APPLICATION NOTE

ATBM BLE 认证测试指令

ATBM606X

1x1
802.11b/g/n/ax
Wi-Fi/BLE 芯片

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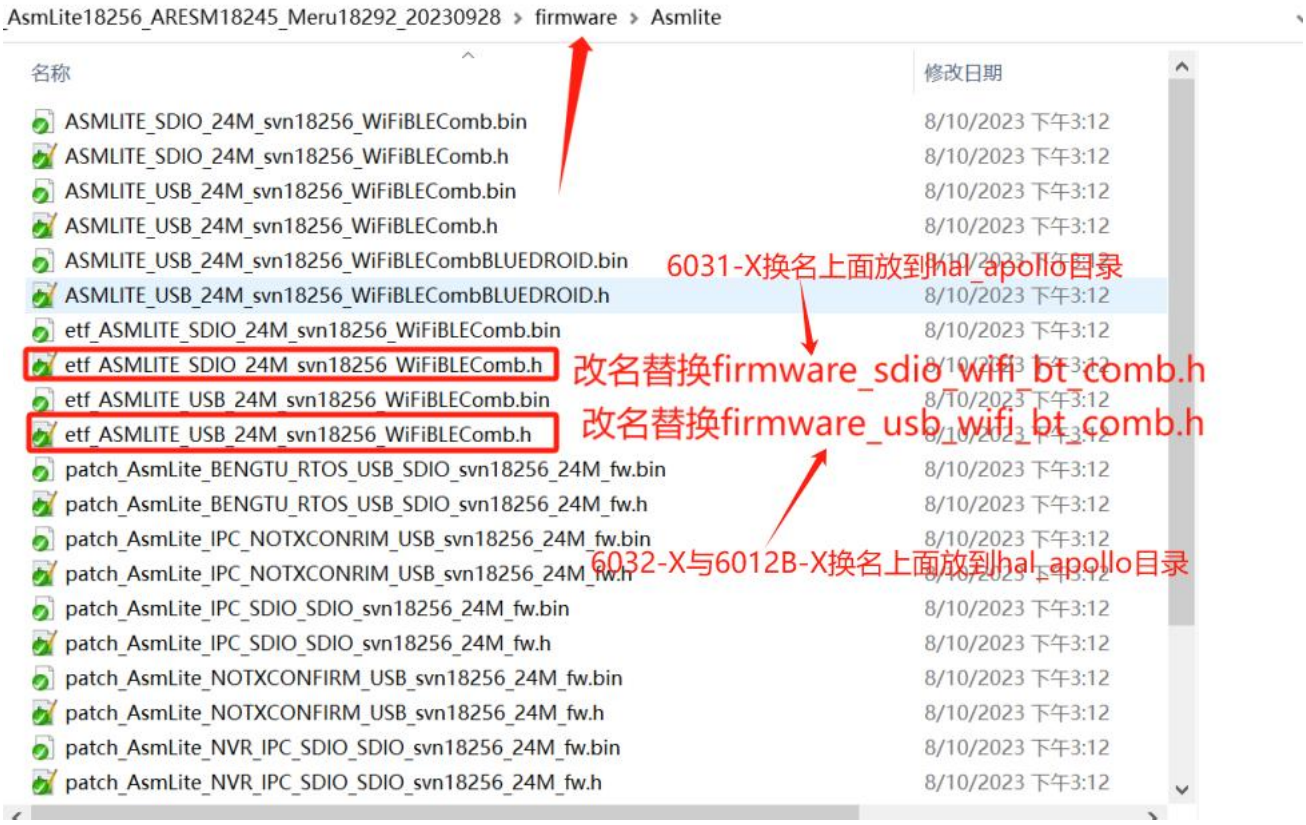
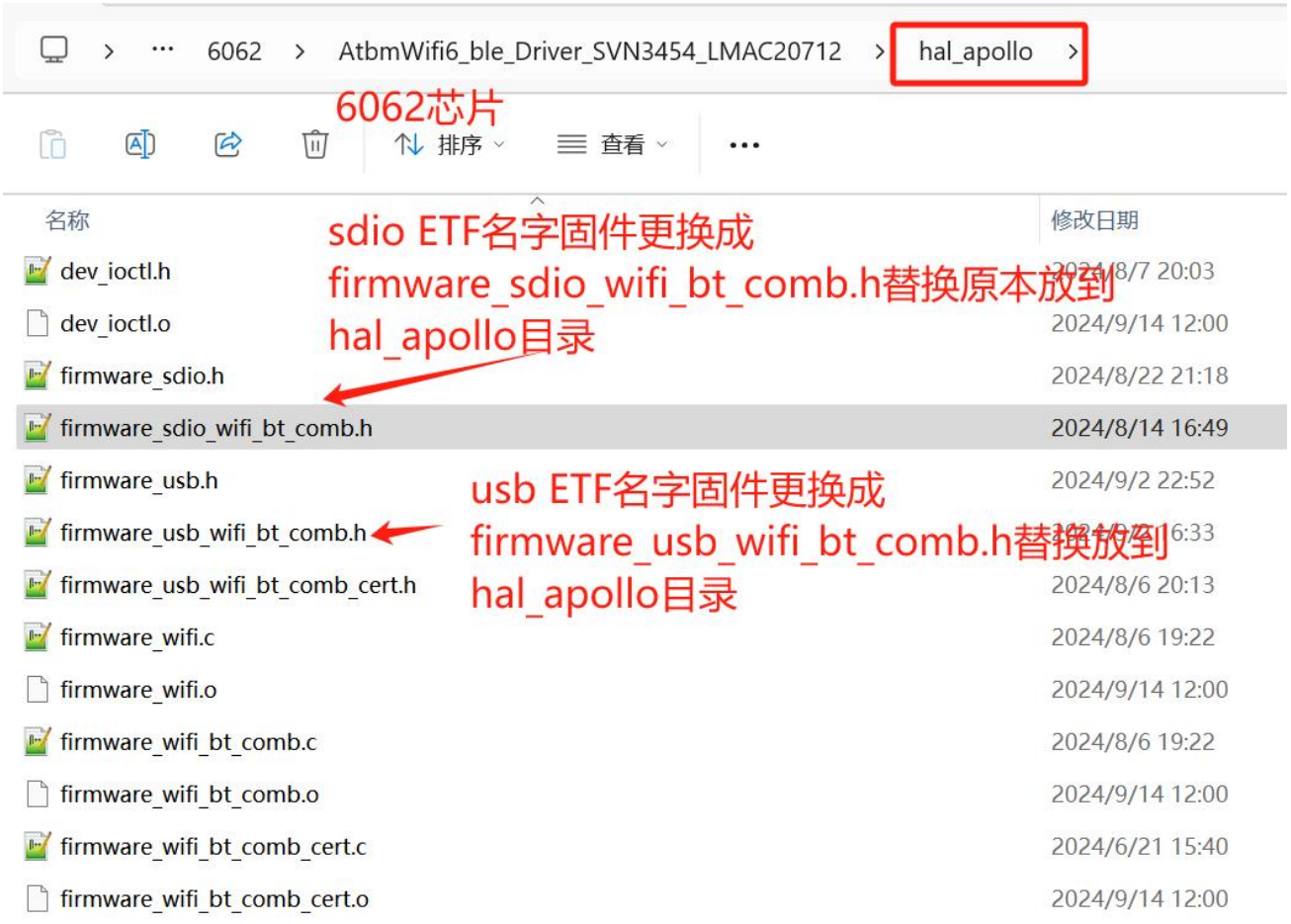
作者	版本	说明
Fuzhenzhou	V1.0	init

1 Linux 长电系列芯片固件替换方法

6062、6031、6032、6132、6012B 芯片需要在 firmware 目录下把下图文件名字带有 ETF 开头.h 文件改名后放在 hal_apollo 目录下替换编译生成专门测试 BLE 固件。





其他芯片请对应下面型号命名

芯片型号	WiFi+BLE comb firmware
ATBM6031-X	firmware_sdio_wifi_bt_comb.h
ATBM6032-X	firmware_usb_wifi_bt_comb.h
ATBM6132	firmware_usb_mercurius_wifi_bt_comb.h
ATBM6132C	
ATBM6062	firmware_sdio_wifi_bt_comb_cronus.h firmware_usb_wifi_bt_comb_cronus.h
ATBM6062C	firmware_sdio_wifi_bt_comb_clite.h firmware_usb_wifi_bt_comb_clite.h
ATBM6162	firmware_sdio_wifi_bt_comb_ocea.h firmware_usb_wifi_bt_comb_ocea.h

更换完后请确认版本号跟替换 etf 固件版本号是否一致:

```
618556]    Input buffers: 18 x 1648 bytes
618556]    Hardware: 7.0
618556]    WSM firmware [=MODEM=RF=Ares_AX Feb 23 2024 18:03:05], ver: 19624, build: 4144, api
618558] [atbm_log]:EFUSE(8)                                    [0]
618560] [atbm_log]:EFUSE(I)                                          [0]
618563] [atbm_log]:EFUSE(B)                              [0]
618566] [atbm_log]:CAPABILITIES_ATBM_PRIVATE_IE  [0]
618569] [atbm_log]:CAPABILITIES_NVR_IPC  [0]
618572] [atbm_log]:CAPABILITIES_NO_CONFIRM  [1]
618575] [atbm_log]:CAPABILITIES_SDIO_PATCH  [0]
618578] [atbm_log]:CAPABILITIES_NO_BACKOFF  [0]
```

Ble log:

```
root@TinaLinux:/# atbm_ble
======>>atbm_ble_start>>>
nimble_port_init++
nimble_host_task
FD_CLOEXEC set
ble_coexist_start--
hif_ioctl_loop
get_command_func
ble_hs_sync:333
ble_hs_hci_cmd_tx:352
ble_smart_cfg_startup!11

[ATBM 1OG]set default tx power(0)
ble_hs_hci_cmd_tx:352
error setting advertisement data; rc=513
pub addr 98:a8:29:ad:9a:b5
```

替换成功启动ble广播就会失败

1.1 加载驱动：

insmod ATBM606x_wifi_usb.ko wifi_bt_comb=1 //请根据实际驱动名字

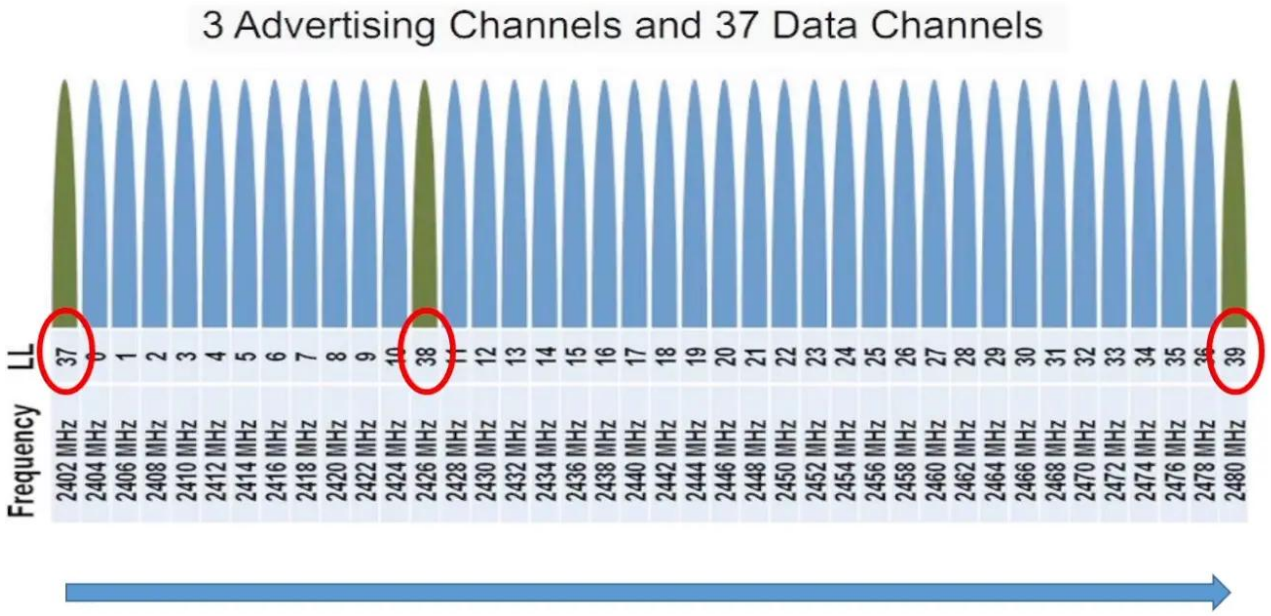
2 Linux 长电系列非信令测试

./nimble_linux & //需要把 BLE 协议栈运行起来才能测试

killall wpa_supplicant //测试时候需要把 sta 功能关闭

killall hostapd //测试时候需要把 ap 功能关闭

3 BLE RF 信道介绍



4 BLE 非信令测试指令

4.1 开启 DTM TX 测试

指令	btshell dtm-tx
格式	btshell dtm-tx chan=<channel> len=<length> payload=<packet_Payload> phyMode=<PHY Mode>
参数	<channel> : 信道 channel = (F-2402)/2，用十六进制表示，是 RF channel 不是 Channel index 比如 channel=2 反推 RF channel 为 2406 公式:(2406-2402)/2=2 <length> : Length in bytes of payload data in each packet (0x00-0xff) <packet_Payload>: 0x00 PRBS9 0x01 Repeated '11110000' 0x02 Repeated '10101010' 0x03 PRBS15 0x04 Repeated '11111111' 0x05 Repeated '00000000' 0x06 Repeated '00001111' 0x07 Repeated '01010101'

	<PHY Mode>: 1 1M PHY 2 2M PHY 3 S8 Code PHY 4 S2 Code PHY
功能描述	开始 Direct Test TX Mode
返回值	OK or Fail
Linux 长供电系列	atbm_cli btshell dtm-tx chan=2 len=27 payload=1 phyMode=1

4.2 停止 DTM TX 测试

指令	btshell dtm-tx stop
格式	btshell dtm-tx stop
参数	无
功能描述	结束 Direct Test TX Mode
返回值	OK or Fail
Linux 长供电系列	atbm_cli btshell dtm-tx stop

4.3 启动 DTM RX 测试

指令	btshell dtm-rx
格式	btshell dtm-rx chan=<channel> phyMode=<PHY Mode>
参数	<channel> : 信道 channel = (F-2402)/2，用十六进制表示，是 RF channel 不是 Channel index 比如 channel=2 反推 RF channel 为 2406 公式:(2406-2402)/2=2 <PHY Mode>: 1 1M PHY 2 2M PHY 3 Receiver set to use the LE Coded PHY
功能描述	开始 Direct Test RX Mode 1. ifconfig wlan0 up 2. 需要打开 lmac 打印（iwpriv wlan0 fwdbg 1）。 3. 需要调用 btshell dtm-rx stop 指令后查看字符串“ll_dtm_end:”收到多少包。
返回值	OK or Fail
Linux 长供电系列	atbm_cli btshell dtm-rx chan=2 phyMode=1

4.4 停止 DTM RX 测试

指令	btshell dtm-rx stop
格式	btshell dtm-rx stop
参数	无
功能描述	结束 Direct Test RX Mode

返回值	OK or Fail
Linux 长供电系列	atbm_cli btshell dtm-rx stop

4.5 启动单载波测试

指令	btshell tone-tx
格式	btshell tone-tx chan=<channel> power=<level>
参数	<channel> : 信道 channel = (F-2402)/2，用十六进制表示，是 RF channel 不是 Channel index 比如 channel=2 反推 RF channel 为 2406 公式:(2406-2402)/2=2 <level> :0 或者 1 等级
功能描述	启动单载波测试
返回值	OK or Fail
Linux 长供电系列	atbm_cli btshell tone-tx chan=0 power=0

4.6 停止单载波测试

指令	btshell tone-tx stop
格式	btshell tone-tx stop
参数	无
功能描述	停止单载波测试
返回值	OK or Fail
Linux 长供电系列	atbm_cli btshell tone-tx stop

4.7 修改发射功率

指令	btshell pwr-set
格式	btshell pwr-set tx_pwr=<level>
参数	tx_pwr=<level> 范围值(0 ~ 15)在启动发包之前设置功率
功能描述	修改 ble 发射功率
返回值	OK or Fail
Linux 长供电系列	atbm_cli btshell pwr-set tx_pwr=0

5 Linux 长电系列 DTM 信令测试

不需要执行./nimble_linux &

需要找出芯片 uart 飞线出来：

芯片串口波特率 115200,8,1, 无校验，无 RTS/CTS

芯片 uart 默认有 log 输出，也可以输入按回车看看有没有反应

```
]dsss1,0,clear4,Err0,unsup0,pwrup0,lost0
]num[tx1,rx0],idle[236,0]
]ofdm[229,19],dsss[1,0],over0,sound0
]AckTimeout[189,31,63351],ChLen[0,205,24,0,0]
]ppm-1,cnt127
]gain26
]rssi-41,gain28->26,small0
]CPU: 1%
]Temp68,ccast1,psm50001,inig26->28,nodBm-57,sig0
]dsss0,1,clear1,Err0,unsup0,pwrup0,lost0
]num[tx1,rx0],idle[1024,0]
]ofdm[0,0],dsss[0,0],over0,sound0
]AckTimeout[60,10,0],ChLen[0,52,7,0,0]
]gain26
]rssi-41,gain26->26,small0
]Temp68,ccast1,psm50001,inig26->34,nodBm-68,sig0
]dsss0,0,clear1,Err0,unsup0,pwrup0,lost0
]num[tx1,rx0],idle[1024,0]
]ofdm[0,0],dsss[0,0],over0,sound0
]AckTimeout[171,10,1],ChLen[0,14,1,0,0]
]ppm-1,cnt127
]CPU: 1%
]Temp68,ccast0,psm5,inig26->0,nodBm-97,sig0
]dsss0,0,clear0,Err0,unsup0,pwrup0,lost0
]num[tx0,rx0],idle[0,0]
]ofdm[0,0],dsss[0,0],over0,sound0
]AckTimeout[162,19,0],ChLen[0,45,4,0,0]
]gain30
]rssi-44,gain26->30,small0
]Temp68,ccast1,psm50001,inig30->40,nodBm-73,sig0
]dsss0,0,clear15,Err0,unsup0,pwrup0,lost0
]num[tx1,rx0],idle[796,0]
]ofdm[0,0],dsss[1,0],over0,sound0
]AckTimeout[208,44,3756],ChLen[0,47,7,0,0]
]gain30
]rssi-44,gain30->30,small0
]ppm-1,cnt127
```

Linux soc 主机串口需要输入命令把 wifi 芯片串口切换成 ble UART HCI 测试模式，

首先要将 wlan0 给启动起来：

ifconfig wlan0 up

启动成功之后，通过如下命令可以切换 ble UART HCI 模式，还是普通模式

iwpriv wlan0 fwcmd set_ble_uart,1 //切换 wifi 芯片 debug uart 到 ble UART HCI 模式

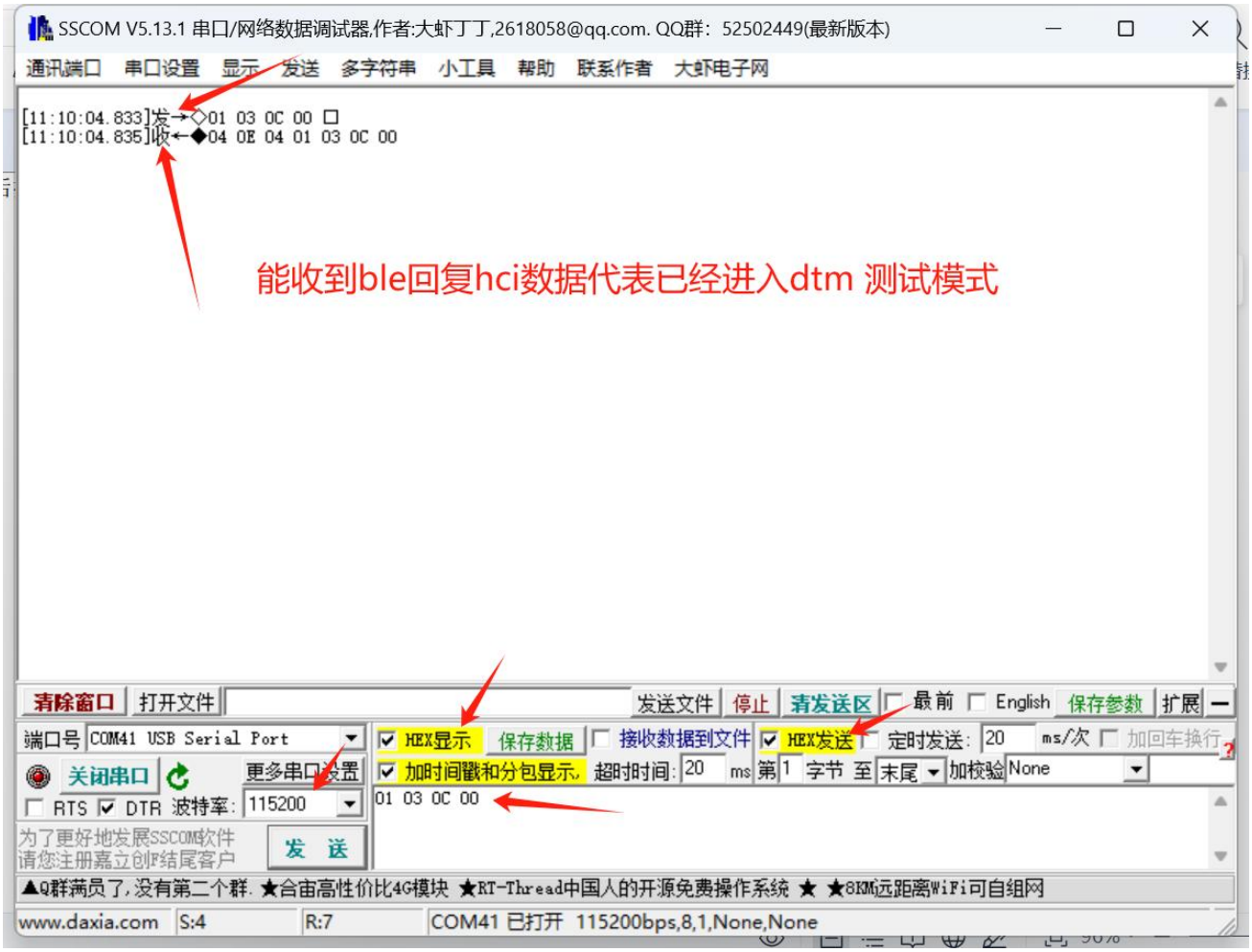
WiFi 芯片串口当切换到 UART HCI 模式之后，我们的 WiFi 芯片串口无法再输入指令，此时给我们 WiFi 芯片的串口发送

Send COM: 01 03 0C 00 (hex 进制非字符串，Reset 指令)

可以看到我们的串口的回复，即进入 UART HCI 测试模式成功，可以接测试仪器进行测试

Receive COM: 04 0E 04 01 03 0C 00 (7 bytes)

另外用一个串口接到芯片串口 tx 和 rx 使用 SSCOM 工具发 hex 数据测试



最后把芯片串口接到测试仪器 CMW500 测试就可以了

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