How to connect to a headless Raspberry Pi without a router

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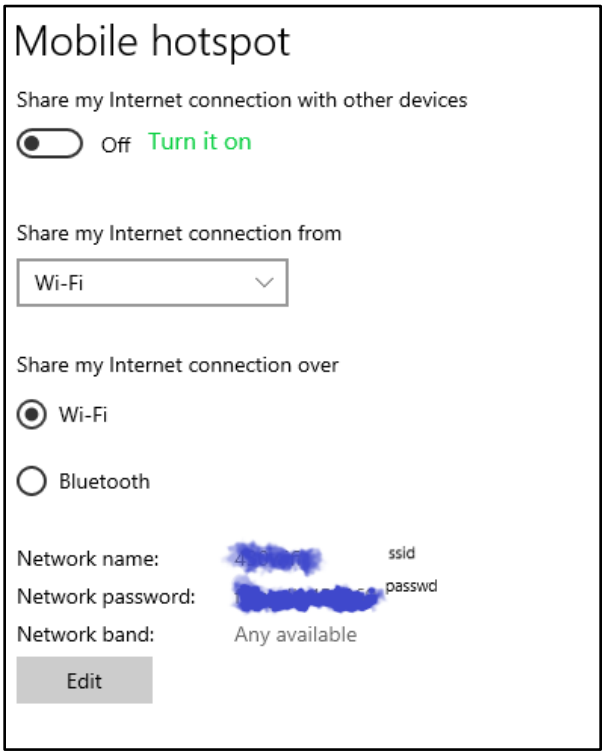
This tutorial is designed for students who do not have access to a router or have only access to *IIT-Secure/eduroam* Wi-Fi connections. This tutorial requires you to have a Wi-Fi transceiver on your desktop or your laptop, and a Windows 10 machine.
This tutorial will enable your desktop/laptop to be a hotspot, so that your Raspberry Pi (RPi) gains access to the Internet via your desktop's/laptop's Internet connection.

1. Open a hotspot in Windows 10:

Go to "Settings->Network & Internet->Mobile hotspot" and set up a hotspot like the below screenshot by enabling Mobile hotspot.



Keep this window open for the time being.

2. Burn the Raspberry Pi OS image(the complete image is recommended) to an SDcard.

Follow the directions in the below link:
https://www.raspberrypi.org/software/
https://www.raspberrypi.org/documentation/installation/installing-images/

3. Modify /boot files in the SDcard

You'll need to modify some files so that the Raspberry Pi would automatically connect to the hotspot we just created on boot.

Create a '*wpa_supplicant.conf*' file at the root directory (e.g., if your SDcard is mounted at say "*H:*", then create the file as "*H:\wpa_supplicant.conf*") and fill with the following content using Notepad:

```
country=US
ctrl_interface=DIR=/var/run/wpa_supplicant GROUP=netdev update_config=1
network={
	scan_ssid=1
	ssid="your_wifi_ssid"
	psk="your_wifi_password"
	}
```

Replace the last two fields with the *ssid* and *password (psk)* of the hotspot you created in Step 1. (e.g., ssid="ece442wifi", psk="#@!$Kd!")

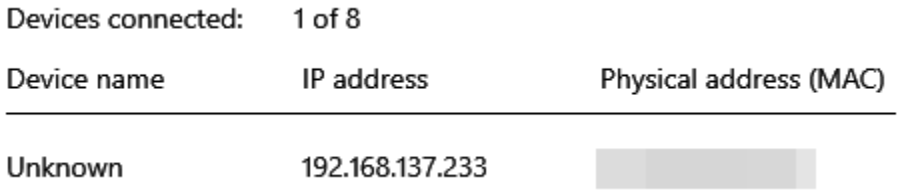
Also, you'll need to enable the SSH connection on boot, so that you can connect to your RPi remotely. Write an empty text file named "ssh" (no file extension) at the root directory of your SDcard.

4. Boot the Raspberry Pi

Insert the SDcard before powering the RPi on. RPi should automatically join the hotspot network and should gain access to the Internet.

5. Find the IP of the Raspberry Pi

Check out the hotspot window to find the RPi's IP, in my case it's 192.168.137.233



6. Establish SSH connection to the RPi

Establish the SSH connection using the default username ‘pi’ and password ‘raspberry’. You **MUST** change the password from this default one to your personal one right away. Change the password before you move forward.
You can use terminal programs like PuTTY(https://www.putty.org/) or MobaXterm (https://mobaxterm.mobatek.net/) to connect to your RPi via SSH using the IP address found from Step 5.

7. Enabling VNC server on the RPi for Remote Desktop Environment

Connect to your RPi via SSH using either PuTTY or MobaXterm.
Run “*sudo raspi-config*” on Terminal, open **Interfacing Options** and enable **VNC**.
Download VNC Viewer from here (https://www.realvnc.com/en/connect/download/viewer/) and install on your PC.
Run VNC Viewer on your PC, and use the address found from Step 5 to connect to your RPi via Remote Desktop environment.

Reference:

https://www.tomshardware.com/reviews/raspberry-pi-headless-setup-how-to,6028.html