You've got mail!

SETTING UP AN EMAIL SERVER TO PROVIDE AN EXTERNAL CONNECTION VIA THE INTERNET NEEDN'T BE A TIRESOME TASK. NIGEL WHITFIELD SHOWS YOU HOW CAREFUL PLANNING CAN HELP GET THE MESSAGE ACROSS.

Most offices have email of some sort set up on their internal network, and increasingly they have a connection to the Internet. In many cases, however, the two aren't linked. Whatever the internal email system you use, and whatever type of net connection, linking the two together to provide an external email connection via the Internet can be tricky; but a little planning and forethought will make it a simpler and more manageable task. Manageability in particular can be an important issue, especially for a smaller company, where looking after the email is likely to be delegated to someone who might be the network administrator as well as having a full-time role in another department.

Before you look at ways to connect your existing internal email system to the rest of the world, you need to decide if it suits your needs. Does the internal system have quirks and annoying features? Does it regularly fall over and require a lot of administrator attention? If so, this might be a good opportunity to replace it.

If you're using simple workgroup email on Windows PCs, would you benefit from a more sophisticated solution, like Novell GroupWise, which will help manage workflow of documents between users? Or would the central database approach of Lotus Notes make it easier for people in your organisation to access the information they need?

Whatever the decision, now is the time to make it; adding an Internet email link can be, though not necessarily, an expensive thing to do. Buying software that will have to be replaced if you change your mail system will only make things more so.

If you're happy with your internal mail system, a straightforward solution for many people is to simply add on an email 'gateway' service, which will act as a bridge for emails to and from the outside world. But while a gateway will work, it might not be the best choice. The type of gateway software and hardware available will depend on the setup you have already, and the software certainly is unlikely to be easy to move between different hardware systems.

Hardware and software options

While your existing internal email solution may just be implemented in software — perhaps with a shared 'post office' set of directories on a common hard disk — when it comes to linking this to the Internet, you will need a more sophisticated setup. Firstly, if your internal email package doesn't run on a server, it has to rely on individual email programs to place files in appropriate places. With an Internet connection, however, you must have a package that runs on a

Hulton Deutsch/Corbis

server, collecting messages and distributing them to users. The package might also have to convert email from an Internet format to the format used by your internal mail package, so that attachments appear correctly in messages, extra Internet headers are hidden, and so on.

In a small network, or one with excess computing power on some of the PCs, you can very probably run an Internet email service on one of your existing computers. But if your hardware is creaking at the seams, or you want to choose a particular type of software, you might find that the only way to run things reliably is to have another computer dedicated to processing messages. And if you expect that Internet email is going to be important to your business, that's almost certainly a necessity.

Basic connections

At its very simplest, you may be able to get away without spending any money at all on your Internet mail link. If you're using a program like Outlook, or the Windows Messaging Client (called Exchange in earlier versions of Windows 95), you can easily add the Microsoft Internet Mail service to a user's profile, which will allow external mail to be sent and received. If you have an Internet connection that's accessible to all the systems, either via a network and a router, or perhaps using the new connection sharing in Windows 98 Second Edition, then all you need to do is find an Internet service provider that will allow you to collect individual emails from a single POP 3 account.

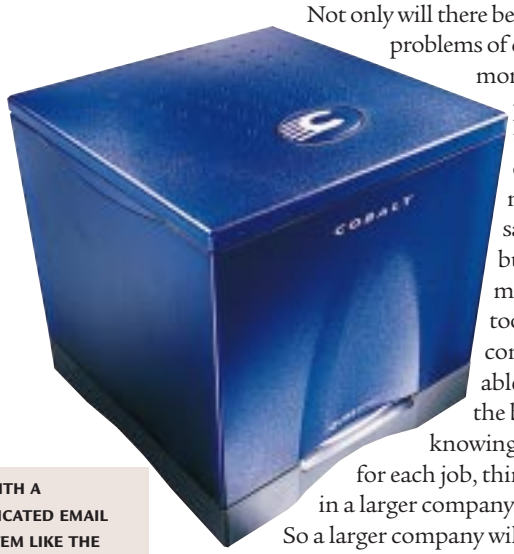
For example, Demon Internet's POP 3 service allows you unlimited email users, and you can retrieve just the messages for a single user in a session by specifying a user name as well as your hostname when you connect. A few simple configuration options on each computer, and hey presto! — individual Internet emails on the desktop, with each person still using the same mail program they were used to.

There are drawbacks to this approach, however. If you're relying on an external ISP, then it's unlikely you'll be able to have multiple users simultaneously accessing the mailbox; and the more users in your office, the greater the likelihood of that happening. And, of course, the main sticking point may be ensuring that each machine has access to the Internet via a shared modem or other connection; adding a router to enable all the systems access could cost anything from £400 to a couple of thousand pounds.

Nevertheless, with a simple router or Windows 98 connection sharing, this can be one of the most cost-effective ways of linking to the rest of the world. For a small office, with little technical expertise, it could also be the simplest and most trouble-free solution: once the email clients have been configured, there's little else to do.

Mid-range system

As we've said, when you have more than a handful of users, things start to become more complicated. Not only will there be potential problems of connection — more than one person wanting to access a common ISP mailbox at the same time — but there are management issues too. While a small company might be able to work on the basis of people knowing who to contact for each job, things are less clear in a larger company with more staff. So a larger company will need a selection of addresses to contact whole teams as well as individuals, for example the sales team or the accounts department, without knowing personal addresses. And the more addresses there are, the greater the likelihood of people wanting a central contact point where they can ask who to mail about a particular issue.



▶ WITH A DEDICATED EMAIL SYSTEM LIKE THE COBALT QUBE, MUCH OF THE CONFIGURATION OF A UNIX EMAIL SERVER CAN BE DONE FROM A WEB BROWSER

Having a 'postmaster' address is mandatory; it's part of the Internet's mail standards, and as a result, it's where many people will send complaints and general queries. And it highlights one of the features that you'll almost certainly need when your mail system grows: aliasing.

You'll have to make hard decisions about HOW YOU WANT TO CONNECT your mail system, and how much you want to spend on it

Aliases are vital if you want to manage mail effectively. They give you control over your own email server, allowing you to add people, like new members of the accounts department, without having to contact your ISP each time a change is needed.

At this point you'll have to make hard decisions about how you want to connect your mail system, and how much you want to spend on it. Do you want to register an Internet domain name for your organisation? And how will you collect your messages? Via an Internet connection, or some other type of dial-up link?

You might have thought that 'Internet email' means you have to use TCP/IP. But you don't need to run the TCP/IP protocol to collect your messages. While this is an obvious option, many people feel that using the protocol can present a security risk too: as long as the TCP/IP connection lasts, your network is potentially vulnerable to malicious attacks.

You can collect messages in other ways instead, like UUCP (Unix-to-Unix Copy Program) or via a connection to a specialised service provider that runs a gateway service for you. This will stop people from directly attacking systems on your network, although viruses in email attachments, such as Melissa, will still reach you.

So what's the main benefit to other types of connection? In many ways, it's simplicity. Installing and configuring TCP/IP, as anyone who's ever set up a network of computers knows, isn't always the most straightforward task, so for less technical administrators, using an alternative system can save a lot of time.

Tight budgets, small hardware

The amount you have available to spend can affect your choice of hardware and software. If you want to run a package like Microsoft Exchange, you'll need a well-featured PC running Windows NT Server, with plenty of memory and disk space. That could set you back over £2000, while NT Server 4 will cost you over £600. You can put Exchange Server on your fileserver, but it will be excruciatingly slow if there's more than a handful of users. For all but the very smallest offices, you'll need a dedicated computer.

For tight budgets, or organisations with limited technical resources, there are 'Internet in a box' solutions, essentially a small computer running an email server and web proxy in a box that comes ready configured. Just plug it in, add a POP 3 mailbox facility to your existing email clients, and you're ready to go.

With more technical expertise you can achieve the same yourself, running either a Windows-based POP3 server — many of which can be downloaded from the Internet — or using Linux or Unix to do the same job. With a dedicated system such as the Cobalt Qube [*pictured, above left*], much of the configuration of a Unix email server can be done from a web browser, without the need to know any Unix commands.

Dedicated servers

While many of the well-known commercial email packages have their own Internet gateway software either available as an option or included in the basic bundle, they're not the only solutions — and very often not the cheapest. For sheer ease of use, a package that's properly integrated with your internal mail system will usually be the best option and the least trouble to maintain. Bear in mind, though, that if you use a client like Outlook, there's no reason why you shouldn't

just use it as an Internet mail system, rather than searching for ways to link your internal system to the world.

If you do want to look around more, as long as your mail system uses one of the common standards, such as MAPI, then you'll be able to find a selection of gateway programs that will link it to other networks, including the Internet.

For example, the TFS gateway software supports several different email systems, and will connect to a service provider via UUCP rather than TCP/IP; it will also run on a fairly low-powered PC, albeit quite slowly.

▶THE INTEL EXPRESS 8100 ISDN ROUTER

In looking at different solutions, there are more things to consider besides compatibility — and it can sometimes be these that will determine which is the best package to use. How, for example, does the gateway handle email addresses? Will it provide 'fuzzy matching' and guess that if someone mails over the Internet to 'nwhitfield' that a message should be delivered to 'Nigel Whitfield' on the internal mail system? Or will it just bounce back an error to the sender?

How easily can aliases be created? And will the system automatically recognise a new user you add to the internal mail system for external mail? Or will you have to add 'set up external mail' to the list of things to do each time you have a new user? Both have their advantages, but if it's ease of use you want, a system that does everything for you, and minimises the amount of misdirected email, will make life much simpler.

Security

All of these are factors to consider when you're choosing your mail system, but there's one that may influence people more than any other now — security. No matter how your PCs connect to the rest of the world for email, whether it's via a dialup link to an ISP's POP3 server, a Unix-based gateway on your LAN, or a UUCP connection to a gateway that links to your Microsoft Mail system, you're still vulnerable to viruses and other malicious attacks that can be sent as email attachments. So for anyone who takes the integrity of their systems seriously, there's one important question that needs to be asked of just about any mail system: Can it be protected against viruses?

The answer is no. With the speed of development of viruses, you're unlikely to be able to offer complete protection — and some speculate that it's the false feeling of safety that caused so many people to fall prey to the latest round, after installing anti-virus software on their email gateways. Even so, it's worth finding an email gateway that can be linked to anti-virus software; most of the major packages can do it, and it will provide some peace of mind. But it's never going to solve the problem. The only way to do that is to make sure the people who are using your email service are properly educated about the possible dangers of attachments. Just say no to executables, Word documents, and anything else that could carry a macro.

If you already have an anti-virus policy, check with the maker of the software you're using to see what email systems it can link to.

▲THE DELL POWEREDGE 6300, POWERED BY AN INTEL XEON SERVER

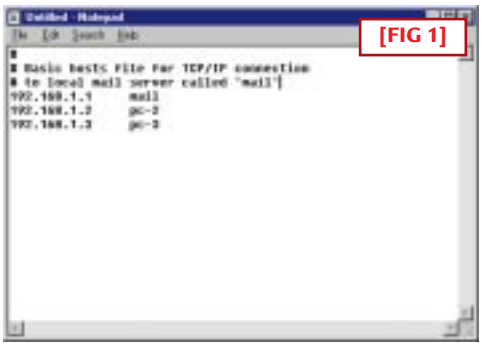
And if you don't have one already, find out what's supported by the email software you want to use.

If you're using a server that talks TCP/IP to the rest of the world, then time spent making sure it's secure is vital; running Microsoft Exchange might seem a simple option, but if your NT server is linked to the rest of the world, even for just a few minutes a day, making sure you have the latest updates to applications like Internet Information Server is essential. Unix systems too are vulnerable, but they seem to fall prey to attacks far less than the more standardised NT and Windows systems. Don't assume, however, that Unix or Linux will solve your problems in this regard: even if an email virus or worm won't affect the mail server itself, it could still pass unscathed to the PCs on your network.

All this might sound like a nightmare — and if you make the wrong decision, it can be. But as our walk-through shows [*over*], it can also be pretty straightforward to configure a basic system to distribute email around your office and to the Internet.

Setting up Internet mail step by step

NTMail is one of the most popular Internet mail systems for Windows NT. It will collect messages via a dialup account as well as a fixed link, and provides features such as aliasing and automatic response 'robots', and plug-ins that can perform functions such as virus checking. You can download a 28-day evaluation version from www.ntmail.co.uk.



Although this workshop is based around NTMail, the steps you'll need to set up TCP/IP addresses and email clients will be similar if you want to share a net connection via Windows 98 or a router that hides your network from the rest of the world.

1 **If you're running NTMail** or another system that provides a POP3 mail service, you'll need to use a POP3 or IMAP4 mail client on each PC — which means installing TCP/IP on all the systems on your network. For a small network with no permanent Internet link, configure the machines with sequential IP addresses from one of the private ranges [see *PCW, September 1999, p110*].

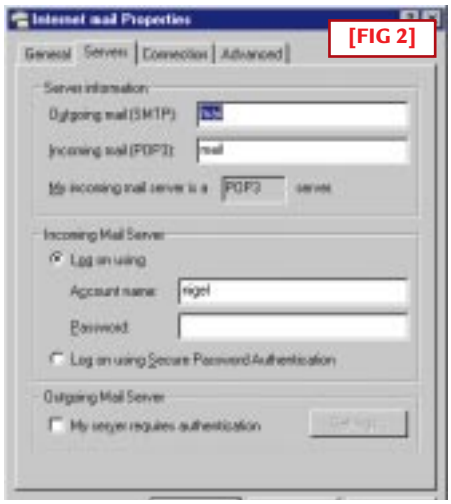
2 **Put a hosts file** in the Windows directory on each system to allow them to resolve names to addresses. Fig 1 is a sample file, created in Notepad and saved as HOSTS with no extension. If you simply want access to the email server, just list that in the file and none of the other systems.

3 **On the client PCs**, using a mail program like Outlook Express, you'll need to configure the name or IP address of the NTMail server for both sending and receiving email. We've called the server simply 'mail' and assigned it the IP address 192.168.1.1. If you're using a service like Demon's POP3, you could specify a particular email name by giving the account name user+hostname.demon.co.uk in Outlook, to collect messages just for 'user'. [Fig 2]

4 **If you're using a Dial-Up Internet connection**, now's the time to configure it. You'll also need to know the details of your account with the ISP that you're using, including the server that you can send all your outgoing email to. This means you can send mail out, then hang up the phone much more quickly.

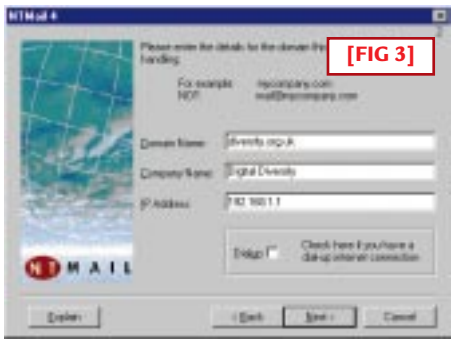
5 **Start the NTMail installation program**. After being asked to agree to the licence, and for a postmaster's password, you'll see this splash screen, where you need to enter the IP address you assigned to your computer's network connection - 192.168.1.1 if you followed our example above. You also have to enter your domain name. Check the box if you're using a dial-up connection to the net. [Fig 3]

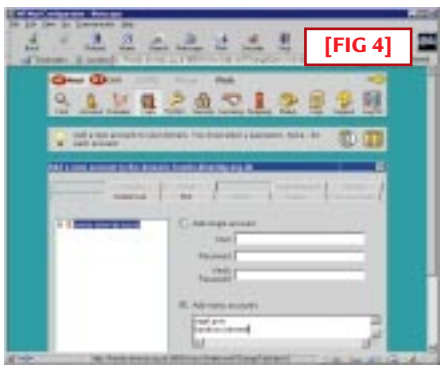
6 **Now you have to enter the details** of your ISP account. Click on Next, then you can specify how often to check for email if you're using a dial-up link. You can also specify whether to use POP3 or SMTP to collect email. POP3 is more common, but SMTP is used by some providers such as Demon and offered by others on request. SMTP is a better option, as it requires less configuration when you add other users. It's also on this page that you'll enter the name of your ISP's outgoing mail server. If you specified POP for collecting mail from the ISP, the next screen will prompt you for details.



7 **Now all the other administration of NTMail** can be done via a web browser from any PC, just by pointing it at port 8001 on the server. You'll need to enter the user name postmaster and the appropriate password.

8 **From the main screen**, click on the Users button and then choose Add. You can add users one at a time, or type a list into the Add Many Users box, separating user name, password and real name by commas, as in our example screen. [Fig 4]





There are plenty more configuration options in NTMail, allowing people to access their messages via the web, or enabling automatic responses. But for basic email between your network and the rest of the world, that's all there is to it. ❐

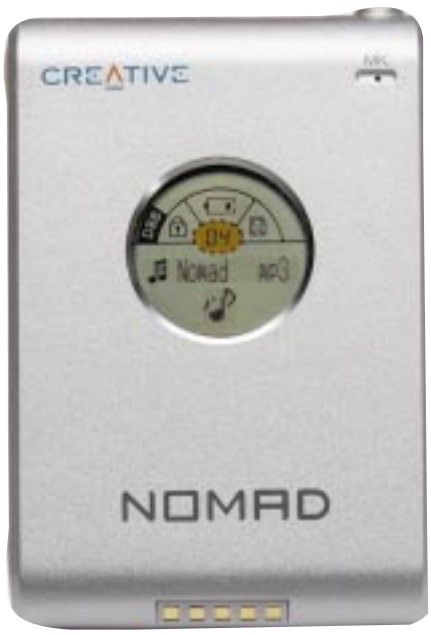
Sound and fury

THE BIG RECORD COMPANIES ARE HITTING SOME SOUR NOTES OVER MP3, THE TECHNOLOGY WHICH ENABLES THE DIGITAL COPYING OF MUSIC OVER THE INTERNET. NIALL MAGENNIS LENDS AN EAR.

For the first time since the explosion of the Internet, 'sex' is no longer the most popular group of three letters searched for on the Web – 'MP3' now claims the top spot. While this might be good news for moral crusaders, it's unlikely to have been greeted with such warmth by the big six record companies – Sony, Bertelsmann, Warner, EMI-Capitol, Universal and PolyGram.

It used to be that if you wanted the latest single without having to pay for it, you listened to the radio with a blank cassette in your tape deck and a finger on the pause button ready for release when the song came on. Record companies didn't mind this all that much. After all, in many countries they were receiving a small royalty from every blank tape sold, and the listening experience was degraded significantly by a moronic DJ speaking over the intro and outro of the song.

▼ BASED AROUND THE INNARDS OF THE YEPP, CREATIVE'S NOMAD COMES WITH EITHER 64MB OR 32MB OF MEMORY, ENOUGH TO STORE TWO HOURS AND ONE HOUR OF MP3 RESPECTIVELY. THE NOMAD ALSO HAS A VOICE DICTATION MODE, SO YOU CAN TAKE VOICE NOTES AS YOU WALK ABOUT



But times have moved on. Nowadays you can simply enter the name of the song or artist into a dedicated search engine such as mp3.lycos.com and a few minutes later you are in possession of a digital copy of the single. This temptation is obviously proving too much for consumers and the big six are not happy.

They're so unhappy, in fact, that they are using the Recording Industry Association of America (RIAA) to try to limit the growth of technology surrounding MP3. This is ironic, as many of these companies contributed research money to fund projects which gave birth to the MP3 standard.

The RIAA now accepts that it is unable to stamp out pirated music download sites which spring up by the hundreds each day. According to Cary Sherman, senior executive vice-president of the RIAA, the association now believes the only viable solution for preventing free downloads is to attack the problem on the receiving end. This resulted in the RIAA's misguided decision to take Diamond Multimedia to court over its Rio MP3 player. Luckily for consumers, this was a battle that the RIAA lost.

'There's a lot of buzz about MP3, but basically it's just a way of compressing audio,' says Scott Law, QuickTime product manager for Apple. 'People have got all excited about it because of the way that it has been adopted. There's a lot of copyrighted material on the Web for people to download and pirate.'

Techno trouble

So just what exactly is this technology that is causing so much controversy? To answer this, we first need to set out how digital audio works. CDs contain audio that has been converted into data by sampling at a rate of 44.1K samples per second using 16 bits per sample. This generates a huge volume of digital information – every minute of audio takes up roughly 10Mb of disk space. While this is fine for use on CDs, it's much too large if you want to distribute music across the Internet. A single song might take hours to download. This is where MP3 comes into play.

As a lossy format, MP3 can compress audio by a factor of 10-12, yet still maintain audio quality

that is hard to distinguish from normal CD sound. It uses a compression method called perceptual coding which takes advantage of weaknesses in the way the human ear perceives sound waves. It basically looks for audio information that the ear won't realise is missing from the signal, and strips out this data.

'There are always musical notes and musical noise in audio playback which is out of your hearing range, so those types of noises get removed,' says David Shickel, technical director of Real Networks. 'It's fairly generic for most encoding types to be able to do that.'

It's surprising that such an old standard has suddenly gained this huge notoriety. The MP3 compression scheme was actually invented in 1991 by a German research firm, the Fraunhofer Institute. Despite there being a whole raft of competing compression schemes from commercial companies with large marketing budgets, MP3 has managed to become the most popular. This is partly due to the excellent audio quality. According to Shickel, it is very difficult to tell the difference between the audio quality offered by the competing compression schemes.

But there are other reasons. Many of the early MP3 encoding and decoding programs were created by amateur coders and given away free on the Internet. Because the software was available for free, it was picked up by students. Many of the early pirate MP3 sites were student Web pages or FTP sites hosted on fast university servers with high bandwidth pipes to the Internet.

Scene and heard

The MP3 scene gradually spread across the Web, so that at any one time there are thousands of copyright songs stored on Websites or FTP servers. 'The RIAA in the US and the Performing Rights Society in the UK are worried about what's happening here. And of course the record companies are clearly looking at their revenues,' says Shickel. 'Arguably I could encode my whole CD collection, put it up on the Web, and you could download the whole thing and put it onto your Diamond Rio player – and guess what, you'd never have to buy their products.'

The spread of MP3 took people within both the software and the record industries by surprise. In many ways, the record companies could be blamed for not being quick enough off the mark with digital distribution, but the fact remains that MP3 distribution is illegal and damaging for many of the artists whose work is being copied.

'The MP3 market is interesting and there's a lot of demand out there for MP3 music, but currently it doesn't allow record producers to derive any revenue from it, so at the moment it's just a technology that allows for piracy of music,' says Neil Laver, Internet product manager at Microsoft. 'Ultimately, in the long term, that's in nobody's interest.'

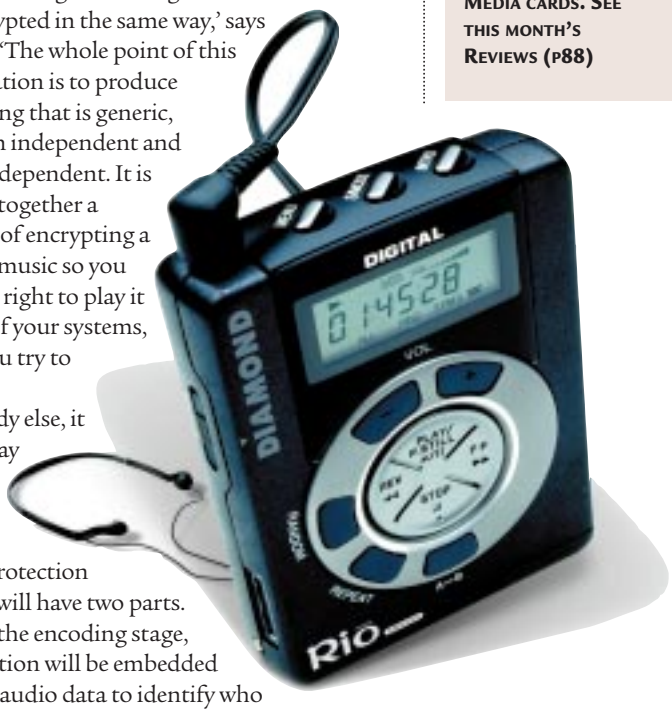
▶ MP3.LYCOS.COM WILL FIND TRACKS FROM YOUR FAVOURITE ARTISTS OR ELSE YOU CAN CHOOSE A SONG TITLE TO SEARCH FOR

Protection scheme

With the RIAA having failed to stop the Diamond Rio from appearing on the market, the music industry needs a new type of technology for protecting digitally encoded music so that digital audio cannot be played back by anyone other than the original purchaser. As a result, it has teamed up with software companies such as Real Networks, Apple and Microsoft to produce a digital copy protection scheme. The group goes by the title Secure Digital Music Initiative (SDMI) and the plan is to develop a protection scheme that will work across a wide range of different compression formats.

'MP3 is here to stay, so SDMI is looking at ways of bolting something on to MP3 files so that it's encrypted in the same way,' says Shickel. 'The whole point of this organisation is to produce something that is generic, platform independent and codec independent. It is putting together a method of encrypting a piece of music so you have the right to play it on any of your systems, but if you try to give it to somebody else, it won't play on their system.'

The SDMI protection scheme will have two parts. First, at the encoding stage, information will be embedded into the audio data to identify who



▼ DIAMOND RIO PMP300: THE RIO WAS THE FIRST MP3 PLAYER TO BE AVAILABLE IN THE UK AND WAS AN INSTANT HIT. NOW IT HAS BEEN UPDATED WITH A MEMORY UPGRADE FROM 32MB TO 64MB, WHICH IS UPGRADABLE TO 96MB VIA REMOVABLE FLASH MEDIA CARDS. SEE THIS MONTH'S REVIEWS (P88)

THE AMATEUR MUSICIANS' VIEW

Benjamin Ackerman plays in an indie rock band called xSpace. The band has posted its music on its website in MP3 format. 'Before we used MP3, we had some short wav file samples on our page, but they were huge in size and too short a clip to be worth a download,' he says. 'By putting our MP3s online, we would be giving people access to the entire song in CD quality and hopefully gaining fans based solely on the quality of the music – the way it's supposed to be.'

Skot McDonald is one half of Australian electronic duo Vellocet. The band also posts songs on its Website. 'We're mainly an electronic/studio band, so MP3 was a practical way of getting stuff that is hard to perform live out to an audience, especially when just starting out,' he says. So is he worried about MP3 files ruining his chances of making a career from music? 'No, because MP3 distorts your music,' he says. 'Anyone who really appreciates the music would have to buy it in a linearly encoded, non-lossy format – CD – to hear it properly. 'Anyway, economies and industries in the developed world are moving towards service rather than product provision, so maybe the future is music service providers paying bands to produce music for free distribution, with the providers making money from advertising, concerts and the like.'

xSpace
www.cosnet.com/xspace/mp3.asp

Vellocet
vellocet.ii.net

▲ SAMSUNG YEPP: THE SAME SIZE AS A CREDIT CARD, SAMSUNG CLAIMS THE YEPP IS THE WORLD'S SMALLEST MP3 PLAYER. IT'S ALSO THE SNAZZIEST, WITH A SILVER OR BLUE FINISH. THE YEPP DOWNLOADS MP3 FILES FROM THE NET INTO ITS 32MB OF MEMORY, WHICH CAN BE EXPANDED USING FLASH MEDIA CARDS, AND ALSO FEATURES A DIGITAL FM TUNER AND VOICE RECORDER

the music has been licensed to. The second part of the equation will involve players, either hardware or software. These will have software code embedded into them that will be able to quiz the embedded information in the audio stream to find out whether the user has actually purchased the music or whether they are trying to use a pirated copy.

'The whole idea is to do the same kind of thing as the way you can get a digital certificate for your Web browsers,' says Shickel. 'The SDMI thing is probably the only non-proprietary thing that's going on.'

The next generation of the MPEG standard will also have provision for the addition of copy protection schemes such as SDMI. 'The MPEG4 systems layer includes all sorts of "hooks" to make it easy to tie in MPEG4 with secure systems, content management systems and rights management systems,' says Rob Koenen, an engineer at KPN Research who sits on the MPEG standards committee. 'MPEG4 will have an interface into which other companies can plug their protection technology. For instance, MPEG has a concept called scene description, which you can hook into. If you encrypt something there, it's very difficult to reconstruct the original material. You'll also be able to hook protection into the individual content streams.'

Despite all these promises of a secure future for record company profits, the reality is that every other digital music protection system in the past has been cracked. Liquid Audio and A2B both claimed that their proprietary music distribution systems were secure, but there is now a program on the Internet called A2b2wav which adds a record button to both company's players, allowing crackers to save the files as standard wav files and then encode them into MP3 files for upload to pirate sites.

It looks like the record companies will have to devise a new business model if they are to make any money on the Web. ❐

PCW CONTACTS

drogo.cselt.stet.it/mpeg
The official MPEG committee Website
www.mpeg.org/MPEG/mp3.html
MPEG pointers and resources
153.96.172.2/amm/techinf/layer3/layer3faq/index.html
An FAQ on MPEG from the Fraunhofer Institute
mp3.lycos.com
An MP3 search engine
mp3.lycos.com/players/windows
A list of MP3 players for download

Illustration by Trevor Dunton

Going going gone

WHAT AM I BID FOR THIS LOVELY PC? A TASTY LITTLE NUMBER? MAKE AN OFFER AT AN ONLINE AUCTION, WITH OUR GUIDE, EIRA HAYWARD.

Are you looking for a good deal on 128Mb of RAM, or that digital camera you've always hankered after at a knock-down price? Then online auctions may be your answer. They're already big business in the US, and are catching on over here.

Currently in the UK there are no more than a dozen active online auction sites, but new ones are launching all the time. Already this year Yahoo UK has started an auction business <auctions.yahoo.co.uk>, as has newspaper group Newsquest <www.auctionhunter.co.uk>. This year has also seen the launch of simultaneous TV and online auctions through The Auction Channel <www.theauctionchannel.co.uk>.

Online auctions have been around for about four years in the US, where the big names include www.eBay.com, www.Egghead.com and www.uBid.com. It seems there is nothing you can't buy at an online auction in the US, from real estate at www.usliquidators.com to fine art, cars or Beanie Babies – they're all available at the click of a mouse.

Online auctions are split into two areas. The first type are person-to-person, where the auctioneer acts as a middleman just like a traditional auction house, never owning what

goes under the hammer. Second, there are business-to-consumer auctions, where the auction house has bought in stock and is selling it off complete with manufacturer's warranty.

It's not always obvious how the sites make any money. Indeed, US analyst Forrester Research finds that many of the US sites are running at a loss. Even the well-established sites are fairly fragile operations – for instance, eBay crashed several times in June for hours at a time and in the process wiped 10 per cent off its share price.

At a traditional auction, both the buyer and the seller are charged a premium, but some of the online sites don't appear to do this. 'Some try to make their money by offering services around the sale, like charges for shipping, insurance and advertising,' says Internet analyst Nick Jones of Jupiter Communications. 'But what they all want you to do is spend a lot of time on the site so they can build up a profile of the kind of consumer you are. It's classic database marketing.'

There have been some rumblings of concern about fraud on online auction sites in the US. eBay, which boasts 250,000 new items on the site each day, is being investigated by federal investigators and the New York City consumer affairs department. Along with the more commonplace stories of sellers not sending what buyers think they have bought, there are more alarming tales of a stolen Kentucky Derby trophy up for sale and a 13-year-old who nearly managed to buy a Ferrari.

There are also different types of auction. Occasionally, sites run a Dutch auction where the lot price drops periodically until the first bidder gets the goods. The lot's opening price and the auction's time of close are set, and then it's just a question of holding your nerve – the first bid wins the auction. Reserve auctions are extremely common. This is where lots have a reserve price – the lowest price at which they can be sold – so if you thought that an auction might be an ideal opportunity to pick up a PC for a couple of quid, think again.

We spoke to one auction addict who hates to go shopping, but who loves the fact that he can bargain-hunt from his PC. His chief criticism was that there is much the auction houses could do to make the online experience more interactive and exciting. Some of them don't automatically let you know when you've been outbid for an item, for instance, when it would be an easy and inexpensive process to fire an email suggesting that you increase your offer.

Online auctions fall a long way short of the thrill and atmosphere of a real auction room. But that said, any bargain hunter can see their appeal, as it is possible to find some good deals. For instance, lastminute.com had a week staying in an apartment in Portugal that went for £200, and Quixell regularly sells high-spec PCs for around £400. If you do your research on prices and decide what your highest bid will be, then the chances are that you'll get what you want at a price you can be pleased with.

The UK sites

Needless to say, some sites are better presented than others. The better ones attempt to assuage any nervousness you might feel about giving them your credit card details with assurances of their credentials – how long they've been in business, who started them, who their backers are, and a privacy policy statement. Person-to person sites also contain warnings about selling pirated software and services like mobile phone subscriptions.

Most ask you to register with a nickname, your email address and credit card details. It's worth noting that you may be refused registration by some of the sites if you use a free email service such as Hotmail or Bigfoot. The better ones also include answers to frequently asked questions, a section which shows you how to bid and the chance to practise in a fantasy auction. The more switched-on will email you with details of lots which may interest you in forthcoming auctions. Some of the more poorly presented sites don't make it clear whether the goods are new or secondhand, or whether they come with any sort of warranty. All sites cover themselves legally with plenty of disclaimers and rules about how to conduct business.

There are alarming tales of a stolen Kentucky Derby trophy up for sale and a 13-YEAR-OLD who nearly managed to buy a Ferrari

The person-to-person sites in the UK suffer from a dearth of merchandise. Whereas eBay in the US can boast it has nearly two-and-a-half million items for sale in over 1,600 categories, eSwap, one of the busiest of the UK person-to-person sites, has about 1,200 items for sale in 13 categories. Other sites like ezvendor.com or computercarboot.com may only have 10 or, at best, a couple of hundred items for sale.

The longest established UK business-to-consumer site is quixell.co.uk. Formed in 1997 and backed by respected venture capitalists, it has the broadest spread of products of all the UK sites. On offer are computers, white and brown goods, jewellery, sports and fitness items, small gifts and accessories, with plenty of items up for grabs in each category. All items come with a photo and full product description. Products are dispatched within five working days and Quixell operates a 14-day money-back guarantee.

A CAUTIONARY TALE

At a recent Quixell auction, *PCW* reader Mark Kendall successfully bid for a 56K modem and 64Mb of SDRAM. He was promised delivery within five to seven days. 'Then the problems started,' he says. 'First I didn't receive a confirmation email, as I had on previous occasions. After a week I sent them an email voicing my concern, then two days later I wrote again as there had been no response.'

Quixell replied saying that Mark had entered the right email address when bidding, but quoted the wrong email address as the one that his confirmation email should have been sent to. Mark waited three weeks for his goods, and threatened legal action. A parcel then duly arrived, containing a piece of bubble wrap and nothing else. The enclosed invoice stated that there was nothing to follow and that the unit price of the modem was £00.00. But Mark's credit card statement showed he had been billed the full amount of his winning bids for both items plus delivery.

Quixell then told Mark that it didn't have the memory to sell in the first place and refunded his money. He eventually got the modem. He comments: 'This dispute went on for over a month and in that time my emails were passed from department to department with no satisfactory answer forthcoming. My trust in the online shopping experience has been diminished. I feel that to gain the trust of people willing to purchase items over the Net, this kind of company has to do more than operate as a high-street store on the Net.'

Auctions are held daily, with closing times at 1pm and 10pm, and traffic on the site is heaviest at these times. Quixell has also started to host auctions for other companies, including a section where it sells off holidays on behalf of travel companies and airlines.

'We're recording four million impressions a month,' says marketing manager Rick Jones. 'And we have a revenue run rate of £12m.' He says Quixell has even sold houses and cars in the past. Most potential punters are already clued up on pricing before they visit the site, but there are instances when an item sells for more than its retail price. Quixell also has a person-to-person auction area on the site.

Taking a different approach, Auctionhunter was formed this year by regional newspaper group Newsquest. An online version of the papers' classified ads, it has an extensive collection of listings, selling everything from cars to cases of wine. Sellers must be registered and maintain a minimum balance of £10 in their account. Auctionhunter charges for listings, and the sales commission is 2.5 per cent. There is no buyer's premium. Once the auction has closed it is up to the buyer to contact the seller to arrange payment and delivery. Offering a similar service, Eswap.co.uk charges for its listings, but does not charge sales commission or a buyer's premium. Computercarboot.com, ukauctions.com, and buy-sell.co.uk run along similar lines but with comparatively few items up for sale.

George Brown and Jim Payne recognised the value of online auctions when they were creating a complete Internet business. 'We started the auctions as a way of getting people into the site to see what else we do,' says Payne. The majority of the lots on Bullnet.co.uk are computer-related, but Payne says the site has found surprising hits in other areas. 'It's items that are a bit unusual which do well,' he says. 'For instance, our lock-picking sets have been very popular.'

As with any type of business, it's important to capture the attention of potential buyers. Theauctionchannel.co.uk occasionally broadcasts specialist auctions on Sky Sports, such as the one for tennis memorabilia in the run-up to Wimbledon. The site's NetBidLive system allows the auctioneers to take bids over the internet at the same time as telephone bids and bids from the saleroom floor. Auctions coming up include Phillips rugby memorabilia on 4th October, and several property auctions.

Other sites to cast an eye over include: Lastminute.com – a good site for holidays and short breaks. The offers are usually posted only a short while before they are due to be taken up. The site also auctions antiques and jewellery. www.morgan-auction.co.uk is the auction website of the Morgan Computer Co. Sandafayre.com is an unpleasant-looking site for stamp collectors. Auctions are held every week, with over $1m-worth of stamps available online. Icollector.com auctions fine art and collectibles. Onlineauctions.co.uk is an auction site similar to Quixell, mainly selling computer equipment. Auctions.yahoo.co.uk was only formed in May this year. The site is an Anglicised version of the US site, with all products originating in the US and all bids in US dollars. Bidders have to pay the shipping charges from the US. ❐

Most potential punters are ALREADY CLUED UP on pricing before they visit the site, but there are instances when an item sells for more than its retail price

Remote Control

Illustration by Simon Downs

IF THE RUSH-HOUR RAT RACE IS A REAL PAIN, YOU MIGHT FIND IT MORE AGREEABLE TO WORK AWAY FROM THE OFFICE. GORDON LAING EXPLAINS THE ATTRACTIONS OF, AND REQUIREMENTS FOR, REMOTE WORKING.

People are changing. Work is changing. As we approach the new millennium, the clichéd nine to five is looking like an increasingly endangered species. Why waste time traipsing into town during rush-hour when you could work at home? Why work at home when you could work on a beach – in a foreign country? Many workers are realising that they could do

some, or even all, of their work elsewhere.

Technology is, of course, the great enabler, but what's involved in setting up a home office? Does the purchase of a notebook make you an effective mobile worker? And what about where you intend to do your work?

In this feature we'll be looking at the issues involved in setting up a home, remote or mobile office for either part or full-time use. We will also review the technology that will allow you to realise this dream.

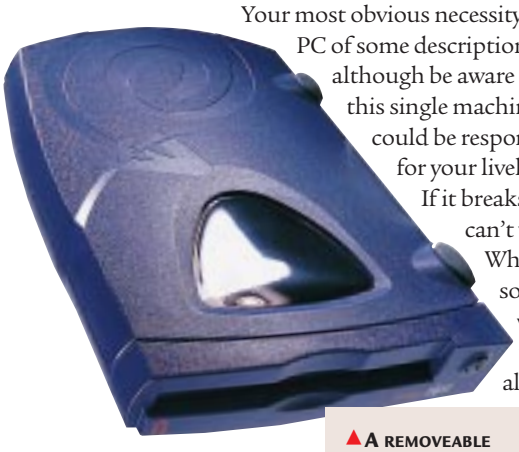
Office equipment and general facilities are the last things most remote workers think of. Well, think again. If you're serious about spending a lot or even all of the time working from home, you'll quickly begin to miss the office facilities you always took for granted. Good ergonomics are also essential. You should have a decent chair and desk, and make sure you're not straining anything – eyes, wrists or otherwise.

Remember, you're not just accommodating a PC. You've also got to find room for a desk, chair, office equipment and plenty of storage for all those unexpected materials. In the future, we may all laugh at the futility of the paperless home.

If you've not gone entirely freelance, ask your employer about contributions for setting up at home. Remember you're doing them a favour by becoming more productive and saving them office costs, so it's not unreasonable to ask them for compensations in return for your sacrifices.

■ Setting up a remote/home office

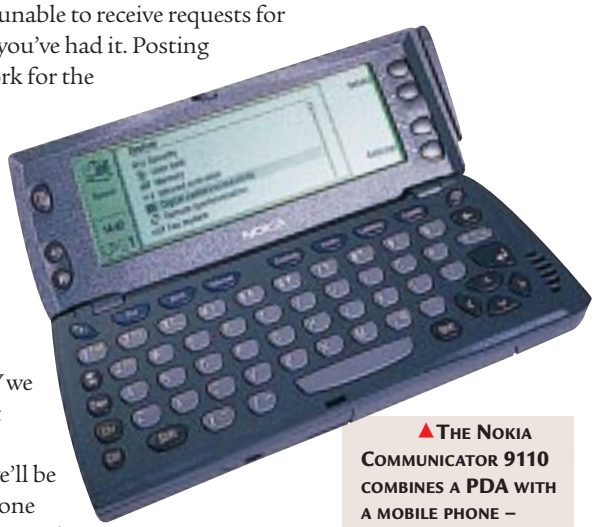
Your most obvious necessity is a PC of some description, although be aware that this single machine could be responsible for your livelihood. If it breaks, you can't work. While the software we've tested allows MIS (Management Information Systems) staff to remotely reconfigure your system, it's of no use if your PC won't power-up.



▲ A REMOVEABLE STORAGE DRIVE, SUCH AS THE IOMEGA ZIP, IS VITAL FOR BACKUP

Backup is essential, both in terms of a second machine and of course your vital data. If you've been sensible enough to fit a backup device, make sure you remove the media. After all, fire, flood or theft are unlikely to remove the tape and leave it in a safe place. Speaking of which, you'd better make sure you're insured for this, too.

Second most obvious are your communications. These are absolutely crucial, because if you are unable to receive requests for work or deliver it, you've had it. Posting floppies might work for the most basic requirements, but it's hardly the height of sophistication – plus you'll need stamps and a nearby letterbox.



▲ THE NOKIA COMMUNICATOR 9110 COMBINES A PDA WITH A MOBILE PHONE – KILLING TWO BIRDS WITH ONE STONE

In the August 1999 issue of *PCW* we looked in depth at communications technologies, so we'll be brief here. One phone line is of course essential, but again, if this office is to be your main one, you'll quickly hanker after another.

Who wants to be unobtainable to phone calls when sending email or browsing the web? Who wants to admit that they have to hang up this voice call and reconfigure their lines before being able to receive a fax? A second line also allows you to more easily separate business and personal charges, which can be a real boon when it comes to claiming expenses or filling out a tax return.

Speak to any remote or mobile worker and the one technology they'll always curse is their communications system – it's never fast enough. If you've worked for a large company, you'll miss fast and free access to the internet. If you're relying on a single 56K modem, you'd better be prepared to wait for files to transfer. You'll also become painfully aware of the wasted bandwidth occupied by pointless email jokes and chain letters, not to mention huge attachments that are sent without consideration of their size.

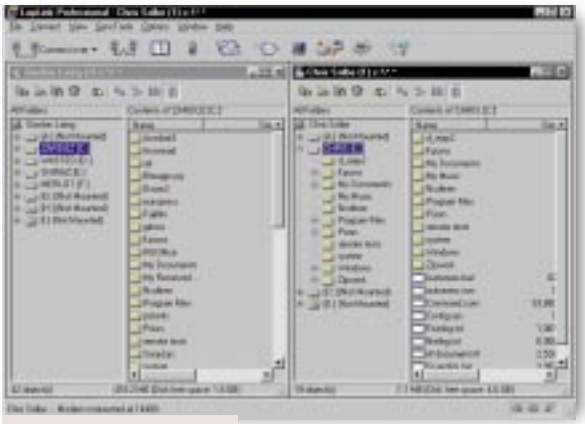
One final word: make sure your ISP is reliable, and available when you want to use it. You may have to dump your free account, but remember, this is your livelihood.

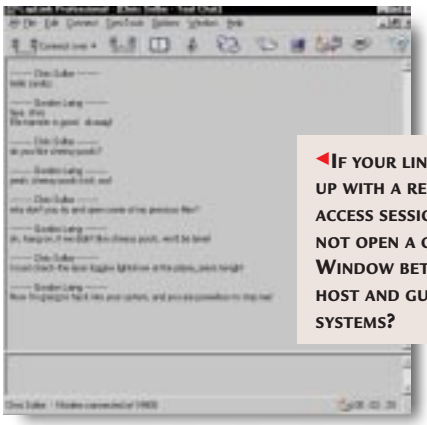
■ Setting up a mobile office

A notebook or handheld PDA is the minimum required for a mobile office. The same backup and insurance applies even more so, as a portable is particularly susceptible to theft or breakages.

Remember you're on battery power, so learn how to make the most of any power-saving utilities. Particularly vigilant users may want to download Intel's Power Monitor to check up on which background Windows utilities are the hungriest – you may get some surprises. Either way, make sure you're fully charged and that you're carrying spares where possible.

Communications in fixed environments are similar to those for desktop PCs. Almost all





▲ LAPLINK'S FILE TRANSFER WINDOW IS AS SIMPLE AS DRAG AND DROP, ALTHOUGH YOU CAN'T USE STANDARD WINDOWS TOOLS TO PERFORM THE SAME OPERATION

◀IF YOUR LINE'S TIED UP WITH A REMOTE ACCESS SESSION, WHY NOT OPEN A CHAT WINDOW BETWEEN HOST AND GUEST SYSTEMS?

portables can connect to modems of some description, and often to ISDN too. The predominant interface is the PC Card, although an increasing number of portables (albeit mostly PDAs) are being fitted with built-in modems. It's worth checking a built-in modem's capabilities, as many older PDAs only operate at 19.2Kbit/sec. It goes without saying that anyone wanting to connect a modem to a foreign landline should carry a selection of adaptors.

Portables really come into their own with mobile communications, for which you'll of course need a mobile phone. In the old days, you'd need a PC Card interface for your mobile, but modern models often come with built-in data capabilities.

Look out for Ericsson's SH888 and Nokia's 8810 mobiles, both of which boast built-in data facilities and IRDA-compliant infra-red ports for wireless connection with your notebook or PDA. Note that Nokia's popular 6110 (aka NK702 for Orange) does feature infra-red, but no data hardware – for wireless operation you'll need to install Nokia's Cellular Data Suite, available only for Windows 95/98 notebooks but, sadly, not for PDAs.

Bear in mind that today's GSM data rates are limited to a mere 9.6Kbit/sec, although this is sufficient for basic email. Mobile data is set to increase dramatically over the next two years, eventually maturing into 2Mbit/sec rates [News Analysis, *PCW* September 1999]. The first enhancement is expected from Orange this September, which aims to launch a 28.8Kbit/sec data service for new phones.

Incidentally, a GSM mobile employs a digital connection which, like ISDN but unlike an analog modem, can negotiate a link almost instantly. Some ISPs offer specific access numbers for mobiles, such as Demon for Orange. Mobiles also often work out cheaper overall for data calls than hotel phones.

If you intend to use your phone abroad, talk to your operator about roaming agreements. Remember there are currently many more 900MHz GSM networks worldwide than 1,800MHz ones, and that North America employs GSM frequencies of 1,900MHz.

World mobile travellers should seriously consider buying a dual – or even triple-band phone. Our top tip for mobile upgraders is to wait for Nokia's forthcoming 7110 dual-band

Mobile locations

Consider the additional complications of a mobile location for notebook and PDA users. Obviously, the issues concerning power, communication and facilities completely change. You'll be lucky to find a power socket for your notebook, and plugging your modem into a phone line will be impossible. You'll be forced to send any emails or files via your mobile phone and just pray that your batteries last the course. But there's more besides.

Perhaps you'd like to go outside? Apart from the fact that almost all notebook and PDA displays as good as disappear in direct sunlight, you'll also suddenly discover the numerous distractions. With dogs and children running around, the park or the local café are suddenly transformed into a canine and nursery hell.

When you're on the move, trains and planes seem quite reasonable places to work until you've actually tried. The former usually rattle around so much you can't type, hand-write or even hear yourself speak on the phone. The latter are, conversely, so quiet you'll have fellow passengers attempting to escape your incessant tapping by jumping out at 30,000 feet. Also remember your particularly cramped space.

Modern office workers often complain that there's never enough meeting rooms, but when you've moved out, there's none at all. The remote or mobile worker may find themselves attempting to conduct serious meetings in the aforementioned locations.

Better bets are relaxed restaurants or even hotel lobbies. Sadly, the ones which seem most tolerable to such visitors tend to be located in the very city centres you're trying so hard to avoid. You may be better off meeting clients at their offices – this saves them any hassle, and of course gets you out of the house.

mobile with WAP (Wireless Application Protocol) Microbrowser and built-in infra-red data hardware.

Whose file is it anyway?

So you've bought the required equipment to break free from the office; now, how do you do it? The biggest issue beyond slow or unreliable communications, is making sure that you've got the required information, and that it's up to date.

If you find yourself regularly working between two systems, it's crucial that both can access the other's data, and that it be synchronised. It's no good having two different files or schedules with the same name – which one is correct?

Clearly, it's vital that the systems attempting to remain synchronised are both speaking the same time and date; bear this in mind when travelling too, and use a visiting time-zone setting, rather than resetting the clock which stamps your files. If your clocks are correct, then there's nothing stopping you simply comparing files by hand to verify which is the most recent.

Document and email folders can happily be copied wholesale from one system to another as you travel between locations. It may be low-tech, but you can fit a lot of messages on a floppy and a lot of documents on a ZIP or JAZ cartridge.

If removable media isn't suitable, then consider a direct cable connection (DCC). Windows 98's DCC supports file transfer over serial and parallel, but not USB connections. Windows 98 also supports infra-red file transfer between IR-equipped devices. Applications such as Office 2000 are becoming increasingly savvy to shared documents or areas where files can be stored, ready for pickup by another system.

Finally, if you don't mind downloading messages twice, you could set one of your system's email clients to leave a copy of the messages on your ISP's server so they're still available when your other system accesses them.

PDAs are becoming increasingly powerful, but almost all expect to be connected to a host PC. Consequently, the more sophisticated models – such as the Psion Series 5, those using Windows CE and the 3Com Palm – all boast effective document, email and schedule synchronisation tools. All three will happily chat with your PC and swap information, so that both machines are up-to-date. Bear in mind that most PDAs prefer to compare notes with fully-fledged PC Personal Information Managers such as Schedule+ and Outlook, and won't want to speak with small email clients such as Outlook Express and Netscape Mail.

Remote **Access Packages**

Notebooks running full Windows operating systems may as well be desktop PCs in terms of built-in synchronisation tools. They'll work with DCC and the various sharing systems described in the main text, but for more sophisticated exchanges you'll need to invest in some dedicated software.

We looked at Traveling Software's LapLink Professional, Symantec's pcANYWHERE 9.0, and Stac Reachout Enterprise 8, all tested under Windows 98 but also available for 95, NT and 3.1/DOS. All offer remarkably similar remote access and file transfer facilities, but with a slight bias towards different users. We'll mention shared features and pick out where each differs.

◄ pcANYWHERE's Remote Control. Note the guest has launched an audio file on the host, but only the host can hear it playing. Remote control only communicates the pointer's position and any keyboard strokes

pcANYWHERE's 'Remote Control' allows you to see another PC's desktop in a window on your very own screen. You can operate the remote PC as if you were there, exploring drives and network connections, launching applications, printing pages and changing settings. The PC being controlled shows the pointer moving around and characters being typed as if by a phantom presence – spooky. The remote desktop can be scaled to fit your window and displayed in a reduced number of colours, with wallpaper disabled for better performance. Even at 14.4Kbit/sec, Remote Control still felt quite responsive, which is reassuring for mobile phone users.

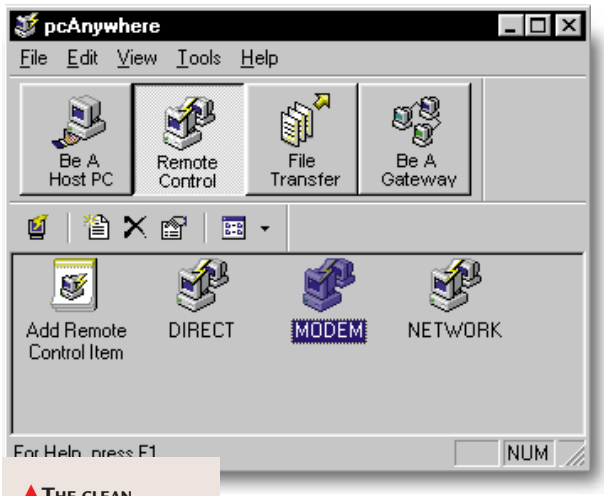
Clearly, Remote Control is great for checking or acquiring data you forgot to bring with you, and is equally useful for MIS departments to diagnose and directly fix problems. It's also obvious that some level of security is in order. LapLink, pcANYWHERE and Reachout all offer varying levels of access to a

The mobile office

defined list of users, and can also force a hangup and modem callback to listed numbers only for added security. Access is via cable, direct modem (or ISDN), IR (where supported) or a variety of network protocols including TCP/IP. TCP/IP requires you to know the IP address of the target machine, although those which employ dynamic allocation (DHCP) are able to use dedicated WINS servers.

File transfer is as easy as drag-and-drop in a Windows Explorer style environment, with the host PC in one pane and the guest alongside. However, you can't open a remote document within an application before transferring it to your local PC, and while the drag-and-drop is simple, you can only perform it using the software's own tools: you can't drag a file from the remote window directly onto your local desktop, for example, but you can copy a remote item into the local clipboard. Each package offers various wizards to synchronise files in pairs of folders, which is a great way of keeping, say, your email inbox and current working documents folders up to date.

Of course, sometimes files change only slightly: you may have a 100-page document with a single word changed, or an image retouched in one corner only. Transferring the entire file again is obviously a waste of bandwidth, so fortunately all three packages recognise any changes and only send the differences. We verified this by observing shorter update times when slightly modifying Word documents, bitmap files and even multi-layered Photoshop 5 images. All three packages also automatically compress files for better performance.



▲ THE CLEAN INTERFACE OF PCANYWHERE WITH ICONS FOR ITS VARIOUS MODES

Differences between the packages are subtle. On the supplied cable front, pcANYWHERE comes with a 25 to 25 pin serial, LapLink is accompanied by 9 to 9/25 pin serial, while meanie Reachout features none. Cables are cheap though, so don't make a buying decision based on this. However, LapLink is currently the only one to support an optional USB cable for a 12Mbit/sec connection between Windows 98 systems (£25).

Presentation is slightly different between the packages. LapLink, with its large, friendly icons, is the most consumer-looking offering, while pcANYWHERE and Reachout's graphics will appeal to the small business or corporate users. With USB support, LapLink offers the most comprehensive file transfer options, while Reachout markets itself to 'centrally-managed corporate remote control', and pcANYWHERE sits somewhere between the two.

Finally, it's worth mentioning that LapLink and pcANYWHERE are also available in Windows CE versions, the former as a free 3.5Mb download to registered LapLink Pro users, and the latter as host or remote flavours for £79 and £39 respectively. We were unable to get hold of pcANYWHERE CE, and LapLink CE inexplicably failed to run on our HP Jornada 680.

Finding a winner is hard, as all three packages do essentially the same thing and there's no difference in cost. Ultimately it boils down to which interface you prefer. pcANYWHERE certainly looks the smartest, but with optional support for both USB connection and a free Windows CE version, LapLink Professional fractionally nudges ahead to win Editor's Choice.

PCW DETAILS

★★★★

Reachout Enterprise 8
Price *£175.08 (£149 ex VAT) (two licences)*
Contact *Stac 01344 302900*
www.stac.com

★★★★

pcANYWHERE 9.0
Price *£169.20 (£144 ex VAT) (two licences).*
Upgrade *£66.98 (£57 ex VAT)*
Contact *Symantec 0171 616 5600*
www.symantec.co.uk

★★★★★

LapLink Professional
Price *£176.19 (£149.95 ex VAT) (two licences)*
Contact *Traveling Software 0800 374849*
www.laplink.com

Intel Power Monitor
http://channel.intel.com/mobile/techforum/sw.htm

The third way

Creating 3D images has traditionally been seen as expensive or time consuming, but all that is about to change. Adele Dyer makes the jump to another dimension.

3D is only good for one thing, some would say – games. But all that could change in the next few years as 3D cameras and printers come onto the market at an affordable price. The 3D camera will allow you to photograph objects and recreate them in the camera itself, before transferring them to a PC. The 3D printer, meanwhile, will make it much easier for designers to create quick, cheap 3D models of the objects they are working on. Until recently there were only two ways to create 3D images – either use a 3D laser scanner to record an existing object, or use CAD or 3D rendering software to draw the object from scratch.

The impetus behind the 3D digital camera is unusual in that it comes from a software, rather than a hardware, vendor. MetaCreations – known for graphics and Web-creation software such as Painter, Poser and Ray Dream Studio – has created a hardware and software combination, the MetaFlash, that fits on to certain cameras. Minolta will be the first manufacturer to produce a 3D camera, the 3D 1500, which uses the MetaFlash and the Dimage EX as the basic unit. Minolta plans to release the camera in the autumn. The 3D 1500 has a detachable lens and so the MetaFlash hardware fits between the camera lens and the camera body, attaching at the point where the lens has been removed. The lens is then attached to the other end of the MetaFlash hardware, effectively putting it in the middle of the camera.

Working with the MetaFlash hardware, the camera does not flash once, but twice. The standard digital camera flashes to provide enough light for it to take the normal 2D image, while the MetaFlash flashes an additional series of thin lines of light. These stripes of light are then captured as a second image and the software can calculate – by looking at where the stripes are lighter or darker – whether the shape at that point is concave or convex. The second image is then superimposed over the first, and, using a technique known as structured-light-based triangulation, the software in the camera uses the information gathered from the stripes to turn the flat image into a 3D image. The geometry of this technique is, we were assured, quite easy, as the distance between the light source and the lens is constant. However, ambient light should be kept to a minimum, the object should be placed between 30cm and 1m away from the camera, and, most importantly, the object must fill the entire picture. This technology can be used not only to determine shapes, but also to pick up textures, again shown by the diffusion of the light.

This first iteration only takes images from a single view, although more than one image can be stitched together on a PC to create a complete 3D object. The next version of MetaFlash aims to eliminate this stage and to create the entire 3D

▼ MetaCreations' MetaFlash fits between the lens and the body of the Minolta 3D 1500

object in the camera itself. Kodak plans to use this next version, which will work with a turntable. As the object is spun around on the turntable, the camera will track the surface of the object and determine how many shots it must take in order to compose a complete 3D object. The software in the camera will then stitch these views together to create an object that can be spun around horizontally. Shots of the top and bottom of the object will, once again, have to be stitched on using a PC.

3D images captured in this way can be used for any number of purposes, although Kodak has its eyes on Internet and intranet use. For example, if you have a company that makes wedding dresses, you could put 3D images of the garments on your site, allowing retailers or customers to see how they look from all angles.

The 3D printers are a little simpler in operation. Known as concept modellers, these printers are small enough and quiet enough to sit in an office and can produce 3D models in a matter of hours. Previously, the only options available to those who needed models were either to use plastic extrusion modellers – which are only suited to certain uses – or to use stereo lithographic modellers, which are based around lasers and can only be used in a clean room, free from all dust and dirt.

Bix Computer Applications sells a concept modeller known as the ThermoJet, designed by 3D Systems. It works in very much the same way as an office inkjet works, squirting material out of a series of nozzles. However, the difference is that the image can be built up in layers to form a 3D object.

Images to be output are created in a CAD package and output to the printer as a .stl file. The printer's drivers first splice the image, cutting it into thin sections horizontally from top to bottom. Then the actual printing can begin.

In the future everyone could have one of these printers in their garage

The material used is a kind of wax, which is constantly heated and kept in a liquid state. The wax is then sprayed through an array of 352 jets, which move backwards and forwards across the printer. In each pass, a layer of wax 0.36mm thick is laid down. This dries very quickly and so the wax is solid before the next layer is applied.

The process is relatively quick, with the time taken dependent on how tall the model is. Bix calculates it takes around about an hour to build 1.5in of the model. So, something small like a mobile phone could be created in a couple of hours and for a cost of around £5. However, the printer does not speed up when creating smaller objects as it still takes the same amount of time for the jets to cross the printer. In fact, to increase the time-efficiency, it makes sense to print two or more models at a time – covering the 10in-square base with various models.

Once the model is complete it is still slightly warm, so Bix suggests you should leave it in the machine for half an hour or put it in the fridge to firm up.

At the moment, this kind of system is being used mostly by companies that are working on multiple iterations of the same design. So, for instance, if a client has commissioned a design for a new telephone, but wants to see four different variations on the same idea, all four can be created quickly and cheaply. Similarly, the designers can show one model to the client in the morning, get their feedback and show them a modified model in the afternoon.

In the future, it could be that every household has one of these printers in the garage and it could be put to any number of different uses. Your children, for example, could find the design for a new toy on the Internet and download it to the printer, cutting out that maddening trip to Toys 'R' Us. Or you could browse for new objects for your home and be able to print out a 3D model before you actually decided to buy them. ❐

▲ **The ThermoJet solid-object printer, which allows designers to produce highly accurate physical models of their designs direct from their CAD systems. The ThermoJet is available in the UK from Bix Computer Applications, a division of Cadtek Systems**

PCW CONTACTS

Bix Computer Applications *0115 840 4069* ***www.bix.co.uk***
Minolta *01908 200400* ***www.minoltaeurope.com***
Kodak *0800 281487* ***www.kodak.co.uk***

Stringer show

Talking shop with Roy Stringer has always been a matter of flying in the face of convention. Ian Burley gets a lesson in re-educating the IT industry from the Navihedron pioneer.

In a time in which most of us continue to be astonished by what the electronic medium is capable of in conveying information across the globe in an instant, there are some who are far from happy about the way the IT industry is developing. One such person is Roy Stringer, who currently carries the impressive tag of creative director and chief hypermedia architect at the Liverpool-based multimedia production company, Amaze Ltd.

I'd reluctantly use a well worn cliché to describe Stringer – he's a guru, a hypermedia guru. He has his own gurus too and a significant influence on Stringer is Ted Nelson, who invented the terms hypermedia and hypertext. Stringer wholeheartedly echoes Nelson's battle-cry for a change to hypermedia standards:

'Electronic media and hypertext are completely screwed up. But this is hardly surprising, because the computer world itself is screwed up, tangled in dumb decisions made long ago, making it fundamentally a mess. It's time to start over.'

Stringer will argue vehemently that compared to today's ubitiquitous IT scene, HYPERMEDIA IS DOWNRIGHT FUTURISTIC, yet its origins date back to the 1960s

Even the Web is a target for criticism – Stringer points out that its power is too often wasted by poor design. This, in turn, relies too heavily on the linear presentation of data and unwieldy hierarchical structures which are themselves difficult to navigate. It's not in Stringer's nature to sit around philosophising about the deficiencies in the computer world – he's actively trying to get us to break away from the old 'linear' way of presenting and absorbing information. This guru is also an evangelist.

Stringer describes himself as an 'independent, self-taught multimedia producer, hypermedia architect and techno-therapist.' His claim to fame is the concept of the Navihedron – a three-dimensional hypermedia navigation tool which utilises bi-directional linking and context sensitivity. Stringer expects this will replace the system of hierarchical menus we are all so familiar with today in the design of computer user interfaces, applications and websites.

Another spotlight is about to shine on Stringer as he is in the middle of a major Navihedron-based collaboration with the famous physicist and author of *A Brief History of Time*, Stephen Hawking. This is *Stephen Hawking's Virtual Universe*, an online realtime 3D environment to explain the principles of theoretical physics.

When I spoke to Stringer, we were at the British Academy of Film and Television Arts (BAFTA). In a couple of hours, Stringer was due to rehearse for his presentation that evening to a BAFTA organised event called *Interactive Learning in Education*, sponsored by NESTA, the government funded National Endowment for Science Technology and the Arts. Stringer was to share the limelight with both the movie director and producer David Puttnam and the Culture Secretary, Chris Smith.

Out of Stringer's bag emerged a brand new Apple G3 PowerBook – the latest slimline version. He was determined to show off his and Amaze's work – a multimedia exploration of the human immune system called Immunology. It's an early example of the use of a Navihedron user interface. The Mac is Stringer's platform of choice, he even worked at Apple for a while, but his crusade to change information technology is nothing to do with hardware standards.

An enormous white blood corpuscle edges across the PowerBook's screen, and as it encounters one of a myriad of other blood components and biological invaders, an accompanying Navihedron window of linked information changes automatically in synchronisation with the unfolding context. As

Stringer's fingers caressed the PowerBook's touch pad, the blood cell animation moved backwards in time – we could relive the experience and re-absorb the tale again, reinforcing the concepts which were being introduced to us. Every bit of information held in this hypermedia 'book' is accessible in three clicks of the mouse. Try doing that with Yahoo...

A bottomless well of energy seems to emanate from Stringer, he has so much to say and is consumed by his passionate self-belief. His conversation dances between topics as wide-ranging as literature, art, science, and philosophy. You could be talking to a university lecturer, but Stringer had a very unconventional education.

His experience of university started at the age of 12, but didn't actually involve going to lectures. It involved watching the Open University on television. Later, at the stage when many teenagers think about specialising in a favoured subject in preparation for university, Stringer and the education system went in opposite directions. Stringer has never let convention hinder his thirst for knowledge. The traditional education system, from his early teens, could not cope with Roy Stringer, but years later he would renew his links with the education world by joining the staff of the Learning Method Unit of the Liverpool John Moores University. This was later spun-off as an independent business, which became Amaze Ltd in 1997.

We tend to think of hypermedia as being an ultra-modern concept. Stringer will argue vehemently that compared to today's ubiquitous IT scene, hypermedia is downright futuristic, yet its origins date back to the 1960s. Stringer remembers how his interest in hypermedia began: 'I started hearing about computers and hypermedia when I was about 12, which is going back about 31 years now.' It was a difficult time. Stringer's father died when he was seven. He has his mother to thank for his interest in computers – indeed, for his interest in education altogether.

'I remember saying to her that I was bored one day, like 12-year-olds do. She told me I had no right to be bored because there were too many things that I didn't understand and that these things I could work out for myself. She got me up the next morning at 6am, and sat me in front of the TV to watch the Open University.'

Roy Stringer

He was hooked, but after this nobody at Stringer's school understood what he was going on about most of time, talking about relativity, quantum mechanics, social history, Mondrian and other esoteric university topics.

By the time he left school, Stringer had come across computers through the Open University. It was then that Stringer became acquainted with the terms 'hypertext' and 'hypermedia', coined by Ted Nelson back in 1965.

Hypermedia was a step beyond the television and worlds away from the philosophy of the classroom. 'I remember thinking how nicely that model mapped on to my own understanding of what the purpose of information was about – as opposed to the way they were trying to instil it into you. So that was when I started thinking about hypermedia and ways of actually engineering it.'

One theory as to why computing is 'screwed up' – to re-quote Nelson – is that programming is a dying skill. Stringer is concerned that these days we aren't exposed to the practice of programming any more. 'I was on a panel at a Macromedia conference a couple of weeks ago. The panel was discussing whether or not designers were valued properly and I asked the audience there if anyone considered themselves a programmer or even a half-decent programmer, and not a single hand went up.' According to Stringer, using tools like Director simply to create animations inside frames is not programming. 'We're missing opportunities to do interesting and engaging interactive things with Director; instead people are just using it to make their print designs move around a bit.'

Awareness that the standard graphical computer user interface model exemplified by Macs and Windows is incredibly old in computer terms sparks near-resentment in Stringer: 'Like anything with a metaphor, the metaphor will always constrain you. It's like the desktop metaphor is constraining what you can do with PCs and Macs now. For the life of me I can't understand why we haven't got a full-on 3D working environment on the desktop. Why we are stuck with a 2D symbolic plane with little icons in the corner just defeats me. It took us seven years to go from a command line interface on a personal computer, like my Nascom stuff, to the first graphical user interface. We've had graphical user interfaces for 15 years now and they still haven't changed.'

Stringer warns that 3D has its own limitations: 'I'm not sure that immersive 3D environments are conducive to work environments on a computer screen. Again, it's too metaphorical. A car isn't a metaphor for a horse and carriage – it used to be, but it isn't any more. A motor car isn't a horse and carriage and so a computer isn't an office desk.'

Even that holy grail of computing, voice control, is too metaphorical, according to Stringer: 'The metaphor there is the conversation. I don't think we're even close with the technology. All I can ever see in those implementations is DOS – precise syntax which makes precise things happen. If you don't say things in the right order, it won't understand you.' True machine understanding could make voice control viable, but Stringer feels that scenario is a long way off yet.

In the meantime, you will soon be able to download a Navihedron applet which manages your computer's shortcuts. Called My-Nav, the applet will be available from the official Navihedron website at www.navihedron.com.

The inherent geometrical simplicity of the Navihedron has triggered other ideas, like N-Space. This idea, which Stringer has patented, is a remarkably easy and logical way of using the nine numbers in a telephone keypad for information navigation. N-Space could become a hit with the emerging generation of multimedia-enabled mobile phones, for example.

Stringer has a couple of bees in his bonnet about the future. He enthusiastically predicts that within five years the internet will be the primary source of digital media, including audio-visual media. His expectation relies on rapid growth of internet bandwidth and end-user accessibility, but he rejects the concern that five years is too soon.

He also predicts that within 10 years, women will replace men as the dominant gender in IT. Stringer feels that today's IT smacks too much of 'men's toys'. IT is an enabling technology for communication and as women are usually better communicators than men, IT will provide women with a key advantage.

Roy Stringer represents that next generation in the evolution of the personal computer. He wants to see PC concepts move away from narrow metaphors to a more user-environmental view. With its vested interest in market stability, Stringer is up against the corporate inertia of Microsoft and even Apple. However, Stringer believes, and many others hope, that innovations such as the Navihedron, My-Nav and N-Space will usher in that new era – sooner or later. ❐