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# Linux bluetooth setup with bluez and hcitool

Updated - June 25, 2018 by Arnab Satapathi



Bluetooth devices are quite ubiquitous today, found almost everywhere, simple and cheap way to add wireless connectivity to a device.



A Linux system could use many protocol like OBEX, A2DP, DUN, HID etc. etc. to interact with different devices for different purpose. So how to connect, pair and manage those bluetooth devices from a Linux PC, let's start.



Part 2 of this tutorial is published, Setup bluetooth in Linux part 2

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## Initial Linux bluetooth setup







Most bluetoth adapters are USB based and could be configured with HCI utilities, some bluetooth devices like Atheros bluetooth adapters may require device firmware installed in the system.

To install required software packages on <u>Debain</u> or other Debian derivatives like <u>Ubuntu</u>, Linux Mint run the commands below.

sudo apt-get install bluetooth bluez bluez-tools rfkill rfcomm

The next may be necessary for proper functioning of the bluetooth adapter, you may want to replace **firmware-atheros** package with the firmware package that matches your device like **firmware-realtek**.

sudo apt-get install bluez-firmware firmware-atheros



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sudo systemctl start bluetooth.service sudo systemctl enable bluetooth.service



#### hcitool scan for bluetooth devices



Before start scanning make sure that your bluetooth device is turned on and not blocked, you can check that with the rfkill command.



sudo rfkill list

If the bluetooth device is blocked (soft or hard blocked), unblock it with the rfkill command again

sudo rfkill unblock bluetooth

Bring up the bluetooth device with hciconfig command and start scanning, make sure the target device's bluetooth is on and It's discoverable.



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sudo hciconfig hci0 up

hcitool scan

Wait few moment to complete the hcitool scan, the results will be something like bellow.

```
Scanning ...
83:23:26:15:54:46 sat_P
```

Here 83:23:26:15:54:46 is the bluetooth MAC address and sat\_P is the name of the bluetooth device, i.e. an Android phone.

#### Bluetooth service discovery

Now we have the bluetooth MAC address of the target device, use the sdptool command to know which services (like DUN, Handsfree audio) are available on that target device.

sdptool browse 83:23:26:15:54:46

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command.

```
sdptool browse 83:23:26:15:54:46 | grep 'Service Name:'
```



You can also use the interactive bluetoothct1 tool for this purpose.



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```
$ bluetoothctl
```

[bluetooth]# info 83:23:26:15:54:46

Device 83:23:26:15:54:46

Name: sat\_P

Alias: Nokia

Class: 0x580204

Icon: phone
Paired: yes
Trusted: yes
Blocked: no

Connected: no

LegacyPairing: no

UUID: OBEX Object Push (00001105-0000-1000-8000-00805f9b34fb)

UUID: Audio Source (0000110a-0000-1000-8000-00805f9b34fb)



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Ping bluetooth devices: If the target device is present, you can ping it with l2ping command, requires root privilege







sudo l2ping <Target device MAC address>

sudo 12ping 83:23:26:15:54:46

# Example

So, bluetooth service discovery is useful to determine the type of the device, like if it's a bluetooth mp3 player or it's a keyboard.

## hcitool connect and pair devices

Connecting to the bluetooth device with **rfcomm**, this command requires root privilege, so use **sudo** .

sudo rfcomm connect <bluetooth host device> <Target bluetooth device MAC> <channel>

An exaple of connecting bluetooth hot device hci0 to a client device on channel 2



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The device/phone will prompt to accept this connection request. Now the bluetooth client device should be available as /dev/rfcomm0 .

Send file through OBEX/OPP to a remote bluetooth device, the first command is a generic example



**y** 



sudo bt-obex -p <Bluetooth remote device mac address> /path/to/file

sudo bt-obex -p 83:23:26:15:54:46 ~/img/some pic.png

Now receive some file from the remote device, an OBEX server example, first start bt-obex in server mode listening for bluetooth connection.

bt-obex -s /path/to/output/folder

Replace /path/to/output/folder with a folder of your choice, like /tmp . Now send some file from the bluetooth client device, i.e. a phone. The sent file should be in the bt-obex output folder.



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sudo bt-obex -f <Remote device MAC address>







#### hcitool commands

So, you've got a basic idea of using the the <a href="hcitool">hcitool</a> command to configure bluetooth devices on Linux.

Here's a list of almost every parameter related with the command. Anyway you can run the hcitool -h command to get a short overview of same, and the man pages are always helpful.

How to use these arguments? Fist if you have multiple bluetooth adapters, and want to use a specific device, then use use the -i flag, like below.

To get the list of available bluetooth devices, just use hcitool dev command.

Then run your desired command like below,

hcitool -i hciX <command> <command parameters>



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```
sudo hcitool -i hci0 scan
```

Scanning ...

00:00:00:5A:AD MI4







```
sudo hcitool -i hci1 lescan
```

LE Scan ...

EA:29:15:15:E8:A1 Keyboard K375s

EA:29:15:15:E8:A1 (unknown)

You need to stop the BLE device scan manually with Ctrl +C key combination.

I used a USB bluetooth adapter, **hci1** in this case to scan a Logitech keyboard. Which is a BLE device, can't be detected by my laptop's default bluetooth device.

Note: If the -i flag is not used, then the first available local bluetooth device will be used. Now the list of commands.

dev	Display local devices.



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scan	Inquire remote devices. For each discovered device, device name are printed.						
name <bdaddr></bdaddr>	Print device name of remote device with Bluetooth address <i>bdaddr</i> .						
info <bdaddr></bdaddr>	Print device name, version and supported features of remote device with Bluetooth address bdaddr.						
spinq	Start periodic inquiry process. No inquiry results are printed.						
epinq	Exit periodic inquiry process.						
cmd <ogf> <ocf> [parameters]</ocf></ogf>	Submit an arbitrary HCI command to local device. <i>ogf</i> , <i>ocf</i> and <i>parameters</i> are hexadecimal bytes.						
con	Display active baseband connections						
cc [ role=m s] [ pkt-type= <ptype>] <bdaddr></bdaddr></ptype>	Create baseband connection to remote device with Bluetooth address <i>bdaddr</i> . Option <i>pkt-type</i> specifies a list of allowed packet types. <i><ptype></ptype></i> is a comma-separated list of packet types, where the possible packet types are <b>DM1</b> , <b>DM3</b> , <b>DM5</b> , <b>DH1</b> , <b>DH3</b> , <b>DH5</b> , <b>HV1</b> , <b>HV2</b> , <b>HV3</b> . Default is to allow all packet types. Option <i>role</i> can have value <i>m</i> (do not allow role switch, stay master) or <i>s</i> (allow role switch, become slave if the peer asks to become master). Default is <i>m</i> .						
dc <bdaddr> [reason]</bdaddr>	Delete baseband connection from remote device with Bluetooth address <i>bdaddr</i> . The reason can be one of the Bluetooth HCI error codes. Default is <i>19</i> for user ended connections. The value must be given in decimal.						



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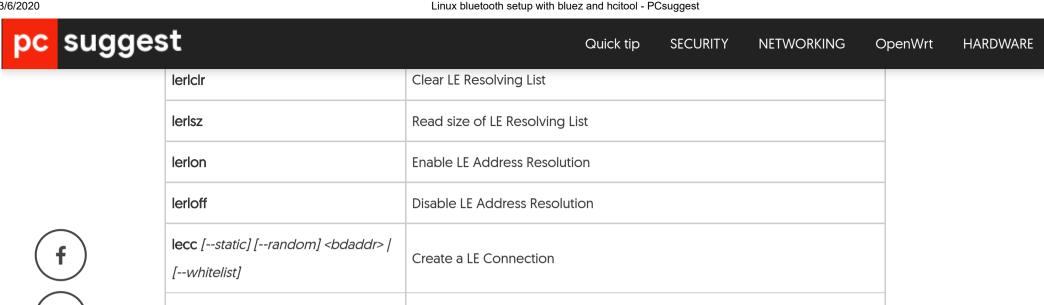
cpt   <packet </packet  types>	Change packet types for baseband connection to device with Bluetooth address <i>bdaddr. packet types</i> is a comma-separated list of packet types, where the possible packet types are <b>DM1,DM3</b> , <b>DM5</b> , <b>DH1</b> , <b>DH3</b> , <b>DH5</b> , <b>HV1</b> , <b>HV2</b> , <b>HV3</b> .					
rssi <bdaddr></bdaddr>	Display received signal strength information for the connection to the device with Bluetooth address bdaddr.					
lq <bdaddr></bdaddr>	Display link quality for the connection to the device with Bluetooth address bdaddr.					
tpl <bdaddr> [type]</bdaddr>	Display transmit power level for the connection to the device with Bluetooth address <i>bdaddr</i> . The type can be <b>0</b> for the current transmit power level (which is default) or <b>1</b> for the maximum transmit power level.					
afh <bdaddr></bdaddr>	Display AFH channel map for the connection to the device with Bluetooth address <i>bdaddr</i> .					
lp <bdaddr> [value]</bdaddr>	With no <i>value</i> , displays link policy settings for the connection to the device with Bluetooth address <i>bdaddr</i> . If <i>value</i> is given, sets the link policy settings for that connection to <i>value</i> . Possible values are RSWITCH, HOLD, SNIFF and PARK.					
lst <bdaddr> [value]</bdaddr>	With no <i>value</i> , displays link supervision timeout for the connection to the device with Bluetooth address <i>bdaddr</i> . If <i>value</i> is given, sets the link supervision timeout for that connection to <i>value</i> slots, or to infinite if <i>value</i> is 0.					
auth	Request authentication for the device with Bluetooth address <i>bdaddr</i> .					







enc <bdaddr> [encrypt enable]</bdaddr>	Enable or disable the encryption for the device with Bluetooth address bdaddr.				
key <bdaddr></bdaddr>	Change the connection link key for the device with Bluetooth address bdaddr.				
clkoff <bdaddr></bdaddr>	Read the clock offset for the device with Bluetooth address <i>bdaddr</i> .				
clock [bdaddr] [which clock]	Read the clock for the device with Bluetooth address <i>bdaddr</i> . The clock can be <b>0</b> for the local clock or <b>1</b> for the piconet clock (which is default).				
lescan [privacy] [passive] [   whitelist] [discovery=g l] [   duplicates]	Start Bluetooth BLE scan				
leinfo [static] [random] <bdaddr></bdaddr>	Get LE remote information				
lewladd [random] <bdaddr></bdaddr>	Add device to LE White List				
lewirm <bdaddr></bdaddr>	Remove device from LE White List				
lewlsz	Read size of LE White List				
lewicir	Clear LE White List				
lerladd [local irk] [peer irk] [ random] <bdaddr></bdaddr>	Add device to LE Resolving List				



Disconnect a LE Connection

LE Connection Update





This list is a direct copy paste of the **hcitool** man page, but better organized.

#### Conclusion

ledc <handle> [reason]

<latency> <timeout>

lecup <handle> <min> <max>

I tested those above commands with three phones, Mi 4, which is Android, a SANSUNG Z3, which is Tizen and a symbian Nokia 5230, and all functions are working fine except Handsfree audio.

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Managing bluetooth devices could be even more easier with graphical tools like **bluedevil** for KDE desktop, Gnome-Bluetooth for Gnome desktop or general purpose Gtk2 application **blueman**.







So when these commands are useful? For headless servers, single board computers like **Raspberry Pi** or machines accessed form a <u>SSH server</u>, or simply knowing what's going on behind the scene.

If you have any suggestion or question just leave a comment, also don't forget to share this with your friends.





Mitai says December 10, 2019

Isusb

Bus 003 Device 002: ID 8087:0024 Intel Corp. Integrated Rate Matching Hub

Bus 003 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub

Bus 001 Device 005: ID 0a12:0001 Cambridge Silicon Radio, Ltd Bluetooth Dongle (HCI mode)

Bus 001 Device 004: ID 046d:c05a Logitech, Inc. M90/M100 Optical Mouse



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Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub

Bus 004 Device 001: ID 1d6b:0003 Linux Foundation 3.0 root hub

Bus 002 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub

sudo hciconfig hci0 up

Can't init device hci0: Operation not supported (95)







Arnab Satapathi says December 11, 2019

May be you need to unblock the bluetooth interface with rfkill command.

sudo rfkill unblock bluetooth







Fidi says December 30, 2018

Can you please help me?

After rebooting my pi bluetooth does not work anymore. Bluetooth service seems to be enabled but not active.





**zhiyong** says May 8, 2018

when using the 'sudo apt-get install bluetooth bluez bluez-tools rfkill rfcomm

'i get an error and it says' Unable to locate package rfcomm'. what do i do?





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Quick tip

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You don't need to install it, already in the bluez package.





Edwin says November 24, 2017

How Can I give Device Permissions to my Debian Laptop's internal Bluetooth as anyone can start/stop the bluetooth? Because I wanted to access bluetooth scan via docker container without privileged mode.

I am unable to scan, But able to start dbus & bluetooth services using the following command.

\*\*docker run --cap-add=SYS\_ADMIN -v /opt/bluetooth:/var/lib/bluetooth -v /sys/fs/cgroup:/sys/fs/cgroup:ro -v /tmp/\$(mktemp -d):/run --net=host -it debian:jessie\*\*

Anybody have any clue? Thanks in advance.





Avi says July 7, 2017

Hello Arnab,

I want use this hci commands in my python program so that my programs makes bluetooth on and discoverable. Can you please tell me how can I do it?





Arnab Satapathi says July 7, 2017

Hi Avi, yeah, you can use the hci and other commands with python.

Use the os.system function, perhaps that's the easiest way to run system commands with python.



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Yaser says December 13, 2016

In regards of pairing device using rfcomm, it ask to input the passkey at the mobile side, when I tried to input 0000 or 1234, the results is wrong and unsuccessful connection, how it possible to disable asking to enter the passkey?







Arnab says December 14, 2016



Hello Yaser,

There's no such option in **rfcomm**, you've to use **bluez** and **hcitool**.

Try sudo hciconfig noauth

Hope this helps.

For details, see man hciconfig and serch for auth and related options.

Reply



miguipda says March 11, 2016

And howto use Bluetooth on OpenWRT to allow using it as a sound server that use many remote Bluetooth speakers (in many rooms)?

And which Bluetooth dungle could be buy on Gearbest.com or Baangood.com?





Arnab says March 11, 2016



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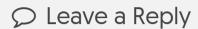
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