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Enabling Hands-Free Profile on Raspberry Pi (Raspbian Stretch) by using PulseAudio

Posted on September 7, 2017 by max

The purpose of this post is to enable Bluetooth Handsfree Profile (HFP) with PulseAudio on Raspbian Stretch so that Raspberry Pi can act like as a handsfree speaker phone or a handsfree car kit. This is an updated version of this post. When I wrote the previous post, I was using Raspbian Jessie and some steps needed to be updated to apply Raspbian Stretch.

There is one thing needs to be mentioned before start. The original plan was to use Raspberry Pi3's on-board Bluetooth chip for this project. Unfortunately, it didn't work. It seems that the problem is related with the chip. So, we have to use a Bluetooth dongle instead.

Here is the list of contents of this post.

Contents

Prerequisites

- Raspberry Pi board (e.g. Raspberry Pi 3 B+)
  Assuming your Raspberry Pi is running Raspbian Stretch. If it's not, please install it first. I used Raspberry Pi 3 B+ but other models should work.
- Bluetooth USB dongle (e.g. Panda Bluetooth 4.0 USB Adapter)
  As mentioned above, we'll use a Bluetooth dongle since the on-board Bluetooth chip doesn't work for HFP.
- USB Sound Card with microphone input (e.g. SYBA USB sound adapter / FG-UAUDV1-C119)
  Required since Raspberry Pi board doesn't have microphone input.

- Microphone with 3.5 mm audio jack (e.g. <u>HDE Mini 3.5mm Aux Auxiliary Voice Microphone</u>)
- Speakers with 3.5 mm audio jack

Below are the required application versions to enable Bluetooth HFP according to <u>PulseAudio release note</u>.

- Bluez 5.0 or later (v5.43 is pre-installed in Stretch)
- PulseAudio 6.0 or later (not pre-installed in Stretch, but it supports v10.0)
- oFono 1.13 or later (not pre-installed in Stretch, but it supports v1.18)

Steps
1. Preparations
1-1. Connect Bluetooth dongle and USB sound card with Raspberry Pi.

1-2. Connect the microphone and speakers to 3.5 mm audio jacks on the USB sound card.

1-3. Boot up Raspberry Pi Board.

1-4. As described, we don't use on-board Bluetooth chip. So we'll disable it. To do that, open "/etc/modprobe.d/raspi-blacklist.conf".

```
sudo nano /etc/modprobe.d/raspi-blacklist.conf
```

1-5. Add lines below and save.

```
blacklist btbcm
blacklist hci_uart
```

1-6. According to <u>a Raspberry Pi Foundation blog post</u>, Bluetooth audio is handled by ALSA through bluez-alsa in Stretch. However, since in this post we are using PulseAudio, let's uninstall bluez-alsa.

```
sudo apt-get purge bluealsa -y
```

1-7. Then reboot the board.

```
sudo reboot
```

1-8. After reboot, check *dmesg* and make sure there is no Bluetooth-related errors.

```
dmesg | grep -i bluetooth
```

1-9. Also, make sure hci0 is UP.

```
hciconfig
```

The result should be like this:

```
hci0:   Type: BR/EDR  Bus: USB
    BD Address: XX:XX:XX:XX:XX:XX  ACL MTU: 310:10  SCO MTU: 64:8
    UP RUNNING
    RX bytes:622 acl:0 sco:0 events:38 errors:0
    TX bytes:1437 acl:0 sco:0 commands:38 errors:0
```

If it's DOWN for some reason, then turn it up.

```
sudo hciconfig hci0 up
```

2. oFono Installation

2-1. oFono is not installed by default, so let's install it.

```
sudo apt-get install ofono -y
```

2-2. Make sure if it's successfully installed.

```
$ ofonod --version
1.18
```

2-2. Then, start the service.

```
sudo systemctl start ofono
```

You can check the service running like below.

```
$ systemctl -a |grep ofono
  ofono.service    loaded    active   running   Telephony service
```

3. PulseAudio Installation & Settings

3-1. In Raspbian Stretch, PulseAudio is not pre-installed. Install PulseAudio and its Bluetooth module:

```
sudo apt-get install pulseaudio pulseaudio-module-bluetooth -y
```

3-2. Check the version. It should be v10.0 (or higher).

```
$ pulseaudio --version
pulseaudio 10.0
```

3-3. Open "/etc/pulse/default.pa".

```
sudo nano /etc/pulse/default.pa
```

3-4. Add "headset=ofono" on the line of 'module-bluetooth-discover'.

```
load-module module-bluetooth-discover headset=ofono
```

3-5. Restart Raspberry Pi.

```
sudo reboot
```

4. Connecting Your Phone

4-1. Launch *bluetoothctl.*

```
bluetoothctl
```

4-2. Then, input below commands.

```
power on
agent on
default-agent
```

4-3. Start searching your phone. Make sure your phone is discoverable.

```
scan on
```

4-4. After detecting your phone, turn scan off.

```
scan off
```

devices command shows a list of found devices.

```
[bluetooth]# devices
Device XX:XX:XX:XX:XX:XX Galaxy S7
```

4-5. Then, pair, trust and connect to your phone by specifying the Bluetooth device address (in this case it's "XX:XX:XX:XX:XX:XX", please replace it wity your device's address).

```
pair XX:XX:XX:XX:XX:XX
trust XX:XX:XX:XX:XX:XX
connect XX:XX:XX:XX:XX:XX
```

If everything is ok, you should see "successful" at the end of the result for each command like below.

```
[bluetooth]# pair XX:XX:XX:XX:XX:XX
...
Pairing successful
```

```
[bluetooth]# trust XX:XX:XX:XX:XX:XX
...
trust succeeded
```

```
[bluetooth]# connect XX:XX:XX:XX:XX:XX
...
Connection successful
```

5. Making a Call

To make a call, you can use oFono test scripts which is included in the source code.

5-1. First, download the source and extruct.

```
wget https://www.kernel.org/pub/linux/network/ofono/ofono-1.18.tar.gz
tar -xzvf ofono-1.18.tar.gz
```

5-2. Then, you can make a call by:

```
python ./ofono-1.18/test/dial-number 8586515050
```

If you want to end the call, then type:

```
python ./ofono-1.18/test/hangup-active
```

Summary
Since Raspbian Stretch supports PulseAudio v10.0, the steps are now a little simpler than previous one. I confirmed both sending and receiving audio are fine during a hands free call. I confirmed Bluetooth audio streaming (A2DP) is working too.

Update (May 2, 2018):
The steps to enable equalizer on HFP sending audio is newly posted.

Reference

– Raspbian Stretch has arrived for Raspberry Pi
https://www.raspberrypi.org/blog/raspbian-stretch/

– Connect Bluetooth Headset To Raspberry Pi 3 (A2DP & HSP)
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https://www.freedesktop.org/wiki/Software/PulseAudio/Notes/6.0/

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