

Audio unter Linux

Audio Debugging für OpenSUSE: https://en.opensuse.org/SDB:Audio_troubleshooting

Das Basis-Framework für Sound ist ALSA mit dem für die Soundkarte passenden Treiber. Moderne Linux Distros transportieren alle Audiodaten über den Pulseaudio Daemon als netzwerk-transparenten Datenstream. Daher kann der Pulseaudio Daemon auch auf entfernte Sound-Hardware im Netz zugreifen. Entsprechend kann man Audiodaten über ALSA oder Pulseaudio abgreifen und weiter verarbeiten. Pulseaudio abstrahiert die Audiodaten vollständig von der darunter liegenden Hardware:

Soundquelle oder -Ziel → PulseAudio → ALSA-Treiber → Soundkarte

Jedes Soundgerät ist entweder Quelle (Source) oder Senke (Sink) für Audiodaten.

Aufnahmen auf der Kommandozeile

Mit arecord/aplay

Auflisten aller Mikrofone

```
arecord -l

**** Liste der Hardware-Geräte (CAPTURE) ****
Karte 1: PCH [HDA Intel PCH], Gerät 0: ALC1150 Analog [ALC1150 Analog]
  Sub-Geräte: 1/1
  Sub-Gerät #0: subdevice #0
Karte 1: PCH [HDA Intel PCH], Gerät 2: ALC1150 Alt Analog [ALC1150 Alt Analog]
  Sub-Geräte: 1/1
  Sub-Gerät #0: subdevice #0
Karte 3: CinemaTM [Microsoft® LifeCam Cinema(TM)], Gerät 0: USB Audio [USB Audio]
  Sub-Geräte: 1/1
  Sub-Gerät #0: subdevice #0
Karte 4: MS [Sennheiser USB-ED CC 01 for MS], Gerät 0: USB Audio [USB Audio]
  Sub-Geräte: 1/1
  Sub-Gerät #0: subdevice #0
```

Aufnahme im Sample Format S16_LE (16 bit little endian, 44100, stereo) in zwei Kanälen (-c) mit Rate 48000 Hertz (-r) für 20 Sekunden (-d) von einem bestimmten Mikrofon (-device)

```
arecord -f S16_LE -c 2 -r 48000 -d 20 --device="hw:4,0" tmp/test.wav
```

Mit Pulseaudio

pacctl: Control a running PulseAudio sound server

list [short] [TYPE]

```
Dump all currently loaded modules, available sinks, sources,
streams, etc. TYPE must be one of: modules,
sinks, sources, sink-inputs, source-outputs, clients,
samples, cards. If not specified, all info is
listed. If short is given, output is in a tabular format, for
easy parsing by scripts.
```

Oder über pacmd, Auflisten der Devices

```
thommie@locutus:~> pacmd list-sources | egrep '^\\s+name:.*\\.monitor'
name: <alsa_output.usb-Sennheiser_Sennheiser_USB-
ED_CC_01_for_MS_A001010202601978-00.analog-stereo.monitor>
name: <alsa_output.pci-0000_00_1b.0.analog-stereo.monitor>
name: <combined.monitor>
name: <ladspa_output.mbeq_1197.mbeq.monitor>
```

Aufnehmen

```
parecord --channels=1 -d STREAM_NAME filename.wav
```

Aufnehmen aus einer bestimmten Applikation

(ohne Störung durch Notification aus Plasma/KDE usw.)

Auflisten der Quellen

```
pacmd list-sinks | egrep '^\\s+name: .*alsa_output'
```

At a high level, here is what you are going to do:

1. Create a “null” sink that you will be recording. Let’s call it recording.
2. Create a combined sink that will send its input to both headphones and the recording sink. Otherwise, you will be able to record a stream but not hear it yourself. So, let’s call this sink combined.
3. Direct the sound from the specific applications you want to record into the combined sink.
4. Record the monitor of the recording sink to a file.

Find out the name of your output device by running

```
'pacmd list-sinks | egrep '^\\s+name: .*alsa_output''
```

In my case, it says

```
'name: <alsa_output.pci-0000_00_1f.3.analog-stereo>'
```

To create the two sinks, run these commands (you need to substitute the name of the output device that you learned on the previous step):

```
'pacmd load-module module-null-sink sink_name=recording
sink_properties=device.description=recording
pacmd load-module module-combine-sink sink_name=combined
sink_properties=device.description=combined \
  slaves=recording,alsa_output.pci-0000_00_1f.3.analog-stereo'
```

If you do this often, make it a permanent setup by creating the file `~/.config/pulse/default.pa` with this contents (note that the long `load-module` command should be on a single line, don't wrap it):

```
'.include /etc/pulse/default.pa
load-module module-null-sink sink_name=recording
sink_properties=device.description=recording
load-module module-combine-sink sink_name=combined
sink_properties=device.description=combined
slaves=recording,alsa_output.pci-0000_00_1f.3.analog-stereo'
```

Now, redirect the sound to the combined sink:

1. Run the `pavucontrol` command (a graphical window will appear) and go to the "Playback" tab.
2. Start the application you'd like to record.
3. The application should appear in `pavucontrol`. If it doesn't, make sure the application produces some sound. Unfortunately, until the application tries to play something, PulseAudio cannot "see" it.

Quelle: <https://ro-che.info/articles/2017-07-21-record-audio-linux>

pipewire als pulseaudio Ersatz

<https://cubiclenate.com/2021/07/17/pipewire-audio-server-on-opensuse-tumbleweed/>

Pakete nachinstallieren

```
sudo zypper in pipewire pipewire-pulseaudio pipewire-alsa'
```

Konflikt

```
Problem: the installed pulseaudio-15.0-6.1.x86_64 conflicts with
'pulseaudio-daemon' provided by the to be installed pipewire-
```

```
pulseaudio-0.3.42-1.1.x86_64
```

Solution 1: Following actions will be done:

- deinstallation of pulseaudio-15.0-6.1.x86_64
- deinstallation of pulseaudio-module-bluetooth-15.0-6.1.x86_64
- deinstallation of pulseaudio-module-gsettings-15.0-6.1.x86_64
- deinstallation of pulseaudio-module-x11-15.0-6.1.x86_64
- deinstallation of pulseaudio-module-zeroconf-15.0-6.1.x86_64
- deinstallation of pulseaudio-lang-15.0-6.1.noarch

Solution 2: do not install pipewire-pulseaudio-0.3.42-1.1.x86_64

Diese Pakete werden deinstalliert

The following 7 packages are going to be REMOVED:

- alsa-plugins-pulse pulseaudio pulseaudio-lang pulseaudio-module-bluetooth
- pulseaudio-module-gsettings
- pulseaudio-module-x11 pulseaudio-module-zeroconf

Tuning: <https://gitlab.freedesktop.org/pipewire/pipewire/-/wikis/Migrate-PulseAudio>

Crackling/Popping issues on intel-hda soundcard

<https://gitlab.freedesktop.org/pipewire/pipewire/-/issues/1569>

Neustart Audio-System (z.B: bei Erkennungsproblem Bluetooth Audio):

```
systemctl restart sound.target
```

Audio Cleanup

- Step one: NOISE REDUCTION
- Step two: COMPRESSION
- Step three: LIMITER FILTER
- Step four: EQUALIZER
- Step five: NORMALIZE

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