



# HiKey970

## Audio Development Guide

Issue	01
Date	2018-03-11

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## Change History

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Changes between document issues are cumulative. The latest document issue contains all the changes made in earlier issues.

### **Issue 01 (2018-03-11)**

The first version.



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# Contents

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<b>Change History .....</b>	<b>i</b>
<b>Contents .....</b>	<b>ii</b>
<b>1 Description .....</b>	<b>1</b>
1.1 AUDIO .....	1
1.1.1 General description .....	1
1.1.2 Features .....	1
1.2 Audio Drive Workflow .....	2
1.2.1 Hifi dsp initialization .....	2
1.2.2 sound card loading process is as follows: .....	3
1.2.3 1.2.3 Data Transfer .....	4
1.3 Development .....	4
1.3.1 DTS Configuration.....	4
1.3.2 Device Driver Configuration .....	5



# 1 Description

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## 1.1 AUDIO

### 1.1.1 General description

The Audio module complies with the standard alsa framework and implements audio playback on the HDMI port. At the same time provides the HIFI DSP interactive driver, and it also achieves the use of dsp audio data pre-processing function in the android platform.

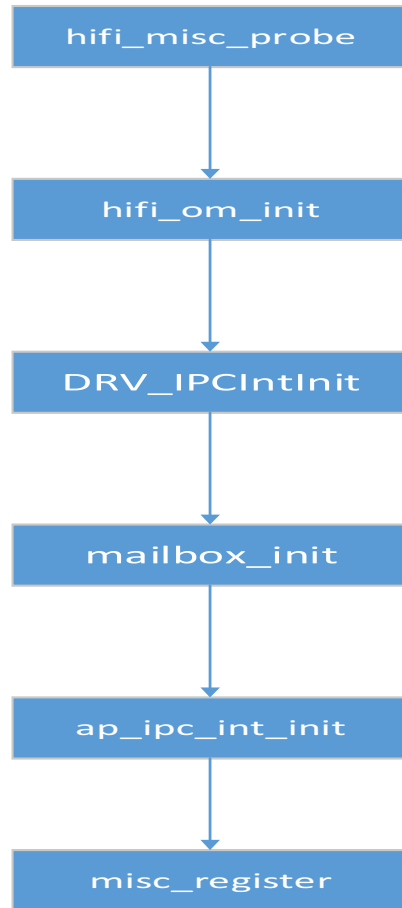
### 1.1.2 Features

1. Provides interactive driving of hifi dsp, which can make full use of the dsp audio data processing capability. hifi dsp driver needs to rely on icp communication driver and mailbox driver in the kernel isi interface.
2. Compliance with the alsa standard framework which enables dual-channel 48k, 16Bit HDMI audio playback capabilities.



## 1.2 Audio Drive Workflow

### 1.2.1 Hifi dsp initialization

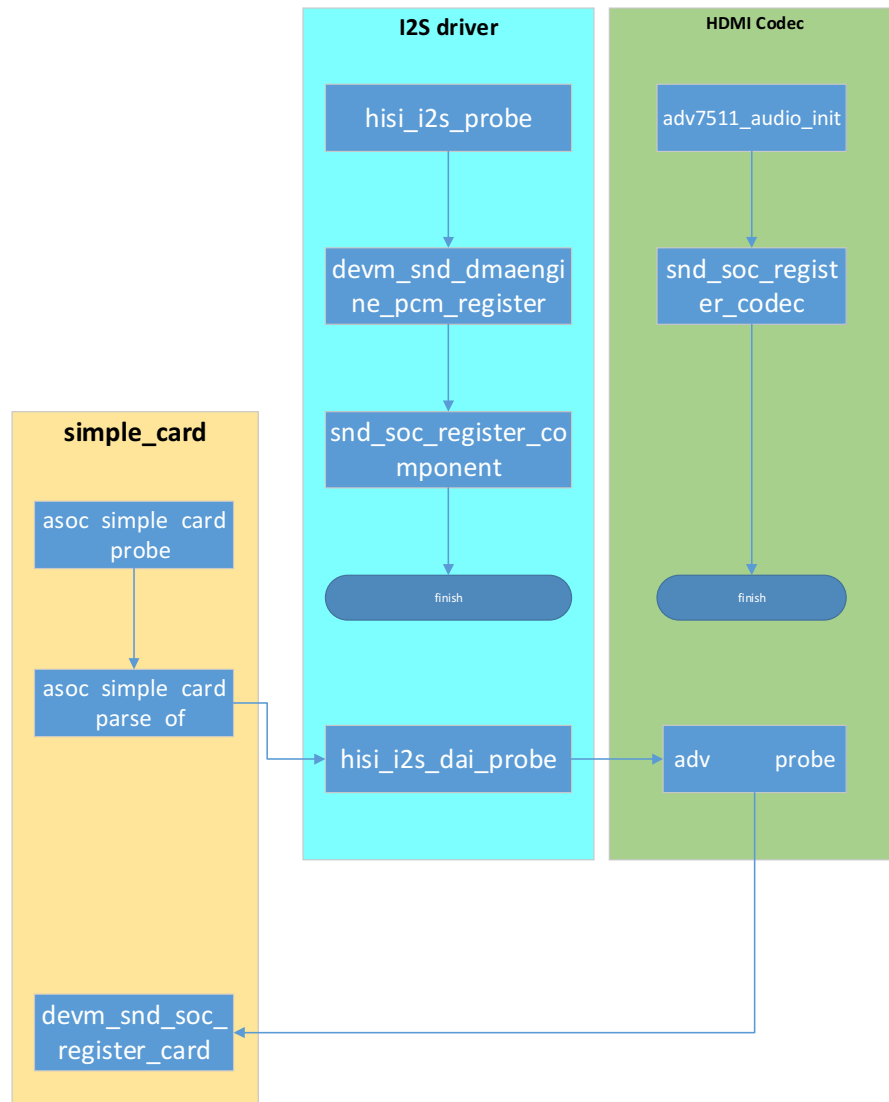


Hifi driver initialization process is as follows:

- a. Ominit initializes struct hifi\_om\_s g\_om\_data; structure, and mainly for the initialization of hifi shared memory structure;
- b. IPC driver initialization;
- c. Initialization of the Mailbox driver;
- d. Ipc terminal registration;
- e. Registration of misc devices;



## 1.2.2 sound card loading process is as follows:



I2S driver registration:

- a. I2s driver initial probe
  - b. I2S dma initialization
  - c. Register component
- Hdmi driver registration:

- a. Audio init
- b. Register codec

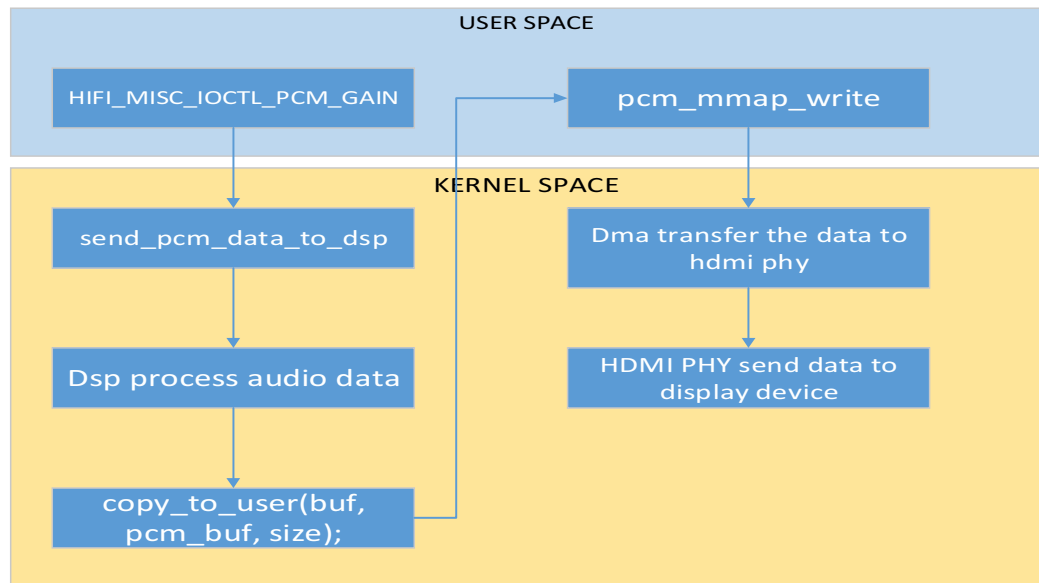
Simple\_card Load the sound card:

- a. simple\_card Probe
- b. Resolve dts to find cpu component and codec component
- c. Call probe function to cpu component and codec component.
- d. Register sound card



## 1.2.3 1.2.3 Data Transfer

The audio data playback process is as follows:



- a. Audio data is sent to hifi misc devices via ioctl
- b. Hifi misc device sends data to hifidsp via mailbox
- c. Hifi dsp processes the data and places the data in a fixed shared memory address
- d. Copy the data processed by hifi dsp to user space
- e. Write data to the pcm device
- f. Dma driver sends data to hdmi
- g. Hdmi sends data to external devices

## 1.3 Development

### 1.3.1 DTS Configuration

1. The dts configuration of HIFI driver: arch/arm64/boot/dts/hisilicon/kin970-hikey970.dts

```
hifidsp {
    compatible = "hisilicon,k3hifidsp";
};
```

2. Hifi shared memory address dts configuration:  
arch/arm64/boot/dts/hisilicon/kin970-hikey970.dts

```
hifi-base {
    reg = <0x0 0x8D500000 0x0 0xC00000>;
    no-map;
};
hifi-data {
    reg = <0x0 0x8E300000 0x0 0x500000>;
```





```
no-map;  
};
```

3. The dts configuration of I2s2: [arch/arm64/boot/dts/hisilicon/kin970.dtsi](#)

```
i2s2: hisi_i2s {  
    compatible = "hisilicon,hisi-i2s";  
    reg = <0x0 0xe804f800 0x0 0x400>,  
    <0x0 0xe804e000 0x0 0x400>;  
    pinctrl-names = "default";  
    pinctrl-0 = <&i2s2_pmx_func &i2s2_cfg_func>;  
    dmas = <&asp_dmac 18 &asp_dmac 19>;  
    dma-names = "rx", "tx";  
    #sound-dai-cells = <0>;  
};
```

4. (4) Simple-audio-card sound card configuration: [arch/arm64/boot/dts/hisilicon/kin970.dtsi](#)

```
sound {  
    compatible = "simple-audio-card";  
    simple-audio-card,name = "hikey-hdmi";  
    simple-audio-card,format = "i2s";  
    simple-audio-card,bitclock-master = <&sound_master>;  
    simple-audio-card,frame-master = <&sound_master>;  
    sound_master: simple-audio-card,cpu {  
        sound-dai = <&i2s2>;  
    };  
    simple-audio-card,codec {  
        sound-dai = <&adv7533>;  
    };  
};
```

## 1.3.2 Device Driver Configuration

1. Support hdmi playback function, modify the kernel config:  
[arch/arm64/configs/hikey970\\_defconfig](#) b/[arch/arm64/configs/hikey970\\_defconfig](#)

```
CONFIG_HISI_ASP_DMA=y  
CONFIG_SND_I2S_HISI_I2S=y
```

2. Support hifi dsp driver, configure kernel config:

```
CONFIG_HISILICON_PLATFORM=y  
CONFIG_HISILICON_PLATFORM_MAILBOX=y  
CONFIG_HISI_MAILBOX=y  
CONFIG_HISI_RPROC=y  
CONFIG_HIFI_DSP_ONE_TRACK=y  
CONFIG_HIFI_MAILBOX=y
```



```
CONFIG_HIFI_IPC=y  
CONFIG_HIFI_IPC_3660=y  
CONFIG_HIKEY970_HIFI=y
```