WLAN

Config-files don't have any security-params enabled (e.g. WLAN-security/authentification in HostAPd), these are only a start for quick testing

internal

in Kernel 4.4.70 code is available, but must be activated

GitHub Forum

Patch Patch #2

wpasupplicant must be removed and hostapd+dnsmasq installed:

```
apt-get remove wpasupplicant

apt-get install hostapd dnsmasq
```

copy cfg to /system/etc/firmware/

helper-applications for next steps (unpack to /usr/bin)
and
Firmware (unpack to /etc/firmware/)
from here

1. wmt_loader
2. stp_uart_launcher -p /etc/firmware &
3. load driver module (if compiled as module 5.4+): modprobe wlan_gen2
4. echo A >/dev/wmtWifi (activate AP-Mode)

in last step ap-device (Accesspoint) will be created, which can be used by hostapd

```
[14:14] root@bpi-r2:~# ifconfig -a|grep Link
ap0       Link encap:Ethernet  HWaddr 02:08:22:68:39:ff
bond0     Link encap:Ethernet  HWaddr e2:7c:e0:71:31:c1
eth0      Link encap:Ethernet  HWaddr 08:00:00:00:00:00
          inet6 addr: fe80::a00:ff:fe00:0/64 Scope:Link
eth1      Link encap:Ethernet  HWaddr 08:00:00:00:00:01
          inet6 addr: fe80::a00:ff:fe00:1/64 Scope:Link
lo        Link encap:Local Loopback
sit0      Link encap:IPv6-in-IPv4
tunl0     Link encap:IPIP Tunnel  HWaddr
wlan0     Link encap:Ethernet  HWaddr 00:08:22:68:39:ff
```

/etc/hostapd/hostapd.conf:

```
hw_mode=g
interface=ap0
driver=nl80211
channel=1
auth_algs=1
ssid=test
```

start hostapd

```
hostapd -dd /etc/hostapd/hostapd.conf
```

interface can now be further configured and DHCP-Server configured and started: ip-configuration

old Script to start-up wireless AP
wifi.sh

client-mode

Afair only working in vendor kernel versions (4.4,4.14)

http://forum.banana-pi.org/t/topic/5548

works with 4.14-mt6625 branch (4.14.32 + vendor-code + fixes)

```
apt install wpasupplicant
/usr/bin/wmt_loader
/usr/bin/stp_uart_launcher -p /etc/firmware &
echo 1 >/dev/wmtWifi
```

/etc/wpa_supplicant/wpa_supplicant.conf:

```
network={
        ssid="ssid"
        psk="12345678"
        priority=1
}
```

```
wpa_supplicant -i wlan0 -c /etc/wpa_supplicant/wpa_supplicant.conf
dhclient wlan0
```

Kernel 4.14

code from 4.4.70 has been merged to my github-repo

wifi-configuration is the same as in Kernel 4.4 internal

discussion here: forum

systemd init script here: http://forum.banana-pi.org/t/bpi-r2-internal-wifi-bt-mt6625l-kernel/4307/281

known issues

random numbers

after a (Re-)boot the random-number generator not filled enough, so that connection-attempts will be rejected.

in the hostapd-log there are entries like this:

```
random: Cannot read from /dev/random: Resource temporarily unavailable
random: Got 0/14 bytes from /dev/random
random: Only 6/20 bytes of strong random data available from /dev/random
random: Not enough entropy pool available for secure operations
WPA: Not enough entropy in random pool to proceed - reject first 4-way
handshake
...
WPA: Reject 4-way handshake to collect more entropy for random number
generation
random: Mark internal entropy pool to be ready (count=1/2)
...
random: Cannot read from /dev/random: Resource temporarily unavailable
random: Got 0/14 bytes from /dev/random
random: Only 6/20 bytes of strong random data available from /dev/random
random: Allow operation to proceed based on internal entropy
```

http://forum.banana-pi.org/t/bpi-r2-new-image-release-ubuntu-16-04-v1-3-2018-3-30/5293/25

```
apt-get install rng-tools
echo 'HRNGDEVICE=/dev/urandom' >> /etc/default/rng-tools
```

init failed

```
root@bpi-iot-ros-ai:~# wmt_loader init combo device
Opened combo device
get device id : 30243
set device id : 30243
do module init: 30243
failed to init module
```

This can be ignored because the combo-driver tries to init wifi,bt,gps and fm. Last 2 fail because driver does not support them.

stpnode

```
Can't open device node(/dev/stpwmt) error:-1
//in dmesg:
[WMT-DEV][W]WMT_open:wait_event_timeout (2000)ms,(200)jiffies,return -EIO
```

reboot fixed that...reason still unclear

Also this can be tried:

```
apt-get install network-manager
sudo nmcli radio wifi off
rfkill unblock 1
rfkill unblock 2
```

no traffic

Kernelmodules SCH_FQ / SCH_FQ_CODEL are known breaking ap0-functionality

maybe there are some kalHifAhbKalWakeLockTimeout messages in dmesg

maybe NETFILTER_XT_TARGET_NFQUEUE does have similar effects (see here)

rcu_stall

this is maybe caused by net.ifnames=0

```
[  437.885886] [MTK-WIFI] WIFI_open: WIFI_open: major 155 minor 0 (pid 2614)
[  437.892961] [MTK-WIFI] WIFI_write: WIFI_write A
[  437.892961]
[  437.938648] kalFirmwareImageMapping firmware size 225840
[  439.132189] [MTK-WIFI] register_set_p2p_mode_handler: (pid 2620) register
set p2p mode handler b6888aac
[  439.141960] [MTK-WIFI] WIFI_write: WMT turn on WIFI success!
[  460.170441] rcu: INFO: rcu_sched detected stalls on CPUs/tasks:
```

hang occours in kalioctl (drivers/misc/mediatek/connectivity/wlan/gen2/os/linux/gl_kal.c) while calling kernel-function down_interruptible (kernel/locking/semaphore.c), semaphore is created correctly in drivers/misc/mediatek/connectivity/wlan/gen2/os/linux/gl_init.c (sema_init(&prGlueInfo→ioctl_sem, 1);)

solution: do not use net.ifnames in cmdline and use udev-renaming

driver hang

check if there is a wlan0 device before starting wifi.sh/manual init of ap0 device. driver will hang after message

```
[MTK-WIFI] WIFI_write: WMT turn on WIFI success
```

if there is a wlan0 interface not mapped to the mt6625l driver (maybe pcie/usb-wifi-device).

rootcause is adding a handler to wrong netdev searched with hardcoded wlan0 in drivers/misc/mediatek/connectivity/common/conn_soc/linux/pub/wmt_chrdev_wifi.c

```
#define WLAN_IFACE_NAME "wlan0"
static INT8 *ifname = WLAN_IFACE_NAME;
netdev = dev_get_by_name(&init_net, ifname);
pf_set_p2p_mode(netdev, p2pmode);
```

you can rename existing wlan0 to anything else before starting ap0 init

```
ip link set wlan0 name wlan_2g
ip link set wlan1 name wlan_5g
```

did this with my mt7615 (dbdc mode) and wifi init finished with success in linux 5.10

client-mode does not work

client mode does not work in 4.9+

http://forum.banana-pi.org/t/bpi-r2-internal-wifi-bt-mt6625l-kernel/4307/293

i tested wifi-client in 5.10, here it is working with config posted here:

http://forum.banana-pi.org/t/bpi-r2-internal-wifi-bt-mt6625l-kernel/4307/329

external

MT7612

mt7612e on AliExpress

firmware neeeded: https://packages.debian.org/buster/firmware-misc-nonfree

4.4.70

forum

```
git clone https://github.com/BPI-SINOVOIP/BPI-R2-bsp.git bpi_r2_mt76
cd bpi_r2_mt76/
cd linux-mt/drivers/net/wireless/mediatek
git clone https://github.com/dfiloni/mt76.git
```

```
cd ../../../.. #bpi_r2_mt76/linux-mt/
patch -p1 < drivers/net/wireless/mediatek/mt76/kernel-patches/0001-add-basic-register-field-manipulation-macros.patch
nano drivers/net/wireless/mediatek/Makefile
#add: obj-$(CONFIG_MT76)     += mt76/
nano drivers/net/wireless/mediatek/Kconfig
#add before endif: before endif # WL_MEDIATEK: source "drivers/net/wireless/mediatek/mt76/Kconfig"
cd ..
./build.sh => 4
#networking support => wireless =>  <M>   Generic IEEE 802.11 Networking Stack (mac80211)
#Device Drivers  => Network device support => Wireless LAN => [*]   Mediatek Wireless LAN support => <M>   MediaTek MT76x2 802.11ac chips support
./build.sh => 1
cp SD/BPI-BOOT/bananapi/bpi-r2/linux/uImage /media/$USER/BPI-BOOT/bananapi/bpi-r2/linux/uImage
sudo cp -r SD/BPI-ROOT/lib/modules /media/$USER/BPI-ROOT/lib/
cp linux-mt/drivers/net/wireless/mediatek/mt76/firmware/* /media/$USER/BPI-ROOT/lib/firmware/
#scp linux-mt/drivers/net/wireless/mediatek/mt76/firmware/* root@192.168.0.10:/lib/firmware/
sync
```

4.14

Kernel 4.14 (in progress...):

import

PCIe-patch

, if not done yet

```
patch -p1 < pcie.patch
cd drivers/net/wireless/mediatek/
git clone https://github.com/openwrt/mt76.git
```

- in mt76/mt7603.h missing „#include <linux/interrupt.h>“
- in mt76/mac80211.c missing „#include <linux/of.h>“
- in Makefile missing „CFLAGS_trace.o := -I$(src)“ und „CFLAGS_mt76x2_trace.o := -I$(src)“
- and include code in drivers/net/wireless/mediatek/Makefile

  ```
  obj-$(CONFIG_MT76)  += mt76/
  ```

  and drivers/net/wireless/mediatek/Kconfig

  ```
  source "drivers/net/wireless/mediatek/mt76/Kconfig"
  ```

unpack

full driver-code for mt76x2 + mt76x3
to drivers/net/wireless/mediatek/

activate following modules in kernel:

```
CONFIG_MAC80211=m
CONFIG_CFG80211=m
CONFIG_MT76=m

#pcie
CONFIG_PCIEPORTBUS=y
CONFIG_PCIE_MEDIATEK=y
CONFIG_PHY_MTK_TPHY=y
```

copy the firmware

```
sudo cp drivers/net/wireless/mediatek/mt76/firmware/* /media/$USER/BPI-ROOT/lib/firmware/
```

configure

```
[10:50] root@bpi-r2:~# ifconfig -a |grep wlan
wlan1     Link encap:Ethernet  HWaddr f8:62:aa:50:12:1d  <<<
```

if your wlan-device-number is above 1, you can edit that with

```
nano /etc/udev/rules.d/70-persistent-net.rules
```

/etc/hostapd/hostapd.conf (change interface)

```
interface=wlan1
#interface=ap0
driver=nl80211

ssid=r2_AP1

hw_mode=g
channel=1
#macaddr_acl=0
auth_algs=1
#ignore_broadcast_ssid=0
#wpa=2
#wmm_enabled=1
#wpa_passphrase=12345678
#wpa_key_mgmt=WPA-PSK
#wpa_pairwise=TKIP
#rsn_pairwise=CCMP
```

/etc/hostapd/hostapd_wlan1.conf

start hostapd (Debugmode):

```
hostapd -dd /etc/hostapd/hostapd.conf
```

set IP-address and start dnsmasq: ip-configuration

MT7615

firmware-files to /lib/firmware/mediatek/

http://forum.banana-pi.org/t/802-11ac-4x4-standard-size-mini-pcie-card-is-launched/11545/15?u=frank-w

I have added mt7615 driver in 5.4 on nov 19 2020 (should be 5.4.78).

Mt7615 is separate kernel-module which needs to be loaded

```
modprobe mt7615e
```

dual-ap

Dbdc mode was added in 5.7

```
echo 1 > /sys/kernel/debug/ieee80211/phy0/mt76/dbdc
```

There is a report that dbdc cannot be enabled after reboot,but on my tests this works without problems

You can only enable 2.4ghz on phy0, and 5ghz on phy1 simultaneously.

antenna connectors

```
WF0-1 are for phy0, and WF2-3 are for phy1.
```

http://forum.banana-pi.org/t/802-11ac-4x4-standard-size-mini-pcie-card-is-launched/11545/16

HostAPd

/etc/hostapd/hostapd.conf

/etc/hostapd/hostapd_wlan1.conf

5GHz

```
apt-get install iw
iw list | grep "Supported interface modes" -A 8
```

```
apt-get install iw wireless-regdb crda
```

country code

setting Country-Code (regulary domain) can be a bit tricky

```
iw reg set ISO_3166-1_alpha-2
iw reg set DE
iw reg get
```

wrong output:

```
global
country 00: DFS-UNSET
```

correct:

```
global
country US: DFS-ETSI
```

maybe try this:

```
modprobe cfg80211 ieee80211_regdom=US
COUNTRY=US crda
```

```
$ sudo nano /etc/modprobe.d/cfg80211.conf
options cfg80211 ieee80211_regdom=US
```

possible frequencies

```
iw list | grep MHz
```

Hostapd-Configuration

```
$ sudo nano /etc/hostapd/hostapd.conf
[...]
country_code=US
ieee80211n=1
ieee80211d=1
hw_mode=a
```

```
channel=48
[...]
```

Config-Examples taken from here (DE)

CountryCode-List

IP-Configuration

set IP-address:

```
#set IP and start
ip addr add 192.168.10.1/24 dev ap0
#ip link set dev ap0 up

ip addr add 192.168.11.1/24 dev wlan1
```

/etc/dnsmasq.conf (activate line by removing # on begin of line)

```
conf-dir=/etc/dnsmasq.d
```

/etc/dnsmasq.d/interfaces.conf

```
#interface=eth0
interface=wlan0
#interface=eth1
interface=ap0

# DHCP-Server not active for Interface
#no-dhcp-interface=ppp0
no-dhcp-interface=eth0
no-dhcp-interface=eth1

#dhcp-authoritative
dhcp-range=ap0,192.168.10.100,192.168.10.150,255.255.255.0,48h
dhcp-option=ap0,3,192.168.10.1
dhcp-range=wlan1,192.168.11.100,192.168.11.150,255.255.255.0,48h
dhcp-option=wlan1,3,192.168.11.1

#special handling of some hosts (here using another dns-server)
#dhcp-host=ap0,x:y:z:x:y:z,frank,set:specialhosts,192.168.10.27,12h
dhcp-option=tag:specialhosts,option:dns-server,192.168.0.11,8.8.4.4
```

/etc/dnsmasq.d/interfaces.conf

```
service dnsmasq start
```

Routing

```
nano /etc/sysctl.conf
#activate net.ipv4.ip_forward=1 and net.ipv6.conf.all.forwarding=1 by
removing # at beginning of line
sysctl -p /etc/sysctl.conf
```

if the BPI-R2 is not the main-router (access to internet), it is neccessary, that this main-router knows the networks (wlan) behind the R2.

The following commands must be entered on a (Debian-)Router, to append the networks to its routing-table (will be lost on reboot if not executed on boot):

```
route add -net 192.168.10.0 netmask 255.255.255.0 gw 192.168.0.10
route add -net 192.168.11.0 netmask 255.255.255.0 gw 192.168.0.10
```

here is 192.168.10.0 the 1st WLAN, 192.168.11.0 the 2nd WLAN and 192.168.0.10 is the LAN-IP of the BPI-R2 (same subnet as LAN-IP from main-router)