WLAN

see too (especially for hostapd config): wlan

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

WiFi connectors are U.FL

without rfkill 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

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:
                        qsz-byt qsz-pkt flows   drops   marks   overlmt
hashcol tx-bytes        tx-packets
                        0       0       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:
                        qsz-byt qsz-pkt flows   drops   marks   overlmt
hashcol tx-bytes        tx-packets
                        0       0       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 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 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: (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 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
```

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
#interface=ap0
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
#interface=ap0
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_centr_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)