Transmission without tears

Mark Baynes tackles the serious subject of organising communications for his own business. He eases himself into ISDN, and gets to the nub of some networking basics.

The more networking I do, the more I realise how little I know. While many networking professionals can specialise in their particular area (Banyan Vines, routers, ISDN, and so on), I feel that I am more akin to those lucky people within companies throughout the UK who have had responsibility for networking thrust upon them — in other words, you have to be a "Jack of all trades". Yet what this person becomes, however, is a master of one subject; delivering the right mix of PC networking technology which is right for their company.

At the moment I am in the early stages of establishing my web design company, Ant Web at www.ant.uk.com, and am therefore considering the basics of what myself and my business partners need in terms of networking. For the past few months, while we have been in the brainstorming and planning stages, we have been able to work at home, meet up on a regular basis and communicate via email and the telephone, but as we now have some real sites to build, we soon realised that we needed to be in the same place at the same time.

Home truths

There is an awful lot written in the various magazines and IT sections of the national newspapers about home working and telecommuting but a lot of it is complete nonsense. The first thing is that the people who write this stuff frequently get seduced by the technology (I, too, have been guilty of this in the past) and forget the obvious; like the fact that it is much simpler to collaborate on a project with a person who is in the same room as you. Yes, if that person is on the other side of the world and you cannot be in the same room then technology may be the answer, but it is still nevertheless second best. Videoconferencing, groupware, email, whiteboarding and all the other wonderful techno-goodies are really useful but we should remember that these are substitutes.

The reason I raise this is that, for the last few weeks, I have been meaning to get around to establishing a remote access server to which we can all dial in, but fortunately, like most of my bright ideas, I never quite got down to it. But I will, at some time or other, because there is no doubt that we will have a need to access centrally-held data, either from our homes or while on the road. But it is not the priority it once was.

The basic jobs I have to do are: (a) establish a LAN in our office; (b) ensure that shared resources such as fax, email and web access facilities are available; and (c) devise the world's best data backup system for the LAN.

To a certain extent, I regard the provision of a basic LAN as pretty straightforward in terms of connecting four PCs together, as I will simply hook them up using 10BaseT via an Ethernet hub and attach further resources such as a server, printer and ISDN router, straight off the hub.

For the past couple of years I have been able to configure my own LANs just as I want them, but this is a bit different as I have to cater for the tastes and needs of three other people, so no doubt you will be hearing a lot about this on a regular basis.

Into ISDN

Last month, as regular readers will remember, I was due to have my Basic Rate ISDN installed. This has now been achieved with a lot less fuss than I thought. You can read a feature on ISDN basics elsewhere in this issue [page 106] so I won't bore you with the details again here; suffice it to say that there is more to ISDN than mere speed and I am carefully considering just how I can make the best use of ISDN's flexibility for my business.

One of the many different ISDN access devices that came my way was a beautifully-built 3Com OfficeConnect Remote 530 ISDN router. Within minutes I was fiddling around, unsuccessfully, trying to use this to connect to Pavilion Internet, my ISP. One of the main reasons I could not get it to connect was that to use a router for ISDN access you need rather more than one dynamically-allocated IP address.

For a network ISDN connection you need a bunch of 16 "class C" addresses. The first and last of these addresses are reserved. You will need one for the connection to your ethernet LAN so you

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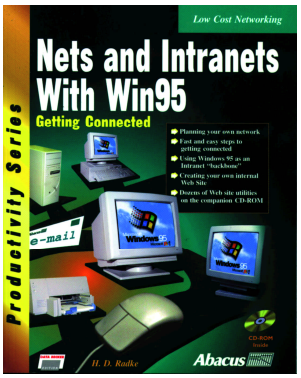
Baynes on books

■ Nets and Intranets with Win95

Author HD Radke
Price £37.49 (CD included)
Publisher Abacus
ISBN 1-55755-311-4



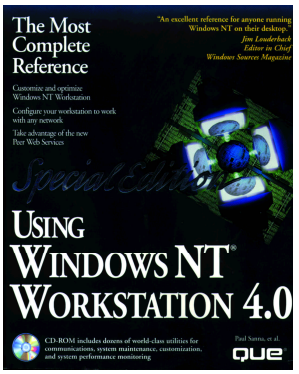
For those who are new to networking, a single source of the most basic information is frequently hard to find, but *Nets and Intranets with Win95* might fit the bill. This 319-page book provides a basic approach to networking small LANs without talking down to the reader.

The first chapter, entitled "What Should Your Network Look Like?", is concerned with planning and deciding what type of network you should aim for: direct cable connection, Ethernet with Win95, a Dial-Up system or a server-based LAN; and provides you with "what you need to know" to get you started. Another chapter moves on to upgrading PCs and the basics of installing network cards. Although the accompanying photographs are not very clear, they are adequate. A useful flowchart, which guides you through the installation process, is a great help. Elsewhere, the book moves on to the subject of configuring Win95 networking and installing Microsoft Exchange.

The basics of sharing resources across a LAN, how an office works using a LAN, and mobile computing are also covered. The only weak part of this book is the final chapter, providing only a cursory explanation of intranets, but this doesn't really detract from the overall usefulness of the book. The focus on Microsoft products such as Exchange and MSN can also be forgiven. Recommended for the first-time networker.

■ Using Windows NT Workstation 4.0 Special Edition

Author Paul Sanna *et al*
Price £46.99 (CD included)
Publisher Que
ISBN 0-7897-0673-3



This is a monster 1,198-page book with a price to match. NT Workstation 4.0 is gaining popularity as a robust OS with the ease of use of Win95 and none of the hassle of Unix. But Microsoft's documentation is not extensive (although there is a lot of on-line help) so you are really going to need a book like this one, to be able to make the most of Workstation 4.0.

The first chapter is the usual introductory stuff and it is not until you get into chapters two and three that the really useful information is provided, which will give the Win95 user a reasonable understanding of why NT Workstation 4.0 could be described as "Windows for Adults v1.0".

The networking section is okay and a reasonable description of TCP/IP configuration is provided, prior to the chapter on using Windows NT with the internet. Using Internet Explorer, Mail and News is covered in succeeding chapters, although only v2.0 of Explorer is dealt with. The accompanying CD is stuffed with useful shareware and some sections will also be of use to advanced Win95 users. This book is worthy of consideration if Workstation 4.0 is becoming a part of your network.

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have 13 remaining which you can allocate to users. Some vendors are advertising these small ISDN routers as being ideal for the home worker, but quite how it can be economical to supply one homeworker with an ISDN router costing £800 when a TA or card will do the job for £200 is rather beyond me. But then, what do I know?

Transmission threesome

But before I get carried away with the delights of routing let's get down to some networking basics. Why not start at the bottom of the OSI stack with the actual physical transmission media itself?

There are essentially three different types of transmission media. The first of these, and the most common, is a conductive metal such as iron or copper. The second type is optical fibre and the third type is not physical at all but, literally, wireless.

Apart from the actual costs of installing and using different network media types there is the all-important issue of bandwidth. To be really technical you should talk about the data rate of a particular media as being the number of bits (not bytes, remember) that can be transmitted per second, and the bandwidth as being the difference between the highest and lowest frequencies that can be transmitted, the frequencies being measured in hertz (Hz).

In practice, the data rate of a network: 128Kb/sec for two, bonded, ISDN B channels; 10Mb/sec for Ethernet; and

Different types of datacommunications — an overview

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	Twisted Pair	Coaxial cable	Optical fibre	Microwave	Satellite
Data rate	Dependent on cable run length	10Mbps	400-500Mb/sec up to several Gigabits/se.	200-300Mb/sec	1-2Mb/sec
Susceptible to interference from:	Nearby wires and monitors	Well-shielded. Not much of an issue but use common sense	Immune to electrical interference	Solid objects, so line of sight is required	Atmospheric conditions
Maximum theoretical distance	Up to one mile between repeaters but dependent on data rate required	2-3 miles between repeaters	20-30 miles between repeaters	20 - 30 miles between microwave towers but dependent on positioning of antenna	Worldwide
Typical use	10Base-T/server-based LANs	Peer-to-peer LANs	Network backbone	Where laying of cable is not a practical option	Primarily used for broadcast and telephony systems
Practical benefits	Very flexible in terms of topology	Simple to install. Reasonably robust	Very high data rates	Good for links between sites where disruption of environment is an issue	Worldwide communications
Practical drawbacks	Easily damaged	Not very flexible in terms of topology	High costs	Needs line of sight	Not cheap

A short guide to datacomm terms

- **Asynchronous transmission** A scenario where the data stream is sent, typically one byte at a time, and the receiver does not know when it will arrive. A start bit and stop are used to indicate the beginning and end of the data transmission. It is typically used where high speed is not an issue.
- **Synchronous transmission** Where much larger quantities of data need to be transmitted and so, instead of sending characters separately, they are sent in groups known as data frames or frames.
- **Simplex communication** Where communication occurs only in one direction; your TV, for instance.
- **Half-duplex communication** Where data devices at either end of the network link can both send and receive but *not* simultaneously; a two-way radio, for example.
- **Full-duplex communication** Where a data device can both send and receive *simultaneously* (say, a computer) and, as it can become more than a little complicated, this is where protocols come into their own.

155Mb/sec for ATM is usually referred to as its bandwidth.

Twisted pair is one of the most common and certainly most flexible (in all senses of the term) varieties of cabling media used for LANs which are our primary concern here. It is so called because insulated copper wires are twisted around each other and then encased in a protective shield. The twisting reduces the interference and good-quality network cabling actually consists of several pairs of wire (e.g. “four-pair”). You will find twisted pair in your telephone socket as well as in any big computer network.

Coaxial cable (or “coax”) comprises of an inner copper or aluminium core which is the actual conductor of the signal, an insulating layer around this, then a wire mesh shield and an outer protective shield. Coax can transit information in either baseband mode (where the whole cable is devoted to a single data stream, which is what happens on a LAN) or in broadband mode where several different data streams are carried simultaneously (cable television is an example).

Optical fibre is something that is much talked about but rarely seen as it is typically used as the backbone of a network. That is, the main network from which the other, smaller networks (typically using twisted pair) feed into. As such, it is usually hidden in the very structure of a building or run down a lift shaft.

One of the main benefits of fibre-optic is that because it uses light (rather than electricity) to transmit data, it is immune to electrical interference. And because of this it can transmit huge amounts of data. When you first see a fibre-optic network cable it’s slimness is quite awe inspiring, especially when you realise that most of its bulk is just a plastic shield. In an ideal networking world all cable would be fibre-optic and then we would all be able to enjoy the benefits of immense bandwidth. But there is a cost hit with fibre because the equipment required to convert an electrical signal to light and back again is the expensive part, rather than the cable itself.

Satellites and microwaves

Wireless networking has often been hyped as the answer to all problems. The reality is that it is only cost-effective in specific scenarios, typically where there is the need for a short-distance network link and it is not feasible to install a permanent cable: between two buildings, for instance, or where great distances need to be covered and it is not known where one end of the network will be situated (say, a mobile link).

For short distances, microwave links are used where two or more microwave devices are installed in line of sight of each other. For greater distances, the wireless link is established using a satellite to act as the signal repeater. However, *PCW* readers are advised to forget about using satellite links as part of their standard network installation — it is not cheap and not that practical either.

Next month we will take a look at how Ethernet and fast Ethernet work.

PCW Contacts

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