

Windows & Networking

Configuring protocols

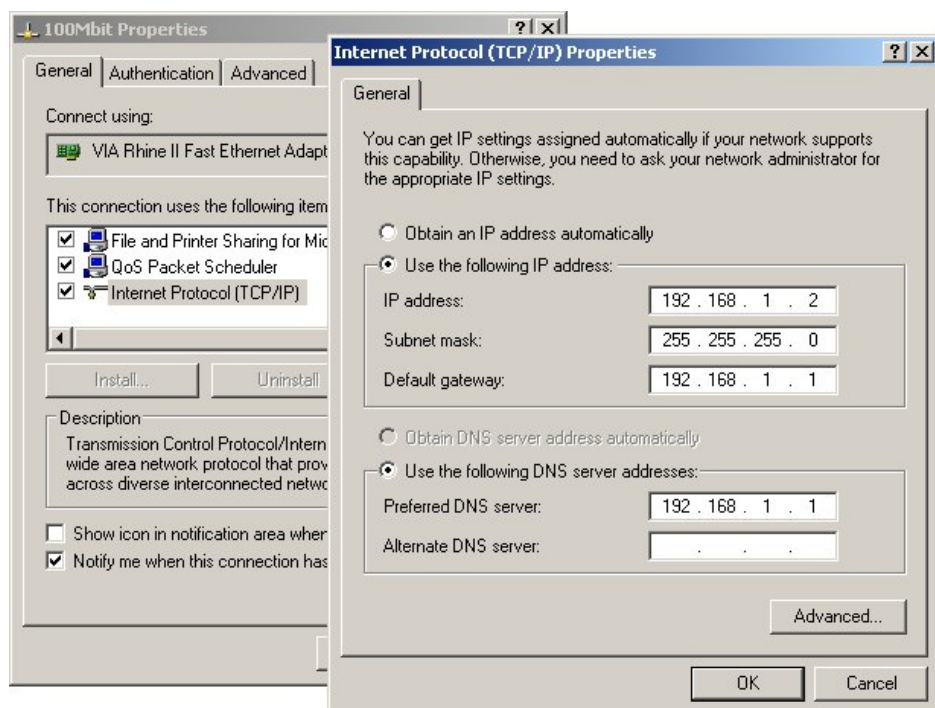
Communicating across a network is a complex task. Thankfully Windows has a built-in facility for doing this, called **NetBIOS**. (NetBIOS is part of Windows and is not related to the main BIOS on the motherboard, despite the similar name.)

Programs talk to NetBIOS; this then uses **protocol** drivers to convert data and break it into **packets** that can be sent out through the network card.

For many years the two most popular protocols were Microsoft's **NetBEUI** protocol and Novell's **IPX/SPX** protocol. These protocols were all incompatible with each other and are no longer used. Nowadays almost all computers use a standard protocol called **TCP/IP** (transmission control protocol / internet protocol).

TCP/IP

All versions of Windows have similar TCP/IP settings:



The **IP address** will uniquely identify this network card on the network.

The **subnet mask** (which has been covered in previous lessons) identifies:

- which part of the IP address is common to the local (sub)network
- which part of the IP address is unique to this network card.

In this case, the 255.255.255 masks 192.168.1, the prefix common to all machines on this (sub)network.

If an IP address is outside the local (sub)network (i.e. it does not start 192.168.1) then the IP packet will be passed to this (sub)network's **default gateway**. The default gateway is a router that directs data packets between networks. In this example the router is connected to this (sub)network using IP address 192.168.1.1.

In order to convert names to IP addresses, Windows will need to know where the nearest **DNS server** is located. On Windows Server system you may also need to supply the network's domain suffix (e.g. mycompany.co.uk) so that the DNS system can identify local computer names (e.g. mailserver.mycompany.co.uk) correctly.

Older Windows networks may also have a **WINS server**. WINS was a DNS-like system that Microsoft used for resolving local network names.

If the network has a DHCP server then it can allocate these details **automatically**. If a PC is set to "obtain an IP address automatically" then it broadcasts a *DHCP request* to all machines on the local network. The server will pick an unused number from its *leased address* table and send it back to the PC. The DHCP system also sends back subnet mask, default gateway and DNS addresses. DHCP is known as *dynamic addressing*, as opposed to the *static addressing* identified above.

IPX/SPX & NWLink

For many years Novell used their own packet format called *IPX/SPX*. IPX uses a 32-bit *network address* and the 48-bit *MAC address* built into the network card. The entire address is formatted as dotted hexadecimal. Examples:

- **7c.0000.0ca1.4567**
- **1ace44.0000.0c23.1231**

The first number (before the dot) is the network address. The rest is the MAC address.

Because IPX/SPX was so widely used on networks Microsoft build a compatible client interface into Windows. It is called *NWLink*.

NetBEUI & NetBIOS

To make peer-to-peer networking easier, Microsoft developed their own networking packet format called *NetBEUI* ("net-booey") — NetBIOS Extended User Interface.

NetBEUI allocated addresses automatically and therefore required no settings from the user. However, because of its simple nature is cannot be used to interlink multiple (sub)networks. Microsoft have now abandoned NetBEUI in favour of TCP/IP.

AppleTalk

AppleTalk was Apple's own networking protocol but has now been dropped in favour of TCP/IP. AppleTalk compatible protocols were available in Windows but were removed in Windows XP.

Tools

IPCONFIG

ipconfig allows you to examine the network settings from the command line.

```
C:\Documents and Settings\Administrator>ipconfig

Windows IP Configuration

PPP adapter Alcatel Speedtouch Connection:

Connection-specific DNS Suffix . : 
IP Address . . . . . : 81.170.109.222
Subnet Mask . . . . . : 255.255.255.255
Default Gateway . . . . . : 81.170.109.222
```

It has a number of useful switches:

ipconfig /all shows the full details for each interface, including MAC (physical) address:

```
PPP adapter Alcatel Speedtouch Connection:

Connection-specific DNS Suffix . : 
Description . . . . . : WAN (PPP/SLIP) Interface
Physical Address . . . . . : 00-53-40-00-00-00
DHCP Enabled. . . . . : No
IP Address . . . . . : 81.170.109.222
Subnet Mask . . . . . : 255.255.255.255
Default Gateway . . . . . : 81.170.109.222
DNS Servers . . . . . : 62.241.162.200
                        62.241.163.201
```

/displaydns shows the DNS addresses cached by Windows (to avoid looking them up again).

/release and **/renew** can be used to discard and request a new DHCP address.

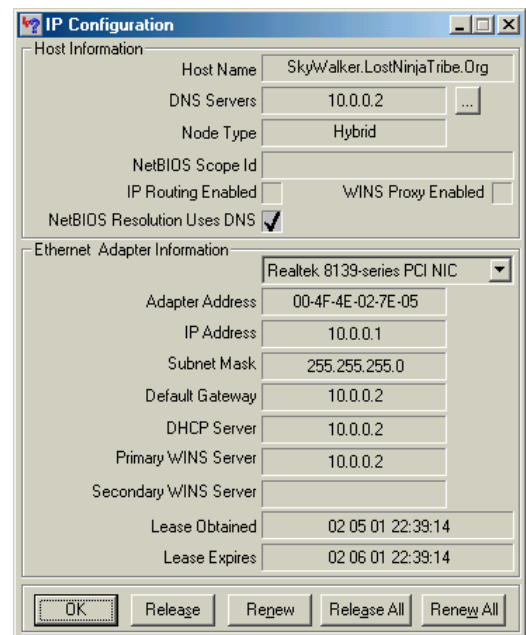
WINIPCFG

winipcfg is a graphical version of **ipconfig** for Windows 9x. To launch it, use the run command and type “winipcfg”.

However it is not supported in NT4, 2000, XP or Vista.

NSLOOKUP

nslookup can be used to find the IP address for a full domain name.



Sharing resources

Simple file sharing

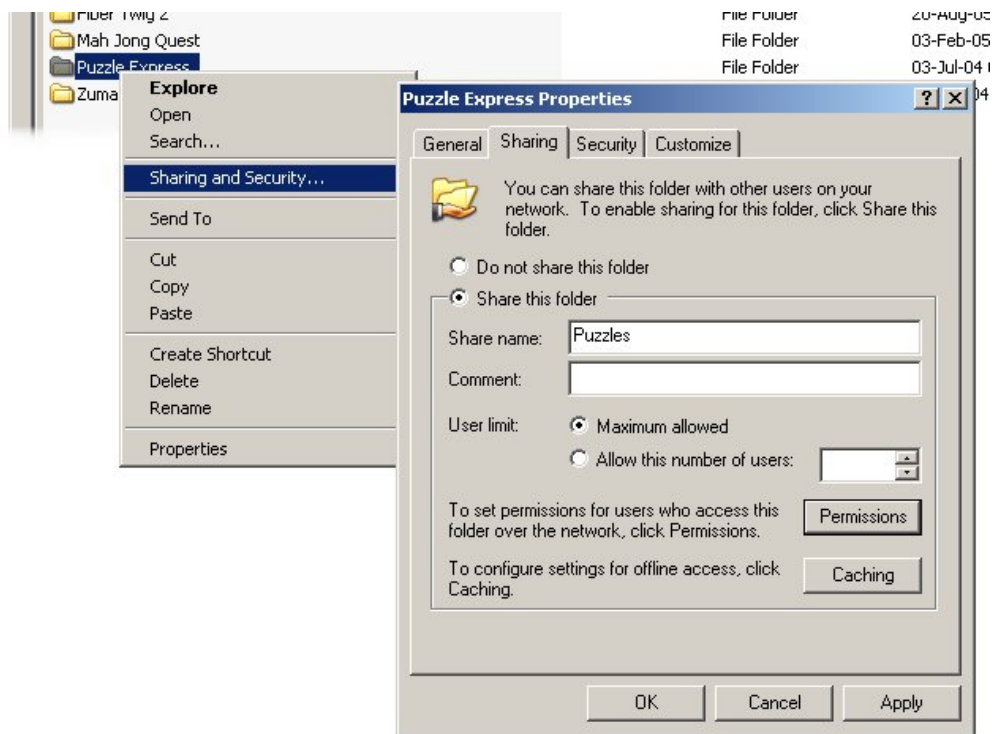
XP Home uses a system called Simple File Sharing to allow others to read files on your hard drive. More information on this can be found at:

<http://www.practicallynetworked.com/sharing/xp/filesharing.htm>

Standard file sharing

XP Professional and Windows 2000 use a different system.

To share a folder or printer with other machines on a network, use right-click (“alt-click”) and select ‘Sharing’. You must then choose a name for the share (usually the same name as the folder) and specify whether access will be full or read-only.



If the name ends with a '\$' then the share will not be listed in Network Neighbourhood (My Network Places).

The share can be referred-to using UNC (universal naming convention):

```
\\computername\sharename\subfolder(s)\file  
\\mailserver\puzzles\game1.exe  
\\colossus\secretarea$\topsecret\mi6\jamesbond.txt
```

Limitations

“File and printer sharing” should be disabled on an Internet interface. This is usually blocked by firewalls but it is important to check network interface settings.