



A star is born

Do you know your thin ethernet from your T connector? Your star cabling layout from your 10Base2? Mark Baynes puts networking basics in the spotlight to help you get connected.

Most letters I get are concerned with basic networking problems, so this month will be of use to most people. I will be covering the basics of networking PCs in terms of network topology and cards. As ever, this will be hands-on and based on real-life situations. Some information will already have been covered in previous columns but bear with me, because it is worthwhile to cover every step. We are only concerned here with ethernet networks, not the wonderful world of Token Ring.

So what are we trying to do? And, more importantly, why? Networking is simply a matter of connecting two or more computers together so that their resources can be shared. Whether a network is the web or two PCs in your bedroom, the principles are the same. By resources, most people mean files, but the most commonly shared resource on a network is a printer.

On the bus

The first thing you are going to need is a good network card and some cabling. For most people, their first network is a peer-to-peer affair whereby two or more computers

share their files with each other. The most simple way to do this is to use 10Base2 or thin ethernet cable (also known as BNC) to establish a bus topology (i.e. network structure) as seen in Fig 1.

You will need an appropriate length of cable between each PC to be networked, and it's a good idea to buy cable lengths slightly longer than you need in case you move your PCs (but not so long that it turns into spaghetti all over the floor).

Each PC will need a network card with a BNC connector and each card will also need a T-connector. The connector attaches to the BNC port, or stub, which sticks out of the back of the network card. The BNC cable does *not* attach directly to the stub (Fig 2). T-connectors are usually included with the card.

Thin ethernet cable is easily recognisable because it will have the BNC connectors at either end: sometimes these are covered with a rubber sleeve, sometimes not, and the cable is quite stiff in comparison to twisted pair or 10BaseT cable. This is because it is shielded and is therefore more robust. Thin ethernet is not sufficiently robust that it will withstand a desk or chair

leg being placed on it or a person's weight being applied to it.

Now, whether or not your BNC network cable (or cables) snake all over your office, with BNC cabling you are merely organising a single line or daisy-chain of PCs and the network cards at either end of the line have to be terminated. This is done by attaching a T-connector to the network card stub, but instead of attaching *another* piece of cable to the *other* side of the connector, you attach a terminator block (Fig 2).

It may be that at some point one of the PCs at either end of the network may need to be removed for some reason: you can remove the T-connector from the PC and just leave it dangling there, and the network will still work well as long as the terminator is present: I've done this a number of times. But it is much better to shorten the network by that single cable run and move the T-connector to the PC which is now at the end of the line.

Star spotting

If you have five or more PCs, or you plan to have more in future, you might be best advised to use a different type of cabling layout from the bus topology, the star, at the centre of which is a hub (or repeater, if you prefer the old-fashioned term). I have used both topologies and prefer the star simply because it is easier to manage. The problem with the bus approach is that the network signal goes from one PC to the next, so if there is a break in the cable in the middle of the network, PCs either side of the break cannot communicate with each other. Also, you have to faff around with T-connectors and terminators — thin ethernet cable is difficult to tuck away out of sight.

If you use the star approach (Fig 3) all

p302 >

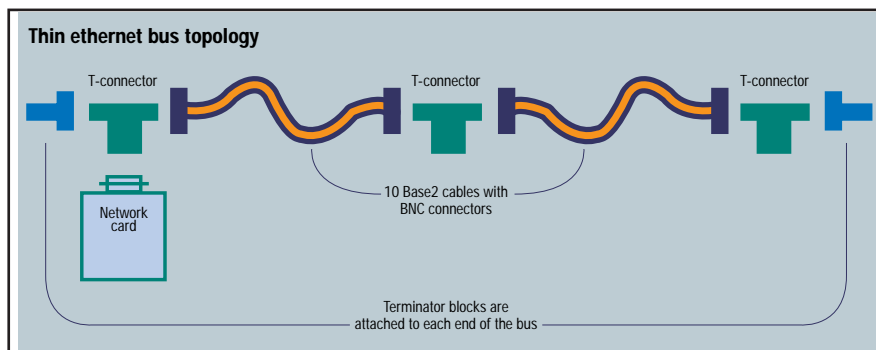


Fig 1 The thin ethernet bus topology requires terminator blocks to be attached to the T-connectors of the network cards at each end of the bus

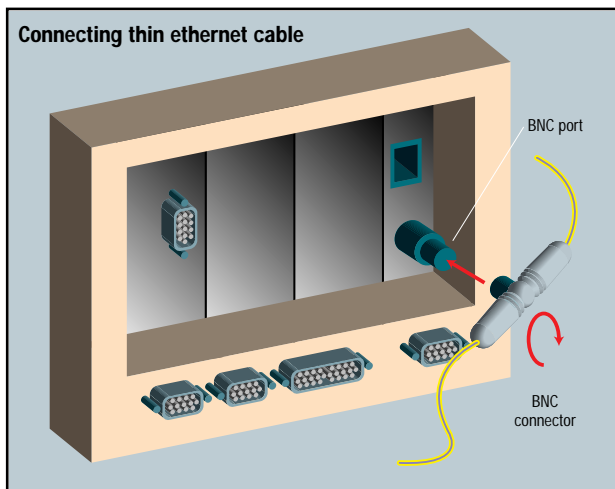
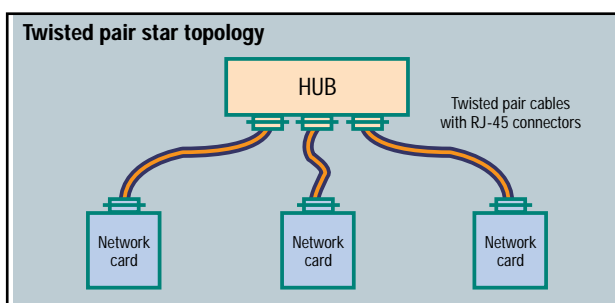


Fig 2 (left) Thin ethernet cable is always attached to the network card via the T-connector, never straight to the BNC stub on the card itself (Source: 3Com)

Fig 3 (below left) The twisted pair star topology means the extra expense of buying a hub but is a much better network layout to manage



and give a crude indication of network traffic. There are many different sizes of hub available: from mini-hubs with only four ports, to hub units with 12 or 15 ports which can be connected to other hub units, thus

providing a single logical hub of 60 ports or more. For most small offices a hub with 10 or 12 ports will suffice.

Hubs can be daisy-chained together using a special crossover port. I do this in the office, with one hub downstairs with all the network PCs and the print server connected to it, which is then daisy-chained using a long run of cable to another hub upstairs, which has the server attached to it.

PCs are connected directly to the hub, so if a length of cable is damaged, only the signal to the PC on the end of that cable run is affected: the others are still in contact with each other. There is the extra cost of the hub, but it's well worth it in the long run.

All hubs have simple connection indicator and network traffic lights on each port which can tell you whether there is a live PC at the other end of the cable run,

You can get 10Base2 hubs which use the BNC approach but most people use twisted pair or 10BaseT hubs which use what is called an RJ-45 port and connector, which looks similar to the connector on the end of a phone or modem line but which is slightly different. The RJ-45 connector on the end of the cable goes into the RJ-45 port in the network card at one end (Fig 4) and the hub at the other end, and that's it.

Twisted pair cable is also thinner than thin ethernet cable so it is easily tucked under the corner of carpets and up the stairs (you should see my house...). But this flexibility is at the expense of resilience, although it is reasonably durable. Because the nature of the star approach means that you will have lots more cable lying around, it is quite often a good idea to fix some plastic ducting to the wall and run the cables through this. You can find this type of ducting in most DIY stores and it's worth the time spent installing it.

Play your cards right

If you are not sure what sort of topology to adopt, I would suggest a combination card, so-called because it has both BNC and RJ-45 ports which allow you to install the card once and change cable types as you wish.

Some cards have an AUI (Attachment Unit Interface) port but for most small networks a combo card with BNC and RJ-45 ports will do fine. I am on record as having stated my belief that it is well worth investing in a good-quality card: 3Com has

Bang on queue

Following publication of the Hands On Networks column in April's PCW, I've received several letters regarding the issue of print servers. Here's one of the best. Thanks for your input, everyone!

■ "With regard to your reply to a reader's letter about print servers which do not require a network print queue. In fact, the HP JetDirect card supports the functionality you need, in both the internal and external flavours.

"Download Windows for Workgroups drivers for the card, so that a WfWG Network PC can print directly to the

printer. The driver uses MS DLC.

"You can also add HPNetwork Printers to W95 which will work in the same way. I've a group called

HP_Network_Printers

in my Network Neighbourhood and can map a local device directly to the device in the Network Printer group.

"If a printer can be made visible in a WfWG network, I think it can be viewed and used by OS/2, and even SCO Open Server 5.0 with Advanced File & Printer Services.

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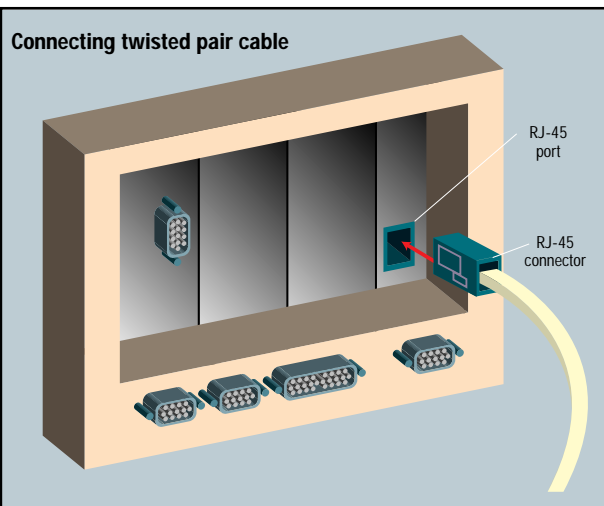


Fig 4 Connecting twisted pair cable is simply a matter of plugging the RJ-45 jack on the end of the cable straight into the socket in the card. (Source: 3Com)

via the RJ-45 or BNC socket, ensure that the network cable you are attaching to the card is attached to the rest of the network, and that's it from the hardware side.

But this is only because

kindly lent me some of its rather good EtherLink cards: the EtherLink III ISA combo and the EtherLink XL PCI RJ-45 card.

Upon opening the box of any good network card you should find at least three things: the card itself, a documentation booklet, and a floppy disk containing a setup program and basic drivers for the usual network clients. The only ones with which we are immediately concerned are the Windows drivers.

My installation machine is an ageing 486DX2 50MHz ISA PC with 12Mb RAM and a 500Mb hard drive, running Windows for Workgroups. It normally has an SMC card installed in it (and has done for the last three years) which has been trouble-free, but for the purposes of this month's column I have removed it.

Physical installation of the EtherLink is simple: just open the machine, slot the card into a free ISA slot, screw down the rear plate, attach the network cable to the card

the EtherLink is software configurable. If you have a card where you have to faff around with jumper switches on the card itself, you will have to set these correctly. I always leave the PC casing open anyway, until I know the new network card is working.

It is always a good idea to check which IRQ and memory address space is free for your card, irrespective of whether your PC and card combination can automatically detect these settings. If you insist on jamming a card into every available slot in your PC, you may have some juggling to do. I always try to keep things as simple as possible in the knowledge that they will get complicated anyway.

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