

A33

Android L WiFi-BT-GPS

配置说明

Revision History

Version	Date	Section/ Page	Changes compared to previous issue
V0.1	2014-12-15	BU2-PD1	initial version for sdk v1.0

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1 概述

目前 A33 android5.0 平台上支持的 WiFi、BT 模组请参考《A33 WiFi&BT&GPS 支持列表_V1.00》，
本文档将以 A33 h7 方案为例一一说明如何配置每款模组。

WiFi 可分 USB 接口和 SDIO 接口两种类型，wifi 的全功能包括 station、softap 和 wifi direct。
BT 基本都采用 UART 接口通信。

本文档会不断的更新，文档和代码对应可能会稍有差别。

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2 rtl8188eu/rtl8188etv

功能：wifi（station/softap/p2p）

接口类型：USB

说明：rtl8188eu 和 8188etv 使用相同的驱动，以下以 rtl8188eu 为例说明

2.1 .config

.config 中需要配置如下选项，将 wifi driver 编译为模块

CONFIG_RTL8188EU = m

2.2 BoardConfig.mk

BoardConfig.mk 文件决定 android 要加载哪一款 wifi 模组，要配置成使用 rtl8188eu 模组需要把 BoardConfig.mk 文件修改成如下（部分代码）。

```
# 1. Wifi Configuration
BOARD_WIFI_VENDOR := realtek

# 1.1 realtek wifi support
ifeq ($(BOARD_WIFI_VENDOR), realtek)
    WPA_SUPPLICANT_VERSION := VER_0_8_X
    BOARD_WPA_SUPPLICANT_DRIVER := NL80211
    BOARD_WPA_SUPPLICANT_PRIVATE_LIB := lib_driver_cmd_rtl
    BOARD_HOSTAPD_DRIVER := NL80211
    BOARD_HOSTAPD_PRIVATE_LIB := lib_driver_cmd_rtl

    BOARD_USR_WIFI := rtl8188eu
    BOARD_WLAN_DEVICE := rtl8188eu
endif
```

说明：

- 1、“#” 符号起注释作用；
- 2、BOARD_WIFI_VENDOR := realtek 指明使用 realtek 的 wifi 模组；
- 3、BOARD_USR_WIFI := rtl8188eu、BOARD_WLAN_DEVICE := rtl8188eu 指明使用 rtl8188eu；

2.3 Init.sun8i.rc

Init.sun8i.rc 是资源和服务配置相关的文件，使用 rtl8188eu 模组需要作如下修改（部分代码）。

```
# realtek wifi service
service wpa_supplicant /system/bin/logwrapper /system/bin/wpa_supplicant \
```

```

-iwlan0 -Dnl80211 -c/data/misc/wifi/wpa_supplicant.conf \
-O/data/misc/wifi/sockets \
-e/data/misc/wifi/entropy.bin -g@android:wpa_wlan0
class main
socket wpa_wlan0 dgram 660 wifi wifi
disabled
oneshot

# 1.2 realtek wifi sta p2p concurrent service
service p2p_supplicant /system/bin/logwrapper /system/bin/wpa_supplicant \
-ip2p0 -Dnl80211 -c/data/misc/wifi/p2p_supplicant.conf \
-e/data/misc/wifi/entropy.bin -N \
-iwlan0 -Dnl80211 -c/data/misc/wifi/wpa_supplicant.conf \
-O/data/misc/wifi/sockets \
-g@android:wpa_wlan0
class main
socket wpa_wlan0 dgram 660 wifi wifi
disabled
oneshot

```

注意:

- 1、若 init.sun8i.rc 文件无修改后代码，可手动添加；
- 2、需注释掉 broadcom wifi service 相关内容。

2.4 sys_config.fex

sys_config.fex 文件决定选择的 wifi 模组，以及 GPIO pin 的分配，要配置成使用 rtl8188eus 模组需要把 sys_config.fex 文件修改成如下（部分代码）。

```

;-----
;wifi/bt/fm/gps/nfc modules configuration
;module_num:
;
;      0- none
;
;      1- ap6181(wifi)
;
;      2- ap6210(wifi+bt)
;
;      3- rtl8188eu(wifi)
;
;      4- rtl8723au(wifi+bt)
;
;      5- rtl8723bs(wifi+bt)
;
;      6- esp8089(wifi)
;
;      7- ap6476(wifi+bt+fm+gps)
;
;      8- ap6330(wifi+bt+fm)
;
;      9- gb9663(wifi+bt+fm)
;module_power1: ""- bat, "axp_dldo1"- axp dldo1
;module_power1_vol: power1 voltage, mv; not used for module_power1 is ""

```

```

;module_power2: ""- bat, "axp_dldo2"- axp dldo2
;module_power2_vol: power2 voltage, mv; not used for module_power2 is ""
;module_power3: ""- bat, "axp_dldo2"- axp dldo2
;module_power3_vol: power3 voltage, mv; not used for module_power3 is ""
;power_switch: module power switch io when bat supply
;chip_en: enable chip io
;lpo_use_apclk: ""- not use, "losc_out"- a23/33, "ac10032k1"、"ac10032k2"、"ac10032k3"- a80/A83T
;-----
[rf_para]
module_num = 3
module_power1 = "axp22_aldol"
module_power1_vol =
module_power2 = ""
module_power2_vol =
module_power3 = ""
module_power3_vol =
power_switch =
chip_en =
lpo_use_apclk = ""

[wifi_para]
wifi_used = 1
wifi_sdc_id = 1
wifi_usbc_id = 1
wifi_usbc_type = 1

;-----
;--- USB1 控制标志
;-----
[usbc1]
usb_used = 1
usb_port_type = 1
usb_detect_type = 0
usb_drv_vbus_gpio = port:PH04<1><0><default><0>
usb_restrict_gpio =
usb_host_init_state = 0
usb_restric_flag = 0
usb_not_suspend = 0

```

说明:

- 1、“;” 符号起注释作用;
- 2、module_num 表示使用哪一款模组;
- 3、module_power1、2、3 表示模组供电;
- 4、module_power1 等表示供电电压;

- 5、lpo_use_apclk 表示使用的主控 32k 时钟；
- 6、wifi_used 为 1 表示使用 wifi，为 0 表示不使用；
- 7、usb_host_init_state = 0 可以在 WiFi 关闭的情况下关闭 USB 控制器从而降低功耗

2.5 rtl8188eu 模组相关文件

以下文件是与 rtl8188eu 模组移植相关的，无需再对这些文件作修改，只需了解即可。

2.5.1 linux

一、rtl8188eus 驱动代码

linux-3.4\drivers\net\wireless\rtl8188eu

二、电源及 GPIO 控制 API

linux-3.4\drivers\misc\rf_pm\rf_pm.c

linux-3.4\drivers\misc\rf_pm\wifi_pm.c

2.5.2 android

一、wifi.c

android4.4.4\hardware\libhardware_legacy\wifi\wifi.c

定义加载的模块路径、模块名和模块参数。

```
#elif defined RTL_8188EU_WIFI_USED
/* rtl8188eu usb wifi */
#ifndef WIFI_DRIVER_MODULE_PATH
#define WIFI_DRIVER_MODULE_PATH        "/system/vendor/modules/8188eu.ko"
#endif
#ifndef WIFI_DRIVER_MODULE_NAME
#define WIFI_DRIVER_MODULE_NAME        "8188eu"
#endif
#ifndef WIFI_DRIVER_MODULE_ARG
#define WIFI_DRIVER_MODULE_ARG        "ifname=wlan0 if2name=p2p0"
#endif
```

3 rtl8723bs

功能: wifi (station/softap/p2p) + bt

接口类型: SDIO + UART

3.1 .config

.config 中需要配置如下选项, 将 wifi driver 编译为模块

CONFIG_RTL8723BS = m

3.2 BoardConfig.mk

BoardConfig.mk 文件决定 android 要加载哪一款 wifi 模组, 以及是否支持蓝牙, 要配置成使用 rtl8723bs 模组需要把 BoardConfig.mk 文件修改成如下 (部分代码)。

```
# 1. Wifi Configuration
BOARD_WIFI_VENDOR := realtek
#BOARD_WIFI_VENDOR := broadcom

# 1.1 realtek wifi support
ifeq ($(BOARD_WIFI_VENDOR), realtek)
    WPA_SUPPLICANT_VERSION := VER_0_8_X
    BOARD_WPA_SUPPLICANT_DRIVER := NL80211
    BOARD_WPA_SUPPLICANT_PRIVATE_LIB := lib_driver_cmd_rtl
    BOARD_HOSTAPD_DRIVER := NL80211
    BOARD_HOSTAPD_PRIVATE_LIB := lib_driver_cmd_rtl

    BOARD_USR_WIFI := rtl8723bs
Endif

# 2. Bluetooth Configuration
# make sure BOARD_HAVE_BLUETOOTH is true for every bt vendor
BOARD_HAVE_BLUETOOTH := true
#BOARD_HAVE_BLUETOOTH_BCM := true
BOARD_HAVE_BLUETOOTH_RTK := true
BLUETOOTH_HCI_USE_RTK_H5 := true
BOARD_HAVE_BLUETOOTH_NAME := rtl8723bs
BOARD_BLUETOOTH_BDROID_BUILDCFG_INCLUDE_DIR:=device/softwinner/astar-h7/bluetooth/
```

说明:

- 1、“#” 符号起注释作用;
- 2、BOARD_WIFI_VENDOR := realtek 指明使用 realtek 的 wifi 模组;
- 3、BOARD_USR_WIFI := rtl8723bs、BOARD_WLAN_DEVICE := rtl8723bs 指明使用 rtl8723bs;
- 4、“BOARD_HAVE_BLUETOOTH_RTK := true” 宏指定蓝牙厂商为 Realtek;

- 5、“BOARD_BLUETOOTH_BDROID_BUILDCFG_INCLUDE_DIR := device/softwinner/astar-h7/bluetooth/” 宏指明配置文件 bdroid_buildcfg.h 路径；
- 5、“BOARD_HAVE_BLUETOOTH_NAME := rtl8723bs” 宏指定蓝牙模组为 rtl8723bs。

注意：

- 1、需注释掉#BOARD_HAVE_BLUETOOTH_BCM := true
- 2、若不需要蓝牙功能只需要把相关宏注释掉就可以。

3.3 init.sun8i.rc

init.sun8i.rc 是资源和服务配置相关的文件，使用 rtl8723bs 模组需要作如下修改（部分代码）。

```
#realtek bluetooth

# UART device
chmod 0660 /dev/ttyS1
chown bluetooth net_bt_stack /dev/ttyS1

# power up/down interface
chmod 0660 /sys/class/rfkill/rfkill0/state
chmod 0660 /sys/class/rfkill/rfkill0/type
chown bluetooth net_bt_stack /sys/class/rfkill/rfkill0/state
chown bluetooth net_bt_stack /sys/class/rfkill/rfkill0/type

# bluetooth MAC address programming
chown bluetooth net_bt_stack ro.bt.bdaddr_path
chown bluetooth net_bt_stack /system/etc/bluetooth
chown bluetooth net_bt_stack /data/misc/bluetooth
setprop ro.bt.bdaddr_path "/data/misc/bluetooth/bdaddr"

# bluetooth LPM
chmod 0220 /proc/bluetooth/sleep/lpm
chmod 0220 /proc/bluetooth/sleep/btwrite
chown bluetooth net_bt_stack /proc/bluetooth/sleep/lpm
chown bluetooth net_bt_stack /proc/bluetooth/sleep/btwrite
write /proc/bluetooth/sleep/lpm 1

# 1. realtek wifi service
service wpa_supplicant /system/bin/logwrapper /system/bin/wpa_supplicant \
    -iwlan0 -Dnl80211 -c/data/misc/wifi/wpa_supplicant.conf \
    -O/data/misc/wifi/sockets \
    -e/data/misc/wifi/entropy.bin -g@android:wpa_wlan0
class main
socket wpa_wlan0 dgram 660 wifi wifi
disabled
oneshot
```

```
# 2 realtek wifi sta p2p concurrent service
service p2p_suppllicant /system/bin/logwrapper /system/bin/wpa_suppllicant \
    -ip2p0 -Dnl80211 -c/data/misc/wifi/p2p_suppllicant.conf \
    -e/data/misc/wifi/entropy.bin -N \
    -iwlan0 -Dnl80211 -c/data/misc/wifi/wpa_suppllicant.conf \
    -O/data/misc/wifi/sockets \
    -g@android:wpa_wlan0
class main
socket wpa_wlan0 dgram 660 wifi wifi
disabled
oneshot
```

注意:

1、若 init.sun8i.rc 文件无修改后代码，可手动添加;

3.4 astar-h7.mk

astar-h7.mk 文件决定拷贝 rtl8723bs wifi 的 firmware 到相应的目录，要配置成使用 rtl8723bs 模组需要把 astar-h7.mk 文件修改成如下（部分代码）。

```
PRODUCT_COPY_FILES += \
frameworks/native/data/etc/android.hardware.bluetooth.xml:system/etc/permissions/android.hardware.bluetooth.xml \

frameworks/native/data/etc/android.hardware.bluetooth_le.xml:system/etc/permissions/android.hardware.bluetooth_le.xml

#rtl8723bs bt fw and config
$(call inherit-product, hardware/realtek/bluetooth/rtl8723bs/firmware/rtlbtfw_cfg.mk)

PRODUCT_PROPERTY_OVERRIDES += \
    ro.product.firmware=v0.1 \
    ro.product.8723b_bt.used = true
```

说明:

1、“#” 符号起注释作用;

3.5 ueventd.sun8i.rc

修改 ueventd.sun8i.rc 文件，增加设备节点:

/dev/ttyS1	0660	bluetooth	bluetooth
------------	------	-----------	-----------

3.6 config.xml

config.xml 文件路径: \android\device\softwinner\astar-h7\overlay\frameworks\base\core\res\res\values\config.xml

要打开蓝牙功能，需要在 config.xml 中把蓝牙的 bt-pan 网口打开，修改的部分代码如下。

```
<!-- List of regexpressions describing the interface (if any) that represent tetherable
      Wifi interfaces.  If the device doesn't want to support tethering over Wifi this
      should be empty.  An example would be "softap.*" -->
<string-array translatable="false" name="config_tether_wifi_regexs">
    <item>"wlan0"</item>
</string-array>

<!-- List of regexpressions describing the interface (if any) that represent tetherable
      bluetooth interfaces.  If the device doesn't want to support tethering over bluetooth this
      should be empty. -->
<string-array translatable="false" name="config_tether_bluetooth_regexs">
    <item>"bt-pan"</item>
</string-array>
```

3.7 vnd_<product>.txt

蓝牙配置文件

文件路径: device\softwinner\astar-h7\bluetooth

创建 vnd_\$(product).txt 文件，如 vnd_astar-h7.txt

```
BLUETOOTH_UART_DEVICE_PORT = "/dev/ttyS1"
FW_PATCHFILE_LOCATION = "/etc/firmware/"
UART_TARGET_BAUD_RATE = 1500000
BT_WAKE_VIA_PROC = TRUE
LPM_IDLE_TIMEOUT_MULTIPLE = 5
BTVND_DBG = TRUE
BTHW_DBG = TRUE
VNDUSERIAL_DBG = TRUE
UPIO_DBG = TRUE
SCO_PCM_IF_CLOCK_RATE = 2
```

3.8 bdroid_buildcfg.h

Android\device\softwinner\astar-h7\bluetooth\bdroid_buildcfg.h 主要配置打开蓝牙时显示的本机名字。

```
#ifndef _BDROID_BUILDCFG_H
#define _BDROID_BUILDCFG_H

#define BTM_DEF_LOCAL_NAME "astar-h7"
```

```
#define BTA_DM_COD {0x1A, 0x01, 0x14}

#define BTIF_HF_SERVICES (BTA_HSP_SERVICE_MASK)
#define BTIF_HF_SERVICE_NAMES { BTIF_HSAG_SERVICE_NAME }
#endif
```

3.9 sys_config.fex

sys_config.fex 文件决定选用的 wifi 模组，以及 GPIO pin 的分配，要配置成使用 rtl8723bs 模组需要把 sys_config.fex 文件修改成如下（部分代码）。

```
-----
;wifi/bt/fm/gps/nfc modules configuration
;module_num:
;
;      0- none
;      1- ap6181(wifi)
;      2- ap6210(wifi+bt)
;      3- rtl8188eu(wifi)
;      4- rtl8723au(wifi+bt)
;      5- rtl8723bs(wifi+bt)
;      6- esp8089(wifi)
;      7- ap6476(wifi+bt+fm+gps)
;      8- ap6330(wifi+bt+fm)
;      9- gb9663(wifi+bt+fm)
;module_power1: ""- bat, "axp_dldo1"- axp dldo1
;module_power1_vol: power1 voltage, mv; not used for module_power1 is ""
;module_power2: ""- bat, "axp_dldo2"- axp dldo2
;module_power2_vol: power2 voltage, mv; not used for module_power2 is ""
;module_power3: ""- bat, "axp_dldo2"- axp dldo2
;module_power3_vol: power3 voltage, mv; not used for module_power3 is ""
;power_switch: module power switch io when bat supply
;chip_en: enable chip io
;lpo_use_apelk: ""- not use, "losc_out"- a23/33, "ac10032k1", "ac10032k2", "ac10032k3"- a80/A83T
;-----

[rf_para]
module_num          = 5
module_power1       = "axp22_aldol"
module_power1_vol   =
module_power2       = ""
module_power2_vol   =
module_power3       = ""
module_power3_vol   =
power_switch        =
chip_en             =
```

```

lpo_use_apclk      = ""

;-----
;wifi configuration
;wifi_used:        0-not use, 1- use
;wifi_sdc_id:      0- SDC0, 1- SDC1, 2- SDC2, 3- SDC3
;wifi_usbc_id:     0- USB0, 1- USB1, 2- USB2
;wifi_usbc_type:   1- EHCI(speed 2.0), 2- OHCI(speed 1.0)
;wl_reg_on:        wifi function enable io
;wl_host_wake:     wifi device wake-up host
;wl_host_wake_invert: whether wl_host_wake use inverter between ap and module
;
;                  0: not used, 1: used
;-----
[wifi_para]
wifi_used          = 1
wifi_sdc_id        = 1
wifi_usbc_id       = 1
wifi_usbc_type     = 1
wl_reg_on          = port:PL06<1><default><default><0>
wl_host_wake       = port:PL07<4><default><default><0>
wl_host_wake_invert = 0

;-----
;bluetooth configuration
;bt_used:          0- no used, 1- used
;bt_uart_id:       0- uart0, 1- uart1, 2- uart2
;bt_rst_n:         bt function enable io
;bt_wake:          host wake-up bluetooth device
;bt_wak_host:      bt device wake-up host
;bt_wake_invert:   whether bt_wake use inverter between ap and module
;
;                  0: not used, 1: used
;bt_host_wake_invert: whether bt_host_wake use inverter between ap and module
;
;                  0: not used, 1: used
;-----
[bt_para]
bt_used            = 1
bt_uart_id         = 1
bt_rst_n           = port:PL08<1><default><default><0>
bt_wake            = port:PL10<1><default><default><0>
bt_host_wake       = port:PL09<4><default><default><0>
bt_wake_invert     = 0
bt_host_wake_invert = 0
ls_int             =
pcm_ch             =

```

说明:

- 1、“;” 符号起注释作用;
- 2、module_num 表示使用哪一款模组;
- 3、module_power1、2、3 表示模组供电;
- 4、module_power1 等表示供电电压;
- 5、lpo_use_apclk 表示使用的主控 32k 时钟;
- 6、wifi_used 为 1 表示使用 wifi, 为 0 表示不使用;
- 7、wifi_sdc_id 表示使用的 SDIO 接口编号;
- 8、wl_reg_on 为控制 wifi on/off 的 GPIO;
- 9、wl_host_wake 为 wifi 唤醒 ap 的 GPIO;
- 10、bt_used 为 1 表示使用 bt, 为 0 表示不使用;
- 11、bt_uart_id 为使用的 uart 口编号;
- 12、bt_rst_n 为控制 bt on/off 的 GPIO;
- 13、bt_wake 为 ap 唤醒 bt 的 GPIO;
- 14、bt_host_wake 为 bt 唤醒 ap 的 GPIO;
- 15、chip_en 为 rtl8723bs wifi bt 功能使能 GPIO;

3.10rtl8723bs 模组移植相关文件

以下文件是与 rtl8723bs 模组移植相关的, 无需再对这些文件作修改, 只需了解即可。

3.10.1 linux

一、rtl8723bs 驱动代码

linux-3.4\drivers\net\wireless\rtl8723bs

二、电源及 GPIO 控制 API

linux-3.4\drivers\misc\rf_pm\rf_pm.c

linux-3.4\drivers\misc\rf_pm\wifi_pm.c

3.10.2 android

一、wifi.c

android\hardware\libhardware_legacy\wifi\wifi.c

定义加载的模块路径、模块名和模块参数。

```
#elif defined RTL_8723BS_WIFI_USED
/* rtl8189ES sdio wifi */
#ifndef WIFI_DRIVER_MODULE_PATH
#define WIFI_DRIVER_MODULE_PATH        "/system/vendor/modules/8723bs.ko"
#endif
#ifndef WIFI_DRIVER_MODULE_NAME
#define WIFI_DRIVER_MODULE_NAME        "8723bs"
```



```
#endif
#ifndef WIFI_DRIVER_MODULE_ARG
#define WIFI_DRIVER_MODULE_ARG    "ifname=wlan0 if2name=p2p0"
#endif
#endif
```

Confidential

4 ap6181

功能：wifi (station/softap/p2p)

接口类型：SDIO

4.1 .config

.config 中需要配置如下选项，将 wifi driver 编译进内核

CONFIG_BCMDHD = y

CONFIG_BCMDHD_OOB = y

4.2 BoardConfig.mk

BoardConfig.mk 文件决定 android 加载哪一款 wifi 模组，要配置成使用 ap6181 模组需要把 BoardConfig.mk 文件修改成如下（部分代码）。

```
# wifi and bt configuration

# 1. Wifi Configuration
#BOARD_WIFI_VENDOR := realtek
BOARD_WIFI_VENDOR := broadcom

# 1.1 broadcom wifi support
ifeq ($(BOARD_WIFI_VENDOR), broadcom)
    BOARD_WPA_SUPPLICANT_DRIVER := NL80211
    WPA_SUPPLICANT_VERSION      := VER_0_8_X
    BOARD_WPA_SUPPLICANT_PRIVATE_LIB := lib_driver_cmd_bcmdhd
    BOARD_HOSTAPD_DRIVER        := NL80211
    BOARD_HOSTAPD_PRIVATE_LIB   := lib_driver_cmd_bcmdhd
    BOARD_WLAN_DEVICE            := bcmdhd
    WIFI_DRIVER_FW_PATH_PARAM    := "/sys/module/bcmdhd/parameters/firmware_path"

    BOARD_USR_WIFI := AP6181

    include hardware/broadcom/wlan/bcmdhd/firmware/${BOARD_USR_WIFI}/device-bcm.mk
endif
```

说明：

- 1、“#” 符号起注释作用；
- 2、“BOARD_USR_WIFI := ap6181” 宏指明 wifi 选用 ap6181；

4.3 Init.sun8i.rc

Init.sun8i.rc 是资源和服务配置相关的文件，使用 ap6181wifi 模组需要作如下修改（部分代码）。

```
# Broadcom wifi service

# 1 Broadcom wifi bcm40181 bcm40183 station and softap
service wpa_supplicant /system/bin/logwrapper /system/bin/wpa_supplicant \
    -iwlan0 -Dnl80211 -c/data/misc/wifi/wpa_supplicant.conf \
    -I/system/etc/wifi/wpa_supplicant_overlay.conf \
    -O/data/misc/wifi/sockets \
    -e/data/misc/wifi/entropy.bin -g@android:wpa_wlan0
class main
socket wpa_wlan0 dgram 660 wifi wifi
disabled
oneshot

# 2 Broadcom wifi sta p2p concurrent service
service p2p_supplicant /system/bin/logwrapper /system/bin/wpa_supplicant \
    -iwlan0 -Dnl80211 -c/data/misc/wifi/wpa_supplicant.conf \
    -I/system/etc/wifi/wpa_supplicant_overlay.conf \
    -O/data/misc/wifi/sockets -N \
    -ip2p0 -Dnl80211 -c/data/misc/wifi/p2p_supplicant.conf \
    -I/system/etc/wifi/p2p_supplicant_overlay.conf \
    -puse_p2p_group_interface=1 -e/data/misc/wifi/entropy.bin \
    -g@android:wpa_wlan0
class main
socket wpa_wlan0 dgram 660 wifi wifi
disabled
oneshot
```

注意：

- 1、若 init.sun8i.rc 文件无修改后代码，可手动添加；
- 2、需注释掉 realtek wifi 相关内容。

4.4 sys_config.fex

sys_config.fex 文件决定 GPIO pin 的分配，要配置成使用 ap6181 模组需要把 sys_config.fex 文件修改成如下（部分代码）。

```
-----
;wifi/bt/fm/gps/nfc modules configuration
;module_num:
;          0- none
;          1- ap6181(wifi)
```

```

;          2- ap6210(wifi+bt)
;          3- rtl8188eu(wifi)
;          4- rtl8723au(wifi+bt)
;          5- rtl8723bs(wifi+bt)
;          6- esp8089(wifi)
;          7- ap6476(wifi+bt+fm+gps)
;          8- ap6330(wifi+bt+fm)
;          9- gb9663(wifi+bt+fm)
;module_power1: ""- bat, "axp_dldo1"- axp dldo1
;module_power1_vol: power1 voltage, mv; not used for module_power1 is ""
;module_power2: ""- bat, "axp_dldo2"- axp dldo2
;module_power2_vol: power2 voltage, mv; not used for module_power2 is ""
;module_power3: ""- bat, "axp_dldo2"- axp dldo2
;module_power3_vol: power3 voltage, mv; not used for module_power3 is ""
;power_switch: module power switch io when bat supply
;chip_en: enable chip io
;lpo_use_apclk: ""- not use, "losc_out"- a23/33, "ac10032k1", "ac10032k2", "ac10032k3"- a80/A83T
;-----
[rf_para]
module_num          = 1
module_power1       = "axp22_aldo1"
module_power1_vol   =
module_power2       = ""
module_power2_vol   =
module_power3       = ""
module_power3_vol   =
power_switch        =
chip_en             =
lpo_use_apclk       = "losc_out"
;-----
;wifi configuration
;wifi_used: 0-not use, 1- use
;wifi_sdc_id: 0- SDC0, 1- SDC1, 2- SDC2, 3- SDC3
;wifi_usbc_id: 0- USB0, 1- USB1, 2- USB2
;wifi_usbc_type: 1- EHCI(speed 2.0), 2- OHCI(speed 1.0)
;wl_reg_on: wifi function enable io
;wl_host_wake: wifi device wake-up host
;wl_host_wake_invert: whether wl_host_wake use inverter between ap and module
;          0: not used, 1: used
;-----
[wifi_para]
wifi_used           = 1
wifi_sdc_id         = 1

```

wifi_usbc_id	= 1
wifi_usbc_type	= 1
wl_reg_on	= port:PL06<1><default><default><0>
wl_host_wake	= port:PL07<4><default><default><0>
wl_host_wake_invert	= 0

说明:

- 1、“;” 符号起注释作用;
- 2、module_num 表示使用哪一款模组;
- 3、module_power1、2、3 表示模组供电;
- 4、module_power1 等表示供电电压;
- 5、lpo_use_apclk 表示使用的主控 32k 时钟;
- 6、wifi_used 为 1 表示使用 wifi，为 0 表示不使用;
- 7、wifi_sdc_id 表示使用的 SDIO 接口编号;
- 8、wl_reg_on 为控制 wifi on/off 的 GPIO;
- 9、wl_host_wake 为 wifi 唤醒 ap 的 GPIO;

4.5 ap6181 模组移植相关文件

以下文件是与 ap6181 模组移植相关的，无需再对这些文件作修改，只需了解即可。

4.5.1 linux

一、ap6181 驱动代码

linux-3.4\drivers\net\wireless\bcmdhd

二、GPIO 控制 API

linux-3.4\drivers\misc\rf_pm\rf_pm.c

linux-3.4\drivers\misc\rf_pm\wifi_pm.c

5 ap6210

功能: wifi (station/softap/p2p) + bt

接口类型: SDIO + UART

5.1 .config

.config 中需要配置如下选项, 将 wifi driver 编译进内核

CONFIG_BCMDHD = y

CONFIG_BCMDHD_OOB = y

5.2 BoardConfig.mk

BoardConfig.mk 文件决定 android 要加载哪一款 wifi 模组、是否开启蓝牙和使用哪一款蓝牙模组, 要配置成使用 ap6210 模组并启用 wifi 和蓝牙功能需要把 BoardConfig.mk 文件的相关代码修改成如下。

```
# wifi and bt configuration

# 1. Wifi Configuration
#BOARD_WIFI_VENDOR := realtek
BOARD_WIFI_VENDOR := broadcom

# 1.1 broadcom wifi support
ifeq ($(BOARD_WIFI_VENDOR), broadcom)
    BOARD_WPA_SUPPLICANT_DRIVER := NL80211
    WPA_SUPPLICANT_VERSION      := VER_0_8_X
    BOARD_WPA_SUPPLICANT_PRIVATE_LIB := lib_driver_cmd_bcmdhd
    BOARD_HOSTAPD_DRIVER        := NL80211
    BOARD_HOSTAPD_PRIVATE_LIB   := lib_driver_cmd_bcmdhd
    BOARD_WLAN_DEVICE            := bcmdhd
    WIFI_DRIVER_FW_PATH_PARAM    := "/sys/module/bcmdhd/parameters/firmware_path"

    BOARD_USR_WIFI := ap6210

    include hardware/broadcom/wlan/bcmdhd/firmware/$(BOARD_USR_WIFI)/device-bcm.mk
endif

# 2. Bluetooth Configuration
# make sure BOARD_HAVE_BLUETOOTH is true for every bt vendor
BOARD_HAVE_BLUETOOTH := true
BOARD_HAVE_BLUETOOTH_BCM := true
#BOARD_HAVE_BLUETOOTH_RTK := true
#BLUETOOTH_HCI_USE_RTK_H5 := true
```

```
BOARD_HAVE_BLUETOOTH_NAME := ap6210
```

```
BOARD_BLUETOOTH_BDROID_BUILDCFG_INCLUDE_DIR  
device/softwinner/astar-h7/bluetooth/
```

```
:=
```

说明:

- 1、“#”符号起注释作用;
- 2、“BOARD_USR_WIFI := AP6210”宏指明 wifi 选用 ap6210;
- 3、“BOARD_HAVE_BLUETOOTH := true”宏指明使用蓝牙;
- 4、“BOARD_HAVE_BLUETOOTH_BCM := true”宏指定蓝牙厂商为 Broadcom;
- 5、“BOARD_HAVE_BLUETOOTH_NAME := ap6210”宏指明蓝牙模组名字;
- 6、“BOARD_BLUETOOTH_BDROID_BUILDCFG_INCLUDE_DIR :=
device/softwinner/astar-h7/bluetooth/”宏指明配置文件 bdroid_buildcfg.h 路径;

注意:

- 1、需注释掉#BOARD_HAVE_BLUETOOTH_RTK := true
- 2、若不需要蓝牙功能只需要把相关宏注释掉就可以。

5.3 Init.sun8i.rc

Init.sun8i.rc 是资源和服务配置相关的文件,要启用 ap6210 模组的 wifi 和蓝牙功能需要作如下修改(部分代码)。

```
# bcm bluetooth
```

```
# uart device
```

```
chmod 660 /dev/ttyS1
```

```
chown bluetooth net_bt_stack /dev/ttyS1
```

```
# power up/down interface
```

```
chmod 0660 /sys/class/rfkill/rfkill0/state
```

```
chmod 0660 /sys/class/rfkill/rfkill0/type
```

```
chown bluetooth net_bt_stack /sys/class/rfkill/rfkill0/state
```

```
chown bluetooth net_bt_stack /sys/class/rfkill/rfkill0/type
```

```
# bluetooth MAC address programming
```

```
chown bluetooth net_bt_stack ro.bt.bdaddr_path
```

```
chown bluetooth net_bt_stack /system/etc/bluetooth
```

```
chown bluetooth net_bt_stack /data/misc/bluetooth
```

```
setprop ro.bt.bdaddr_path "/data/misc/bluetooth/bdaddr"
```

```
# bluetooth LPM
```

```
chmod 0220 /proc/bluetooth/sleep/lpm
```

```
chmod 0220 /proc/bluetooth/sleep/btwrite
```

```
chown bluetooth net_bt_stack /proc/bluetooth/sleep/lpm
```

```
chown bluetooth net_bt_stack /proc/bluetooth/sleep/btwrite
.....
```

broadcom wifi service

```
# 1 broadcom wifi bcm40181 bcm40183 station and softap
service wpa_supplicant /system/bin/logwrapper /system/bin/wpa_supplicant \
    -iwlan0 -Dnl80211 -c/data/misc/wifi/wpa_supplicant.conf \
    -I/system/etc/wifi/wpa_supplicant_overlay.conf \
    -O/data/misc/wifi/sockets \
    -e/data/misc/wifi/entropy.bin -g@android:wpa_wlan0
class main
socket wpa_wlan0 dgram 660 wifi wifi
disabled
oneshot
```

```
# 2 braodcom wifi sta p2p concurrent service
service p2p_supplicant /system/bin/logwrapper /system/bin/wpa_supplicant \
    -iwlan0 -Dnl80211 -c/data/misc/wifi/wpa_supplicant.conf \
    -I/system/etc/wifi/wpa_supplicant_overlay.conf \
    -O/data/misc/wifi/sockets -N \
    -ip2p0 -Dnl80211 -c/data/misc/wifi/p2p_supplicant.conf \
    -I/system/etc/wifi/p2p_supplicant_overlay.conf \
    -puse_p2p_group_interface=1 -e/data/misc/wifi/entropy.bin \
    -g@android:wpa_wlan0
class main
socket wpa_wlan0 dgram 660 wifi wifi
disabled
oneshot
```

注意:

- 1、若 init.sun8i.rc 文件无修改后代码，可手动添加；
- 2、需注释掉 realtek wifi 和 bluetooth 相关内容。

5.4 astar-h7.mk

astar-h7.mk 文件定义需要的 package，ap6210 的 bt 功能需要 bt_vendor.conf，需要把 astar-h7.mk 文件修改成如下（部分代码）。

```
PRODUCT_COPY_FILES += \
frameworks/native/data/etc/android.hardware.bluetooth.xml:system/etc/permissions/android.hardware.bluetooth.xml \

frameworks/native/data/etc/android.hardware.bluetooth_le.xml:system/etc/permissions/android.hardware.bluetooth_le.xml
```



```
PRODUCT_COPY_FILES += \
    device/softwinner/astar-h7/bluetooth/bt_vendor.conf:system/etc/bluetooth/bt_vendor.conf
```

5.5 config.xml

config.xml 文件路径: \android4.4.4\device\softwinner\astar-h7\overlay\frameworks\base\core\res\res\values\config.xml

要打开蓝牙功能, 需要在 config.xml 中把蓝牙的 bt-pan 网口打开, 修改的部分代码如下。

```
<!-- List of regexpressions describing the interface (if any) that represent tetherable
      Wifi interfaces.  If the device doesn't want to support tethering over Wifi this
      should be empty.  An example would be "softap.*" -->
<!-- default: disable Softap feature -->
<string-array translatable="false" name="config_tether_wifi_regexs">
    <item>"wlan0"</item>
</string-array>
-->

<!-- List of regexpressions describing the interface (if any) that represent tetherable
      bluetooth interfaces.  If the device doesn't want to support tethering over bluetooth this
      should be empty. -->
<!-- default: disable Bluetooth PAN feature -->
<string-array translatable="false" name="config_tether_bluetooth_regexs">
    <item>"bt-pan"</item>
</string-array>
<!-- List of regexpressions describing the interface (if any) that represent tetherable
```

注: 若相应平台该目录下没 config.xml 文件, 可到其他相应平台对应目录下拷贝一份。

5.6 vnd_<product>.txt

蓝牙配置文件 设置波特率, uart 设备文件和 firmware 路径(初始值), 调试信息配置

文件路径: device\softwinner\astar-h7\bluetooth

创建 vnd_\$(product).txt 文件, 如 vnd_astar-h7.txt

```
#Set baudrate to 1500000
UART_TARGET_BAUD_RATE=1500000
BLUETOOTH_UART_DEVICE_PORT = "/dev/ttyS1"
FW_PATCHFILE_LOCATION = "/system/vendor/modules/"
LPM_IDLE_TIMEOUT_MULTIPLE = 5
#LPM_SLEEP_MODE = FALSE
BT_WAKE_VIA_PROC = TRUE
BTVND_DBG = TRUE
BTHW_DBG = TRUE
VNDUSERIAL_DBG = TRUE
```

```
UPIO_DBG = TRUE
```

5.7 bt_vendor.conf

文件路径: device\softwinner\astar-h7\bluetooth

```
# UART device port where Bluetooth controller is attached
UartPort = /dev/ttyS1
```

```
# Firmware patch file location
FwPatchFilePath = /system/vendor/modules/
```

```
#Firmware name
FwPatchFileName = bcm20710a1.hcd
```

5.8 bdroid_buildcfg.h

android4.4.4\device\softwinner\astar-h7\bluetooth\bdroid_buildcfg.h 主要配置打开蓝牙时显示的本机名字。

```
#ifndef _BDROID_BUILDCFG_H
#define _BDROID_BUILDCFG_H

#define BTM_DEF_LOCAL_NAME "astar-h7"

#define BTA_DM_COD {0x1A, 0x01, 0x14}

#define BTIF_HF_SERVICES (BTA_HSP_SERVICE_MASK)
#define BTIF_HF_SERVICE_NAMES { BTIF_HSAG_SERVICE_NAME }
#endif
```

5.9 sys_config.fex

sys_config.fex 文件决定 GPIO pin 的分配，要配置成使用 ap6210 模组需要把 sys_config.fex 文件修改成如下（部分代码）。

```
;------
;wifi/bt/fm/gps/nfc modules configuration
;module_num:
;          0- none
;          1- ap6181(wifi)
;          2- ap6210(wifi+bt)
;          3- rtl8188eu(wifi)
;          4- rtl8723au(wifi+bt)
;          5- rtl8723bs(wifi+bt)
```

```

;          6- esp8089(wifi)
;          7- ap6476(wifi+bt+fm+gps)
;          8- ap6330(wifi+bt+fm)
;          9- gb9663(wifi+bt+fm)
;module_power1: ""- bat, "axp_dldo1"- axp dldo1
;module_power1_vol: power1 voltage, mv; not used for module_power1 is ""
;module_power2: ""- bat, "axp_dldo2"- axp dldo2
;module_power2_vol: power2 voltage, mv; not used for module_power2 is ""
;module_power3: ""- bat, "axp_dldo2"- axp dldo2
;module_power3_vol: power3 voltage, mv; not used for module_power3 is ""
;power_switch: module power switch io when bat supply
;chip_en: enable chip io
;lpo_use_apclk: ""- not use, "losc_out"- a23/33, "ac10032k1"、"ac10032k2"、"ac10032k3"- a80/A83T
;-----
[rf_para]
module_num          = 2
module_power1       = "axp22_aldo1"
module_power1_vol   =
module_power2       = ""
module_power2_vol   =
module_power3       = ""
module_power3_vol   =
power_switch        =
chip_en             =
lpo_use_apclk       = "losc_out"
;-----
;wifi configuration
;wifi_used: 0-not use, 1- use
;wifi_sdc_id: 0- SDC0, 1- SDC1, 2- SDC2, 3- SDC3
;wifi_usbc_id: 0- USB0, 1- USB1, 2- USB2
;wifi_usbc_type: 1- EHCI(speed 2.0), 2- OHCI(speed 1.0)
;wl_reg_on: wifi function enable io
;wl_host_wake: wifi device wake-up host
;wl_host_wake_invert: whether wl_host_wake use inverter between ap and module
;          0: not used, 1: used
;-----
[wifi_para]
wifi_used           = 1
wifi_sdc_id         = 1
wifi_usbc_id        = 1
wifi_usbc_type      = 1
wl_reg_on           = port:PL06<1><default><default><0>
wl_host_wake        = port:PL07<4><default><default><0>

```

```

wl_host_wake_invert    = 0

;-----
;bluetooth configuration
;bt_used:              0- no used, 1- used
;bt_uart_id:           0- uart0, 1- uart1, 2- uart2
;bt_rst_n:              bt function enable io
;bt_wake:               host wake-up bluetooth device
;bt_wak_host:          bt device wake-up host
;bt_wake_invert:        whether bt_wake use inverter between ap and module
;
;                      0: not used, 1: used
;bt_host_wake_invert:   whether bt_host_wake use inverter between ap and module
;
;                      0: not used, 1: used
;-----

[bt_para]
bt_used                = 1
bt_uart_id              = 1
bt_rst_n                = port:PL08<1><default><default><0>
bt_wake                 = port:PL10<1><default><default><0>
bt_host_wake            = port:PL09<4><default><default><0>
bt_wake_invert          = 0
bt_host_wake_invert     = 0
ls_int                  =
pcm_ch                  =

```

说明:

- 1、“;” 符号起注释作用;
- 2、module_num 表示使用哪一款模组;
- 3、module_power1、2、3 表示模组供电;
- 4、module_power1 等表示供电电压;
- 5、lpo_use_apclk 表示使用的主控 32k 时钟;
- 6、wifi_used 为 1 表示使用 wifi，为 0 表示不使用;
- 7、wifi_sdc_id 表示使用的 SDIO 接口编号;
- 8、wl_reg_on 为控制 wifi on/off 的 GPIO;
- 9、wl_host_wake 为 wifi 唤醒 ap 的 GPIO;
- 10、bt_used 为 1 表示使用 bt，为 0 表示不使用;
- 11、bt_uart_id 为使用的 uart 口编号;
- 12、bt_rst_n 为控制 bt on/off 的 GPIO;
- 13、bt_wake 为 ap 唤醒 bt 的 GPIO;
- 14、bt_host_wake 为 bt 唤醒 ap 的 GPIO;

5.10ap6210 模组移植相关文件

以下文件是与 ap6210 模组移植相关的，无需再对这些文件作修改，只需了解即可。

5.10.1 linux

一、ap6210 驱动代码

linux-3.4\drivers\net\wireless\bcmdhd

二、GPIO 控制 API

linux-3.4\drivers\misc\rf_pm\rf_pm.c

linux-3.4\drivers\misc\rf_pm\wifi_pm.c

Confidential

6 ap6330

功能: wifi (station/softap/p2p) + bt

接口类型: SDIO + UART

6.1 .config

.config 中需要配置如下选项, 将 wifi driver 编译进内核

CONFIG_BCMHDHD = y

CONFIG_BCMHDHD_OOB = y

6.2 BoardConfig.mk

BoardConfig.mk 文件决定 android 要加载哪一款 wifi 模组、是否开启蓝牙和使用哪一款蓝牙模组, 要配置成使用 ap6330 模组并启用 wifi 和蓝牙功能需要把 BoardConfig.mk 文件的相关代码修改成如下。

```
# wifi and bt configuration

# 1. Wifi Configuration
#BOARD_WIFI_VENDOR := realtek
BOARD_WIFI_VENDOR := broadcom

# 1.1 broadcom wifi support
ifeq ($(BOARD_WIFI_VENDOR), broadcom)
    BOARD_WPA_SUPPLICANT_DRIVER := NL80211
    WPA_SUPPLICANT_VERSION      := VER_0_8_X
    BOARD_WPA_SUPPLICANT_PRIVATE_LIB := lib_driver_cmd_bcmdhd
    BOARD_HOSTAPD_DRIVER        := NL80211
    BOARD_HOSTAPD_PRIVATE_LIB   := lib_driver_cmd_bcmdhd
    BOARD_WLAN_DEVICE            := bcmdhd
    WIFI_DRIVER_FW_PATH_PARAM    := "/sys/module/bcmdhd/parameters/firmware_path"

    BOARD_USR_WIFI := AP6330
    include hardware/broadcom/wlan/bcmdhd/firmware/${BOARD_USR_WIFI}/device-bcm.mk
endif

# 2. Bluetooth Configuration
# make sure BOARD_HAVE_BLUETOOTH is true for every bt vendor
BOARD_HAVE_BLUETOOTH := true
BOARD_HAVE_BLUETOOTH_BCM := true
#BOARD_HAVE_BLUETOOTH_RTK := true
#BLUETOOTH_HCI_USE_RTK_H5 := true
BOARD_HAVE_BLUETOOTH_NAME := ap6330
```

```
BOARD_BLUETOOTH_BDROID_BUILDCFG_INCLUDE_DIR
device/softwinner/astar-h7/bluetooth/
```

:=

说明:

- 1、“#”符号起注释作用;
- 2、“BOARD_USR_WIFI := AP6330”宏指明 wifi 选用 ap6330;
- 3、“BOARD_HAVE_BLUETOOTH := true”宏指明使用蓝牙;
- 4、“BOARD_HAVE_BLUETOOTH_BCM := true”宏指定蓝牙厂商为 Broadcom;
- 5、“BOARD_HAVE_BLUETOOTH_NAME := ap6330”宏指明蓝牙模组名字;
- 6、“BOARD_BLUETOOTH_BDROID_BUILDCFG_INCLUDE_DIR := device/softwinner/astar-h7/bluetooth/”宏指明配置文件 bdroid_buildcfg.h 路径;

注意:

- 1、需注释掉#BOARD_HAVE_BLUETOOTH_RTK := true
- 2、若不需要蓝牙功能只需要把相关宏注释掉就可以。

6.3 Init.sun8i.rc

Init.sun8i.rc 是资源和服务配置相关的文件,要启用 ap6330 模组的 wifi 和蓝牙功能需要作如下修改(部分代码)。

bcm bluetooth

```
# uart device
chmod 660 /dev/ttyS1
chown bluetooth net_bt_stack /dev/ttyS1

# power up/down interface
chmod 0660 /sys/class/rfkill/rfkill0/state
chmod 0660 /sys/class/rfkill/rfkill0/type
chown bluetooth net_bt_stack /sys/class/rfkill/rfkill0/state
chown bluetooth net_bt_stack /sys/class/rfkill/rfkill0/type

# bluetooth MAC address programming
chown bluetooth net_bt_stack ro.bt.bdaddr_path
chown bluetooth net_bt_stack /system/etc/bluetooth
chown bluetooth net_bt_stack /data/misc/bluetooth
setprop ro.bt.bdaddr_path "/data/misc/bluetooth/bdaddr"

# bluetooth LPM
chmod 0220 /proc/bluetooth/sleep/lpm
chmod 0220 /proc/bluetooth/sleep/btwrite
chown bluetooth net_bt_stack /proc/bluetooth/sleep/lpm
chown bluetooth net_bt_stack /proc/bluetooth/sleep/btwrite
```

.....

broadcom wifi service

```
# 1 broadcom wifi bcm40181 bcm40183 station and softap
service wpa_supplicant /system/bin/logwrapper /system/bin/wpa_supplicant \
    -iwlan0 -Dnl80211 -c/data/misc/wifi/wpa_supplicant.conf \
    -I/system/etc/wifi/wpa_supplicant_overlay.conf \
    -O/data/misc/wifi/sockets \
    -e/data/misc/wifi/entropy.bin -g@android:wpa_wlan0
class main
socket wpa_wlan0 dgram 660 wifi wifi
disabled
oneshot
```

2 broadcom wifi sta p2p concurrent service

```
service p2p_supplicant /system/bin/logwrapper /system/bin/wpa_supplicant \
    -iwlan0 -Dnl80211 -c/data/misc/wifi/wpa_supplicant.conf \
    -I/system/etc/wifi/wpa_supplicant_overlay.conf \
    -O/data/misc/wifi/sockets -N \
    -ip2p0 -Dnl80211 -c/data/misc/wifi/p2p_supplicant.conf \
    -I/system/etc/wifi/p2p_supplicant_overlay.conf \
    -puse_p2p_group_interface=1 -e/data/misc/wifi/entropy.bin \
    -g@android:wpa_wlan0
class main
socket wpa_wlan0 dgram 660 wifi wifi
disabled
oneshot
```

注意:

- 1、若 init.sun8i.rc 文件无修改后代码，可手动添加；
- 2、需注释掉 realtek wifi 和 bluetooth 相关内容。

6.4 astar-h7.mk

astar-h7.mk 文件定义需要的 package，ap6330 的 bt 功能需要 bt_vendor.conf，需要把 astar-h7.mk 文件修改成如下（部分代码）。

```
PRODUCT_COPY_FILES += \
frameworks/native/data/etc/android.hardware.bluetooth.xml:system/etc/permissions/android.hardware.bluetooth.xml \

frameworks/native/data/etc/android.hardware.bluetooth_le.xml:system/etc/permissions/android.hardware.bluetooth_le.xml

PRODUCT_COPY_FILES += \
```


device/softwinner/astar-h7/bluetooth/bt_vendor.conf:system/etc/bluetooth/bt_vendor.conf

6.5 config.xml

config.xml 文件路径: \android4.4.4\device\softwinner\astar-h7\overlay\frameworks\base\core\res\res\values\config.xml

要打开蓝牙功能，需要在 config.xml 中把蓝牙的 bt-pan 网口打开，修改的部分代码如下。

```

<!-- List of regexpressions describing the interface (if any) that represent tetherable
      Wifi interfaces.  If the device doesn't want to support tethering over Wifi this
      should be empty.  An example would be "softap.*" -->
<!--  default: disable Softap feature -->
<string-array translatable="false" name="config_tether_wifi_regexs">
<item>"wlan0"</item>
</string-array>
-->

<!-- List of regexpressions describing the interface (if any) that represent tetherable
      bluetooth interfaces.  If the device doesn't want to support tethering over bluetooth this
      should be empty. -->
<!--  default: disable Bluetooth PAN feature -->
<string-array translatable="false" name="config_tether_bluetooth_regexs">
<item>"bt-pan"</item>
</string-array>
<!-- List of regexpressions describing the interface (if any) that represent tetherable

```

注：若相应平台该目录下没 config.xml 文件，可到其他相应平台对应目录下拷贝一份。

6.6 vnd_<product>.txt

蓝牙配置文件 设置波特率，uart 设备文件和 firmware 路径(初始值)，调试信息配置

文件路径: device/softwinner/astar-h7/bluetooth

创建 vnd_\$(product).txt 文件，如 vnd_astar-h7.txt

```

#Set baudrate to 1500000
UART_TARGET_BAUD_RATE=1500000
BLUETOOTH_UART_DEVICE_PORT = "/dev/ttyS1"
FW_PATCHFILE_LOCATION = "/system/vendor/modules/"
LPM_IDLE_TIMEOUT_MULTIPLE = 5
#LPM_SLEEP_MODE = FALSE
BT_WAKE_VIA_PROC = TRUE
BTVND_DBG = TRUE
BTHW_DBG = TRUE
VNDUSERIAL_DBG = TRUE
UPIO_DBG = TRUE

```

6.7 bt_vendor.conf

文件路径: device\softwinner\astar-h7\bluetooth

```
# UART device port where Bluetooth controller is attached
UartPort = /dev/ttyS1

# Firmware patch file location
FwPatchFilePath = /system/vendor/modules/

#Firmware name
FwPatchFileName = bcm40183b2.hcd
```

6.8 bdroid_buildcfg.h

android4.4.4\device\softwinner\astar-h7\bluetooth\bdroid_buildcfg.h 主要配置打开蓝牙时显示的本机名字。

```
#ifndef _BDROID_BUILDCFG_H
#define _BDROID_BUILDCFG_H

#define BTM_DEF_LOCAL_NAME "astar-h7"

#define BTA_DM_COD {0x1A, 0x01, 0x14}

#define BTIF_HF_SERVICES (BTA_HSP_SERVICE_MASK)
#define BTIF_HF_SERVICE_NAMES { BTIF_HSAG_SERVICE_NAME }
#endif
```

6.9 sys_config.fex

sys_config.fex 文件决定 GPIO pin 的分配，要配置成使用 ap6330 模组需要把 sys_config.fex 文件修改成如下（部分代码）。

```
-----
;wifi/bt/fm/gps/nfc modules configuration
;module_num:
;          0- none
;          1- ap6181(wifi)
;          2- ap6210(wifi+bt)
;          3- rtl8188eu(wifi)
;          4- rtl8723au(wifi+bt)
;          5- rtl8723bs(wifi+bt)
;          6- esp8089(wifi)
;          7- ap6476(wifi+bt+fm+gps)
```

```

;          8- ap6330(wifi+bt+fm)
;          9- gb9663(wifi+bt+fm)
;module_power1: ""- bat, "axp_dldo1"- axp dldo1
;module_power1_vol: power1 voltage, mv; not used for module_power1 is ""
;module_power2: ""- bat, "axp_dldo2"- axp dldo2
;module_power2_vol: power2 voltage, mv; not used for module_power2 is ""
;module_power3: ""- bat, "axp_dldo2"- axp dldo2
;module_power3_vol: power3 voltage, mv; not used for module_power3 is ""
;power_switch: module power switch io when bat supply
;chip_en: enable chip io
;lpo_use_apclk: ""- not use, "losc_out"- a23/33, "ac10032k1", "ac10032k2", "ac10032k3"- a80/A83T
;-----
[rf_para]
module_num          = 8
module_power1       = "axp22_aldo1"
module_power1_vol   =
module_power2       = ""
module_power2_vol   =
module_power3       = ""
module_power3_vol   =
power_switch        =
chip_en             =
lpo_use_apclk       = "losc_out"
;-----
;wifi configuration
;wifi_used: 0-not use, 1- use
;wifi_sdc_id: 0- SDC0, 1- SDC1, 2- SDC2, 3- SDC3
;wifi_usbc_id: 0- USB0, 1- USB1, 2- USB2
;wifi_usbc_type: 1- EHCI(speed 2.0), 2- OHCI(speed 1.0)
;wl_reg_on: wifi function enable io
;wl_host_wake: wifi device wake-up host
;wl_host_wake_invert: whether wl_host_wake use inverter between ap and module
;          0: not used, 1: used
;-----
[wifi_para]
wifi_used           = 1
wifi_sdc_id         = 1
wifi_usbc_id        = 1
wifi_usbc_type      = 1
wl_reg_on           = port:PL06<1><default><default><0>
wl_host_wake        = port:PL07<4><default><default><0>
wl_host_wake_invert = 0

```

```

;-----
;bluetooth configuration
;bt_used:          0- no used, 1- used
;bt_uart_id:       0- uart0, 1- uart1, 2- uart2
;bt_rst_n:         bt function enable io
;bt_wake:          host wake-up bluetooth device
;bt_wak_host:      bt device wake-up host
;bt_wake_invert:   whether bt_wake use inverter between ap and module
;
;                  0: not used, 1: used
;bt_host_wake_invert: whether bt_host_wake use inverter between ap and module
;
;                  0: not used, 1: used
;-----
[bt_para]
bt_used              = 1
bt_uart_id           = 1
bt_rst_n             = port:PL08<1><default><default><0>
bt_wake              = port:PL10<1><default><default><0>
bt_host_wake         = port:PL09<4><default><default><0>
bt_wake_invert       = 0
bt_host_wake_invert  = 0
ls_int               =
pcm_ch               =

```

说明:

- 1、“;” 符号起注释作用;
- 2、module_num 表示使用哪一款模组;
- 3、module_power1、2、3 表示模组供电;
- 4、module_power1 等表示供电电压;
- 5、lpo_use_apclk 表示使用的主控 32k 时钟;
- 6、wifi_used 为 1 表示使用 wifi，为 0 表示不使用;
- 7、wifi_sdc_id 表示使用的 SDIO 接口编号;
- 8、wl_reg_on 为控制 wifi on/off 的 GPIO;
- 9、wl_host_wake 为 wifi 唤醒 ap 的 GPIO;
- 10、bt_used 为 1 表示使用 bt，为 0 表示不使用;
- 11、bt_uart_id 为使用的 uart 口编号;
- 12、bt_rst_n 为控制 bt on/off 的 GPIO;
- 13、bt_wake 为 ap 唤醒 bt 的 GPIO;
- 14、bt_host_wake 为 bt 唤醒 ap 的 GPIO;

6.10ap6330 模组移植相关文件

以下文件是与 ap6330 模组移植相关的，无需再对这些文件作修改，只需了解即可。

6.10.1 linux

一、ap6330 驱动代码

linux-3.4\drivers\net\wireless\bcmdhd

二、GPIO 控制 API

linux-3.4\drivers\misc\rf_pm\rf_pm.c

linux-3.4\drivers\misc\rf_pm\wifi_pm.c

Confidential

7 gb9663

功能: wifi (station/softap/p2p) + bt

接口类型: SDIO + UART

7.1 .config

.config 中需要配置如下选项, 将 wifi driver 编译进内核

CONFIG_BCMDHD = y

CONFIG_BCMDHD_OOB = y

7.2 BoardConfig.mk

BoardConfig.mk 文件决定 android 要加载哪一款 wifi 模组、是否开启蓝牙和使用哪一款蓝牙模组, 要配置成使用 gb9663 模组并启用 wifi 和蓝牙功能需要把 BoardConfig.mk 文件的相关代码修改成如下。

```
# wifi and bt configuration

# 1. Wifi Configuration
#BOARD_WIFI_VENDOR := realtek
BOARD_WIFI_VENDOR := broadcom

# 1.1 broadcom wifi support
ifeq ($(BOARD_WIFI_VENDOR), broadcom)
    BOARD_WPA_SUPPLICANT_DRIVER := NL80211
    WPA_SUPPLICANT_VERSION      := VER_0_8_X
    BOARD_WPA_SUPPLICANT_PRIVATE_LIB := lib_driver_cmd_bcmdhd
    BOARD_HOSTAPD_DRIVER        := NL80211
    BOARD_HOSTAPD_PRIVATE_LIB   := lib_driver_cmd_bcmdhd
    BOARD_WLAN_DEVICE            := bcmdhd
    WIFI_DRIVER_FW_PATH_PARAM    := "/sys/module/bcmdhd/parameters/firmware_path"

    BOARD_USR_WIFI := gb9663

    include hardware/broadcom/wlan/bcmdhd/firmware/$(BOARD_USR_WIFI)/device-bcm.mk
endif

# 2. Bluetooth Configuration
# make sure BOARD_HAVE_BLUETOOTH is true for every bt vendor
BOARD_HAVE_BLUETOOTH := true
BOARD_HAVE_BLUETOOTH_BCM := true
#BOARD_HAVE_BLUETOOTH_RTK := true
#BLUETOOTH_HCI_USE_RTK_H5 := true
```

```
BOARD_HAVE_BLUETOOTH_NAME := gb9663
```

```
BOARD_BLUETOOTH_BDROID_BUILDCFG_INCLUDE_DIR
device/softwinner/astar-h7/bluetooth/
```

```
:=
```

说明:

- 1、“#”符号起注释作用;
- 2、“BOARD_USR_WIFI := GB9663”宏指明 wifi 选用 gb9663;
- 3、“BOARD_HAVE_BLUETOOTH := true”宏指明使用蓝牙;
- 4、“BOARD_HAVE_BLUETOOTH_BCM := true”宏指定蓝牙厂商为 Broadcom;
- 5、“BOARD_HAVE_BLUETOOTH_NAME := gb9663”宏指明蓝牙模组名字;
- 6、“BOARD_BLUETOOTH_BDROID_BUILDCFG_INCLUDE_DIR := device/softwinner/astar-h7/bluetooth/”宏指明配置文件 bdroid_buildcfg.h 路径;

注意:

- 1、需注释掉#BOARD_HAVE_BLUETOOTH_RTK := true
- 2、若不需要蓝牙功能只需要把相关宏注释掉就可以。

7.3 Init.sun8i.rc

Init.sun8i.rc 是资源和服务配置相关的文件，要启用 gb9663 模组的 wifi 和蓝牙功能需要作如下修改（部分代码）。

```
# bcm bluetooth
```

```
# uart device
```

```
chmod 660 /dev/ttyS1
```

```
chown bluetooth net_bt_stack /dev/ttyS1
```

```
# power up/down interface
```

```
chmod 0660 /sys/class/rfkill/rfkill0/state
```

```
chmod 0660 /sys/class/rfkill/rfkill0/type
```

```
chown bluetooth net_bt_stack /sys/class/rfkill/rfkill0/state
```

```
chown bluetooth net_bt_stack /sys/class/rfkill/rfkill0/type
```

```
# bluetooth MAC address programming
```

```
chown bluetooth net_bt_stack ro.bt.bdaddr_path
```

```
chown bluetooth net_bt_stack /system/etc/bluetooth
```

```
chown bluetooth net_bt_stack /data/misc/bluetooth
```

```
setprop ro.bt.bdaddr_path "/data/misc/bluetooth/bdaddr"
```

```
# bluetooth LPM
```

```
chmod 0220 /proc/bluetooth/sleep/lpm
```

```
chmod 0220 /proc/bluetooth/sleep/btwrite
```

```
chown bluetooth net_bt_stack /proc/bluetooth/sleep/lpm
```

```
chown bluetooth net_bt_stack /proc/bluetooth/sleep/btwrite
```

Broadcom wifi service

```

# 1 Broadcom wifi bcm40181 bcm40183 station and softap
service wpa_supplicant /system/bin/logwrapper /system/bin/wpa_supplicant \
    -iwlan0 -Dnl80211 -c/data/misc/wifi/wpa_supplicant.conf \
    -I/system/etc/wifi/wpa_supplicant_overlay.conf \
    -O/data/misc/wifi/sockets \
    -e/data/misc/wifi/entropy.bin -g@android:wpa_wlan0
class main
socket wpa_wlan0 dgram 660 wifi wifi
disabled
oneshot

```

2 Broadcom wifi sta p2p concurrent service

```

service p2p_supplicant /system/bin/logwrapper /system/bin/wpa_supplicant \
    -iwlan0 -Dnl80211 -c/data/misc/wifi/wpa_supplicant.conf \
    -I/system/etc/wifi/wpa_supplicant_overlay.conf \
    -O/data/misc/wifi/sockets -N \
    -ip2p0 -Dnl80211 -c/data/misc/wifi/p2p_supplicant.conf \
    -I/system/etc/wifi/p2p_supplicant_overlay.conf \
    -puse_p2p_group_interface=1 -e/data/misc/wifi/entropy.bin \
    -g@android:wpa_wlan0
class main
socket wpa_wlan0 dgram 660 wifi wifi
disabled
oneshot

```

注意:

- 1、若 init.sun8i.rc 文件无修改后代码，可手动添加；
- 2、需注释掉 realtek wifi 和 bluetooth 相关内容。

7.4 astar-h7.mk

astar-h7.mk 文件定义需要的 package，gb9663 的 bt 功能需要 bt_vendor.conf，需要把 astar-h7.mk 文件修改成如下（部分代码）。

```

PRODUCT_COPY_FILES += \
frameworks/native/data/etc/android.hardware.bluetooth.xml:system/etc/permissions/android.hardware.bluetooth.xml \

frameworks/native/data/etc/android.hardware.bluetooth_le.xml:system/etc/permissions/android.hardware.bluetooth_le.xml

```



```
PRODUCT_COPY_FILES += \
    device/softwinner/astar-h7/bluetooth/bt_vendor.conf:system/etc/bluetooth/bt_vendor.conf
```

7.5 config.xml

config.xml 文件路径: \android4.4.4\device\softwinner\astar-h7\overlay\frameworks\base\core\res\res\values\config.xml

要打开蓝牙功能，需要在 config.xml 中把蓝牙的 bt-pan 网口打开，修改的部分代码如下。

```
<!-- List of regexpressions describing the interface (if any) that represent tetherable
      Wifi interfaces.  If the device doesn't want to support tethering over Wifi this
      should be empty.  An example would be "softap.*" -->
<!-- default: disable Softap feature -->
<string-array translatable="false" name="config_tether_wifi_regexs">
    <item>"wlan0"</item>
</string-array>
-->

<!-- List of regexpressions describing the interface (if any) that represent tetherable
      bluetooth interfaces.  If the device doesn't want to support tethering over bluetooth this
      should be empty. -->
<!-- default: disable Bluetooth PAN feature -->
<string-array translatable="false" name="config_tether_bluetooth_regexs">
    <item>"bt-pan"</item>
</string-array>
<!-- List of regexpressions describing the interface (if any) that represent tetherable
```

注：若相应平台该目录下没 config.xml 文件，可到其他相应平台对应目录下拷贝一份。

7.6 vnd_<product>.txt

蓝牙配置文件 设置波特率，uart 设备文件和 firmware 路径(初始值)，调试信息配置

文件路径: device\softwinner\astar-h7\bluetooth

创建 vnd_\$(product).txt 文件，如 vnd_astar-h7.txt

```
#Set baudrate to 1500000
UART_TARGET_BAUD_RATE=1500000
BLUETOOTH_UART_DEVICE_PORT = "/dev/ttyS1"
FW_PATCHFILE_LOCATION = "/system/vendor/modules/"
LPM_IDLE_TIMEOUT_MULTIPLE = 5
#LPM_SLEEP_MODE = FALSE
BT_WAKE_VIA_PROC = TRUE
BTVND_DBG = TRUE
BTHW_DBG = TRUE
VNDUSERIAL_DBG = TRUE
UPIO_DBG = TRUE
```

7.7 bt_vendor.conf

文件路径: device\softwinner\astar-h7\bluetooth

```
# UART device port where Bluetooth controller is attached
UartPort = /dev/ttyS1

# Firmware patch file location
FwPatchFilePath = /system/vendor/modules/

#Firmware name
FwPatchFileName = bcm40183b2.hcd
```

7.8 bdroid_buildcfg.h

android4.4.4\device\softwinner\astar-h7\bluetooth\bdroid_buildcfg.h 主要配置打开蓝牙时显示的本机名字。

```
#ifndef _BDROID_BUILDCFG_H
#define _BDROID_BUILDCFG_H

#define BTM_DEF_LOCAL_NAME "astar-h7"

#define BTA_DM_COD {0x1A, 0x01, 0x14}

#define BTIF_HF_SERVICES (BTA_HSP_SERVICE_MASK)
#define BTIF_HF_SERVICE_NAMES { BTIF_HSAG_SERVICE_NAME }
#endif
```

7.9 sys_config.fex

sys_config.fex 文件决定 GPIO pin 的分配，要配置成使用 gb9663 模组需要把 sys_config.fex 文件修改成如下（部分代码）。

```
-----
;wifi/bt/fm/gps/nfc modules configuration
;module_num:
;
;      0- none
;      1- ap6181(wifi)
;      2- ap6210(wifi+bt)
;      3- rtl8188eu(wifi)
;      4- rtl8723au(wifi+bt)
;      5- rtl8723bs(wifi+bt)
;      6- esp8089(wifi)
;      7- ap6476(wifi+bt+fm+gps)
```

```

;          8- ap6330(wifi+bt+fm)
;          9- gb9663(wifi+bt+fm)
;module_power1: ""- bat, "axp_dldo1"- axp dldo1
;module_power1_vol: power1 voltage, mv; not used for module_power1 is ""
;module_power2: ""- bat, "axp_dldo2"- axp dldo2
;module_power2_vol: power2 voltage, mv; not used for module_power2 is ""
;module_power3: ""- bat, "axp_dldo2"- axp dldo2
;module_power3_vol: power3 voltage, mv; not used for module_power3 is ""
;power_switch: module power switch io when bat supply
;chip_en: enable chip io
;lpo_use_apclk: ""- not use, "losc_out"- a23/33, "ac10032k1", "ac10032k2", "ac10032k3"- a80/A83T
;-----
[rf_para]
module_num          = 8
module_power1       = "axp15_sw0"
module_power1_vol   =
module_power2       = "axp15_cldo3"
module_power2_vol   =
module_power3       = "axp22_aldo1"
module_power3_vol   =
power_switch        =
chip_en             =
lpo_use_apclk       = "losc_out"
;-----
;wifi configuration
;wifi_used: 0-not use, 1- use
;wifi_sdc_id: 0- SDC0, 1- SDC1, 2- SDC2, 3- SDC3
;wifi_usbc_id: 0- USB0, 1- USB1, 2- USB2
;wifi_usbc_type: 1- EHCI(speed 2.0), 2- OHCI(speed 1.0)
;wl_reg_on: wifi function enable io
;wl_host_wake: wifi device wake-up host
;wl_host_wake_invert: whether wl_host_wake use inverter between ap and module
;          0: not used, 1: used
;-----
[wifi_para]
wifi_used           = 1
wifi_sdc_id         = 1
wifi_usbc_id        = 1
wifi_usbc_type      = 1
wl_reg_on           = port:PL06<1><default><default><0>
wl_host_wake        = port:PL07<4><default><default><0>
wl_host_wake_invert = 0

```

```

;-----
;bluetooth configuration
;bt_used:          0- no used, 1- used
;bt_uart_id:       0- uart0, 1- uart1, 2- uart2
;bt_rst_n:         bt function enable io
;bt_wake:          host wake-up bluetooth device
;bt_wak_host:      bt device wake-up host
;bt_wake_invert:   whether bt_wake use inverter between ap and module
;
;                  0: not used, 1: used
;bt_host_wake_invert: whether bt_host_wake use inverter between ap and module
;
;                  0: not used, 1: used
;-----
[bt_para]
bt_used              = 1
bt_uart_id           = 1
bt_rst_n              = port:PL08<1><default><default><0>
bt_wake              = port:PL10<1><default><default><0>
bt_host_wake         = port:PL09<4><default><default><0>
bt_wake_invert       = 0
bt_host_wake_invert  = 0
ls_int               =
pcm_ch               =

```

说明:

- 1、“;” 符号起注释作用;
- 2、module_num 表示使用哪一款模组;
- 3、module_power1、2、3 表示模组供电;
- 4、module_power1 等表示供电电压;
- 5、lpo_use_apclk 表示使用的主控 32k 时钟;
- 6、wifi_used 为 1 表示使用 wifi，为 0 表示不使用;
- 7、wifi_sdc_id 表示使用的 SDIO 接口编号;
- 8、wl_reg_on 为控制 wifi on/off 的 GPIO;
- 9、wl_host_wake 为 wifi 唤醒 ap 的 GPIO;
- 10、bt_used 为 1 表示使用 bt，为 0 表示不使用;
- 11、bt_uart_id 为使用的 uart 口编号;
- 12、bt_rst_n 为控制 bt on/off 的 GPIO;
- 13、bt_wake 为 ap 唤醒 bt 的 GPIO;
- 14、bt_host_wake 为 bt 唤醒 ap 的 GPIO;

7.10gb9663 模组移植相关文件

以下文件是与 gb9663 模组移植相关的，无需再对这些文件作修改，只需了解即可。

7.10.1 linux

一、gb9663 驱动代码

linux-3.4\drivers\net\wireless\bcmdhd

二、GPIO 控制 API

linux-3.4\drivers\misc\rf_pm\rf_pm.c

linux-3.4\drivers\misc\rf_pm\wifi_pm.c

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