhelper=udisks2)
:~$
:~$ sudo eject /dev/sdc1
```

问 2：无线系统异常，无法正常使用网卡怎么办？

执行指令“sudo rfkill unblock wifi”可以修复无线异常情况

指令：sudo rfkill unblock wifi

执行成功如下

```
~/Desktop$ sudo rfkill unblock wifi
~/Desktop$
```

问 3：麒麟系统安装驱动的时候报错，无法正常安装驱动，怎么办？

缺环境造成的，执行指令“sudo apt-get install build-essential”，把该软件包安装好，再重新安装驱动即可。

指令：sudo apt-get install build-essential

报错如下显示：

```
install -p -m 644 aic_load_fw/aic_load_fw.ko /lib/modules/5.10.0-8-generic/kern
el/drivers/net/wireless/aic8800/
install -p -m 644 aic8800_fdrv/aic8800_fdrv.ko /lib/modules/5.10.0-8-generic/ke
rnel/drivers/net/wireless/aic8800/
/sbin/depmod -a 5.10.0-8-generic
insmod done
gcc -c wifi_test.c -o wifi_test.o
wifi_test.c:1:10: fatal error: stdio.h: 没有那个文件或目录
1 | #include <stdio.h>
  | ^~~~~~
compilation terminated.
make: *** [Makefile:16: wifi_test.o] 错误 1
make failed, install aic8800_wifi driver failed
dpkg: 处理软件包 ax300-wifi-adapter-linux-driver-v1.0.2 (--install)时出错:
```

2、辅助工具

1) 安装 ifconfig 网络工具

执行命令“`sudo apt install net-tool`”，安装 ifconfig 工具

指令：`sudo apt install net-tools`

安装成功如下显示：

```
[sudo] password for n:
Reading package lists... Done
Building dependency tree
Reading state information... Done
net-tools is already the newest version (1.60+git20180626.aebd88e-1ubuntu1).
0 upgraded, 0 newly installed, 0 to remove and 294 not upgraded.
```

2) 执行命令“ifconfig”进行查询。

3、网卡使用

在使用网卡的过程中，尽量不要在 SSID 或者密码中使用单引号等特殊字符，否则可能会出现扫描不到或者连接不上无线信号的情况。

4、常见的编译错误

1) 重定义错误

```
In file included from /home/aic/work/drivers/aic8800/aic8800_fdrv/rwnx_defs.h:32:0,
                 from /home/aic/work/drivers/aic8800/aic8800_fdrv/rwnx_msg_tx.h:16,
                 from /home/aic/work/drivers/aic8800/aic8800_fdrv/rwnx_msg_tx.c:13:
/home/aic/work/drivers/aic8800/aic8800_fdrv/rwnx_compat.h:278:8: 错误: 'struct ieee80211_wmm_param_ie' 重定义
struct ieee80211_wmm_param_ie {
In file included from include/net/cfg80211.h:24:0:
```

此错误提示 struct ieee80211_wmm_param_ie 和内核头文件中 cfg80211.h

中的 struct ieee80211_wmm_param_ie 重定义。可以在内核头文件中查看结构体定义是否一致，如果一致的话，去掉驱动中的定义，如果不一致，根据内核中的定义来修改驱动。

```
277 //
278 #if 0
279 struct ieee80211_wmm_param_ie {
280     u8 element_id; /* Element ID: 221 (0xdd); */
281     u8 len; /* Length: 24 */
282     /* required fields for WMM version 1 */
283     u8 oui[3]; /* 00:50:f2 */
284     u8 oui_type; /* 2 */
285     u8 oui_subtype; /* 1 */
286     u8 version; /* 1 for WMM version 1.0 */
287     u8 qos_info; /* AP/STA specific QoS info */
288     u8 reserved; /* 0 */
289     /* AC_BE, AC_BK, AC_VI, AC_VO */
290     struct ieee80211_wmm_ac_param ac[4];
291 } __packed;
292 #endif
```

2) 参数不一致

```
/home/aic/work/drivers/aic8800/aic8800_fdrv/rwnx_msg_rx.c:978:13: 错误: 提供给函数 'cfg80211_roamed' 的实参太多
    , GFP_ATOMIC);
In file included from /home/aic/work/drivers/aic8800/aic8800_fdrv/rwnx_defs.h:20:0,
                  from /home/aic/work/drivers/aic8800/aic8800_fdrv/rwnx_msg_rx.c:14:
include/net/cfg80211.h:5505:6: 附注: 在此声明
void cfg80211_roamed(struct net_device *dev, struct cfg80211_roam_info *info,
/home/aic/work/drivers/aic8800/aic8800_fdrv/rwnx_msg_rx.c: 在函数 'rwnx_rx_sm_disconnect_ind' 中:
/home/aic/work/drivers/aic8800/aic8800_fdrv/rwnx_msg_rx.c:1060:13: 错误: 提供给函数 'cfg80211_disconnected' 的实参太少
    cfg80211_disconnected(dev, ind->reason_code, NULL, 0,
In file included from /home/aic/work/drivers/aic8800/aic8800_fdrv/rwnx_defs.h:20:0,
                  from /home/aic/work/drivers/aic8800/aic8800_fdrv/rwnx_msg_rx.c:14:
include/net/cfg80211.h:5521:6: 附注: 在此声明
void cfg80211_disconnected(struct net_device *dev, u16 reason,
```

此错误提示 cfg80211_roamed 参数太多及 cfg80211_disconnected 参数太少

①cfg80211_roamed 修改

查看 cfg80211.h 中 cfg80211_roamed 的函数声明，如下：

```
/**
 * cfg80211_roamed - notify cfg80211 of roaming
 *
 * @dev: network device
 * @info: information about the new BSS. struct &cfg80211_roam_info.
 * @gfp: allocation flags
 *
 * This function may be called with the driver passing either the BSSID of the
 * new AP or passing the bss entry to avoid a race in timeout of the bss entry.
 * It should be called by the underlying driver whenever it roamed from one AP
 * to another while connected. Drivers which have roaming implemented in
 * firmware should pass the bss entry to avoid a race in bss entry timeout where
 * the bss entry of the new AP is seen in the driver, but gets timed out by the
 * time it is accessed in __cfg80211_roamed() due to delay in scheduling
 * rdev->event_work. In case of any failures, the reference is released
 * either in cfg80211_roamed() or in __cfg80211_roamed(), Otherwise, it will be
 * released while diconncting from the current bss.
 */
void cfg80211_roamed(struct net_device *dev, struct cfg80211_roam_info *info,
                    gfp_t gfp);
/**
```

使用 `uname -a` 或者 `uname -r` 查看内核版本如下:

```
alic@aic aic8800l$ uname -a
Linux aic 3.10.0-957.el7.x86_64 #1 SMP Thu Nov 8 23:39:32 UTC 2018 x86_64 x86_64 x86_64 GNU/Linux
```

当前内核版本为 3.10, 根据代码, 修改如下:

```
955     else {
956 #if LINUX_VERSION_CODE >= KERNEL_VERSION(4, 12, 0) || CONFIG_CENTOS
957     struct cfg80211_roam_info info;
958     memset(&info, 0, sizeof(info));
959     if (rwnx_vif->ch_index < NX_CHAN_CTXT_CNT)
960         info.channel = rwnx_hw->chanctx_table[rwnx_vif->ch_index].chan_def.chan;
961     info.bssid = (const u8 *)ind->bssid.array;
962     info.req_ie = req_ie;
963     info.req_ie_len = ind->assoc_req_ie_len;
964     info.resp_ie = rsp_ie;
965     info.resp_ie_len = ind->assoc_rsp_ie_len;
966     cfg80211_roamed(dev, &info, GFP_ATOMIC);
967 #else
968     struct cfg80211_roam_info info;
969     memset(&info, 0, sizeof(info));
970     if (rwnx_vif->ch_index < NX_CHAN_CTXT_CNT)
971         info.channel = rwnx_hw->chanctx_table[rwnx_vif->ch_index].chan_def.chan;
972     info.bssid = (const u8 *)ind->bssid.array;
973     info.req_ie = req_ie;
974     info.req_ie_len = ind->assoc_req_ie_len;
975     info.resp_ie = rsp_ie;
976     info.resp_ie_len = ind->assoc_rsp_ie_len;
977     cfg80211_roamed(dev, &info, GFP_ATOMIC);
978 #endif /*LINUX_VERSION_CODE >= KERNEL_VERSION(4, 12, 0)*/
979 }
```

②cfg80211_disconnected 修改

查看 `cfg80211.h` 中 `cfg80211_disconnected` 的函数声明

```
/**
 * cfg80211_disconnected - notify cfg80211 that connection was dropped
 *
 * @dev: network device
 * @ie: information elements of the deauth/disassoc frame (may be %NULL)
 * @ie_len: length of IEs
 * @reason: reason code for the disconnection, set it to 0 if unknown
 * @locally_generated: disconnection was requested locally
 * @gfp: allocation flags
 *
 * After it calls this function, the driver should enter an idle state
 * and not try to connect to any AP any more.
 */
void cfg80211_disconnected(struct net_device *dev, u16 reason,
                           const u8 *ie, size_t ie_len,
                           bool locally_generated, gfp_t gfp);
/**
```

当前内核版本为 3.10, 根据代码, 修改 `rwnx_compat.h` 如下:

```
207
208 #if 0// LINUX_VERSION_CODE < KERNEL_VERSION(4, 2, 0) && (!defined CONFIG_CENTOS)
209 #define cfg80211_disconnected(dev, reason, ie, len, local, gfp) \
210     cfg80211_disconnected(dev, reason, ie, len, gfp)
211 #endif
```

或者

```
208 #if LINUX_VERSION_CODE < KERNEL_VERSION(4, 2, 0)
209 #define cfg80211_disconnected(dev, reason, ie, len, local, gfp) \
210     cfg80211_disconnected(dev, reason, ie, len, local, gfp)
211 #endif
```

3) 未声明或者未定义

/home/aic/work/drivers/aic8800/aic8800_fdrv/rwnx_compat.h:205:27: 错误: 'IEEE80211_NUM_BANDS'未声明 (在此函数内第一次使用)
#define NUM_NL80211_BANDS IEEE80211_NUM_BANDS

此错误为未声明，查看内核头文件，已经存在 NUM_NL80211_BANDS 的声明

```
/**
 * enum nl80211_band - Frequency band
 * @NL80211_BAND_2GHZ: 2.4 GHz ISM band
 * @NL80211_BAND_5GHZ: around 5 GHz band (4.9 - 5.7 GHz)
 * @NL80211_BAND_60GHZ: around 60 GHz band (58.32 - 64.80 GHz)
 * @NUM_NL80211_BANDS: number of bands, avoid using this in userspace
 * since newer kernel versions may support more bands
 */
enum nl80211_band {
    NL80211_BAND_2GHZ,
    NL80211_BAND_5GHZ,
    NL80211_BAND_60GHZ,
    NUM_NL80211_BANDS,
};
```

解决方法:

```
203
204 #if 0//LINUX VERSION CODE < KERNEL VERSION(4, 7, 0)
205 #define NUM_NL80211_BANDS IEEE80211_NUM_BANDS
206 #endif
207
```