

# 移植USB无线网卡RTL8XXXU驱动

2020年3月28日买的USB无限网卡，买来就开始吃灰，今年都2025年6月5日了，终于把它用起来了，同时被用起来的还有一个 HDMI转换器，都得感谢 Cool Pi CM5 EVB，不然还不知道什么时候被启用呢？要不是我太懒，早就被闲鱼消化了。



这玩意插在Ubuntu22.04的x86主机上时可以使用的，但是插在CM5开发板上就不能用，两台设备上的dmesg信息如下，分别是：

- Ubuntu22.04 x86 :

```
1 [21127.996516] usb 3-1: new high-speed USB device number 11 using xhci_hcd
2 [21128.122926] usb 3-1: New USB device found, idVendor=0bda, idProduct=1a2b, bcdDevice= 2.00
3 [21128.122948] usb 3-1: New USB device strings: Mfr=1, Product=2, SerialNumber=0
4 [21128.122955] usb 3-1: Product: DISK
5 [21128.122961] usb 3-1: Manufacturer: Realtek
6 [21128.127085] usb-storage 3-1:1.0: USB Mass Storage device detected
7 [21128.128089] scsi host2: usb-storage 3-1:1.0
8 [21128.727108] usb 3-1: USB disconnect, device number 11
9 [21129.107734] usb 3-1: New USB device found, idVendor=0bda, idProduct=b711, bcdDevice= 2.00
10 [21129.107748] usb 3-1: New USB device strings: Mfr=1, Product=2, SerialNumber=3
11 [21129.107752] usb 3-1: Product: 802.11n WLAN Adapter
12 [21129.107756] usb 3-1: Manufacturer: Realtek
13 [21129.107758] usb 3-1: SerialNumber: 00E04CB82101
14 [21129.159986] usb 3-1: RTL8710BU rev A (UMC) romver 2, 1T1R, TX queues 3, Wifi=1, BT=0, GPS=0, HI PA=0
15 [21129.160014] usb 3-1: RTL8710BU MAC: 54:a7:03:ea:1d:90
16 [21129.160015] usb 3-1: rtl8xxxu: Loading firmware rtlwifi/rtl8710bufw_UMC.bin
17 [21129.160072] usb 3-1: Firmware revision 16.0 (signature 0x10b2)
18 [21130.138935] usbcore: registered new interface driver rtl8xxxu
19 [21130.146959] rtl8xxxu 3-1:1.0 wlx54a703ea1d90: renamed from wlan0
20 [21130.365986] userif-3: sent link down event.
21 [21130.366001] userif-3: sent link up event.
22
```

- Ubuntu22.04 arm64 :

```
1 $ sudo dmesg -w
2 [ 3721.683741] usb 1-1: new high-speed USB device number 6 using xhci-hcd
3 [ 3721.810001] usb 1-1: New USB device found, idVendor=0bda, idProduct=1a2b, bcdDevice= 2.00
4 [ 3721.810008] usb 1-1: New USB device strings: Mfr=1, Product=2, SerialNumber=0
5 [ 3721.810011] usb 1-1: Product: DISK
6 [ 3721.810014] usb 1-1: Manufacturer: Realtek
7 [ 3721.810691] usb-storage 1-1:1.0: USB Mass Storage device detected
8 [ 3721.810986] scsi host1: usb-storage 1-1:1.0
9 [ 3722.386422] usb 1-1: USB disconnect, device number 6
10 [ 3722.608760] usb 1-1: new high-speed USB device number 7 using xhci-hcd
11 [ 3722.735055] usb 1-1: New USB device found, idVendor=0bda, idProduct=b711, bcdDevice= 2.00
12 [ 3722.735062] usb 1-1: New USB device strings: Mfr=1, Product=2, SerialNumber=3
13 [ 3722.735066] usb 1-1: Product: 802.11n WLAN Adapter
14 [ 3722.735069] usb 1-1: Manufacturer: Realtek
15 [ 3722.735072] usb 1-1: SerialNumber: 00E04CB82101
```

- 好像是没加载驱动 rtl8xxxu，手动加载：

```
1 $ sudo modprobe rtl8xxxu
2
3 # dmesg新增信息
4 usbcore: registered new interface driver rtl8xxxu
```

- 说明系统是有 `rtl8xxxu.ko` 的
- 从下面的信息来看，`usb-modswitch` 也是正常的：

```
1 [ 3721.810691] usb-storage 1-1:1.0: USB Mass Storage device detected
2 [ 3721.810986] scsi host1: usb-storage 1-1:1.0
3 [ 3722.386422] usb 1-1: USB disconnect, device number 6
4 [ 3722.608760] usb 1-1: new high-speed USB device number 7 using xhci-hcd
```

- 扩展：

```
1 $ sudo apt install usb-modeswitch usb-modeswitch-data
2
3 $ sudo usb_modeswitch -v 0x0bda -p 0x1a2b -V 0x0bda -P 0xb711 -J
```

## 1. 为什么驱动加载了，却没有网卡

### 1.1 查看网络接口信息

#### 1.1.1 `ifconfig -a`：

- 没有新网卡出现：

```
1 $ ifconfig -a
2 dummy0: flags=130<BROADCAST,NOARP> mtu 1500
3 ether xx:xx:xx:xx:xx:xx txqueuelen 1000 (Ethernet)
4 RX packets 0 bytes 0 (0.0 B)
5 RX errors 0 dropped 0 overruns 0 frame 0
6 TX packets 0 bytes 0 (0.0 B)
7 TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
8
9 eth0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
10 inet 192.168.101.132 netmask 255.255.254.0 broadcast 192.168.101.255
11 inet6 fe80::9048:e1ff:fed0:635 prefixlen 64 scopeid 0x20<link>
12 ether xx:xx:xx:xx:xx:xx txqueuelen 1000 (Ethernet)
13 RX packets 800116 bytes 125198703 (125.1 MB)
14 RX errors 0 dropped 0 overruns 0 frame 0
15 TX packets 323086 bytes 114050831 (114.0 MB)
16 TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
17 device interrupt 76
18
19 eth1: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500
20 ether xx:xx:xx:xx:xx:xx txqueuelen 1000 (Ethernet)
21 RX packets 0 bytes 0 (0.0 B)
22 RX errors 0 dropped 0 overruns 0 frame 0
23 TX packets 0 bytes 0 (0.0 B)
24 TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
25 device interrupt 88 base 0x8000
26
27 ip6_vti0: flags=128<NOARP> mtu 1364
28 unspec 00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00 txqueuelen 1000 (UNSPEC)
29 RX packets 0 bytes 0 (0.0 B)
30 RX errors 0 dropped 0 overruns 0 frame 0
31 TX packets 0 bytes 0 (0.0 B)
32 TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
33
34 ip6tnl0: flags=128<NOARP> mtu 1452
35 unspec 00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00 txqueuelen 1000 (UNSPEC)
36 RX packets 0 bytes 0 (0.0 B)
37 RX errors 0 dropped 0 overruns 0 frame 0
38 TX packets 0 bytes 0 (0.0 B)
39 TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
40
41 ip_vti0: flags=128<NOARP> mtu 1480
42 tunnel txqueuelen 1000 (IPIP Tunnel)
43 RX packets 0 bytes 0 (0.0 B)
44 RX errors 0 dropped 0 overruns 0 frame 0
45 TX packets 0 bytes 0 (0.0 B)
46 TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
47
```

```
48 lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
49     inet 127.0.0.1 netmask 255.0.0.0
50     inet6 ::1 prefixlen 128 scopeid 0x10<host>
51     loop txqueuelen 1000 (Local Loopback)
52     RX packets 838 bytes 89639 (89.6 KB)
53     RX errors 0 dropped 0 overruns 0 frame 0
54     TX packets 838 bytes 89639 (89.6 KB)
55     TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

### 1.1.2 检查 /sys/class/net 下是否有新接口

```
1 $ ls /sys/class/net/
2 dummy0 eth0 eth1 ip6_vti0 ip6tnl0 ip_vti0 lo
```

- 没有新接口；

## 1.2 查看USB硬件信息

- lsusb:

```
1 $ lsusb
2 Bus 001 Device 009: ID 0bda:b711 Realtek Semiconductor Corp. RTL8188GU 802.11n WLAN Adapter (After Modeswitch)
```

- 有这个网卡；
- usb-devices:

```
1 $ usb-devices
2
3 打印出来的信息太杂乱
```

## 1.3 firmware

从x86的信息中看到有加载固件的信息：

```
1 [21129.160015] usb 3-1: rtl8xxxu: Loading firmware rtlwifi/rtl8710bufw_UMC.bin
```

发现CM5的固件目录 /lib/firmware/rtlwifi/ 下并没有 rtl8710bufw\_UMC.bin 这个固件，然后从x86中将这个固件复制到这个目录下，还是不行，按理说固件是被网卡加载使用的，跟cpu的架构应该没啥关系，x86与Arm一样用才对；

- ubuntu在线安装固件的命令：

```
1 $ sudo apt install linux-firmware
```

- 因为公司的网络不行，所以采用这个网卡，没网，这个命令暂时行不通；

## 1.4 确保依赖模块 cfg80211、mac80211 已经加载

在 dmesg 信息中有如下的信息：

```
1 [ 3722.735066] usb 1-1: Product: 802.11n WLAN Adapter
```

rtl8xxxu 驱动依赖于 Linux 的无线框架：cfg80211 和 mac80211。如果这两个基础模块没先加载，驱动也不会实际生成网络接口。

所以看一下模块 cfg80211、mac80211 是否已经加载：

```
1 $ lsmod | grep -E "cfg80211|mac80211"
2 # 啥也没有
3
4 $ zcat /proc/config.gz | grep -i cfg80211
5 CONFIG_CFG80211=y
6 # CONFIG_CFG80211_DEVELOPER_WARNINGS is not set
7 # CONFIG_CFG80211_CERTIFICATION_ONUS is not set
8 CONFIG_CFG80211_REQUIRE_SIGNED_REGDB=y
9 CONFIG_CFG80211_USE_KERNEL_REGDB_KEYS=y
10 CONFIG_CFG80211_DEFAULT_PS=y
11 CONFIG_CFG80211_CRDA_SUPPORT=y
12 CONFIG_CFG80211_WEXT=y
13 CONFIG_CFG80211_WEXT_EXPORT=y
14
15 $ zcat /proc/config.gz | grep -i mac80211
16 CONFIG_MAC80211=y
17 CONFIG_MAC80211_HAS_RC=y
18 CONFIG_MAC80211_RC_MINSTREL=y
19 CONFIG_MAC80211_RC_DEFAULT_MINSTREL=y
20 CONFIG_MAC80211_RC_DEFAULT="minstrel_ht"
21 # CONFIG_MAC80211_MESH is not set
```

```
22 | CONFIG_MAC80211_LEDS=y
23 | # CONFIG_MAC80211_MESSAGE_TRACING is not set
24 | # CONFIG_MAC80211_DEBUG_MENU is not set
25 | CONFIG_MAC80211_STA_HASH_MAX_SIZE=0
26 | # CONFIG_MAC80211_HWSIM is not set
```

- 模块 `cfg80211`、`mac80211` 已经编译到镜像中。

此时问题还是没有解决；

## 1.5 为什么没有： `rtl8xxxu: Loading firmware rtlwifi/rtl8710bufw_UMC.bin`

为什么没有： `rtl8xxxu: Loading firmware rtlwifi/rtl8710bufw_UMC.bin`，这个固件明明存在!!!!!!????

### 1.5.1 `modinfo` 上大分，确认驱动究竟要哪个固件文件

```
1 | $ modinfo rtl8xxxu | grep ^firmware
2 | firmware:      rtlwifi/rtl8723bu_bt.bin
3 | firmware:      rtlwifi/rtl8723bu_nic.bin
4 | firmware:      rtlwifi/rtl8192eu_nic.bin
5 | firmware:      rtlwifi/rtl8192cufw_TMSC.bin
6 | firmware:      rtlwifi/rtl8192cufw_B.bin
7 | firmware:      rtlwifi/rtl8192cufw_A.bin
8 | firmware:      rtlwifi/rtl8723aufw_B_NoBT.bin
9 | firmware:      rtlwifi/rtl8723aufw_B.bin
10 | firmware:      rtlwifi/rtl8723aufw_A.bin
```

- 确实没有 `rtl8710bufw_UMC.bin`；

### 1.5.2 查看内核源码

```
1 | // 在rtl8xxxu驱动源码中随便搜索一个 rtlwifi/rtl8192cufw_B.bin
2 | MODULE_AUTHOR("Jes Sorensen <Jes.Sorensen@gmail.com>");
3 | MODULE_DESCRIPTION("RTL8XXu USB mac80211 Wireless LAN Driver");
4 | MODULE_LICENSE("GPL");
5 | MODULE_FIRMWARE("rtlwifi/rtl8723aufw_A.bin");
6 | MODULE_FIRMWARE("rtlwifi/rtl8723aufw_B.bin");
7 | MODULE_FIRMWARE("rtlwifi/rtl8723aufw_B_NoBT.bin");
8 | MODULE_FIRMWARE("rtlwifi/rtl8192cufw_A.bin");
9 | MODULE_FIRMWARE("rtlwifi/rtl8192cufw_B.bin");
10 | MODULE_FIRMWARE("rtlwifi/rtl8192cufw_TMSC.bin");
11 | MODULE_FIRMWARE("rtlwifi/rtl8192eu_nic.bin");
12 | MODULE_FIRMWARE("rtlwifi/rtl8723bu_nic.bin");
13 | MODULE_FIRMWARE("rtlwifi/rtl8723bu_bt.bin");
```

- 并没有如下的代码：

```
1 | MODULE_FIRMWARE("rtlwifi/rtl8710bufw_UMC.bin");
```

既然 `ubuntu22.04 x86` 的有这个驱动，就把 `ubuntu22.04 x86` 内核源码下载来看看：

```
1 | $ sudo apt install linux-source
```

- 很遗憾，并没有找到 `MODULE_FIRMWARE("rtlwifi/rtl8710bufw_UMC.bin");`

### 1.5.3 去github上找 `rtlwifi/rtl8710bufw_UMC.bin`：

果然还是得github，一搜一个准，很快就找到了 `rtl8710b` 驱动源码，最终确定使用下面repo的驱动源码：

```
1 | repo: https://github.com/gregkh/linux
2 | branch: linux-6.6.y
3 | kernel version: 6.6.93
```

对比一下驱动文件：

```
1 | $ tree
2 | .
3 | ├── Kconfig
4 | ├── Makefile
5 | ├── rtl8xxxu_8188e.c
6 | ├── rtl8xxxu_8188f.c
7 | ├── rtl8xxxu_8192c.c
8 | ├── rtl8xxxu_8192e.c
9 | ├── rtl8xxxu_8192f.c
10 | ├── rtl8xxxu_8710b.c # 驱动在这里
11 | ├── rtl8xxxu_8723a.c
12 | ├── rtl8xxxu_8723b.c
```

```
13 | └─ rtl8xxxu_core.c
14 | └─ rtl8xxxu.h
15 | └─ rtl8xxxu_regs.h
16 |
17 | # 原内核并没有 rtl8xxxu_8710b.c
18 | $ tree
19 | .
20 | └─ Kconfig
21 | └─ Makefile
22 | └─ rtl8xxxu_8192c.c
23 | └─ rtl8xxxu_8192e.c
24 | └─ rtl8xxxu_8723a.c
25 | └─ rtl8xxxu_8723b.c
26 | └─ rtl8xxxu_core.c
27 | └─ rtl8xxxu.h
28 | └─ rtl8xxxu_regs.h
```

下面就是移植驱动，这个就没什么好说的了，编译好之后，插上网卡，果然奇迹出现了：

```
1 | $ sudo dmesg -w
2 | [26080.573408] usb 1-1: new high-speed USB device number 10 using xhci-hcd
3 | [26080.699605] usb 1-1: New USB device found, idVendor=0bda, idProduct=1a2b, bcdDevice= 2.00
4 | [26080.699611] usb 1-1: New USB device strings: Mfr=1, Product=2, SerialNumber=0
5 | [26080.699615] usb 1-1: Product: DISK
6 | [26080.699618] usb 1-1: Manufacturer: Realtek
7 | [26080.700285] usb-storage 1-1:1.0: USB Mass Storage device detected
8 | [26080.701984] scsi host1: usb-storage 1-1:1.0
9 | [26081.270798] usb 1-1: USB disconnect, device number 10
10 | [26081.492958] usb 1-1: new high-speed USB device number 11 using xhci-hcd
11 | [26081.619192] usb 1-1: New USB device found, idVendor=0bda, idProduct=b711, bcdDevice= 2.00
12 | [26081.619198] usb 1-1: New USB device strings: Mfr=1, Product=2, SerialNumber=3
13 | [26081.619202] usb 1-1: Product: 802.11n WLAN Adapter
14 | [26081.619205] usb 1-1: Manufacturer: Realtek
15 | [26081.619208] usb 1-1: SerialNumber: 00E04CB82101
16 | [26081.639758] usb 1-1: RTL8710BU rev A (UMC) romver 2, 1T1R, TX queues 3, WiFi=1, BT=0, GPS=0, HI PA=0
17 | [26081.639766] usb 1-1: RTL8710BU MAC: 54:a7:03:ea:1d:90
18 | [26081.639770] usb 1-1: rtl8xxxu: Loading firmware rtlwifi/rtl8710bufw_UMC.bin
19 | [26081.639847] usb 1-1: Firmware revision 16.0 (signature 0x10b2)
```

## 1.6 总结

记录一下问题解决的思路过程，很有意思。