

NETWORKS

A network is a data transmission system that allows the exchange of information between computers.

WHAT WE NEED TO KNOW TO CREATE OR CONFIGURE A NETWORK:

❖ To know the types of existing networks:

- According to its extension, it can be:
 - LAN (local), such as in a house, an office...
 - MAN (metropolitan) as in the town hall, a bank...
 - WAN (worldwide), such as Internet, INTERPOL...
- Depending on its distribution, it can be:
 - Peer-to-peer networks (P2P) where all the computers that share information are of the same level. Examples of this are the data exchange programs like Emule or Torrent.
 - Client-server networks, where a PC is the one in command and the other PCs have to wait to be attended. Examples are the computer classroom, or when we surf the Internet.

❖ To know the components that we must manage (hardware).

○ Wiring:

- Coaxial wire with BNC connector. It has small data loss, it is safe, but it is difficult to manage because the connector is placed with difficulty, which makes it expensive.
- Twisted pair wire with RJ45 connectors. It is cheaper and easier to place. It consists of eight very thin cables (similar to those of the telephone) screwed in two. They have characteristic colours so they can be easily identified.
- Optical fibre. They are the cables that do not cause loss (practically). They are glass tubes through which information circulates in the form of pulses of light. Their problem is that they are expensive and also need a converter of electrical signals in pulses of light at each end, which makes them even more expensive

Twisted pair wire		RJ-45 connector	
Coaxial wire		BNC connector	
Optical fibre			

- **Network cards for wire or wireless**

Standard network card	
Wireless network card	

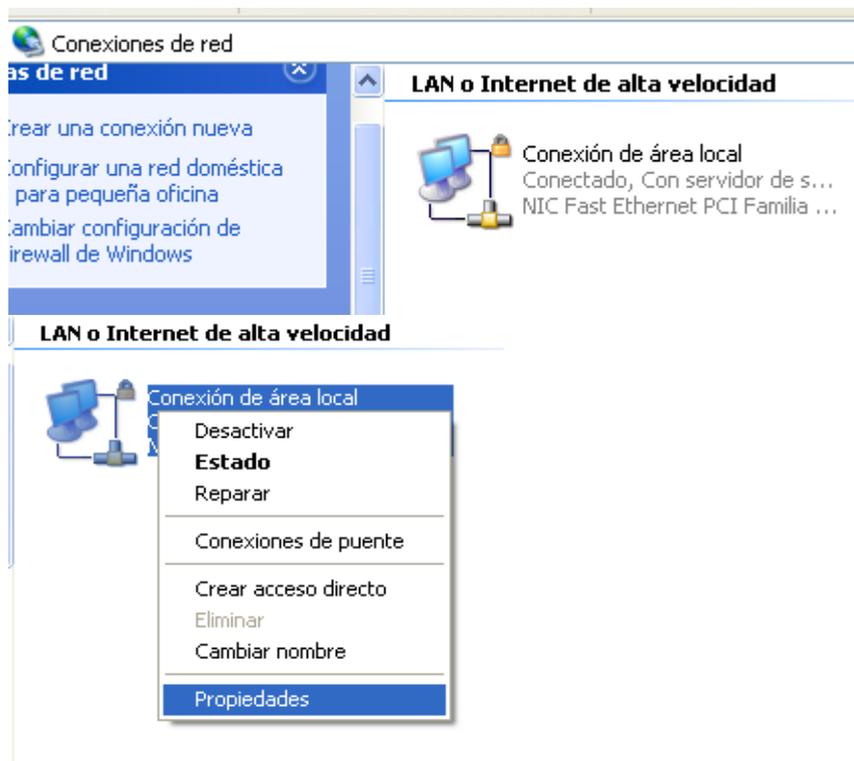
- **Network devices (routers or switches).** The router is essential because it is the device that transforms the electrical signal that comes through the telephone cable into a signal that our computer can understand. Routers have a small computer inside, and they are able to carry out this task and identify which computers requested some information and send it to them. If our network is very big, we can place a switch in the intermediate positions. It's cheaper than the router, but you can't connect it directly to the phone jack. It only serves for intermediate positions.

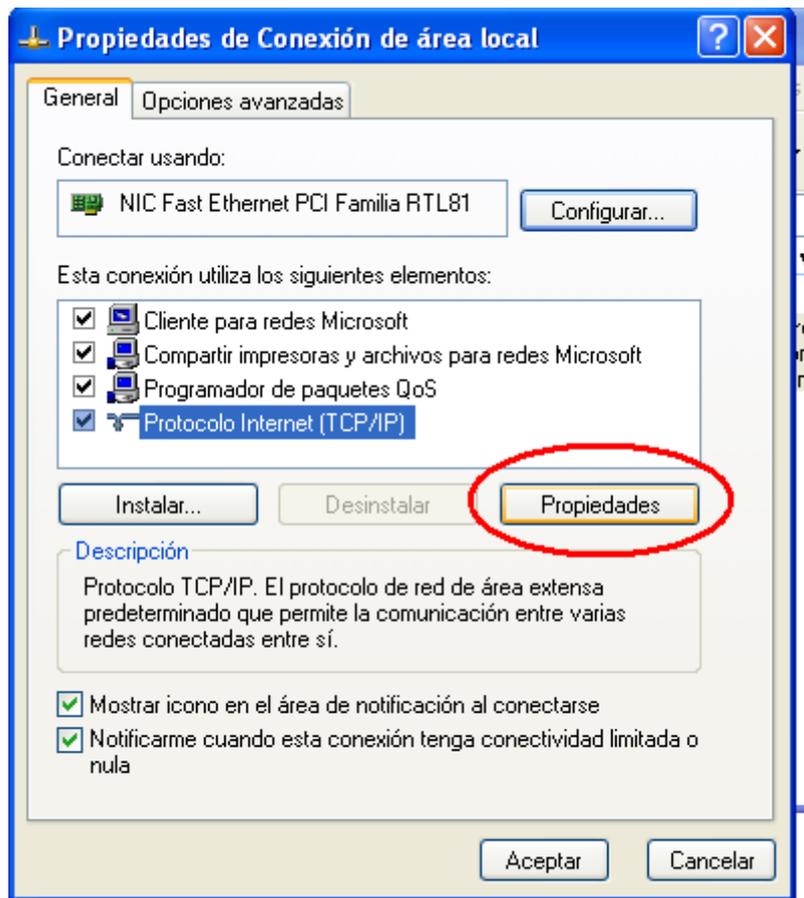
- ❖ **To know the software of the computer.**

- **IP address.** IP means Internet Protocol. It is the number that identifies my computer when I am in a network. It is composed of a series of four numbers that can range from 0 to 255 (2^8). This IP can be static (fixed in time) or dynamic (variable in time). The device which provides me with a dynamic IP is my router.
- **IP V6 address.** It is an extension because the other is not enough for the amount of computers in the world. It does not replace the other, but complements it. It consists of eight segments and can contain letters from A to F.
- **Default Gateway.** It is the IP address of the device that serves as a link between two computer networks, one of ours at home or work and the other Internet (usually). This device is usually a router, which acts as a minicomputer (generating dynamic IP for our equipment), and also as Proxy ("intermediate equipment") and firewall (firewall). The gateway is the private IP of my router, with which I communicate (the same for all the same manufactured). However, when you go online you can use a different one, which is available at the moment, called Public IP. The IP of the gateway usually ends in 1, indicating that it is the device number one in my net.
- **Subnet mask.** It is an IP type code that indicates the number of computers that the network can have. It is used a lot to put subnets within the same network. If we are not interested in subnets, we put 255.255.255.0. To understand how it works, we must write the numbers in binary language.

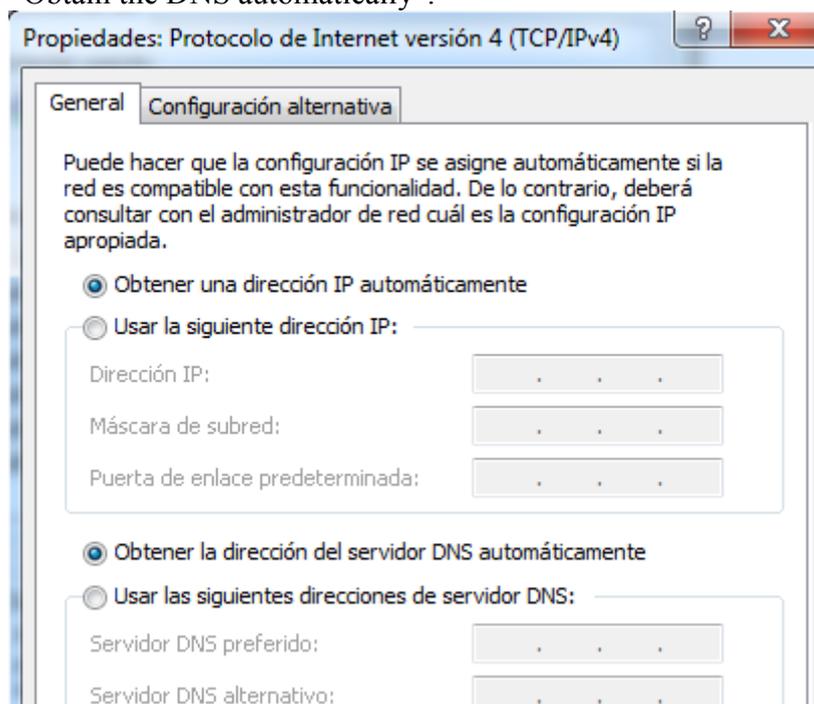
Binary	Decimal	Nº Computers	Nº subnets
11111111.11111111.11111111.11111111	255.255.255.255	1	256
11111111.11111111.11111111.11111110	255.255.255.254	2	128
11111111.11111111.11111111.11111100	255.255.255.252	4	64
11111111.11111111.11111111.11111000	255.255.255.248	8	32
11111111.11111111.11111111.11110000	255.255.255.240	16	16
11111111.11111111.11111111.11100000	255.255.255.224	32	8
11111111.11111111.11111111.11000000	255.255.255.192	64	4
11111111.11111111.11111111.10000000	255.255.255.128	128	2
11111111.11111111.11111111.00000000	255.255.255.0	256	1

- **DNS addresses.** These are the IP addresses of some machines (from the Internet provider) that translate the words we type when typing an address into IP addresses, (for example www.elpais.es has IP number 91.216.63.241). DNS means Domain Name System.
 - **How to find out my IP address:** If you want to know what your IP address is, you just have to press the **Start** button - **Run**, type **cmd** and press the OK button. This command will open a window in MS-DOS mode. Now type in the command line **ipconfig** and it will show you your IP address and your network mask. If you type **ipconfig/all** it will give you all the data you can find. Remember that if you have a dynamic IP, this number will be different every time you connect to the Internet.
- ❖ **Configuring the computer software.**
- **How to modify my IP address, netmask ... The first thing is to access it. On the control panel I look for the network connections icon:**



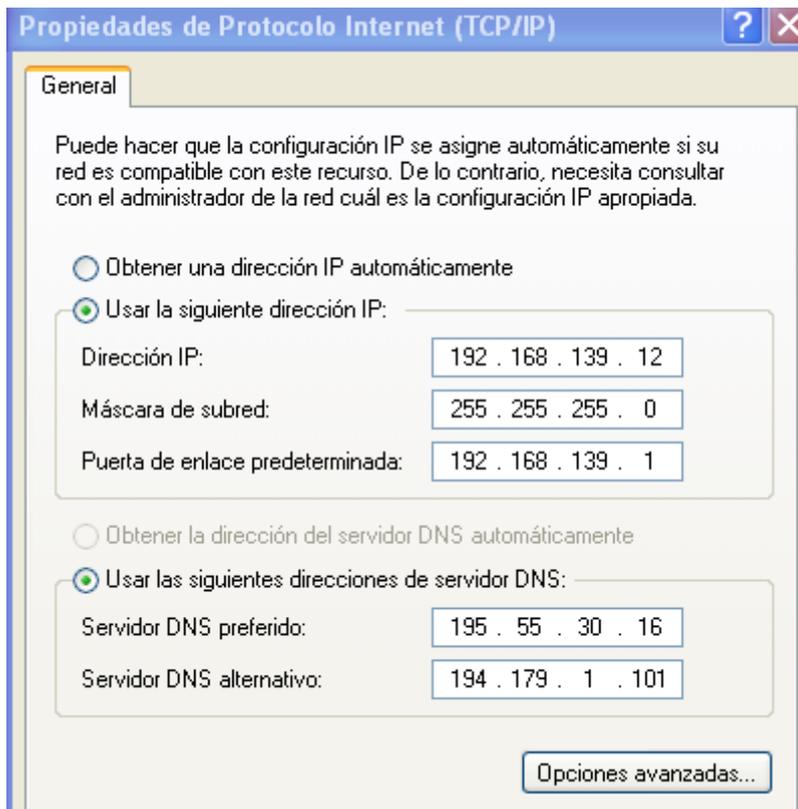


Here we will check the data that the provider has given us (Movistar, Vodafone, Telecable ...). If our provider gives us a fixed IP (and we pay for it) we have to write it in the ROUTER and not here). Here, we write in the DNS that the provider has given us, or, if we have the DNS written in the Router, we can choose the option "Obtain the DNS automatically".



If my computer needs to have a fixed IP, I'll write it here (normally it will not be necessary. It may be necessary for banks, offices where the equipment is turned off and on constantly, places where there are subnets ...) in any other case, I'll choose the tab to obtain an IP automatically.

If I put a fixed IP, I'll need to write correctly the default gateway (the same in all computers), and the IP address. I must write consecutive IPs until completing with all the computers of the network. In the example below I'm working in computer number 11 (number 1 is reserved for the router).



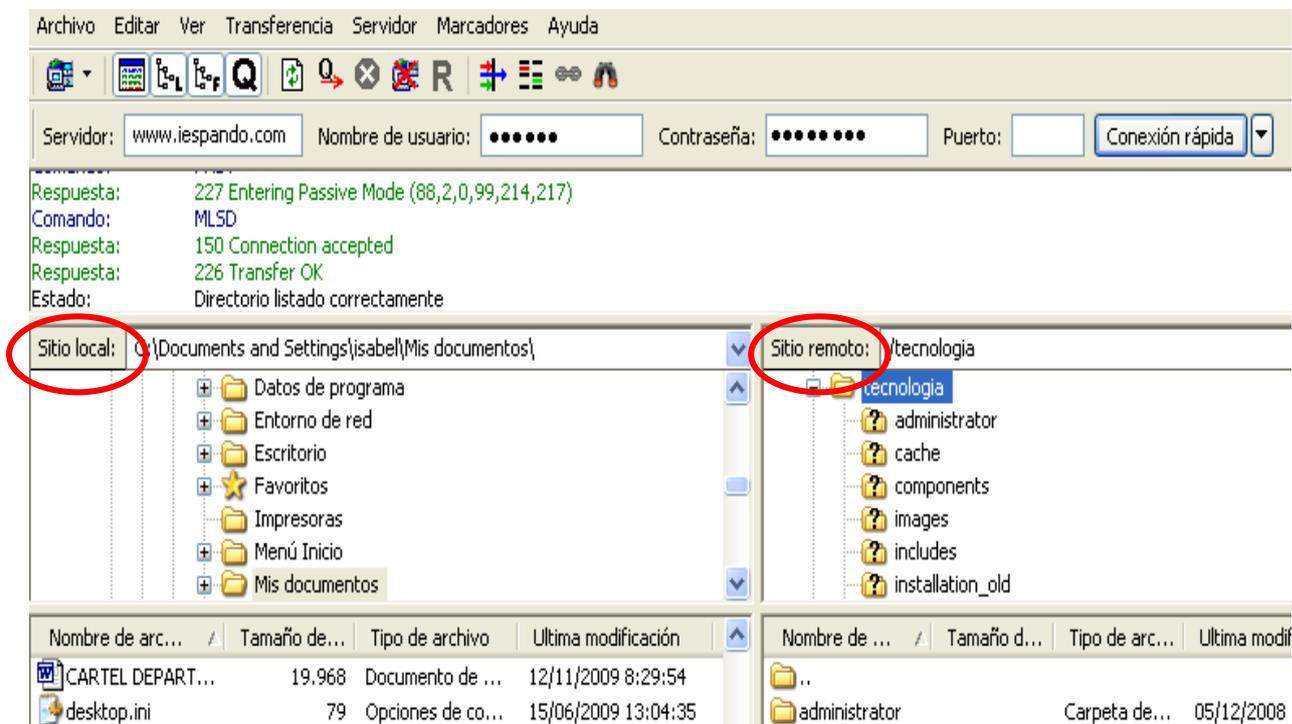
- ❖ **Configuring my router.** If my connection is new, my company will provide me with a router already configured to work with my company, but if I already have a router from another company or I want a different one (cheaper or more powerful) I must configure the router to work with my company. For this I must act as follows:
 - I search online what the necessary data for my company are, such as DNS, type of IP, user and password for access. For example in <http://www.adslzone.net/datosconexion.html> where we can find this table:

Proveedor	Tipo de IP	Protocolo	VPI/VCI	Encapsulation Mode	Usuario	Contraseña	DNS
Arrakis	Dinámica	PPPoA	0/35	VC-MUX	No rellenar	No rellenar	195.5.64.2 195.5.64.6
Auna	Dinámica	PPPoA	8/35	VC-MUX	auXXXXXX@aunadslXXX	"contraseña"	62.81.31.250 62.81.61.2
Comunitel	Dinámica	PPPoA	0/33	VC-MUX	"usuario"	"contraseña"	212.145.4.097 212.145.4.098
Eresmas	Dinámica	PPPoA	8/35	VC-MUX	No rellenar	No rellenar	62.81.236.128 62.81.236.129
Jazztel	Dinámica	PPPoA	8/35	VC-MUX	"usuario"	"contraseña"	62.151.2.65
Jazztel ADSL2+ / Desagregado	Dinámica	PPPoE	8/35	LLC-BRIDGING	usuario@adsl	"contraseña"	62.151.2.65
OpenforYou	Dinámica	PPPoA	8/32	VC-MUX	usuario@open	asignada por el ISP	213.195.64.129 200.195.79.129
Tele2	Dinámica	PPPoA	8/35	VC-MUX	euxxxxx@tele2.es	xxxx-xxxx	130.244.127.161 130.244.127.169
Telefónica (España)	Dinámica	PPPoE	8/32	LLC/SNAP	adslppp@telefonicanetpa	adslppp	80.58.0.33 80.58.32.97
Telefónica (España)	Fija	RFC 1483	8/32	LLC/SNAP	-	-	80.58.0.33 80.58.32.97
Terra	Dinámica	PPPoE	8/32	LLC/SNAP	"usuario" + @terradsl ó @terradsl14	"contraseña"	194.224.52.36 194.224.52.37
Terra	Fija	RFC 1483	8/32	LLC/SNAP	-	-	195.235.113.3 195.235.96.90
Uni2	Dinámica	PPPoA	1/33	VC-MUX	"usuario"@formula	"contraseña"	195.130.224.18 195.130.225.129
Orange	Dinámica	PPPoA	8/35	VC-MUX	suministrado por Orange	"contraseña"	62.37.237.140 62.37.236.252
Orange 20 Megas	Dinámica	PPPoE	8/35	LLC-BRIDGING	usuario@orangeadsl	"contraseña"	62.37.237.140 62.37.236.252
Orange	Fija	RFC 1483	8/32	LLC/SNAP	-	-	62.37.237.140 62.37.236.252
Ya.com	Dinámica	PPPoE	8/32	VC - MUX	ad + número de teléfono@yacomadsl	"contraseña"	62.151.2.8 62.151.4.21
Ya.com	Fija	RFC 1483	8/32	LLC/SNAP	-	-	62.151.2.8 62.151.4.21

- I have **to connect the router with the RJ45 wire directly to my computer**, without any other connection. I must write down the gateway address. In this way, by entering the gateway in the Internet browser, I access the router.
- **User and password.** Normally it asks me for an access password. The default value can be found in the Internet or I can find it in the website of the manufacturer of the equipment. If it doesn't accept it (maybe someone changed it), reset the router to return it to the factory state which is the one on the Internet. It is usually "admin", "admin".
- I must **change the manufacturer's data** by the new ones that my Internet server provides me.
- I must **change the access password**, so that it is not accessible to everyone, and if it is wireless, I must put some security key, such as a password to access the network. I accept the changes and connect the wires correctly.
- If **my company provides me with a fixed IP** for the Internet (it is not common), I must write it by hand instead the default value in the main screen where it says "IP address". If not, I don't need to change anything.

❖ **Transfer of files. How to share information.**

- **Attaching a file to an email.**
- **By FTP (file transfer program).** These are programs that transfer files from our computer to a server computer, almost always a Web page server. The most used program is FileZilla, because it is free and works very well.



- **P2P programs**, which handle file traffic between computers, without using any server. An example is the Ares or the Emule programs, but they should not be used for criminal purposes. The program is used to put the computers in contact and transfer files, but there isn't a central computer (server) saving data.

❖ **Transfer of information.** To browse the Internet and to consult information, we need an Internet browser program, such as Explorer, Chrome or Mozilla, a page address or URL (for example, <http://www.iespando.com>) and a protocol hypertext, which is, usually HTML