Linux Audio Driver Introduction

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What Is It?

snd-tw680x is a Linux kernel model for the Advanced Linux Sound Architecture (ALSA). It allows you to capture digitized sound directly from a TW6805 or TW6816 capture card, without hooking it to your sound card. This document will show you how to make the module, how to intall it, and how to test it.

Make the Module

Extract the module package into a directory, then change into the directory and just make it.

make

If everything is good, you will see the module which is named snd-tw680x.ko in the directory.

Install the Module

To use the snd-tw680x module, of cause, it should be installed first. To install the module just execute "make install".

make install

To check if it is been installed on your system, type

```
# find /lib/modules/`uname -r` -name 'snd-tw680x*'
```

If it returns a filename, the module is installed. You are able to load it. Please follow the next step.

Load the Module

Once the module is installed, it needs to be loaded. Please run "make load".

make load

or you can do the following.

modprobe snd-tw680x

If it doesn't give you any errors, use the lsmod command below to confirm that it's loaded.

lsmod | grep snd-tw680x

Check the Module

Sometimes the module doesn't recognize your TW6805/16 card. It is usually caused by a bad hardware ID. If your card can not be installed correctly, try to modify the hardware ID in the dirver source code and redo the above steps until the module is correctly installed.

To make sure that your card is recognized correctly, try

```
# cat /proc/asound/cards
```

The output of TW6805 should have one or more lines that look something like

```
 1 [TW6805  ]: TW68XX-Techwell TW6805
```

The output of TW6816 should look like below.

```
 1 [TW6816  ]: TW68XX-Techwell TW6816
 2 [TW6816  ]: TW68XX-Techwell TW6816
 3 [TW6816  ]: TW68XX-Techwell TW6816
 4 [TW6816  ]: TW68XX-Techwell TW6816
```

Now, the 'cat' command above shows you the ALSA audio devices in your system and their ALSA device numbers.
Usually, the first device is numbered as 0 and is the sound card in the system.
In the above example, TW6805 is number as 1 and is the second ALSA sound device.
The Tw6816 is number as 1, 2, 3, and 4 which are the second to fifth ALSA sound device.

Test the Driver

Once the module is loaded, it creates one or more ALSA sound card instances for each TW6805/16 card it found. To see these, type

```
# cat /proc/asound/cards
```

The number preceding the card you are interested in is the ALSA sound card number.
If your system uses udev or devfs, a corresponding device file might be created automatically. It will probably be named `/dev/dsp` or `/dev/adsp` for ALSA sound card zero,
or `/dev/dsp<ALSA_sound_card_number_here>`.
If the device file has not been created, please refer to the documentation for your Linux distribution to determine how to create it.
Once you know the name of the device file, you can try it with

```
# dd if=/dev/dsp1 of=/dev/dsp bs=1K count=33
```

Accoring to my system and the ALSA information above the /dev/dsp is the default sound card, and /dev/dsp1 is the TW6805 capture card. You should hear about 5 seconds of sound from your TW6805 capture card. If you only hear static, don't worry, your capture card might not have the correct input selected or be tuned to a valid channel. If the sound you hear is noisy, it might be because the dd command is not meant for playing sound. It's just a very crude way to test that the driver is working. If you hear sound, it's probably working fine.

You can also test it by using sox, SOund eXchange,

```
# sox -r8000 -t ossdsp /dev/dsp1 -t ossdsp /dev/dsp
```

We also assume that /dev/dsp is your default sound card, and /dev/dsp1 is your TW6805 capture card. You could hear the sound from your TW6805 capture card. If you would like to stop it, press Ctrl-C. To test in this way, please make sure the Open Sound System works correctly in your system.

Record the Audio

Once you can hear the audio correctly, we could start to record the audio into a wav file. To record a 8KHz (-

r8000) 16bit signal-channel (-fS16_LE) audio into a wav file for 10 seconds (-d10), please try

```
# arecord -d10 -fS16_LE -r8000 -D hw:1 -c1 -vv test.wav
```

Arecord is a command-line recorder for ALSA sound-card driver, and is ususllay could be found in many distrubutions. For example, it could be found in my system Fedora Core 10.
The most important thing is to identify the correct hardware to record the audio. There are several ways to choose the capture device. In the above example, we use hw description.
hw:1 means the capture card 1, which is according to the example in the Testing the driver section above. If you would like to record the audio from card 2, just change the "hw:1" to "hw:2".

Play the Audio File

After the wav file is created, we can play it by the following commands,

```
# aplay -vv test.wav
```

or

```
# aplay -c1 -fS16_LE -r8000 -vv test.wav
```

Aplay is a command-line player for ALSA sound-card driver, and is usually could be found in many distrbutions.

FAQ

As far as we know, some Linux distributions have also installed the PulseAudio in its system. It may conflict with the ALSA auido system. If you have problem to run the arecord and aplay, please follow the instructions below to make a mofification.

1. # sudo gedit /etc/pluse/default.pa
2. modify "#load-module module-alsa-sink " to "load-module module-alsa-sink device=dmix"
3. modify "load-module module-suspend-on-idle" to "#load-module module-suspend-on-idle"
4. modify "load-module module-hal-detect" to "#load-module module-hal-detect"
5. # cd tw68xx_working (the directory of the audio source code)
6. # make
7. # make install
8. # reboot

Techwell's Linux audio module is modified from ALSA snd-bt87x module. Please refer to http://www.mythtv.org/wiki/index.php/Snd-bt87x for useful informaitn.