???????? Audio ??????????????????????? USB ??????

???? USB ????????????

1. USB ????????? ALSA ??
2. ???? STLinux Kernel????? ALSA ????????????
3. ????????????? ALSA ??????
4. ?? ALSA ????
   - ? stlinux23-sh4-alsa-lib
   - ? stlinux23-sh4-alsa-utils
   - ? stlinux23-sh4-alsaplayer
5. ??????

## ???? Linux kernel

????

????? .config ? General setup ???? CONFIG_SOUND=m
??: ??????????????????? m ? y


```
CONFIG_SOUND=m
#
# General setup
#
.....
```

    Advanced Linux Sound Architecture (SND) [N/m/?] (NEW) m

     Sequencer support (SND_SEQUENCER) [N/m/?] (NEW) m
       Sequencer dummy client (SND_SEQ_DUMMY) [N/m/?] (NEW) m
     OSS Mixer API (SND_MIXER_OSS) [N/m/?] (NEW) m
     OSS PCM (digital audio) API (SND_PCM_OSS) [N/m/?] (NEW) m
     OSS PCM (digital audio) API - Include plugin system (SND_PCM_OSS_PLUGINS) [Y/n/?] (NEW) y
     OSS Sequencer API (SND_SEQUENCER_OSS) [N/y/?] (NEW) y
     Dynamic device file minor numbers (SND_DYNAMIC_MINORS) [N/y/?] (NEW) y
     Support old ALSA API (SND_SUPPORT_OLD_API) [Y/n/?] (NEW) y
     Verbose procfs contents (SND_VERBOSE_PROCFS) [Y/n/?] (NEW) y
     Verbose printk (SND_VERBOSE_PRINTK) [N/y/?] (NEW) n
    Debug (SND_DEBUG) [N/y/?] (NEW) n

    *
    * Generic devices
    *
    Dummy (/dev/null) soundcard (SND_DUMMY) [N/m/?] (NEW) m
    Virtual MIDI soundcard (SND_VIRMIDI) [N/m/?] (NEW) m
    MOTU MidiTimePiece AV multiport MIDI (SND_MTPAV) [N/m/?] (NEW) n
    UART16550 serial MIDI driver (SND_SERIAL_U16550) [N/m/?] (NEW) n
    Generic MPU-401 UART driver (SND_MPU401) [N/m/?] (NEW) n

```
*
* USB devices
*
USB Audio/MIDI driver (SND_USB_AUDIO) [N/m/?] (NEW) m
Native Instruments USB audio devices (SND_USB_CAIAQ) [N/m/?] (NEW) n


*
* System on Chip audio support
*
ALSA for SoC audio support (SND_SOC) [N/m/?] (NEW) m
*
* STMicroelectronics SoCs support
*
STMicroelectronics SoCs support (SND_STM) [N/m/?] (NEW) m
  Name of BPA2 partition to allocate buffers from (SND_STM_BPA2_PARTITION_NAME) [audio]
(NEW)
  STx7100 and STx7109 support (SND_STM_STX710X) [N/m/?] (NEW) m
  STx7105 support (SND_STM_STX7105) [M/n/?] (NEW) m
  STx7111 support (SND_STM_STX7111) [N/m/?] (NEW) m
  STx7141 support (SND_STM_STX7141) [N/m/?] (NEW) m
  STx7200 support (SND_STM_STX7200) [N/m/?] (NEW) m
  Dummy converter driver (SND_STM_CONV_DUMMY) [N/m/?] (NEW) m
  Generic GPIO-controlled converter driver (SND_STM_CONV_GPIO) [N/m/?] (NEW) m
  Generic I2C-controlled converter driver (SND_STM_CONV_I2C) [N/m/?] (NEW) m

*
* Open Sound System
*
Open Sound System (DEPRECATED) (SOUND_PRIME) [N/m/?] (NEW) n
```

????


```
make ARCH=sh CROSS_COMPILE=sh4-linux- vmlinux
make ARCH=sh CROSS_COMPILE=sh4-linux- modules
make ARCH=sh CROSS_COMPILE=sh4-linux- modules_install INSTALL_MOD_PATH=./modules_install
```

make the vmlinux.ub


```
sh4-linux-objcopy -O binary vmlinux vmlinux.bin
gzip --best --force vmlinux.bin
mkimage -A sh -O linux -T kernel -C gzip -a 0x80800000 -e 0x80801000 -n "Linux 2.6" -d vmlinux.bin.gz
vmlinux.ub
```

## ???? ALSA-Lib ? ALSA-Utils ??

????: http://www.alsa-project.org/main/index.php/Download

alsa-lib

CC=sh4-linux-gcc \
./configure --host=sh4-linux

make
make install DESTDIR=/home/alang/STLinux_Cross-Compile/build_opt/alsa-lib

alsa-utils

CC=sh4-linux-gcc \
./configure --host=sh4-linux

make
make install DESTDIR=/home/alang/STLinux_Cross-Compile/build_opt/alsa-utils

## ?? ALSA ????

??????????
/lib/modules/2.6.23.17_stm23_A18B-PDK7105-32BITS-A18B/kernel/sound

????
modprobe soundcore
modprobe snd-usb-audio
modprobe snd-pcm-oss
modprobe snd_seq_midi
modprobe snd_seq_oss

TIP:

    ??????????? depmod -a

??????????

root@localhost:/dev/snd# lsmod | grep snd
soundcore             6468  1 snd
snd              49972  7
snd_usb_audio,snd_pcm,snd_timer,snd_usb_lib,snd_rawmidi,snd_seq_device,snd_hwdep
snd_hwdep             7492  1 snd_usb_audio
snd_seq_device        6860  1 snd_rawmidi
snd_rawmidi          22496  1 snd_usb_lib
snd_timer            21060  1 snd_pcm
snd_pcm              78373  1 snd_usb_audio
snd_page_alloc        6376  1 snd_pcm

```
snd_usb_lib        15712  1 snd_usb_audio
snd_usb_audio      80128  0
```

?? /etc/modprobe.conf (???)


```
# ALSA portion
alias char-major-116 snd
alias snd-card-0 snd-usb-audio
options snd-usb-audio nrpacks=1

# OSS/Free portion
alias char-major-14 soundcore
alias sound-slot-0 snd-card-0

# card #1
alias sound-service-0-0 snd-mixer-oss
alias sound-service-0-1 snd-seq-oss
alias sound-service-0-3 snd-pcm-oss
alias sound-service-0-12 snd-pcm-oss
```

TIPs:

   ?? modprobe.conf ?????? APP ?? aplay  -l???????????????


?? alsa.conf
??? alsa-lib ???<alsa-lib>/usr/share/alsa/alsa.conf ??? /usr/share/alsa/alsa.conf

????????? alsa.conf?

```
pcm.!default {
  type hw
  card 0
}
pcm.hw {
  type hw
  card 0
  device 0
  subdevice 0
}
ctl.!default {
  type hw
  card 0
}
ctl.hw {
  type hw
  card 0
}
```

?????

???? audio

vi /etc/group
?????
audio:*:1000:

?????? dev_snd_all.tar.gz

mkdir /dev/snd
chmod 0755 /dev/snd
tar xzf dev_snd_all.tar.gz -C /dev/snd

????

```
root@localhost:/dev/snd# ls -l /dev/snd
crw-rw----   1 root    audio   116,  5 Jan  1  2000 controlC0
crw-rw-rw-   1 root    audio   116, 32 Feb 24 16:56 controlC1
crw-rw----   1 root    audio   116,  4 Jan  1  2000 pcmC0D0c
crw-rw----   1 root    audio   116,  3 Jan  1  2000 pcmC0D0p
crw-rw-rw-   1 root    audio   116, 25 Feb 24 16:56 pcmC0D1c
crw-rw-rw-   1 root    audio   116, 17 Feb 24 16:56 pcmC0D1p
crw-rw-rw-   1 root    audio   116, 26 Feb 24 16:56 pcmC0D2c
crw-rw-rw-   1 root    audio   116, 18 Feb 24 16:56 pcmC0D2p
crw-rw----   1 root    audio   116,  1 Feb 24 16:56 seq
crw-rw----   1 root    audio   116,  2 Jan  1  2000 timer
```

## Q&A

**?? alsamixer????? Error opening terminal: vt102**.
Ans??? STLinux ????? /opt/STM/STLinux-2.3/devkit/sh4/target/usr/share/terminfo/v/vt102 ????? usr/
share/terminfo/v/vt102

**????**

- http://alsa.opensrc.org/AlsaBuild2.6
- http://alsa.opensrc.org/TroubleShooting
- http://snowwolf725.blogspot.tw/