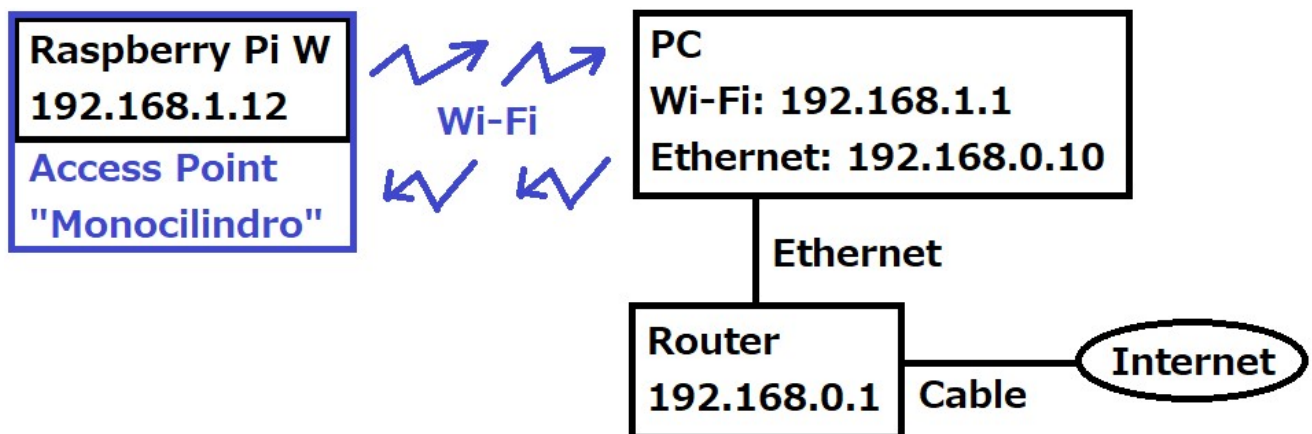


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25th November 2017

This guide will explain how to transform your Raspberry Pi into an Wi-Fi Access Point. Some parts of this guide are taken from the [Raspberry Pi official website](http://www.raspberrypi.org).

A PC connects to Raspberry Pi Zero W by using Wi-Fi, and shares its Internet connection through Ethernet LAN. Therefore, the Raspberry Pi Zero W can connect to the Internet through the PC (the PC is acting as a sort of Internet network bridge).

The reason why I decided to implement this network layout is that I wanted to use my Raspberry Pi Zero W as a standalone unit (I want to leave it connected on the Fuelino installed on my motorcycle), and sometimes add Internet Connection through my PC. Raspberry Pi is going to work as an Access Point (including DHCP server) most of the time, and I will connect it to Internet only to perform Raspbian OS updates.



Configuration on Raspberry Pi side.

Install the necessary packages, and then disable their services.

```
sudo apt-get install dnsmasq hostapd
sudo systemctl stop dnsmasq
sudo systemctl stop hostapd
```

```
pi@raspberrypi: ~  
File Edit Tabs Help  
Preparing to unpack .../dnsmasq_2.76-5+rpt1+deb9u1_all.deb ...  
Unpacking dnsmasq (2.76-5+rpt1+deb9u1) ...  
Selecting previously unselected package libnl-route-3-200:armhf.  
Preparing to unpack .../libnl-route-3-200_3.2.27-2_armhf.deb ...  
Unpacking libnl-route-3-200:armhf (3.2.27-2) ...  
Selecting previously unselected package hostapd.  
Preparing to unpack .../hostapd_2%3a2.4-1+deb9u1_armhf.deb ...  
Unpacking hostapd (2:2.4-1+deb9u1) ...  
Setting up dns-root-data (2017072601-deb9u1) ...  
Setting up libnl-route-3-200:armhf (3.2.27-2) ...  
Processing triggers for libc-bin (2.24-11+deb9u1) ...  
Processing triggers for systemd (232-25+deb9u1) ...  
Setting up dnsmasq-base (2.76-5+rpt1+deb9u1) ...  
Processing triggers for man-db (2.7.6.1-2) ...  
Processing triggers for dbus (1.10.22-0+deb9u1) ...  
Setting up hostapd (2:2.4-1+deb9u1) ...  
Setting up dnsmasq (2.76-5+rpt1+deb9u1) ...  
Created symlink /etc/systemd/system/multi-user.target.wants/dnsmasq.service → /lib/systemd/system/dnsmasq.service.  
Processing triggers for systemd (232-25+deb9u1) ...  
pi@raspberrypi:~$ sudo systemctl stop dnsmasq  
pi@raspberrypi:~$ sudo systemctl stop hostapd  
pi@raspberrypi:~$  
pi@raspberrypi:~$
```

Modify DHCP client settings (DHCP client is not needed when working as Access Point).

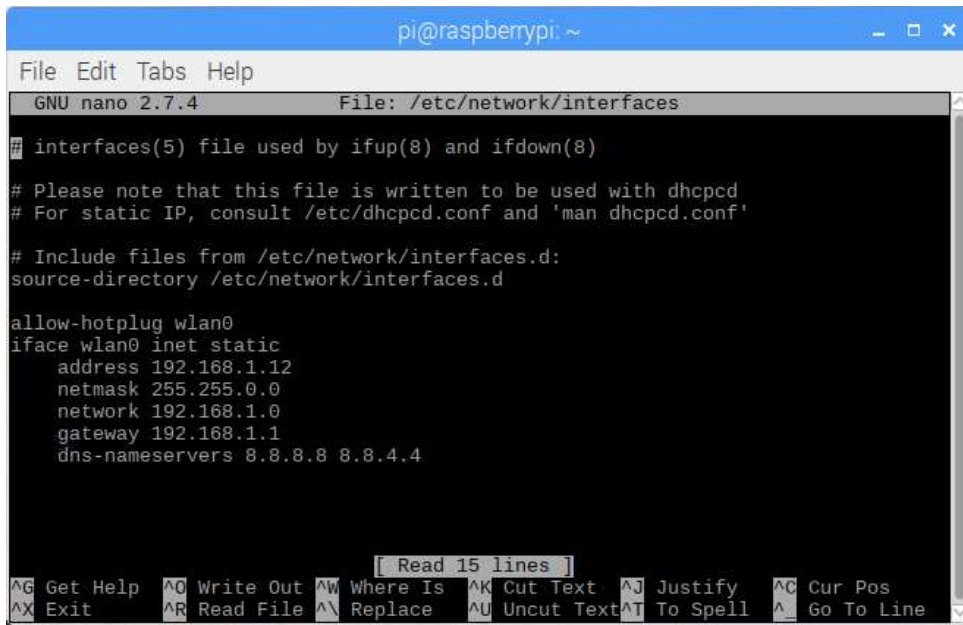
sudo nano /etc/dhcpd.conf

Add *denyinterfaces wlan0* to the end of the file (but above any other added interface lines) and save the file.

```
pi@raspberrypi: ~  
File Edit Tabs Help  
GNU nano 2.7.4 File: /etc/dhcpd.conf Modified  
#static routers=192.168.1.1  
#static domain_name_servers=192.168.1.1  
  
# fallback to static profile on eth0  
#interface eth0  
#fallback static_eth0  
  
denyinterfaces wlan0  
|  
  
^G Get Help ^O Write Out ^W Where Is ^K Cut Text ^J Justify ^C Cur Pos  
^X Exit ^R Read File ^\ Replace ^U Uncut Text ^T To Spell ^_ Go To Line
```

sudo nano /etc/network/interfaces

```
allow-hotplug wlan0
iface wlan0 inet static
    address 192.168.1.12
    netmask 255.255.0.0
    network 192.168.1.0
    gateway 192.168.1.1
    dns-nameservers 8.8.8.8 8.8.4.4
```

A screenshot of a terminal window on a Raspberry Pi. The window title is 'pi@raspberrypi: ~'. The terminal shows the nano text editor editing the file '/etc/network/interfaces'. The file content is as follows:

```
# interfaces(5) file used by ifup(8) and ifdown(8)

# Please note that this file is written to be used with dhcpcd
# For static IP, consult /etc/dhcpcd.conf and 'man dhcpcd.conf'

# Include files from /etc/network/interfaces.d:
source-directory /etc/network/interfaces.d

allow-hotplug wlan0
iface wlan0 inet static
    address 192.168.1.12
    netmask 255.255.0.0
    network 192.168.1.0
    gateway 192.168.1.1
    dns-nameservers 8.8.8.8 8.8.4.4
```

The nano editor's status bar at the bottom shows 'GNU nano 2.7.4' and 'File: /etc/network/interfaces'. It also displays a 'Read 15 lines' indicator and a list of keyboard shortcuts: ^G Get Help, ^O Write Out, ^W Where Is, ^K Cut Text, ^J Justify, ^C Cur Pos, ^X Exit, ^R Read File, ^\ Replace, ^U Uncut Text, ^T To Spell, ^_ Go To Line.

Type the following:

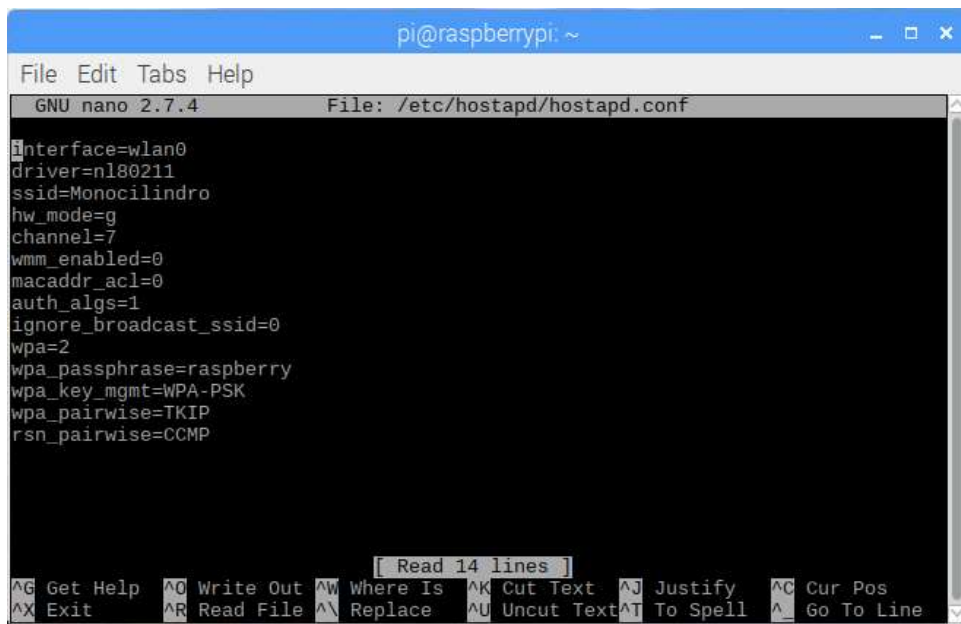
```
sudo service dhcpcd restart
sudo ifdown wlan0
sudo ifup wlan0
```

Configuring the access point host software (hostapd):

```
sudo nano /etc/hostapd/hostapd.conf
```

```
interface=wlan0
driver=nl80211
ssid=Monocilindro
hw_mode=g
channel=7
wmm_enabled=0
macaddr_acl=0
auth_algs=1
```

```
ignore_broadcast_ssid=0
wpa=2
wpa_passphrase=raspberry
wpa_key_mgmt=WPA-PSK
wpa_pairwise=TKIP
rsn_pairwise=CCMP
```



The screenshot shows a terminal window titled "pi@raspberrypi: ~". The window contains the GNU nano 2.7.4 text editor editing the file /etc/hostapd/hostapd.conf. The configuration text is as follows:

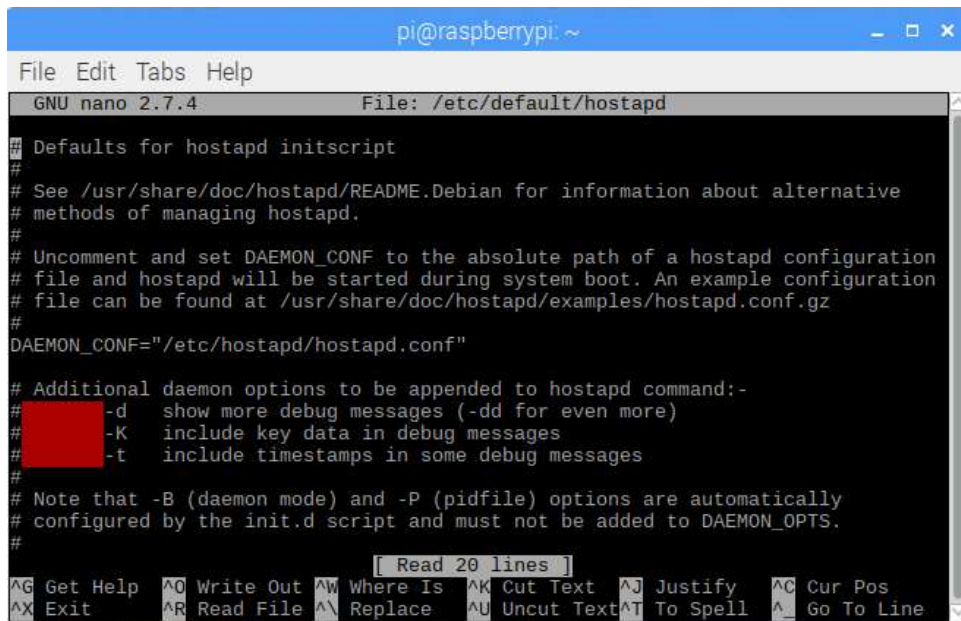
```
interface=wlan0
driver=nl80211
ssid=Monocilindro
hw_mode=g
channel=7
wmm_enabled=0
macaddr_acl=0
auth_algs=1
ignore_broadcast_ssid=0
wpa=2
wpa_passphrase=raspberry
wpa_key_mgmt=WPA-PSK
wpa_pairwise=TKIP
rsn_pairwise=CCMP
```

At the bottom of the terminal, a status bar displays various keyboard shortcuts: ^G Get Help, ^O Write Out, ^W Where Is, ^K Cut Text, ^J Justify, ^C Cur Pos, ^X Exit, ^R Read File, ^_ Replace, ^U Uncut Text, ^T To Spell, and ^_ Go To Line. A small indicator "[Read 14 lines]" is also visible.

sudo nano /etc/default/hostapd

Correct as following:

DAEMON_CONF="/etc/hostapd/hostapd.conf"



```
pi@raspberrypi: ~
File Edit Tabs Help
GNU nano 2.7.4 File: /etc/default/hostapd

# Defaults for hostapd initscript
#
# See /usr/share/doc/hostapd/README.Debian for information about alternative
# methods of managing hostapd.
#
# Uncomment and set DAEMON_CONF to the absolute path of a hostapd configuration
# file and hostapd will be started during system boot. An example configuration
# file can be found at /usr/share/doc/hostapd/examples/hostapd.conf.gz
#
DAEMON_CONF="/etc/hostapd/hostapd.conf"

# Additional daemon options to be appended to hostapd command:-
# -d show more debug messages (-dd for even more)
# -K include key data in debug messages
# -t include timestamps in some debug messages
#
# Note that -B (daemon mode) and -P (pidfile) options are automatically
# configured by the init.d script and must not be added to DAEMON_OPTS.
#

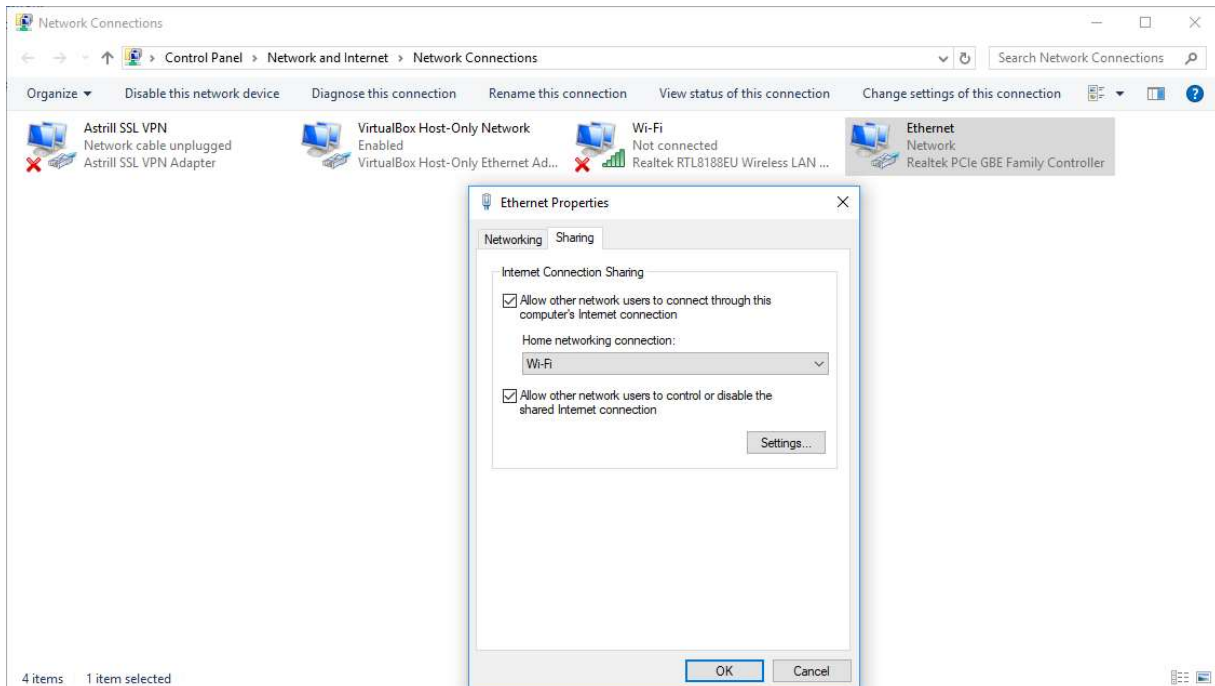
[ Read 20 lines ]
^G Get Help ^O Write Out ^W Where Is ^K Cut Text ^J Justify ^C Cur Pos
^X Exit ^R Read File ^\ Replace ^U Uncut Text ^T To Spell ^_ Go To Line
```

Start up by the Access Point on Raspberry Pi by writing:

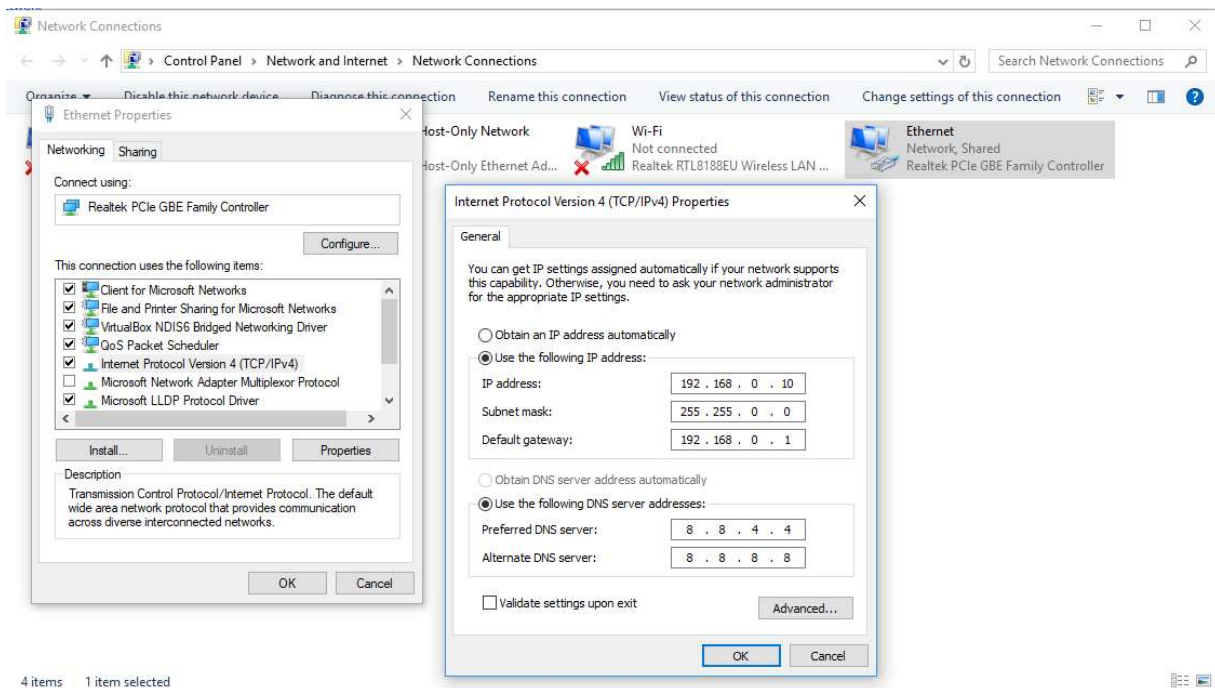
```
sudo service hostapd start
sudo service dnsmasq start
```

Configuration on PC side.

Select the “Ethernet” (Cable LAN) connection and share the Internet connection with “Wi-Fi” network.

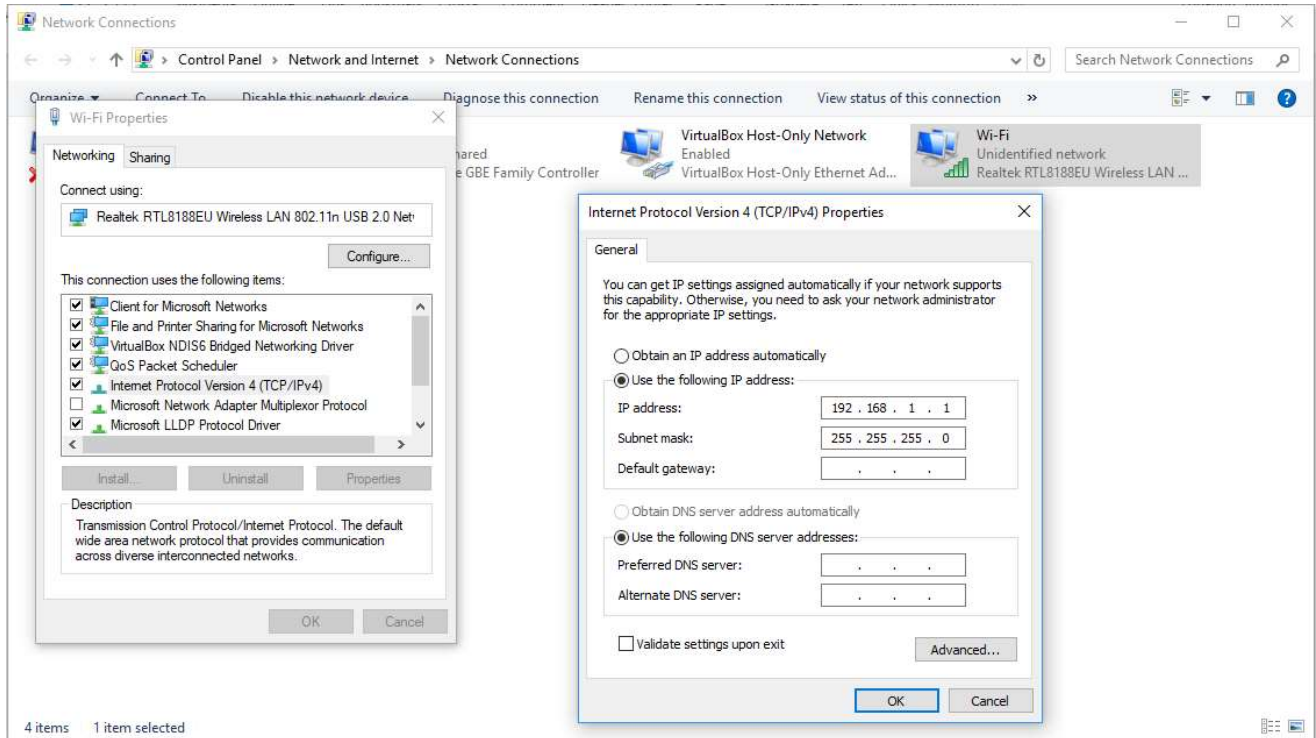


[Optional: set static IP address for the Ethernet connection]

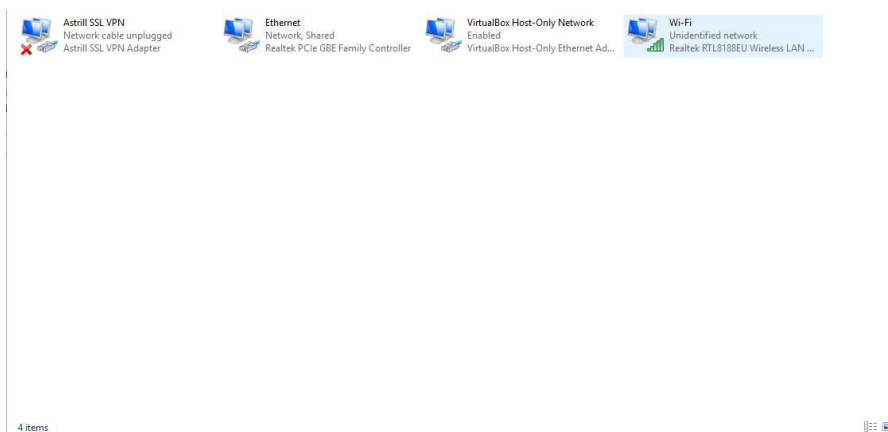


Set-up the settings for the Wi-Fi connection with Raspberry Pi:

- IP Address: 192.168.1.1
- Subnet Mask: 255.255.255.0



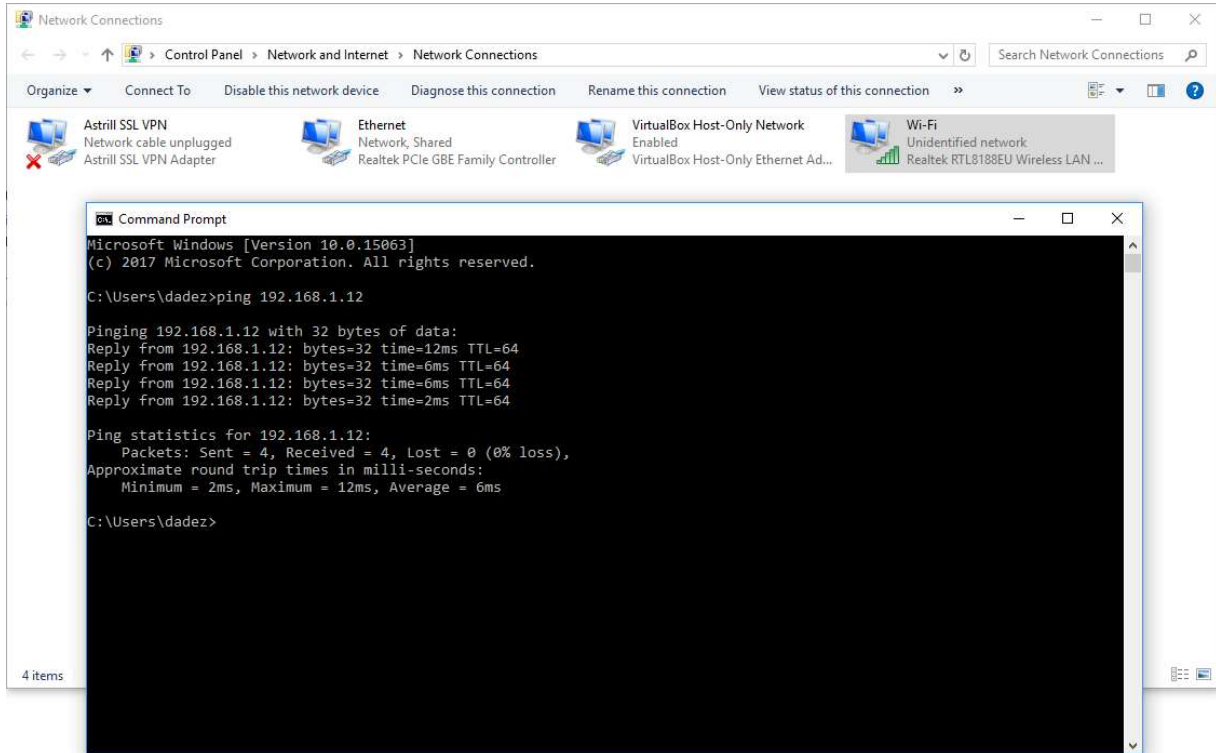
Connect to Raspberry Pi (Access Point). The AP name is “Monocilindro”, the password is “raspberry”.



Final test on PC side.

Just to make sure, open “cmd” (Command Prompt) and send a ping to Raspberry Pi.

ping 192.168.1.12



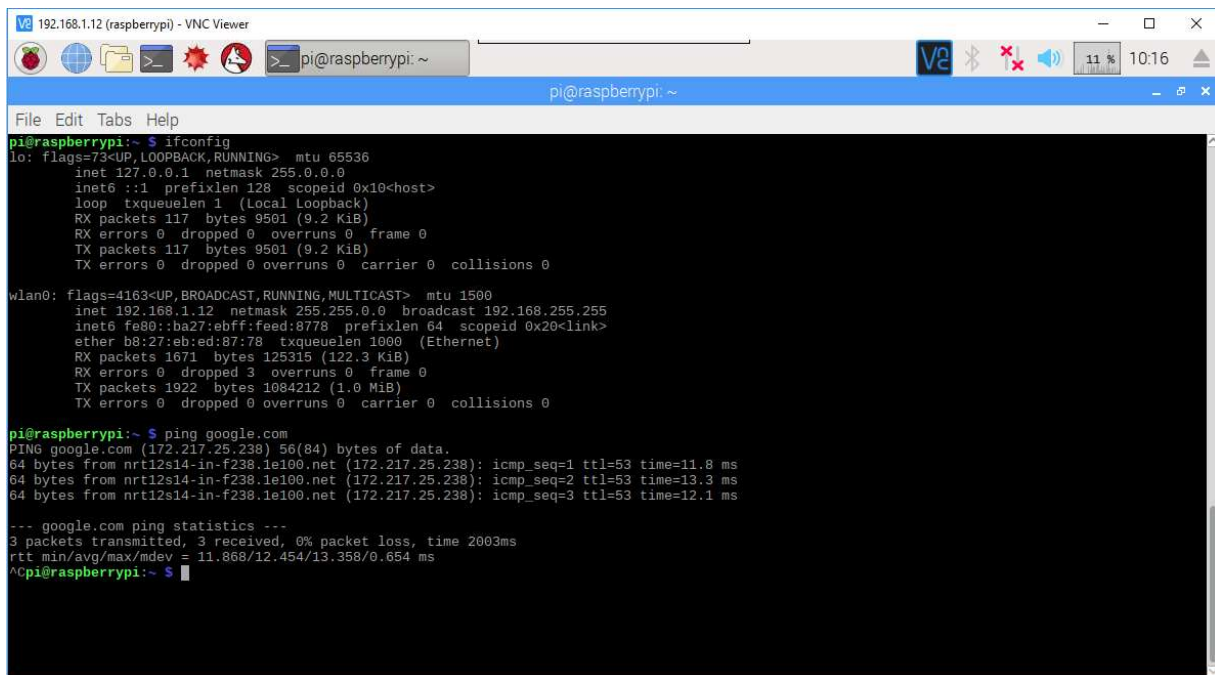
Connect to Raspberry Pi using VNC Viewer.

From Raspberry Pi (192.168.1.12), check “ifconfig” and ping “google.com”.

If you get a reply, it means that the configuration is working properly.

ifconfig

ping google.com



```
pi@raspberrypi:~ $ ifconfig
lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536
    inet 127.0.0.1 netmask 255.0.0.0
    inet6 ::1 prefixlen 128 scopeid 0x10<host>
    loop txqueuelen 1 (Local Loopback)
    RX packets 117 bytes 9501 (9.2 KiB)
    RX errors 0 dropped 0 overruns 0 frame 0
    TX packets 117 bytes 9501 (9.2 KiB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

wlan0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500
    inet 192.168.1.12 netmask 255.255.0.0 broadcast 192.168.255.255
    inet6 fe80::ba27:ebff:fead:8779 prefixlen 64 scopeid 0x20<link>
    ether b8:27:eb:ed:87:79 txqueuelen 1000 (Ethernet)
    RX packets 1671 bytes 125315 (122.3 KiB)
    RX errors 0 dropped 3 overruns 0 frame 0
    TX packets 1922 bytes 1084212 (1.0 MiB)
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0

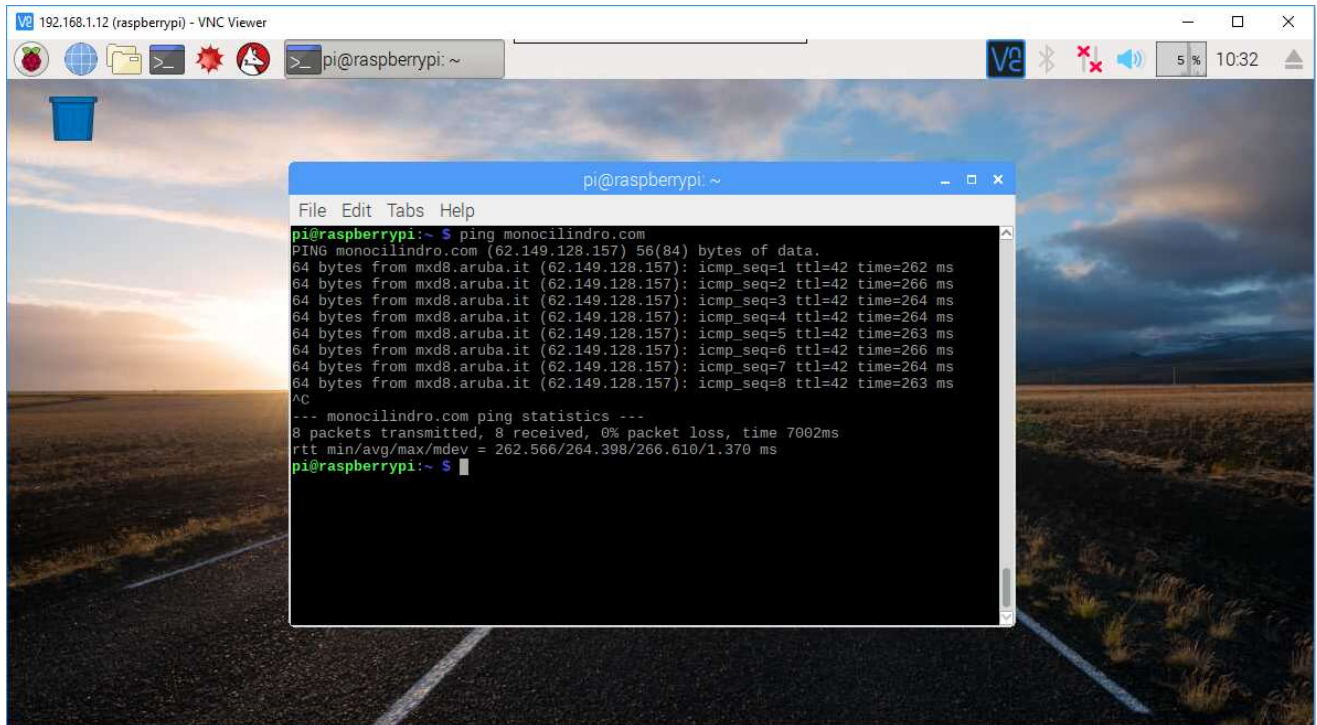
pi@raspberrypi:~ $ ping google.com
PING google.com (172.217.25.238) 56(84) bytes of data:
64 bytes from nrt12s14-in-f238.1e100.net (172.217.25.238): icmp_seq=1 ttl=53 time=11.8 ms
64 bytes from nrt12s14-in-f238.1e100.net (172.217.25.238): icmp_seq=2 ttl=53 time=13.3 ms
64 bytes from nrt12s14-in-f238.1e100.net (172.217.25.238): icmp_seq=3 ttl=53 time=12.1 ms

--- google.com ping statistics ---
3 packets transmitted, 3 received, 0% packet loss, time 2003ms
rtt min/avg/max/mdev = 11.868/12.454/13.358/0.654 ms
^Cpi@raspberrypi:~ $
```

Alternatively, you can also try to ping “monocilindro.com”: ☺

ping monocilindro.com

The following message should appear.

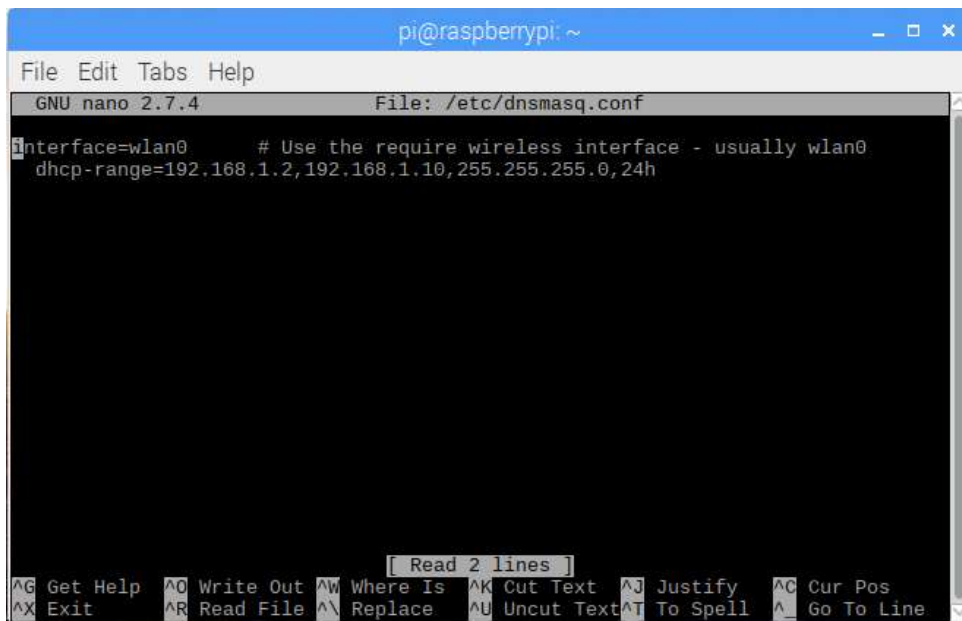


Optional: DHCP server setup on Raspberry Pi

Add DHCP server functionality to Raspberry Pi, in case you want to connect to it also by using other devices (such as an Apple Iphone, Android phone, etc...) and you don't want to manually setup the IP address of your phone everytime.

```
sudo mv /etc/dnsmasq.conf /etc/dnsmasq.conf.orig  
sudo nano /etc/dnsmasq.conf
```

```
interface=wlan0    # Use the require wireless interface - usually wlan0  
dhcp-range=192.168.1.2,192.168.1.10,255.255.255.0,24h
```



```
pi@raspberrypi: ~  
File Edit Tabs Help  
GNU nano 2.7.4 File: /etc/dnsmasq.conf  
interface=wlan0    # Use the require wireless interface - usually wlan0  
dhcp-range=192.168.1.2,192.168.1.10,255.255.255.0,24h  
[ Read 2 lines ]  
^G Get Help  ^O Write Out ^W Where Is  ^K Cut Text  ^J Justify   ^C Cur Pos  
^X Exit      ^R Read File ^\ Replace  ^U Uncut Text ^T To Spell  ^_ Go To Line
```