everyday genius

7668 Customization Bring-up SOP

Version: 1.0

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Specifications are subject to change without notice.

Document Revision History

Revision	Date	Description
1.0	2019-08-30	Initial Draft

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1. Introduction

The purpose of this document is CONSYS MT7668 configurate and bringup.

1.1 Purpose

The purpose of this document is CONSYS MT6631 configurate and bringup.
MT6631 is a 4-in-1 connectivity RF chip which contains front-ends of a 2.4GHz Wi-Fi and Bluetooth transceiver, a 5GHz Wi-Fi transceiver. Definitions, Acronyms and Abbreviations
WMT: Wireless Management Task

1.2 References

N/A

1.3 Overview

Section 1 is Project Config
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2. CONSYS bring-up Contents

2.1 Project Config

File path:

- device/project_name/
- Configuration item:
- ProjectConfig.mk, modify below config for mt7668

```
MTK_BT_CHIP = MTK_CONSYS_MT8167
MTK_BT_CHIP = MTK_MT7668
MTK_COMBO_CHIP = CONSYS_8167
MTK_COMBO_CHIP = MT7668
```

- BoardConfig.mk, add below statement at the end of BoardConfig.mk

```
ifeq ($(MTK_WLAN_SUPPORT), yes)
ifeq ($(MTK_COMBO_CHIP), MT7668)
WIFI_DRIVER_FW_PATH_PARAM :=
WIFI_DRIVER_FW_PATH_STA:=
WIFI_DRIVER_FW_PATH_AP:=
WIFI_DRIVER_FW_PATH_P2P:=
WIFI_DRIVER_STATE_CTRL_PARAM :=
WIFI_DRIVER_STATE_ON :=
WIFI_DRIVER_STATE_OFF :=
endif
endif
```

- Configuration item:
  - init.project.rc , add below statement at the end of BoardConfig.mk

```
# WiFi
mkdir /data/misc/wifi 0770 wifi wifi
mkdir /data/misc/wifi/sockets 0770 wifi wifi
mkdir /data/misc/wpa_supplicant 0770 wifi wifi
# Wlan
service wpa_supplicant /vendor/bin/hw/wpa_supplicant \
-iwlan0 -Dnl80211 -c/data/misc/wifi/wpa_supplicant.conf \
-I/vendor/etc/wifi/wpa_supplicant_overlay.conf -N \
-ip2p0 -Dnl80211 -c/data/misc/wifi/p2p_supplicant.conf -
e/data/misc/wifi/entropy.bin \
-I/vendor/etc/wifi/p2p_supplicant_overlay.conf \
-O/data/misc/wifi/sockets -g@android:wpa_wlan0
# we will start as root and wpa_supplicant will switch to user wifi
# after setting up the capabilities required for WEXT
# user wifi
# group wifi inet keystore
```

- class main
- socket wpa_wlan0 dgram 660 wifi wifi
- disabled
- oneshot

If the configuration already exist in this file, please don't add it again.

2.2 Kernel Config

For example, kernel-4.9/arch/arm64/configs/tb8768p1_64_bsp_defconfig

File path:

- kernel-4.4/arch/arm64/configs/[project]_debug_defconfig
- kernel-4.4/arch/arm64/configs/[project]_defconfig

Configuration item:

- modify below config for mt7668

```
CONFIG_MMC_MTK_COMM_SDIO=y
CONFIG_MTK_COMBO_CHIP_CONSYS_8167=y
CONFIG_MTK_COMBO_CHIP_MT7668=y
CONFIG_MTK_BTIF=y
```

If the configuration already exist in this file, please don't add it again.

2.3 DTS Config

For example, kernel-4.9/arch/arm64/boot/dts/mediatek/tb8768p1_64_bsp.dts

File path:

- vendor/mediatek/proprietary/bootable/bootloader/lk/target/[project_name]/dct/dct/codegen.dws
- vendor/mediatek/proprietary/bootable/bootloader/preloader/custom/[project_name]/dct/dct/codegen.dws
- Tool path:
  - alps/vendor/mediatek/proprietary/scripts/dct/DrvGen.exe
- According to the Schematic and GPIO table, Customer need to modify codegen.dws file.

2.4 Gpio config

- File path:
- kernel-4.4/arch/arm64/boot/dts/mediatek/(project).dts
- Configuration item:
- Remove 8167 internal consys settings from dts file

```
&reserved_memory {
        #address-cells = <2>;
```

```
        #size-cells = <2>;
        ranges;
        consys-reserve-memory {
            compatible = "mediatek,consys-reserve-memory";
            no-map;
            size = <0 0x200000>;
            alignment = <0 0x200000>;
        };
};
&consys {
        pinctrl-names = "default", "gps_lna_state_init", "gps_lna_state_oh", "gps_lna_state_ol";
        pinctrl-0 = <&consys_pins_default>;
        pinctrl-1 = <&gpslna_pins_init>;
        pinctrl-2 = <&gpslna_pins_oh>;
        pinctrl-3 = <&gpslna_pins_ol>;
        vcn18-supply = <&mt6392_vcn18_reg>;
        vcn35-supply = <&mt6392_vcn35_reg>;
        status = "okay";
};
```

- File path:
- kernel-4.4/arch/arm64/boot/dts/mediatek/[project].dts
- Configuration item:
- Remove 8167 internal consys settings from dts file

```
    /* CONSYS GPIO Settings - Start */
consys_pins_default: default {
};
/* CONSYS GPIO Settings - End */
/* CONSYS GPIO Settings - Start */
gpslna_pins_init: gpslna@0 {
};
gpslna_pins_oh: gpslna@1 {
};
gpslna_pins_ol: gpslna@2 {
};
/* CONSYS GPIO Settings - End */
```

- File path:
- kernel-4.4/arch/arm64/boot/dts/mediatek/[project].dts
- Configuration item:
- Firstly verify the device connect with which host (MSDC1 or MSDC2)
- Add sdio vmmc settings to dts file

```
sdio_fixed_3v3: fixedregulator@2 {
        compatible = "regulator-fixed";
        regulator-name = "sdio_fixed_3v3";
        regulator-min-microvolt = <3300000>;
        regulator-max-microvolt = <3300000>;
        gpio = <&pio 2 GPIO_ACTIVE_HIGH>;
        enable-active-high;
        startup-delay-us = <500000>;
};
```

- Add mmc2 settings to dts file for MSDC2

```
&mmc2 {
        pinctrl-names = "default", "state_uhs", "state_dat1", "state_eint";
        pinctrl-0 = <&mmc2_pins_default>;
        pinctrl-1 = <&mmc2_pins_uhs>;
        pinctrl-2 = <&mmc2_pins_dat1>;
        pinctrl-3 = <&mmc2_dat1_eint>;
        eint-gpios = <&pio 71 0>;
        status = "okay";
        bus-width = <4>;
        max-frequency = <200000000>;
        cap-sd-highspeed;
        sd-uhs-sdr50;
        sd-uhs-sdr104;
        keep-power-in-suspend;
        enable-sdio-wakeup;
        vmmc-supply = <&sdio_fixed_3v3>;
        cap-sdio-irq;
        non-removable;
};
```

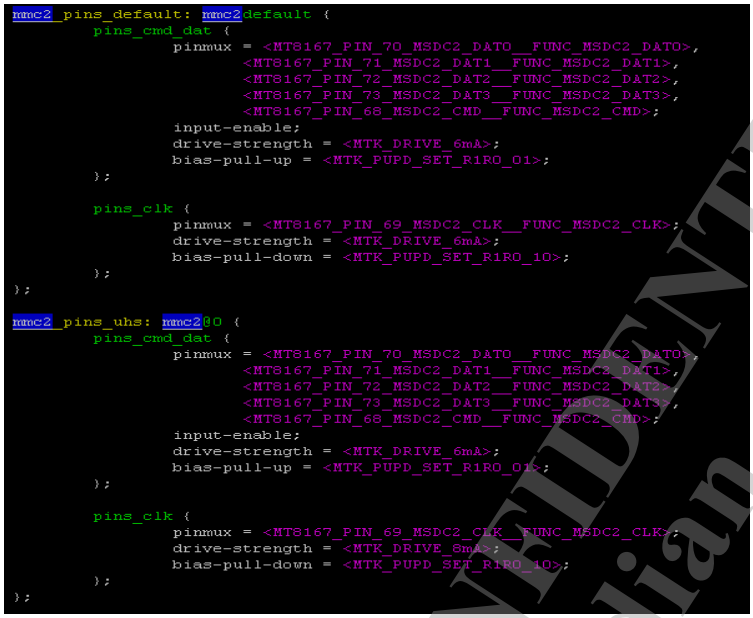
- Configuration item:
  - Add mmc1 settings to dts file for MSDC1
  - Cause MSDC1 prepare for SD card, so must overwrite the head.

```
msdc1: mmc@11130000 {
        compatible = "mediatek,mt8167-sdio";
        reg = <0 0x11130000 0 0x1000>;
        interrupts = <GIC_SPI 79 IRQ_TYPE_LEVEL_LOW>;
        clocks = <&topckgen CLK_TOP_MSDC1>,
                 <&topckgen CLK_TOP_AXI_INFRA_SEL>,
                 <&topckgen CLK_TOP_MSDC1_INFRA>;
        clock-names = "source", "hclk", "source_cg";
        status = "disabled";
};
```

```
&msdc1 {
        pinctrl-names = "default", "state_uhs", "state_dat1", "state_eint";
        pinctrl-0 = <&mmc1_pins_default>;
        pinctrl-1 = <&mmc1_pins_uhs>;
        pinctrl-2 = <&mmc1_pins_dat1>;
        pinctrl-3 = <&mmc1_dat1_eint>;
        eint-gpios = <&pio 107 0>;
        status = "okay";
        bus-width = <4>;
        max-frequency = <200000000>;
        cap-sd-highspeed;
        sd-uhs-sdr50;
        sd-uhs-sdr104;
        keep-power-in-suspend;
        enable-sdio-wakeup;
        vmmc-supply = <&sdio_fixed_3v3>;
        cap-sdio-irq;
        non-removable;
};
```

- Configuration item:

- According to the Schematic and GPIO table, mt7668 connected to the AP GPIO num
- Add mmc2 pinctrl for MSDC2

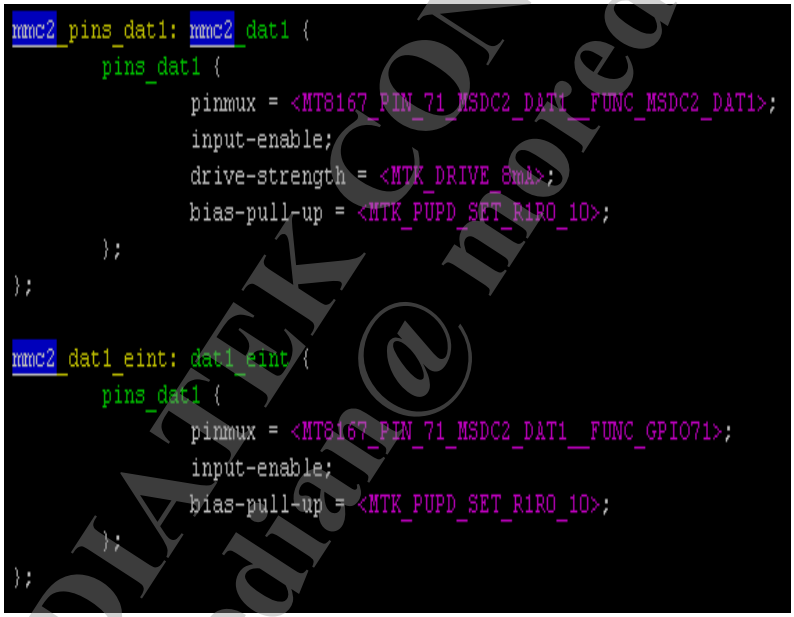


```
mmc2_pins_default: mmc2default {
        pins_cmd_dat {
                pinmux = <MT8167_PIN_70_MSDC2_DAT0__FUNC_MSDC2_DAT0>,
                         <MT8167_PIN_71_MSDC2_DAT1__FUNC_MSDC2_DAT1>,
                         <MT8167_PIN_72_MSDC2_DAT2__FUNC_MSDC2_DAT2>,
                         <MT8167_PIN_73_MSDC2_DAT3__FUNC_MSDC2_DAT3>,
                         <MT8167_PIN_68_MSDC2_CMD__FUNC_MSDC2_CMD>;
                input-enable;
                drive-strength = <MTK_DRIVE_6mA>;
                bias-pull-up = <MTK_PUPD_SET_R1R0_01>;
        };

        pins_clk {
                pinmux = <MT8167_PIN_69_MSDC2_CLK__FUNC_MSDC2_CLK>;
                drive-strength = <MTK_DRIVE_6mA>;
                bias-pull-down = <MTK_PUPD_SET_R1R0_10>;
        };
};

mmc2_pins_uhs: mmc2@0 {
        pins_cmd_dat {
                pinmux = <MT8167_PIN_70_MSDC2_DAT0__FUNC_MSDC2_DAT0>,
                         <MT8167_PIN_71_MSDC2_DAT1__FUNC_MSDC2_DAT1>,
                         <MT8167_PIN_72_MSDC2_DAT2__FUNC_MSDC2_DAT2>,
                         <MT8167_PIN_73_MSDC2_DAT3__FUNC_MSDC2_DAT3>,
                         <MT8167_PIN_68_MSDC2_CMD__FUNC_MSDC2_CMD>;
                input-enable;
                drive-strength = <MTK_DRIVE_6mA>;
                bias-pull-up = <MTK_PUPD_SET_R1R0_01>;
        };

        pins_clk {
                pinmux = <MT8167_PIN_69_MSDC2_CLK__FUNC_MSDC2_CLK>;
                drive-strength = <MTK_DRIVE_8mA>;
                bias-pull-down = <MTK_PUPD_SET_R1R0_10>;
        };
};
```



```
mmc2_pins_dat1: mmc2_dat1 {
        pins_dat1 {
                pinmux = <MT8167_PIN_71_MSDC2_DAT1__FUNC_MSDC2_DAT1>;
                input-enable;
                drive-strength = <MTK_DRIVE_8mA>;
                bias-pull-up = <MTK_PUPD_SET_R1R0_10>;
        };
};

mmc2_dat1_eint: dat1_eint {
        pins_dat1 {
                pinmux = <MT8167_PIN_71_MSDC2_DAT1__FUNC_GPIO71>;
                input-enable;
                bias-pull-up = <MTK_PUPD_SET_R1R0_10>;
        };
};
```

- Configuration item:
  - According to the Schematic and GPIO table, mt7668 connected to the AP GPIO num
  - Add mmc1 pinctrl for MSDC1

2.6 coex config

Solution	wifi.cfg	eFuse	Note
FDD	1. "FddPerPkt 0" 2. "CoexModeCtrl 1"	0x3E[6] = 0	Default sol

TDD	1. **"FddPerPkt 0"** 2. **"CoexModeCtrl 2"**	3. **0x3E[6] = 1** 4. **(0x3D[1:0] = 1 for SPDT)**	5. **Ne** 6. **Tes**

```
mmc1_pins_default: mmc1default {
        pins_cmd_dat {
                pinmux = <MT8167_PIN_106_MSDC1_DAT0__FUNC_MSDC1_DAT0>,
                         <MT8167_PIN_107_MSDC1_DAT1__FUNC_MSDC1_DAT1>,
                         <MT8167_PIN_108_MSDC1_DAT2__FUNC_MSDC1_DAT2>,
                         <MT8167_PIN_109_MSDC1_DAT3__FUNC_MSDC1_DAT3>,
                         <MT8167_PIN_104_MSDC1_CMD__FUNC_MSDC1_CMD>;
                input-enable;
                drive-strength = <MTK_DRIVE_6mA>;
                bias-pull-up = <MTK_PUPD_SET_R1R0_01>;
        };

        pins_clk {
                pinmux = <MT8167_PIN_105_MSDC1_CLK__FUNC_MSDC1_CLK>;
                drive-strength = <MTK_DRIVE_6mA>;
                bias-pull-down = <MTK_PUPD_SET_R1R0_10>;
        };
};

mmc1_pins_uhs: mmc1@0 {
        pins_cmd_dat {
                pinmux = <MT8167_PIN_106_MSDC1_DAT0__FUNC_MSDC1_DAT0>,
                         <MT8167_PIN_107_MSDC1_DAT1__FUNC_MSDC1_DAT1>,
                         <MT8167_PIN_108_MSDC1_DAT2__FUNC_MSDC1_DAT2>,
                         <MT8167_PIN_109_MSDC1_DAT3__FUNC_MSDC1_DAT3>,
                         <MT8167_PIN_104_MSDC1_CMD__FUNC_MSDC1_CMD>;
                input-enable;
                drive-strength = <MTK_DRIVE_6mA>;
                bias-pull-up = <MTK_PUPD_SET_R1R0_01>;
        };

        pins_clk {
                pinmux = <MT8167_PIN_105_MSDC1_CLK__FUNC_MSDC1_CLK>;
                drive-strength = <MTK_DRIVE_8mA>;
                bias-pull-down = <MTK_PUPD_SET_R1R0_10>;
        };
};
```

```
mmc1_pins_dat1: mmc1_dat1 {
        pins_dat1 {
                pinmux = <MT8167_PIN_107_MSDC1_DAT1__FUNC_MSDC1_DAT1>;
                input-enable;
                drive-strength = <MTK_DRIVE_8mA>;
                bias-pull-up = <MTK_PUPD_SET_R1R0_10>;
        };
};

mmc1_dat1_eint: dat1_eint {
        pins_dat1 {
                pinmux = <MT8167_PIN_107_MSDC1_DAT1__FUNC_GPIO107>;
                input-enable;
                bias-pull-up = <MTK_PUPD_SET_R1R0_10>;
        };
};
```

2.5 Check list

- Before bring up, customer should check below items to confirm mt7668 has been built in.

out/target/product/[project]/vendor/lib/modules/wlan_drv_gen4_mt7668.ko
out/target/product/[project]/vendor/lib/modules/btmtksdio.ko
out/target/product/[project]/vendor/firmware/EEPROM_MT7668.bin
out/target/product/[project]/vendor/firmware/mt7668_patch_e2_hdr.bin
out/target/product/[project]/vendor/firmware/TxPwrLimit_76x8.dat
out/target/product/[project]/vendor/firmware/wifi.cfg

out/target/product/[project]/vendor/firmware/bt.cfg (optional)
out/target/product/[project]/vendor/firmware/WIFI_RAM_CODE_MT7668.bin
out/target/product/[project]/vendor/firmware/WIFI_RAM_CODE2_SDIO_MT7668.bin
out/target/product/[project]/vendor/etc/init/init.wlan_mt7668_drv.rc
out/target/product/[project]/vendor/etc/init/init.btmtksdio.rc