

# WLAN

see too (especially for hostapd config): [wlan](#)

```
apt install hostapd iw wireless-regdb crda dnsmasq rkill  
iw reg set DE
```

WiFi connectors are U.FL

without rkill hostapd does not start and prints this error:

```
Feb 12 09:56:39 bpi-r3 hostapd[2764]: wlan1: IEEE 802.11 Configured channel  
(40) not found from the channel list of current mode (2) IEEE 802.11a  
Feb 12 09:56:39 bpi-r3 hostapd[2764]: wlan1: IEEE 802.11 Hardware does not  
support configured channel
```

and iw shows „(no IR)“ after all channels

ubuntu does not have the crda tool and so cfg80211 needs the regulatory.db

it can be installed with wireless-regdb or copy regulatory.db and regulatory.db.p7s from  
<https://mirrors.edge.kernel.org/pub/software/network/wireless-regdb/>

to load the file cfg80211 needs to be compiled as module and it needs the CONFIG\_CFG80211\_WEXT option (else you get the error „nl80211 not found“ error when using iw).

## BPI-R3 internal wifi

```
modprobe mt7915e
```

```
root@bpi-r3:~# modprobe mt7915e  
[ 1845.929130] mt7986-wmac 18000000.wifi: HW/SW Version: 0x8a108a10, Build  
Time: 20220113162701a  
[ 1845.929130]  
[ 1846.080835] mt7986-wmac 18000000.wifi: WM Firmware Version: ____000000,  
Build Time: 20220113162756  
[ 1846.151817] mt7986-wmac 18000000.wifi: WA Firmware Version: DEV_000000,  
Build Time: 20220113163034  
root@bpi-r3:~# ip a  
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group  
default qlen 1000  
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00  
    inet 127.0.0.1/8 scope host lo  
        valid_lft forever preferred_lft forever  
    inet6 ::1/128 scope host  
        valid_lft forever preferred_lft forever  
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1504 qdisc fq_codel state UP
```

```
group default qlen 1000
    link/ether a6:10:3b:a5:8c:b2 brd ff:ff:ff:ff:ff:ff
    inet6 fe80::a410:3bff:fea5:8cb2/64 scope link
        valid_lft forever preferred_lft forever
3: eth1: <BROADCAST,MULTICAST> mtu 1500 qdisc noop state DOWN group default
qlen 1000
    link/ether 92:65:f3:ec:b0:19 brd ff:ff:ff:ff:ff:ff
4: sit0@NONE: <NOARP> mtu 1480 qdisc noop state DOWN group default qlen 1000
    link/sit 0.0.0.0 brd 0.0.0.0
5: wan@eth0: <BROADCAST,MULTICAST> mtu 1500 qdisc noop state DOWN group
default qlen 1000
    link/ether de:d5:1a:b0:11:33 brd ff:ff:ff:ff:ff:ff
6: lan0@eth0: <BROADCAST,MULTICAST> mtu 1500 qdisc noop state DOWN group
default qlen 1000
    link/ether 5a:de:ab:24:d9:82 brd ff:ff:ff:ff:ff:ff
7: lan1@eth0: <BROADCAST,MULTICAST> mtu 1500 qdisc noop state DOWN group
default qlen 1000
    link/ether fe:49:16:78:33:39 brd ff:ff:ff:ff:ff:ff
8: lan2@eth0: <BROADCAST,MULTICAST> mtu 1500 qdisc noop state DOWN group
default qlen 1000
    link/ether 3e:bf:7a:a1:ae:f8 brd ff:ff:ff:ff:ff:ff
9: lan3@eth0: <BROADCAST,MULTICAST> mtu 1500 qdisc noop state DOWN group
default qlen 1000
    link/ether 82:6c:36:12:39:5e brd ff:ff:ff:ff:ff:ff
10: lan4@eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue
state UP group default qlen 1000
    link/ether 36:89:b6:5d:ed:5d brd ff:ff:ff:ff:ff:ff
    inet 192.168.0.19/24 scope global lan4
        valid_lft forever preferred_lft forever
    inet6 fe80::3489:b6ff:fe5d:ed5d/64 scope link
        valid_lft forever preferred_lft forever
11: wwan0: <POINTOPOINT,MULTICAST,NOARP,UP,LOWER_UP> mtu 1500 qdisc fq_codel
state UNKNOWN group default qlen 1000
    link/none
    inet6 fe80::68df:ff6d:c2ae:aad4/64 scope link stable-privacy
        valid_lft forever preferred_lft forever
12: wlan0: <BROADCAST,MULTICAST> mtu 1500 qdisc noop state DOWN group
default qlen 1000
    link/ether 00:0c:43:26:60:00 brd ff:ff:ff:ff:ff:ff
13: wlan1: <BROADCAST,MULTICAST> mtu 1500 qdisc noop state DOWN group
default qlen 1000
    link/ether 82:0c:43:26:60:00 brd ff:ff:ff:ff:ff:ff
root@bpi-r3:~# iw dev
phy#1
    Interface wlan1
        ifindex 13
        wdev 0x100000001
        addr 82:0c:43:26:60:00
        type managed
        txpower 6.00 dBm
        multicast TXQ:
```

```
hashcol tx-bytes      qsz-byt qsz-pkt flows  drops  marks  overlmt
tx-packets
0          0          0      0      0      0      0
phy#0
    Interface wlan0
        ifindex 12
        wdev 0x1
        addr 00:0c:43:26:60:00
        type managed
        txpower 6.00 dBm
        multicast TXQ:
hashcol tx-bytes      qsz-byt qsz-pkt flows  drops  marks  overlmt
tx-packets
0          0          0      0      0      0      0
root@bpi-r3:~# iw list
Wiphy phy1
    wiphy index: 1
    max # scan SSIDs: 4
    max scan IEs length: 2190 bytes
    max # sched scan SSIDs: 0
    max # match sets: 0
    Retry short limit: 7
    Retry long limit: 4
    Coverage class: 0 (up to 0m)
    Device supports RSN-IBSS.
    Device supports AP-side u-APSD.
    Device supports T-DLS.
    Supported Ciphers:
        * WEP40 (00-0f-ac:1)
        * WEP104 (00-0f-ac:5)
        * TKIP (00-0f-ac:2)
        * CCMP-128 (00-0f-ac:4)
        * CCMP-256 (00-0f-ac:10)
        * GCMP-128 (00-0f-ac:8)
        * GCMP-256 (00-0f-ac:9)
        * CMAC (00-0f-ac:6)
        * CMAC-256 (00-0f-ac:13)
        * GMAC-128 (00-0f-ac:11)
        * GMAC-256 (00-0f-ac:12)
    Available Antennas: TX 0xf RX 0xf
    Configured Antennas: TX 0xf RX 0xf
    Supported interface modes:
        * IBSS
        * managed
        * AP
        * AP/VLAN
        * monitor
        * P2P-client
        * P2P-GO
```

## Band 2:

Capabilities: 0x9ff

RX LDPC

HT20/HT40

SM Power Save disabled

RX Greenfield

RX HT20 SGI

RX HT40 SGI

TX STBC

RX STBC 1-stream

Max AMSDU length: 7935 bytes

No DSSS/CCK HT40

Maximum RX AMPDU length 65535 bytes (exponent: 0x003)

Minimum RX AMPDU time spacing: 4 usec (0x05)

HT TX/RX MCS rate indexes supported: 0-31

VHT Capabilities (0x339b79f6):

Max MPDU length: 11454

Supported Channel Width: 160 MHz

RX LDPC

short GI (80 MHz)

short GI (160/80+80 MHz)

TX STBC

SU Beamformer

SU Beamformee

MU Beamformer

MU Beamformee

RX antenna pattern consistency

TX antenna pattern consistency

VHT RX MCS set:

1 streams: MCS 0-9

2 streams: MCS 0-9

3 streams: MCS 0-9

4 streams: MCS 0-9

5 streams: not supported

6 streams: not supported

7 streams: not supported

8 streams: not supported

VHT RX highest supported: 0 Mbps

VHT TX MCS set:

1 streams: MCS 0-9

2 streams: MCS 0-9

3 streams: MCS 0-9

4 streams: MCS 0-9

5 streams: not supported

6 streams: not supported

7 streams: not supported

8 streams: not supported

VHT TX highest supported: 0 Mbps

HE Iftypes: Station

HE MAC Capabilities (0x08011a000040):

+HTC HE Supported

```

Trigger Frame MAC Padding Duration: 2
OM Control
Maximum A-MPDU Length Exponent: 3
A-MSDU in A-MPDU
HE PHY Capabilities: (0x5c70ce126d00f3164e3f00):
HE40/HE80/5GHz
HE160/5GHz
HE160/HE80+80/5GHz
242 tone RUs/5GHz
Device Class: 1
LDPC Coding in Payload
HE SU PPDU with 1x HE-LTF and 0.8us GI
NDP with 4x HE-LTF and 3.2us GI
STBC Tx <= 80MHz
STBC Rx <= 80MHz
Full Bandwidth UL MU-MIMO
Partial Bandwidth UL MU-MIMO
DCM Max Constellation: 2
DCM Max Constellation Rx: 2
SU Beamformee
Beamformee STS <= 80Mhz: 3
Beamformee STS > 80Mhz: 3
Codebook Size SU Feedback
Codebook Size MU Feedback
Triggered CQI Feedback
Partial Bandwidth Extended Range
Partial Bandwidth DL MU-MIMO
PPE Threshold Present
Power Boost Factor ar
HE SU PPDU & HE PPDU 4x HE-LTF 0.8us GI
Max NC: 2
20MHz in 40MHz HE PPDU 2.4GHz
20MHz in 160/80+80MHz HE PPDU
80MHz in 160/80+80MHz HE PPDU
DCM Max BW: 1
Longer Than 16HE SIG-B OFDM Symbols
Non-Triggered CQI Feedback
TX 1024-QAM
RX 1024-QAM
RX Full BW SU Using HE MU PPDU with
Compression SIGB
RX Full BW SU Using HE MU PPDU with Non-
Compression SIGB
HE RX MCS and NSS set <= 80 MHz
1 streams: MCS 0-11
2 streams: MCS 0-11
3 streams: MCS 0-11
4 streams: MCS 0-11
5 streams: not supported
6 streams: not supported
7 streams: not supported

```

```

      8 streams: not supported
HE TX MCS and NSS set <= 80 MHz
      1 streams: MCS 0-11
      2 streams: MCS 0-11
      3 streams: MCS 0-11
      4 streams: MCS 0-11
      5 streams: not supported
      6 streams: not supported
      7 streams: not supported
      8 streams: not supported
HE RX MCS and NSS set 160 MHz
      1 streams: MCS 0-11
      2 streams: MCS 0-11
      3 streams: MCS 0-11
      4 streams: MCS 0-11
      5 streams: not supported
      6 streams: not supported
      7 streams: not supported
      8 streams: not supported
HE TX MCS and NSS set 160 MHz
      1 streams: MCS 0-11
      2 streams: MCS 0-11
      3 streams: MCS 0-11
      4 streams: MCS 0-11
      5 streams: not supported
      6 streams: not supported
      7 streams: not supported
      8 streams: not supported
HE RX MCS and NSS set 80+80 MHz
      1 streams: MCS 0-11
      2 streams: MCS 0-11
      3 streams: MCS 0-11
      4 streams: MCS 0-11
      5 streams: not supported
      6 streams: not supported
      7 streams: not supported
      8 streams: not supported
HE TX MCS and NSS set 80+80 MHz
      1 streams: MCS 0-11
      2 streams: MCS 0-11
      3 streams: MCS 0-11
      4 streams: MCS 0-11
      5 streams: not supported
      6 streams: not supported
      7 streams: not supported
      8 streams: not supported
PPE Threshold 0x3b 0x1c 0xc7 0x71 0x1c 0xc7 0x71
0x1c 0xc7 0x71
HE Iftypes: AP
HE MAC Capabilities (0x00051a081044):
    +HTC HE Supported
```

```
TWT Responder
BSR
OM Control
Maximum A-MPDU Length Exponent: 3
BQR
A-MSDU in A-MPDU
OM Control UL MU Data Disable RX
HE PHY Capabilities: (0x1c20ce926f1bafd0000c00):
HE40/HE80/5GHz
HE160/5GHz
HE160/HE80+80/5GHz
LDPC Coding in Payload
NDP with 4x HE-LTF and 3.2us GI
STBC Tx <= 80MHz
STBC Rx <= 80MHz
Full Bandwidth UL MU-MIMO
Partial Bandwidth UL MU-MIMO
DCM Max Constellation: 2
DCM Max Constellation Rx: 2
SU Beamformer
SU Beamformee
MU Beamformer
Beamformee STS <= 80Mhz: 3
Beamformee STS > 80Mhz: 3
Sounding Dimensions <= 80Mhz: 3
Sounding Dimensions > 80Mhz: 3
Codebook Size SU Feedback
Codebook Size MU Feedback
Triggered SU Beamforming Feedback
Triggered MU Beamforming Feedback
Partial Bandwidth Extended Range
PPE Threshold Present
Max NC: 2
STBC Tx > 80MHz
STBC Rx > 80MHz
TX 1024-QAM
RX 1024-QAM
HE RX MCS and NSS set <= 80 MHz
    1 streams: MCS 0-11
    2 streams: MCS 0-11
    3 streams: MCS 0-11
    4 streams: MCS 0-11
    5 streams: not supported
    6 streams: not supported
    7 streams: not supported
    8 streams: not supported
HE TX MCS and NSS set <= 80 MHz
    1 streams: MCS 0-11
    2 streams: MCS 0-11
    3 streams: MCS 0-11
    4 streams: MCS 0-11
```

5 streams: not supported  
6 streams: not supported  
7 streams: not supported  
8 streams: not supported

HE RX MCS and NSS set 160 MHz

1 streams: MCS 0-11  
2 streams: MCS 0-11  
3 streams: MCS 0-11  
4 streams: MCS 0-11  
5 streams: not supported  
6 streams: not supported  
7 streams: not supported  
8 streams: not supported

HE TX MCS and NSS set 160 MHz

1 streams: MCS 0-11  
2 streams: MCS 0-11  
3 streams: MCS 0-11  
4 streams: MCS 0-11  
5 streams: not supported  
6 streams: not supported  
7 streams: not supported  
8 streams: not supported

HE RX MCS and NSS set 80+80 MHz

1 streams: MCS 0-11  
2 streams: MCS 0-11  
3 streams: MCS 0-11  
4 streams: MCS 0-11  
5 streams: not supported  
6 streams: not supported  
7 streams: not supported  
8 streams: not supported

HE TX MCS and NSS set 80+80 MHz

1 streams: MCS 0-11  
2 streams: MCS 0-11  
3 streams: MCS 0-11  
4 streams: MCS 0-11  
5 streams: not supported  
6 streams: not supported  
7 streams: not supported  
8 streams: not supported

PPE Threshold 0x3b 0x1c 0xc7 0x71 0x1c 0xc7 0x71

0x1c 0xc7 0x71

Bitrates (non-HT):

- \* 6.0 Mbps
- \* 9.0 Mbps
- \* 12.0 Mbps
- \* 18.0 Mbps
- \* 24.0 Mbps
- \* 36.0 Mbps
- \* 48.0 Mbps
- \* 54.0 Mbps



## Frequencies:

```
* 5180 MHz [36] (20.0 dBm) (no IR)
* 5200 MHz [40] (20.0 dBm) (no IR)
* 5220 MHz [44] (20.0 dBm) (no IR)
* 5240 MHz [48] (20.0 dBm) (no IR)
* 5260 MHz [52] (20.0 dBm) (no IR, radar detection)
* 5280 MHz [56] (20.0 dBm) (no IR, radar detection)
* 5300 MHz [60] (20.0 dBm) (no IR, radar detection)
* 5320 MHz [64] (20.0 dBm) (no IR, radar detection)
* 5500 MHz [100] (20.0 dBm) (no IR, radar detection)
* 5520 MHz [104] (20.0 dBm) (no IR, radar detection)
* 5540 MHz [108] (20.0 dBm) (no IR, radar detection)
* 5560 MHz [112] (20.0 dBm) (no IR, radar detection)
* 5580 MHz [116] (20.0 dBm) (no IR, radar detection)
* 5600 MHz [120] (20.0 dBm) (no IR, radar detection)
* 5620 MHz [124] (20.0 dBm) (no IR, radar detection)
* 5640 MHz [128] (20.0 dBm) (no IR, radar detection)
* 5660 MHz [132] (20.0 dBm) (no IR, radar detection)
* 5680 MHz [136] (20.0 dBm) (no IR, radar detection)
* 5700 MHz [140] (20.0 dBm) (no IR, radar detection)
* 5720 MHz [144] (20.0 dBm) (no IR, radar detection)
* 5745 MHz [149] (20.0 dBm) (no IR)
* 5765 MHz [153] (20.0 dBm) (no IR)
* 5785 MHz [157] (20.0 dBm) (no IR)
* 5805 MHz [161] (20.0 dBm) (no IR)
* 5825 MHz [165] (20.0 dBm) (no IR)
* 5845 MHz [169] (disabled)
* 5865 MHz [173] (disabled)
```

## Supported commands:

```
* new_interface
* set_interface
* new_key
* start_ap
* new_station
* set_bss
* authenticate
* associate
* deauthenticate
* disassociate
* join_ibss
* remain_on_channel
* set_tx_bitrate_mask
* frame
* frame_wait_cancel
* set_wiphy_netns
* set_channel
* tdls_mgmt
* tdls_oper
* probe_client
* set_noack_map
* register_beacons
```

```

* start_p2p_device
* set_mcast_rate
* connect
* disconnect
* channel_switch
* set_qos_map
* set_multicast_to_unicast
* Unknown command (140)
software interface modes (can always be added):
* AP/VLAN
* monitor
valid interface combinations:
* #{ IBSS } <= 1, #{ AP } <= 16, #{ managed } <= 19,
  total <= 19, #channels <= 1, STA/AP BI must match, radar
detect widths: { 20 MHz (no HT), 20 MHz, 40 MHz, 80
MHz, 80+80 MHz, 160 MHz }

HT Capability overrides:
* MCS: ff ff ff ff ff ff ff ff ff
* maximum A-MSDU length
* supported channel width
* short GI for 40 MHz
* max A-MPDU length exponent
* min MPDU start spacing
Device supports TX status socket option.
Device supports HT-IBSS.
Device supports SAE with AUTHENTICATE command
Device supports low priority scan.
Device supports scan flush.
Device supports AP scan.
Device supports per-vif TX power setting
Driver supports full state transitions for AP/GO clients
Driver supports a userspace MPM
Device supports active monitor (which will ACK incoming frames)
Device supports configuring vdev MAC-addr on create.
max # scan plans: 1
max scan plan interval: -1
max scan plan iterations: 0
Supported TX frame types:
* IBSS: 0x00 0x10 0x20 0x30 0x40 0x50 0x60 0x70 0x80 0x90
0xa0 0xb0 0xc0 0xd0 0xe0 0xf0
* managed: 0x00 0x10 0x20 0x30 0x40 0x50 0x60 0x70 0x80
0x90 0xa0 0xb0 0xc0 0xd0 0xe0 0xf0
* AP: 0x00 0x10 0x20 0x30 0x40 0x50 0x60 0x70 0x80 0x90
0xa0 0xb0 0xc0 0xd0 0xe0 0xf0
* AP/VLAN: 0x00 0x10 0x20 0x30 0x40 0x50 0x60 0x70 0x80
0x90 0xa0 0xb0 0xc0 0xd0 0xe0 0xf0
* mesh point: 0x00 0x10 0x20 0x30 0x40 0x50 0x60 0x70 0x80
0x90 0xa0 0xb0 0xc0 0xd0 0xe0 0xf0
* P2P-client: 0x00 0x10 0x20 0x30 0x40 0x50 0x60 0x70 0x80
0x90 0xa0 0xb0 0xc0 0xd0 0xe0 0xf0

```

```
* P2P-GO: 0x00 0x10 0x20 0x30 0x40 0x50 0x60 0x70 0x80 0x90
0xa0 0xb0 0xc0 0xd0 0xe0 0xf0
* P2P-device: 0x00 0x10 0x20 0x30 0x40 0x50 0x60 0x70 0x80
0x90 0xa0 0xb0 0xc0 0xd0 0xe0 0xf0
Supported RX frame types:
* IBSS: 0x40 0xb0 0xc0 0xd0
* managed: 0x40 0xb0 0xd0
* AP: 0x00 0x20 0x40 0xa0 0xb0 0xc0 0xd0
* AP/VLAN: 0x00 0x20 0x40 0xa0 0xb0 0xc0 0xd0
* mesh point: 0xb0 0xc0 0xd0
* P2P-client: 0x40 0xd0
* P2P-GO: 0x00 0x20 0x40 0xa0 0xb0 0xc0 0xd0
* P2P-device: 0x40 0xd0
Supported extended features:
* [ VHT_IBSS ]: VHT-IBSS
* [ RRM ]: RRM
* [ BEACON_RATE_LEGACY ]: legacy beacon rate setting
* [ BEACON_RATE_HT ]: HT beacon rate setting
* [ BEACON_RATE_VHT ]: VHT beacon rate setting
* [ FILS_STA ]: STA FILS (Fast Initial Link Setup)
* [ CQM_RSSI_LIST ]: multiple CQM_RSSI_THOLD records
* [ CONTROL_PORT_OVER_NL80211 ]: control port over nl80211
* [ TXQS ]: FQ-CoDel-enabled intermediate TXQs
* [ AIRTIME_FAIRNESS ]: airtime fairness scheduling
* [ AQL ]: Airtime Queue Limits (AQL)
* [ SCAN_RANDOM_SN ]: use random sequence numbers in scans
* [ SCAN_MIN_PREQ_CONTENT ]: use probe request with only
rate IEs in scans
* [ CONTROL_PORT_NO_PREAUTH ]: disable pre-auth over nl80211
control port support
* [ DEL_IBSS_STA ]: deletion of IBSS station support
* [ SCAN_FREQ_KHZ ]: scan on kHz frequency support
* [ CONTROL_PORT_OVER_NL80211_TX_STATUS ]: tx status for
nl80211 control port support
Wiphy phy0
wiphy index: 0
max # scan SSIDs: 4
max scan IEs length: 2200 bytes
max # sched scan SSIDs: 0
max # match sets: 0
Retry short limit: 7
Retry long limit: 4
Coverage class: 0 (up to 0m)
Device supports RSN-IBSS.
Device supports AP-side u-APSD.
Device supports T-DLS.
Supported Ciphers:
* WEP40 (00-0f-ac:1)
* WEP104 (00-0f-ac:5)
* TKIP (00-0f-ac:2)
* CCMP-128 (00-0f-ac:4)
```

```
* CCMP-256 (00-0f-ac:10)
* GCMP-128 (00-0f-ac:8)
* GCMP-256 (00-0f-ac:9)
* CMAC (00-0f-ac:6)
* CMAC-256 (00-0f-ac:13)
* GMAC-128 (00-0f-ac:11)
* GMAC-256 (00-0f-ac:12)
Available Antennas: TX 0xf RX 0xf
Configured Antennas: TX 0xf RX 0xf
Supported interface modes:
  * IBSS
  * managed
  * AP
  * AP/VLAN
  * monitor
  * P2P-client
  * P2P-GO
Band 1:
  Capabilities: 0x9ff
    RX LDPC
    HT20/HT40
    SM Power Save disabled
    RX Greenfield
    RX HT20 SGI
    RX HT40 SGI
    TX STBC
    RX STBC 1-stream
    Max AMSDU length: 7935 bytes
    No DSSS/CCK HT40
  Maximum RX AMPDU length 65535 bytes (exponent: 0x003)
  Minimum RX AMPDU time spacing: 4 usec (0x05)
  HT TX/RX MCS rate indexes supported: 0-31
  HE Ifypes: Station
    HE MAC Capabilities (0x08011a000040):
      +HTC HE Supported
      Trigger Frame MAC Padding Duration: 2
      OM Control
      Maximum A-MPDU Length Exponent: 3
      A-MSDU in A-MPDU
    HE PHY Capabilities: (0x2270ce126d00f3164e3f00):
      HE40/2.4GHz
      242 tone RUs/2.4GHz
      Device Class: 1
      LDPC Coding in Payload
      HE SU PPDU with 1x HE-LTF and 0.8us GI
      NDP with 4x HE-LTF and 3.2us GI
      STBC Tx <= 80MHz
      STBC Rx <= 80MHz
      Full Bandwidth UL MU-MIMO
      Partial Bandwidth UL MU-MIMO
      DCM Max Constellation: 2
```

```

DCM Max Constellation Rx: 2
SU Beamformee
Beamformee STS <= 80Mhz: 3
Beamformee STS > 80Mhz: 3
Codebook Size SU Feedback
Codebook Size MU Feedback
Triggered CQI Feedback
Partial Bandwidth Extended Range
Partial Bandwidth DL MU-MIMO
PPE Threshold Present
Power Boost Factor ar
HE SU PPDU & HE PPDU 4x HE-LTF 0.8us GI
Max NC: 2
20MHz in 40MHz HE PPDU 2.4GHz
20MHz in 160/80+80MHz HE PPDU
80MHz in 160/80+80MHz HE PPDU
DCM Max BW: 1
Longer Than 16HE SIG-B OFDM Symbols
Non-Triggered CQI Feedback
TX 1024-QAM
RX 1024-QAM
RX Full BW SU Using HE MU PPDU with

```

Compression SIGB

```

RX Full BW SU Using HE MU PPDU with Non-

```

Compression SIGB

```

HE RX MCS and NSS set <= 80 MHz
    1 streams: MCS 0-11
    2 streams: MCS 0-11
    3 streams: MCS 0-11
    4 streams: MCS 0-11
    5 streams: not supported
    6 streams: not supported
    7 streams: not supported
    8 streams: not supported

```

```

HE TX MCS and NSS set <= 80 MHz
    1 streams: MCS 0-11
    2 streams: MCS 0-11
    3 streams: MCS 0-11
    4 streams: MCS 0-11
    5 streams: not supported
    6 streams: not supported
    7 streams: not supported
    8 streams: not supported

```

```

PPE Threshold 0x3b 0x1c 0xc7 0x71 0x1c 0xc7 0x71

```

0x1c 0xc7 0x71

HE Iftypes: AP

```

HE MAC Capabilities (0x00051a081044):

```

```

+HTC HE Supported
TWT Responder
BSR
OM Control

```

```
Maximum A-MPDU Length Exponent: 3
BQR
A-MSDU in A-MPDU
OM Control UL MU Data Disable RX
HE PHY Capabilities: (0x0220ce926f1bafd0000c00):
HE40/2.4GHz
LDPC Coding in Payload
NDP with 4x HE-LTF and 3.2us GI
STBC Tx <= 80MHz
STBC Rx <= 80MHz
Full Bandwidth UL MU-MIMO
Partial Bandwidth UL MU-MIMO
DCM Max Constellation: 2
DCM Max Constellation Rx: 2
SU Beamformer
SU Beamformee
MU Beamformer
Beamformee STS <= 80Mhz: 3
Beamformee STS > 80Mhz: 3
Sounding Dimensions <= 80Mhz: 3
Sounding Dimensions > 80Mhz: 3
Codebook Size SU Feedback
Codebook Size MU Feedback
Triggered SU Beamforming Feedback
Triggered MU Beamforming Feedback
Partial Bandwidth Extended Range
PPE Threshold Present
Max NC: 2
STBC Tx > 80MHz
STBC Rx > 80MHz
TX 1024-QAM
RX 1024-QAM
HE RX MCS and NSS set <= 80 MHz
    1 streams: MCS 0-11
    2 streams: MCS 0-11
    3 streams: MCS 0-11
    4 streams: MCS 0-11
    5 streams: not supported
    6 streams: not supported
    7 streams: not supported
    8 streams: not supported
HE TX MCS and NSS set <= 80 MHz
    1 streams: MCS 0-11
    2 streams: MCS 0-11
    3 streams: MCS 0-11
    4 streams: MCS 0-11
    5 streams: not supported
    6 streams: not supported
    7 streams: not supported
    8 streams: not supported
PPE Threshold 0x3b 0x1c 0xc7 0x71 0x1c 0xc7 0x71
```

0x1c 0xc7 0x71

Bitrates (non-HT):

- \* 1.0 Mbps (short preamble supported)
- \* 2.0 Mbps (short preamble supported)
- \* 5.5 Mbps (short preamble supported)
- \* 11.0 Mbps (short preamble supported)
- \* 6.0 Mbps
- \* 9.0 Mbps
- \* 12.0 Mbps
- \* 18.0 Mbps
- \* 24.0 Mbps
- \* 36.0 Mbps
- \* 48.0 Mbps
- \* 54.0 Mbps

Frequencies:

- \* 2412 MHz [1] (20.0 dBm)
- \* 2417 MHz [2] (20.0 dBm)
- \* 2422 MHz [3] (20.0 dBm)
- \* 2427 MHz [4] (20.0 dBm)
- \* 2432 MHz [5] (20.0 dBm)
- \* 2437 MHz [6] (20.0 dBm)
- \* 2442 MHz [7] (20.0 dBm)
- \* 2447 MHz [8] (20.0 dBm)
- \* 2452 MHz [9] (20.0 dBm)
- \* 2457 MHz [10] (20.0 dBm)
- \* 2462 MHz [11] (20.0 dBm)
- \* 2467 MHz [12] (20.0 dBm) (no IR)
- \* 2472 MHz [13] (20.0 dBm) (no IR)
- \* 2484 MHz [14] (20.0 dBm) (no IR)

Supported commands:

- \* new\_interface
- \* set\_interface
- \* new\_key
- \* start\_ap
- \* new\_station
- \* set\_bss
- \* authenticate
- \* associate
- \* deauthenticate
- \* disassociate
- \* join\_ibss
- \* remain\_on\_channel
- \* set\_tx\_bitrate\_mask
- \* frame
- \* frame\_wait\_cancel
- \* set\_wiphy\_netns
- \* set\_channel
- \* tdls\_mgmt
- \* tdls\_oper
- \* probe\_client
- \* set\_noack\_map

```

* register_beacons
* start_p2p_device
* set_mcast_rate
* connect
* disconnect
* channel_switch
* set_qos_map
* set_multicast_to_unicast
* Unknown command (140)
software interface modes (can always be added):
* AP/VLAN
* monitor
valid interface combinations:
* #{ IBSS } <= 1, #{ AP } <= 16, #{ managed } <= 19,
  total <= 19, #channels <= 1, STA/AP BI must match, radar
detect widths: { 20 MHz (no HT), 20 MHz, 40 MHz, 80
MHz, 80+80 MHz, 160 MHz }

HT Capability overrides:
* MCS: ff ff ff ff ff ff ff ff ff
* maximum A-MSDU length
* supported channel width
* short GI for 40 MHz
* max A-MPDU length exponent
* min MPDU start spacing
Device supports TX status socket option.
Device supports HT-IBSS.
Device supports SAE with AUTHENTICATE command
Device supports low priority scan.
Device supports scan flush.
Device supports AP scan.
Device supports per-vif TX power setting
Driver supports full state transitions for AP/GO clients
Driver supports a userspace MPM
Device supports active monitor (which will ACK incoming frames)
Device supports configuring vdev MAC-addr on create.
max # scan plans: 1
max scan plan interval: -1
max scan plan iterations: 0
Supported TX frame types:
* IBSS: 0x00 0x10 0x20 0x30 0x40 0x50 0x60 0x70 0x80 0x90
0xa0 0xb0 0xc0 0xd0 0xe0 0xf0
* managed: 0x00 0x10 0x20 0x30 0x40 0x50 0x60 0x70 0x80
0x90 0xa0 0xb0 0xc0 0xd0 0xe0 0xf0
* AP: 0x00 0x10 0x20 0x30 0x40 0x50 0x60 0x70 0x80 0x90
0xa0 0xb0 0xc0 0xd0 0xe0 0xf0
* AP/VLAN: 0x00 0x10 0x20 0x30 0x40 0x50 0x60 0x70 0x80
0x90 0xa0 0xb0 0xc0 0xd0 0xe0 0xf0
* mesh point: 0x00 0x10 0x20 0x30 0x40 0x50 0x60 0x70 0x80
0x90 0xa0 0xb0 0xc0 0xd0 0xe0 0xf0
* P2P-client: 0x00 0x10 0x20 0x30 0x40 0x50 0x60 0x70 0x80

```



```

0x90 0xa0 0xb0 0xc0 0xd0 0xe0 0xf0
    * P2P-GO: 0x00 0x10 0x20 0x30 0x40 0x50 0x60 0x70 0x80 0x90
0xa0 0xb0 0xc0 0xd0 0xe0 0xf0
    * P2P-device: 0x00 0x10 0x20 0x30 0x40 0x50 0x60 0x70 0x80
0x90 0xa0 0xb0 0xc0 0xd0 0xe0 0xf0
    Supported RX frame types:
        * IBSS: 0x40 0xb0 0xc0 0xd0
        * managed: 0x40 0xb0 0xd0
        * AP: 0x00 0x20 0x40 0xa0 0xb0 0xc0 0xd0
        * AP/VLAN: 0x00 0x20 0x40 0xa0 0xb0 0xc0 0xd0
        * mesh point: 0xb0 0xc0 0xd0
        * P2P-client: 0x40 0xd0
        * P2P-GO: 0x00 0x20 0x40 0xa0 0xb0 0xc0 0xd0
        * P2P-device: 0x40 0xd0
    Supported extended features:
        * [ VHT_IBSS ]: VHT-IBSS
        * [ RRM ]: RRM
        * [ BEACON_RATE_LEGACY ]: legacy beacon rate setting
        * [ BEACON_RATE_HT ]: HT beacon rate setting
        * [ BEACON_RATE_VHT ]: VHT beacon rate setting
        * [ FILS_STA ]: STA FILS (Fast Initial Link Setup)
        * [ CQM_RSSI_LIST ]: multiple CQM_RSSI_THRESHOLD records
        * [ CONTROL_PORT_OVER_NL80211 ]: control port over nl80211
        * [ TXQS ]: FQ-CoDel-enabled intermediate TXQs
        * [ AIRTIME_FAIRNESS ]: airtime fairness scheduling
        * [ AQL ]: Airtime Queue Limits (AQL)
        * [ SCAN_RANDOM_SN ]: use random sequence numbers in scans
        * [ SCAN_MIN_PREQ_CONTENT ]: use probe request with only
rate IEs in scans
        * [ CONTROL_PORT_NO_PREAUTH ]: disable pre-auth over nl80211
control port support
        * [ DEL_IBSS_STA ]: deletion of IBSS station support
        * [ SCAN_FREQ_KHZ ]: scan on kHz frequency support
        * [ CONTROL_PORT_OVER_NL80211_TX_STATUS ]: tx status for
nl80211 control port support

```

## hostapd-config

2g4-config (wlan0):

```

#ctrl_interface=/var/run/hostapd
#ctrl_interface_group=0 # These 2 are just parameters so that the hostap
daemon
runs.

interface=wlan0
driver=nl80211

ssid=r3_AP0

```

```
hw_mode=g
#channel=2
#channel=4
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
```

5g-config (wlan1):

```
ctrl_interface=/var/run/hostapd_2
#ctrl_interface_group=0 # These 2 are just parameters so that the hostap
daemon
runs.

interface=wlan1
driver=nl80211

ssid=r3_AP1

#2.4G
hw_mode=g
channel=1

#5G-Support
country_code=DE
ieee80211n=1
ieee80211d=1
hw_mode=a

#34-50 step 2
channel=36
#channel=149

ieee80211h=1
require_vht=1
ht_capab=[GF][HT40+][SHORT-GI-20][SHORT-GI-40][RX-STBC1][DSSS_CCK-40]
vht_oper_chwidth=1
vht_capab=[SHORT-GI-80][RX-STBC-1][RX-ANTENNA-PATTERN][TX-ANTENNA-PATTERN]

#42 would be the centered frequency center channel number for 36 primary
#channel only if this were a 80 MHz channel, so the combination here is
#invalid. You would either need to change this to use vht_oper_chwidth=1
#or set vht_oper_cent_freq_seg0_idx=0 if you want to use a 40 MHz
#channel.
```

```
#for ch36:
vht_oper_centr_freq_seg0_idx=42
#for ch149:
#vht_oper_centr_freq_seg0_idx=155

#channel=60
ieee80211ac=1
wmm_enabled=1

#security
wpa=2
wpa_passphrase=12345678
wpa_key_mgmt=WPA-PSK
wpa_pairwise=TKIP CCMP
#ignore_broadcast_ssid=0
auth_algs=1
#rsn_pairwise=CCMP

#macaddr_acl=0
#accept_mac_file=/etc/hostapd/acl_accept
#deny_mac_file=/etc/hostapd/acl_deny

#macaddr_acl=1
#accept_mac_file=/etc/hostapd/hostapd.allow
```

running hostapd:

```
hostapd -d hostapd_wlan0.conf &> /tmp/hostapd_wlan0.log &
hostapd -d hostapd_wlan1.conf &> /tmp/hostapd_wlan1.log &
```

Leds are not yet working properly (2g4 is mapped by mt76 driver and can be switched on manually but not off, 5g led is still missing)

## Virtual SSID

<https://medium.com/@renaudcerrato/how-to-setup-a-virtual-ssid-with-hostapd-804c13c9a3c2>

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