

windows^{WORLD}

Your practical guide to Win98 and Win2000

WINDOWS NETWORKING

Installing a sophisticated network and sharing your Internet connection between several users

178

WINDOWS 2000

Discover how you can stretch your legs further with Windows 2000: this month – terminal services revealed

182

How to set up a small network

PART THREE



Rub-a-dub-dub, three-men-and-a-hub... Paul Warner shows how Ethernet can help create a high speed connection between several users

Last month we daisy-chained several machines together with coaxial cable and BNC connectors, creating a basic home network. If you are running an old accounts program under DOS then this 'thin Ethernet' network will be perfectly adequate.

Larger applications with bigger files, however, start to stretch a 10Mbps cable. If one machine goes down because of a faulty connection, then all the machines connected in the chain are compromised. If you're thinking of blasting larger graphics files around your network or are running a business and can't afford instability, you'll want something more robust.

The simple solution is to install a hub. These are readily available and the cost of installing a 100Mbps system has dropped to fit the wallet of homes and small businesses.

What's a hub? Imagine an old horse-drawn cart with spoked wheels. The centre of the wheel has a large bearing to fit on to the axle. Surrounding this is a wooden cylinder that has radial holes equally spaced around the outside.

These are used to locate the wheel spokes, the other end fitting into the wooden rim of the wheel. The centre of the wheel is called the hub.

A network hub functions in a similar way. All the computers in your network are connected to a central box or 'hub', with each

machine on a wire 'spoke'. This is commonly known as a 'Star Network'.

Advantages of a Star

Adding computers to the network and removing them again is simple and won't disturb the rest of your system. Just run a cable from your new machine's Network Interface Connection (NIC), a fancy name for your Ethernet card. Plug it into

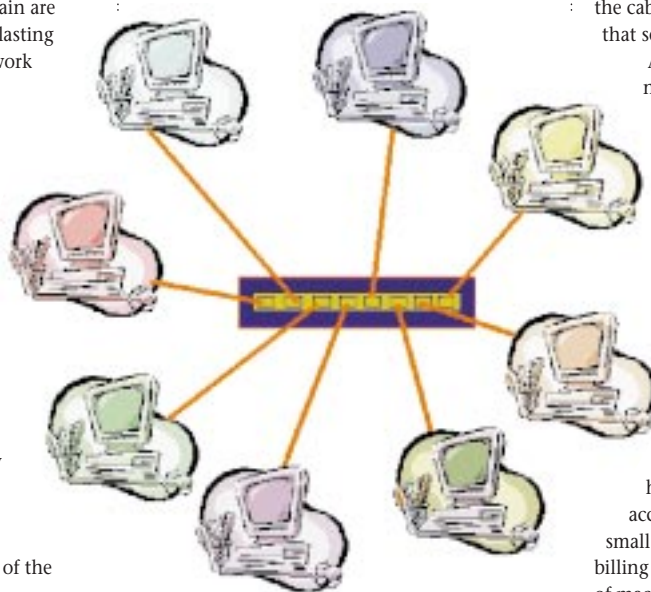
a spare socket in the hub and provided your network protocols are set up correctly, that's it.

With all the machines connected to one central position, it is a lot easier to diagnose any faults on your network. Some intelligent hubs can do more than just distribute data over your network and include microprocessors to monitor and diagnose system faults.

If one machine in the network falls over or the cabling is damaged, then the hub can isolate that section of the network.

All the other machines will function normally while you repair the offending machine. The only drawback is that any shared device like a printer or backup drive that's situated on the offending machine will be off line but this is true of any network.

Some hubs can accommodate multiple cable types so you could connect machines with different wiring. If your network grows, you can connect hubs together so that clusters of machines on separate hubs can talk to each other. For instance, you may have an office with a couple of machines connected to a hub. These could, for example, run the accounts and management systems of a small hotel. You update the booking and billing system in reception and install a couple of machines in the foyer. Both areas use a hub to connect their respective machines together and in turn, each hub can be connected, making a hybrid star network.



All the computers connect directly to the hub in what's known as a 'star network'.



WALKTHROUGH

Share the Net with Windows 98

Once you have your network up and running why not make your Internet connection available to every one else on your LAN

We've already covered sharing printers and files on your network, but you can do a lot more. We'll look at Intranets and personal Web servers in the near

future but this month it's a simple systematic intro to set up shared Internet access over your network.



1 You must install Internet sharing on a machine that's already connected to the Internet. Open up Control Panel - Start>Settings>Control Panel and select Add/Remove Programs. From the Windows Set up tab, highlight the Internet Tools section and open up the 'Details' button. Tick the Internet Connection Sharing box. It requires about 900kb to install in Windows98.

Once this is done the system will ask you for the Windows Installation CD. Several files will be copied to your system before you move on to the next step.



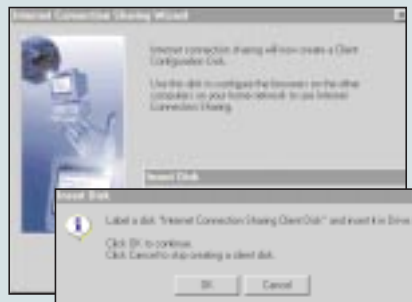
2 The Internet Connection Sharing Wizard should now start. This will only work successfully if you have an existing Internet connection to your ISP installed on this machine. The next choice asks you to choose between a Dial up Connection and a high-speed connection. For most people the choice is dial up connection. This covers both a modem on a conventional telephone or an ISDN connection like Home Highway. If you have more than one connection then you'll be presented with a menu of all available connections to choose from. You can also select to dial out automatically when accessing the Internet.



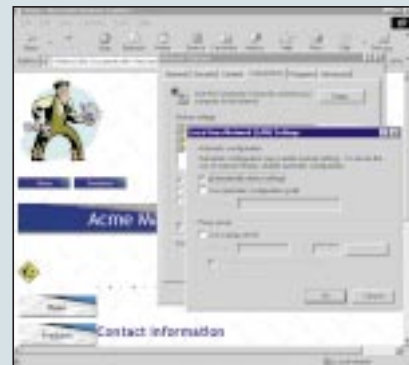
3 The wizard will now set up the Network connection. If you have more than one card that supports networking, you'll be offered a choice. In most cases, you'll only have the one network connection and it will choose this automatically.



4 Once the Wizard has finished interrogating you, the next step is to create a Client Configuration Disc. First, you'll have to format a new floppy disc. The Wizard then generates a couple of files on the floppy. The other file icsclset.exe is run on the client machines and sets up Internet Explorer to use the shared connection. A text file (ReadMe.txt) outlines the principles of Internet Sharing and contains instructions about setting them up. The text file also includes details of installing a network card and TCP/IP addressing. We've already covered installing a network card and will look into the Black Art of IP addresses in the near future. For the moment, the default installation values that you used when you installed the card should be fine.



5 The next step is to run the client set up floppy on the network machine you're planning to use for the extra Internet connection. Insert the disc (usually in drive A:) and from the Start Menu select run and enter icsclset.exe the name of the other file on the floppy. This will patch your existing Internet browser so that it looks for a Network connection over the LAN rather than from a network dial up adaptor.



6 Once your browser has been patched for shared connection it will automatically look over the network for a connection to the Internet.

Disadvantages of a Star network

The reason that hubs are such a popular method of networking is that they don't have many disadvantages. The main one is if your hub goes down, the whole network stops functioning. We've never experienced this, but it wouldn't be a serious problem for average user. Hubs are readily available and changing one over takes a few minutes before you're up and running.

For the larger corporate user it would make sense to standardise its specification and keep a spare hub, just in case.

The only other disadvantage is the cost of cabling. As each machine has to be wired to a central point, you're going to need a lot more cables than a simple daisy chain.

Choosing a hub

Hubs come in a range of sizes. For the home

network, you can usually pick up a kit with a hub and a couple of network cards for under £100. This will get you up and running with two machines and the potential to add another two machines later.

Cards designed for use with a hub usually use 'Twisted Pair' cable. These are similar to the standard connectors that you find on telephone systems and connect using a RJ-45 telephone connector. If you're upgrading

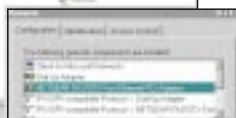




WALKTHROUGH

Installing Ethernet adaptors and wiring up a hub

Three easy steps to get connected



1 First, you have to install network cards on all the machines you're going to connect together. Prices of Fast Ethernet Cards have dropped considerably and are usually capable of working at either 10 or 100Mbps. Windows 98 should automatically recognise the card and ask for drivers. Many drivers are available from within 98 and your card may install with one of these.



2 You'll need to measure up the exact length of twisted pair cabling before buying them. Always get a couple of metres more than you need and you'll be able to move the machines around easily for rear access and cleaning. Prices range from about £6 for a 3-metre category 5 cable up to £20 for 30 meters. You only want to wire up once, so it's best to use category 5 cables in case you upgrade to 100Mbps in the future.



3 Once all the cables are in and the hub is powered up, it's just a question of switching on the computers and setting up sharing and shared devices. This is done in exactly the same way as a simple coaxial system that we looked at last month. Enable file and printer sharing on each machine. Then allocated any devices that you wish to share, directories, drives or printers. Remember network printers don't just appear, they have to be installed like any other. When you go through the install routine, choose 'network printer'. Drivers are then copied from the printer's host machine.

from a coaxial 10base2 system, you may already have this type of connector on your NIC card. If not, new cards are available from about £10.

Some Ethernet cards are listed as 10/100 Mbps. These support 100baseT connection or 'Fast Ethernet' and are capable of data transitions ten times faster than the normal 10Mbps. Achieving this extra speed does require a compatible hub and more expensive cabling. Faster hubs usually cost about twice the price of an equivalent 10base hub and you won't be able to use normal Ethernet cable.

What is twisted pair?

When signals are transmitted down copper wire, they can cause interference in adjacent cables, known as 'crosstalk'.

By twisting the cables around each other, the 'Noise' or interference is cancelled out, resulting in a cleaner signal.

Unshielded Twisted Pair (UTP) is made up of several twisted pair cables in a plastic casing. This is the sort of cable typically used by telephone systems.

When you're shifting computer data down this type of cable they need to be of highest quality. These are graded from one to five.

- Categories 1 and 2 are the cables initially designed for voice communication and can support data rates of up to 4Mbps. Category 1 is the older telephone cable.
- Category 3. This is used by most 10base2 systems supporting data transmission rates of up to 10Mbps.
- Category 4 is not that common but can support rates up to 20Mbps.
- Category 5. This is the highest-grade specification and the recommended type of cable for Fast Ethernet at 100Mbps and higher.

Fast Ethernet is now quite affordable. If you plan to work at 100Mbps then all the equipment and cabling will need to be rated for this speed. **PCP**

WIRING THE WORLD

Ethernet Cabling Specifications

There are a host of networking cable types. These are the specifications of some of the more common ten megabits per second types

10BASET

- 10 megabits per second transmission speed, baseband, unshielded twisted pair
- Use UTP (unshielded twisted pair)
- DIX/AUI or RJ45 connection on NIC (DIX: A 15-pin, D-shaped connector for AUI interfaced to thick Ethernet cables)
- Workstations no more than 328 feet from hub
- 1 hub can connect 12 workstations
- 12 hubs to one central hub
- Minimum cable length between workstations: 8 feet.

10BASE2

- 10 megabits per second transmission speed, baseband 200 meters

- Coax thin-net (also known as 'cheapernet') cable.
- Ethernet 0.2-inch diameter 50-ohm RG-58 A/U
- On-board transceiver
- Length of trunk segment 607 feet.
- 30 workstations per trunk
- 1,024 workstations maximum per network.
- Entire network trunk 3,035 feet
- Minimum cable length between workstations – 20 inches

10BASE5

- 10 megabits per second, baseband 500 meters
- Ethernet .4-inch diameter, 50-ohm RG-11
- DIX/AUI connection on the NIC
- External transceiver

- Trunk segment length 1,640 feet.
- Entire trunk length 8,200 feet.
- Minimum cable length between taps – 8 feet.

10BROAD36

- (10 megabits per second, broadband 3,600 meters) Ethernet 50 ohm
- Coaxial cable
- Transceivers for either single cable (with head-end frequency translator) or dual cable (with a head-end cable loop) network
- Ethernet channel takes 18MHz

10BASEF

- Fibre optic inter-repeater link (FOIRL)
- Maximum distance – 1 kilometre