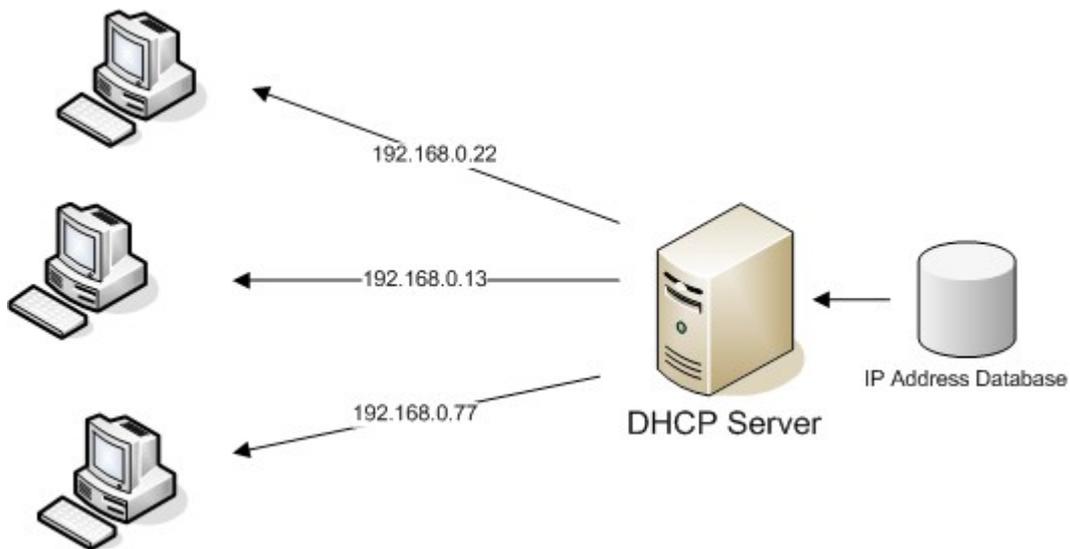


DHCP Service Start up

From hardware to software



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Network Services
Hardware and Operating Systems
Computer Networks





DHCP Service Start up From hardware to software

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Introduction

In this activity students are going to start up a DHCP Service in a local network. The project will begin from the hardware installation, will pass through the operating system, and network configuration, and will end with the setup of the DHCP Service.

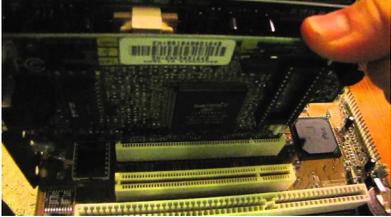
At the final section the students must answer several questions about the previous sections.



Hardware installation

In this part, students will install the network interface cards on the PC.

Now, I'm going to show the steps to install a network card in a computer. the card that will be installed will be PCI.

<p>Open your internship computer</p>	
<p>Insert the network card into a PCI slot on the motherboard.</p> <ul style="list-style-type: none">• If necessary, remove the cover from the slot on the back of the cabinet.• Align the NIC to the expansion slot.• Press down on the network card until the card is fully seated.• Fix the NIC by securing the PC's mounting bracket to the cabinet with a screw.	
<p>Reassemble the computer case</p>	
<p>Reconnects all the ports of the computer.</p>	

Operating system configuration

First we have to boot the system





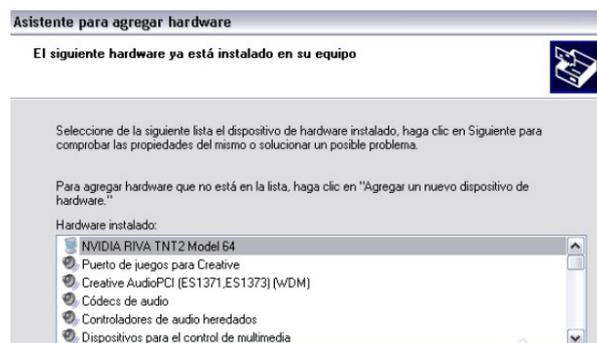
DHCP Service Start up From hardware to software

Once the system is started, we insert the CD with the drivers of the network card. To make the procedure more complete, we will not install from the automatic installer of the CD but we will use the wizard to add new Windows hardware. The indications are generic so that they can be applied to any hardware.

Step 1.

As the device is not plug and play, it does not find the device. Therefore we proceed to execute the assistant. The assistant looks for new hardware.

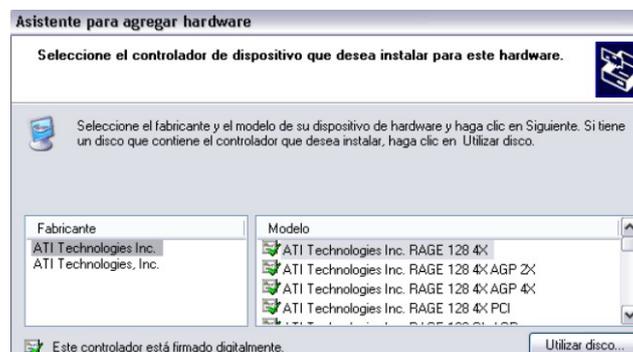
We follow the steps of the wizard to add the new device.



Step 2.

In this screen we must select the type of device that it shows us to install, Adapter red, and click Next.

For each type of Windows device, it shows us a list of the models for which it has a controller.

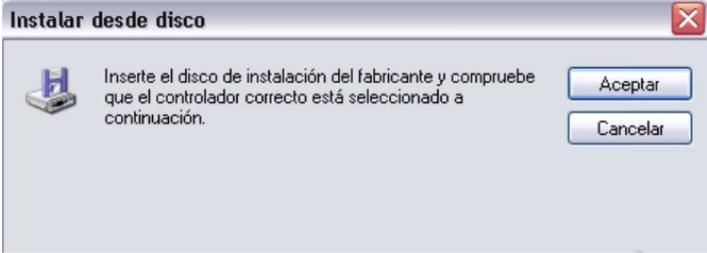


If we do not find the exact model and there is some other similar model, we can try and install it, sometimes several models of the same family share the same controller.

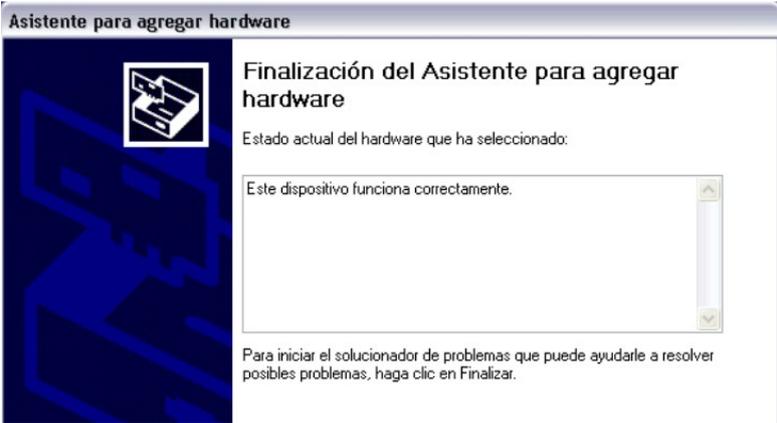
We have the possibility to use the manufacturer's discs by clicking on the Have Disk button ... In that case a screen will appear asking you to enter the manufacturer's disc, as you can see below.



DHCP Service Start up From hardware to software

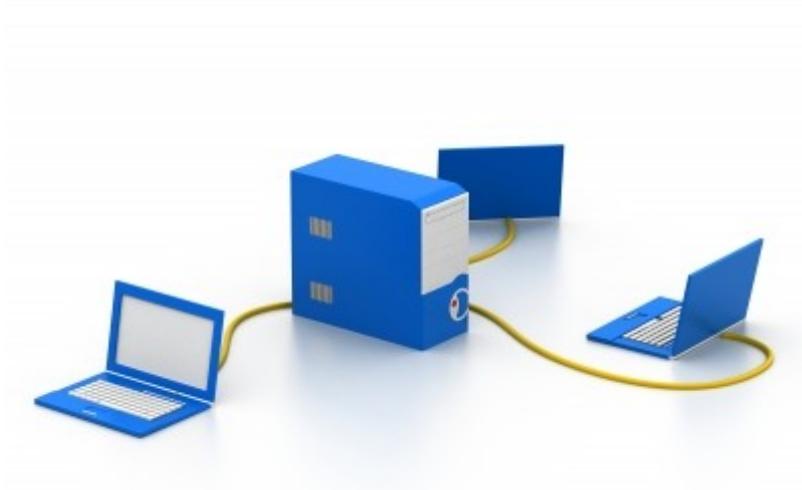


Here we must locate, inside the CD, the installation file of the model of the card that we have installed.





Network configuration



In this part, students will configure the DHCP clients network interface cards.

Clients configuration

Actual client operating systems works mainly with TCP/IP protocols. That is why we can assume that network configuration parameters are the same for all client operating systems.

The difference among the client operating system is the place, the command, or the configuration file for set up the parameters.



Microsoft Windows clients

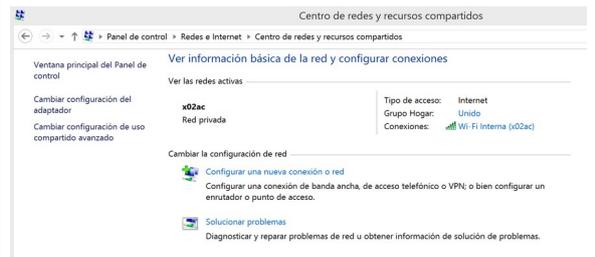
The explanations for this part are made over a system with de Microsoft Windows 8.1 operating system.

<p>Press windows key:</p>	
<p>We'll get: Click on the Panel Control icon.</p>	
<p>We'll get: Click on the Redes e Internet option.</p>	
<p>We'll get: Click on the Centro de redes y recursos compartidos.</p>	

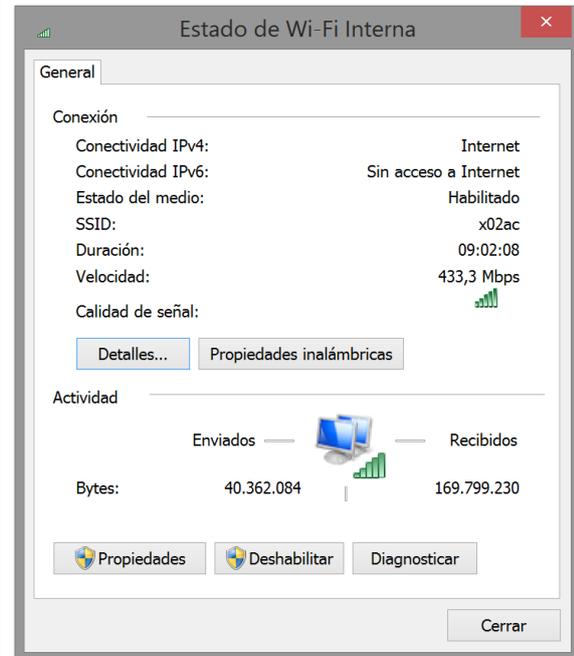


DHCP Service Start up From hardware to software

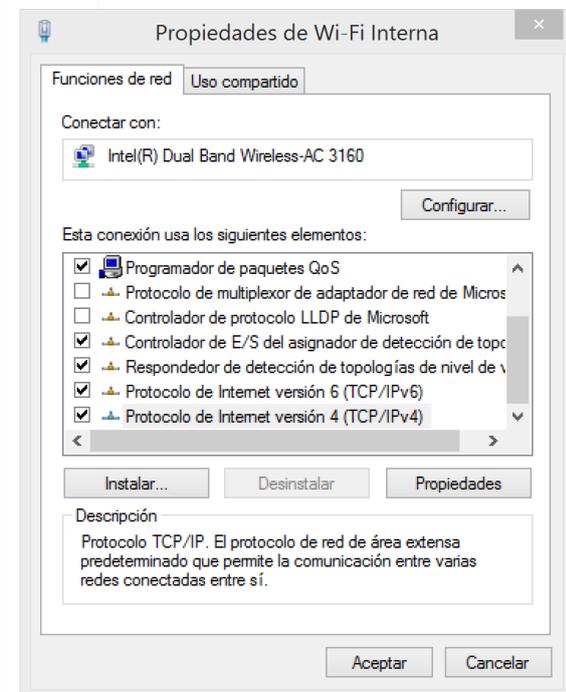
We'll get:
Click on the Conexiones item, of the NIC we want to configure.



We'll get:
Click on Propiedades button.



We'll get:
Select "Protocolo de Internet version 4" (TCP/IPv4) in the item list, and click on Propiedades button.





DHCP Service Start up From hardware to software

We'll get:

In this form we must select the options:

- Obtener una dirección IP automáticamente.
- Obtener la dirección del servidor DNS automáticamente.

Then click Aceptar button.

Propiedades: Protocolo de Internet versión 4 (TCP/IP...)

General Configuración alternativa

Puede hacer que la configuración IP se asigne automáticamente si la red es compatible con esta funcionalidad. De lo contrario, deberá consultar con el administrador de red cuál es la configuración IP apropiada.

Obtener una dirección IP automáticamente

Usar la siguiente dirección IP:

Dirección IP: . . .

Máscara de subred: . . .

Puerta de enlace predeterminada: . . .

Obtener la dirección del servidor DNS automáticamente

Usar las siguientes direcciones de servidor DNS:

Servidor DNS preferido: . . .

Servidor DNS alternativo: . . .

Validar configuración al salir

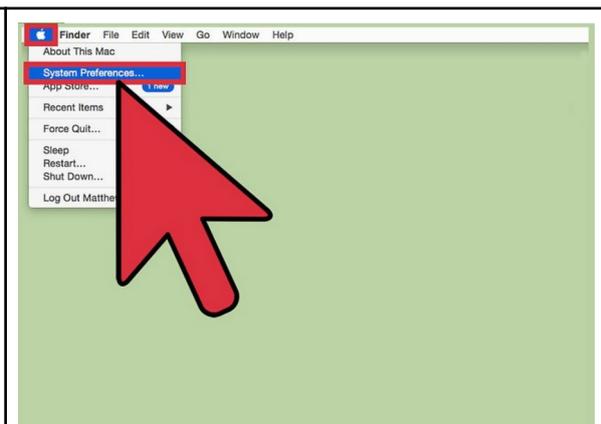
Opciones avanzadas...

Aceptar Cancelar

And now we have the network interface card prepared for obtain the IP configuration from a DHCP server located in the same broadcast domain of the network.

MAC OS clients

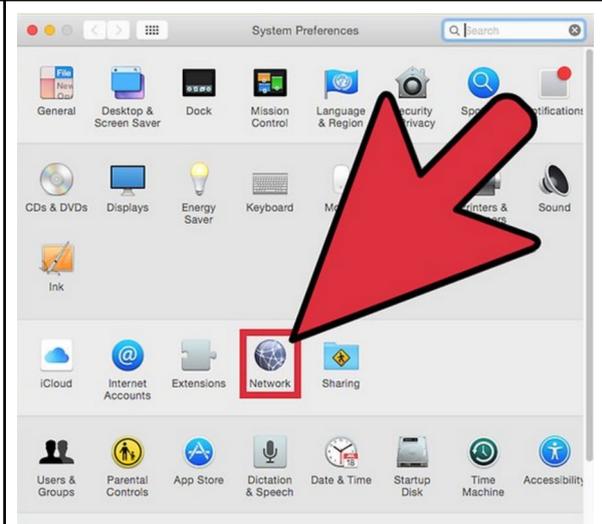
Click on the System Preferences of the system Menu:



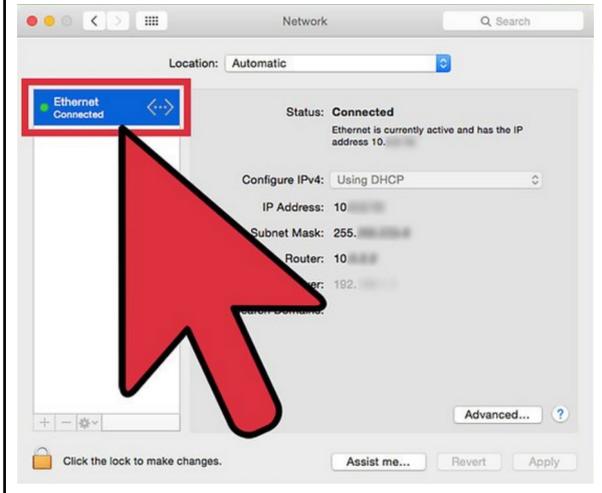


DHCP Service Start up From hardware to software

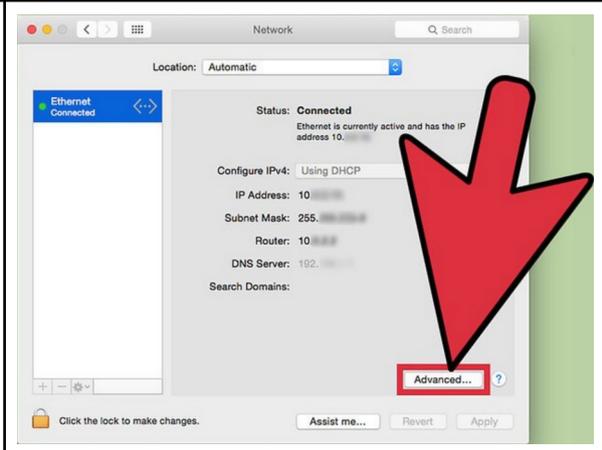
We'll get the system preferences form options.
Click on the Network icon.



We'll get a form with a list of the network interfaces cards, NICs, we have in the system.
Click on the interfaces desired.



And then click on the Advanced... button for access to the configuration form for the NIC.





DHCP Service Start up From hardware to software

We'll get the form with the different options of configuration. Click on TCP/IP option.



Select Using DHCP item in the Configure IPv4 list options.



Click on the OK button.





DHCP Service Start up From hardware to software

And finally we have the network interface card prepared for obtain the IP configuracion from a DHCP server located in the same broadcast domain of the network.





GNU/Linux clients

In GNU/Linux systems is more flexible to configure network interface cards through the configuration files and commands.

The process is shown next.

Task	Commands or descriptions
To obtain the name of the network interface card:	<code>dmesg grep -i network</code>
To obtain the network interface cards installed and show their configuration:	<code>ifconfig</code>
Change the network interface cards name. This can be accomplished editing the 10-network.rules. If this file don't exist, we must to create it.	<code>nano /etc/udev/rules.d/10-network.rules</code>
Add or modify the line associated to the network interface card we want change her name. Association is made through the MAC address.	Format line is: <code>SUBSYSTEM=="net", ACTION="add", ATTR{address}=="<MAC Address>, NAME="<NIC name>"</code>
If we want to make a temporal name change for the network interface card:	<code>ifconfig <nic name> down</code> <code>ip link set <nic new name></code> <code>ifconfig <nic new name> up</code>
Edit NIC configuration file:	<code>nano /etc/network/interfaces</code>
For configure a NIC as a DHCP client, the file section for the NIC will have to be:	<code>auto <NIC name></code> <code>iface <NIC name> inet dhcp</code>
Restart the networking subsystem:	<code>/etc/init.d/networking stop</code> <code>/etc/init.d/networking start</code> or <code>/etc/init.d/networking restart</code>
Instead of restarting the complete networking subsystem, we can only restart the NIC we have changed her configuration:	<code>ifconfig <NIC name> down</code> <code>ifconfig <NIC name> up</code> or <code>ifdown <NIC name></code> <code>ifup <NIC name></code>



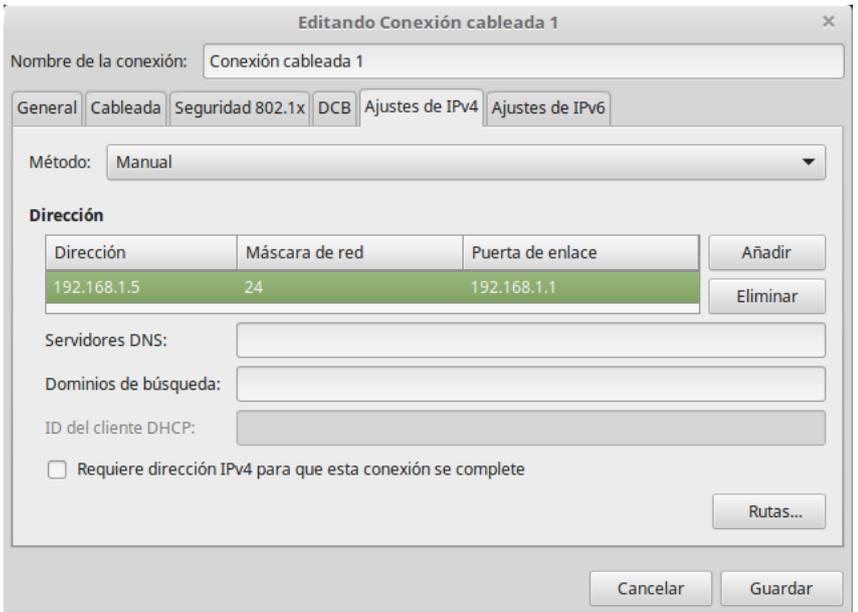
DHCP Service Start up From hardware to software

DHCP Service set up

A DHCP server dynamically assigns IP addresses to PCs within a network, this prevents us from having to configure the IP address of each machine separately so it is widely used in all types of networks. In addition to assigning the IP address DHCP can provide a set of automatic configurations such as the broadcast address, the addresses of the DNS servers and many other parameters that we will see in this tutorial.

We will install a DHCP server in Ubuntu, which will provide IP addressing within our network and we will also configure other necessary parameters so that PCs can navigate and communicate inside and outside our network.

1.- Assign a fixed IP address to our DHCP server

Through the terminal in the file /etc/network/interfaces	<pre>auto lo iface lo inet loopback auto eth0 iface eth0 inet static address 192.168.1.5 gateway 192.168.1.1 netmask 255.255.255.0 network 192.168.1.0 broadcast 192.168.1.255</pre>
Through the Graphical interface	

2.- Installing the DHCP server

We open the terminal and execute:



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DHCP Service Start up From hardware to software

```
$ sudo apt-get install dhcp3-server
```

At the end of the installation, messages similar to these will appear:

```
Setting up dhcp3-server (3.1.3-2ubuntu3) ...
```

We have to wait for it to end and we continue.

3.- Select the network interface on which the DHCP server will operate

Open the file dhcp3-server with the editor selected by the user, here nano, running:

```
$ sudo nano / etc / default / dhcp3-server
```

Where it appears:

```
INTERFACES = ""
```

We add:

```
INTERFACES = "eth0"
```

Then we save and close the file, here we are saying that the DHCP server must "listen" on this interface for DHCP requests.

4.- Modify the DHCP configuration file

Rename the file dhcpd.conf with another name, for example: dhcpd.conf-backup.

```
$ sudo rename /etc/dhcp3/dhcpd.conf /etc/dhcp3/dhcpd.conf-respaldo
```

We created the file xxx again.

```
$ sudo nano /etc/dhcp3/dhcpd.conf
```

We write the following configuration in the file:.

```
default-lease-time 600; # wait time before renewing the IP address
max-lease-time 7200; #maximum waiting time before renewing the IP address
option subnet-mask 255.255.255.0;
option broadcast-address 192.168.1.255;
option routers 192.168.1.1;
option domain-name-servers 208.67.222.222,208.67.220.220; #servers DNS
option domain-name "ejemplo.local";
subnet 192.168.1.0 netmask 255.255.255.0 {
range 192.168.1.100 192.168.1.200;
}
```

Only this must have the configuration file, no more or less save the file. Let's see it line by line:





DHCP Service Start up From hardware to software

- **default-lease-time 600:** this is the default loan or rental time of the IP address and is measured in seconds.
- **max-lease-time 7200:** it is the maximum time that an IP address should last before it expires and the client must ask for an address again.
- **option subnet-mask 255.255.255.0:** It is the network mask that we defined above.
- **option broadcast-address 192.168.1.255:** It is the broadcast address of our network.
- **option routers 192.168.1.1:** It is the IP address of our gateway (also called data gateway or gateway).
- **option domain-name-servers 208.67.222.222,208.67.220.220:** It is the IP address of our DNS servers as explained above.
- **option domain-name "example.local":** This is the domain name of our network, this parameter is optional.
- **subnet 192.168.1.0 netmask 255.255.255.0:** Here we define our network that we want to assign the range of IP addresses.
- **range 192.168.1.100 192.168.1.200:** It is the range of addresses from .100 to .200.

If you have another server or host that needs a fixed IP and you do not want to configure it on the server/host, simply add the following lines just like the printer at the end of the previous file:

```
host pc1 { #pc1 is de host/server name
    hardware ethernet xx:xx:xx:xx:xx:xx; #MAC
    fixed-address 192.168.1.11; #Desired IP
}
```

5.- Restart the DHCP server

Finally, for the configuration to take effect and our DHCP server to work, we execute:

```
$ sudo /etc/init.d/dhcp3-server restart
```

With this we restart the DHCP service and if it does not show any error it should work.

Once this is done, clients should obtain IP addresses automatically and be within the range of .100 and .200. For example 192.168.1.101.-

Final tasks

Hardware installation

1. Creation of a memory with all the steps followed for the installation of a network card in a PC.
2. Explain the created memory to the group.





DHCP Service Start up From hardware to software

Operating System configuration

1. Creation of a memory with all the steps followed for the installation and configuration of an operating system.
2. Explain the created memory to the group.

Network configuration

1. To do a tutorial for view and/or edit the TCP/IP configuration in Android devices through the graphic user interface.
2. The same as the previous task, through the command line interface.
3. Explain to the group one of the two previous task.

DHCP Service setup

1. Install the DHCP server on an Ubuntu machine and provide a memory with all the steps followed and captures of each of the executed instructions.
2. Include new machines in your network that request an automatic IP address, check that the assigned IP addresses are correct, and include this information in the memory.
3. Explain to the group the memory created.

