news

Our new-look website

Our website has been long overdue for an overhaul, as many of you have not been slow to point out. We took our time because we wanted to get it right, and the new-look site is now up for you to see.

Like other magazine houses, our parent VNU decided to opt for an umbrella site. This means *Personal Computer World* readers can also get the benefit of our sister publications. These include *Computing, What PC?* and *ComputerActive*.

You will still be able to reach the site from *www.pcw.co.uk*, where we will have some of our own content. Exactly how much we have yet to work out. But you can be sure there will be more of everything for everyone.

BT pricing users away from ADSL, say access providers

British Telecom has priced its fast ADSL services too high for both small businesses and homes, say service providers – including one of BT's own divisions.

Grant Groster, head of BT Internet Business Services, said ADSL is 'not positioned to make inroads' into this market. But he added: 'We are talking [to BT] and if it is priced attractively we will certainly be introducing it.'

BT is selling ADSL through providers like UUNet, Virgin and Easynet, rather than direct to users. For its basic IPStream service, vendors are charged £40 to £150 per month for connections of between 512Kbit/sec and 2Mbit/sec.

It has emerged that there is a far more interesting option called DataStream, which could lead to a broader range of services and access boxes. But DataStream requires vendors to invest 'in excess of £10m a year' for a national service, says UUNet.

With IPStream, BT installs all the lines and boxes needed to deliver IP services via a

ADSL may not have such a huge speed advantage over cable modems as was originally expected, says UUNet's Steve Groves.

Cable users have to share local bandwidth between people on their local loop, giving them a minimum 400Kbit/sec.

ADSL offers a guaranteed link of between 512Kbit and

2Mbit – but that is only to the local exchange. Lines from there to your service provider – the on-ramp to the Internet – are shared.

BT allocates capacity on the assumption that the equivalent of only one-in-20 ADSL lines is in full use at any one time, which means the service may deteriorate at peak times just as with cable.

10Mbit/sec Ethernet port. Neither user nor vendor has a choice of equipment.

DataStream delivers Asynchronous Transfer Mode (ATM) data to the home or office. It is up to the service provider to then decide how it will present the data to the user. This has two huge advantages:

● Raw ATM, unlike IP at present, is good at delivering multimedia data such as streaming video.

● ADSL service providers could offer new services, such as video on demand directly to TV sets, rather than just IP data direct to a PC.

UUNet product manager Steve Groves said operators

will have to pay up to £29,000 a year for each of BT's 400 exchanges from which they want to provide DataStream services.

He said UUNet could offer the service in high-demand areas, but it would prefer to provide a national service, which at BT prices is a very expensive proposition. BT is also insisting that operators commit to supporting at least 50 users per exchange.

'DataStream could allow small operators to offer a variety of services. But the cost of entering the market is too high for them,' said Groves.

UUNet has sent a protest about the prices to telecoms watchdog Oftel.

The BT charges quoted so far are based on business lines. Consumer prices may end up being cheaper than these. A BT spokesman said: 'I don't believe £40 a month is high for a [512Kbit/sec] always-on connection.'

He expected vendors to charge less, getting extra revenue from adverts and commerce. He said: 'We are committed to making this a mass market. You will see costs come down.'

**CLIVE AKASS**
VNU NEWSWIRE

● *Point of view – page 28*

Intel offers first look at Merced

This is the first official picture of Intel's IA-64 processor, which is due to ship next year. The chip, previously know as Merced, is now officially to be called Itanium. It was given its first public airing at the Intel Developer's Forum in Florida, but as Gordon Laing reports on page 46, it gave little indication of its potential.

All the running at the moment is being made by AMD's 32bit 700MHz Athlon, which is being used by a whole raft of PC vendors including IBM and Compaq.

But Intel could take the performance lead
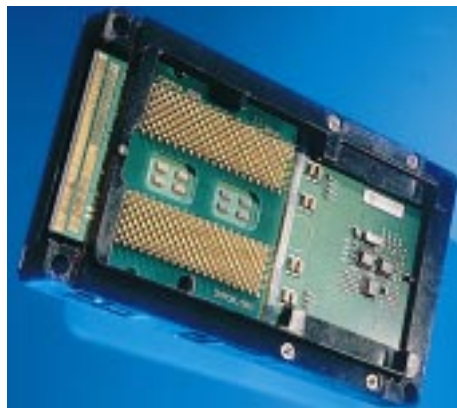
again this month, with two 733MHz processors, a PIII and a PIII Xeon, using 0.18 micron architecture. Intel denies that its launch is

New chip war

● *continued from page 27*
a response to the Athlon, saying it is not targetted at the same market as the PIIIs.

But the new 0.18 micron chips have been launched earlier than expected, hot on the heels of the new AMDs.

With Intel admitting to a bug in its RAMBUS-enabled 820 chipset (*see opposite*), the big question is what kind of RAM these processors will use. A source who has tried a PIII 733MHz with RAMBUS said it 'blows away' the Athlon.

New Psion

PC prices hit by parts shortage

Rising memory costs have pushed up PC prices in the run-up to the Christmas rush. Vendors also face a shortage of silicon following the Taiwan quake.

A 128MB SDRAM module that cost $60 in July, cost $240 just two months later. This forced vendors to put up prices by around £60.

This was before the quake that hit many chipmakers, including UMC, the second biggest supplier of custom chips, and the big Taiwan Semiconductor Manufacturing Company. UMC supplies the silicon for SanDisk flash memory modules. Days after the quake it said production had not been hit as hard as had been thought, but it was still down on full capacity.

Robin Saxby, head of specialist chipmaker ARM, told a Cambridge conference that the full impact of the Taiwan quake would be hard to guess for some time.

Flash memory was getting scarce even before the quake because of a mushrooming demand for mobile phones.

There were also reported shortages of some PC chipsets, a situation which is unlikely to be helped by the bug in Intel's new 820 (see opposite).

Evesham Micro purchasing director Luke Ireland said the companies that were most likely to be hit by shortages were those which chop and change suppliers to get the best price.

'A lot of people have been buying on the spot rather than building a relationship with a supplier so that you get support when something such as this happens.'

Ireland said he had just come back from Taiwan, where the situation was far worse than was reported, particularly with electricity supplies.

He said the Taiwanese had made no plans to cope with the disaster. 'They work on the basis that everything will be all right. It's a strange stance to take when you live in an earthquake zone.'

ADDITIONAL REPORTING
VNU NEWSWIRE

Psion has launched a new model in its PDA range, called the Revo. It boasts a silver case, a 36MHz ARM 710 processor, 8MB of RAM, an improved serial link and the latest Epoc 5 operating system. Psion has taken a leaf out of arch-rival 3Com's book by bundling a docking station with PsiWin connectivity software. Watch out for a review next month.

Not 'nuff respect

Once upon what seems a very long time ago, soldiers came back from a big war with fine dreams of creating a world fit for heroes. All the services needed by people would be owned by the people for the benefit of the people.

To the astonishment of the world they voted out the great war leader Churchill and voted in the Labour Government of Clement Atlee, which proceeded to nationalise everything in sight.

It all went wrong of course. The world could not be reduced to ideology (although even some Labour opponents tried) and most of the old public-owned industries have been re-privatised. But this too has its snags. What happens when national interest collides with the commercial interests of a company providing a public service?

A lot of obfuscation happens, if BT's pricing of ADSL is anything to go by. This is not a matter of a minor market pitch: ADSL is national infrastructure, like the roads and railways.

Within a few years, even a few months, all commerce will essentially be ecommerce – if only to the extent that at some point a transaction will hit the wires. ADSL will mediate much of this activity and if we don't get it right we could lose out to countries that do.

We may also lose an opportunity to get a head start. We have the advantage, for a global medium, of speaking a global language; we are respected global content providers; and a legacy of the monolithic pre-BT nationalised phone service is a homogeneous network that is relatively easily upgraded. The US, by contrast, is having to upgrade piecemeal.

First, we need to kick-start mass use of the Internet, and for that we need fast always-on links such as ADSL. The economics of its pricing are complex. But consider two statements by Ovum analyst John Matthews (see page 37): that carriers still cling to monopolistic practices; and that transmission costs are negligible compared with those of billing and management.

These major costs are not going to be higher for higher bandwidth use – indeed ADSL, being flat rate, is very cheap to bill. Most analysts agree that the cost of bandwidth will become infinitesimally small with mass use. Even BT admits costs will fall rapidly, and there is no chance of it failing to recoup its ADSL investment. There is no excuse for these high threshhold prices.

If Oftel won't jump on BT it's time MPs did. And it is time BT paid some respect to the wartime ideals which, in an odd way, gave birth to it – by balancing profit with some sense of public duty.

Clive Akass **on BT biting the hand that once fed it**

RAMBUStification over new Intel bug

Intel was on the defensive last month after it was forced to withdraw boards supporting the new fast RAMBUS memory.

Vendors have spent millions preparing to launch PCs using the boards, based on the new 820 chipset that runs a 133MHz front-side bus and is designed to talk to RAMBUS.

There were several reports of data loss using the 820 with three RAMBUS modules – it seems to have no problems with two.

Intel said the 820 would be released when the problems were sorted out, but it could not say how long that would take. A spokesman said the cost could not be assessed but would be minimal because the bug had been discovered before production machines began shipping. That said, we have an 820-based machine in this issue (see p82)

But the decision will have knock-on effects throughout the industry. Samsung, for instance, has invested much in RAMBUS production assuming an immediate demand for the chips.

One winner will be rival chipmaker VIA, which offers a chipset supporting SDRAM and a 133MHz front-side-bus.

Intel chips support SDRAM only with a 100HMz bus, though the company now says it will offer 133MHz SDRAM support early next year.

Such is the confusion about the 820 that Intel was reported to be telling some vendors to use the VIA chips.

IBM is doing just that with its new range of workstations. Worldwide workstation product manager Bob Gleason said: 'We will support RAMBUS when the problems with the 820 are sorted out.'

He still expected to launch PCs using the multi-processor version, the 840, later this month; this does not seem to share the bug.

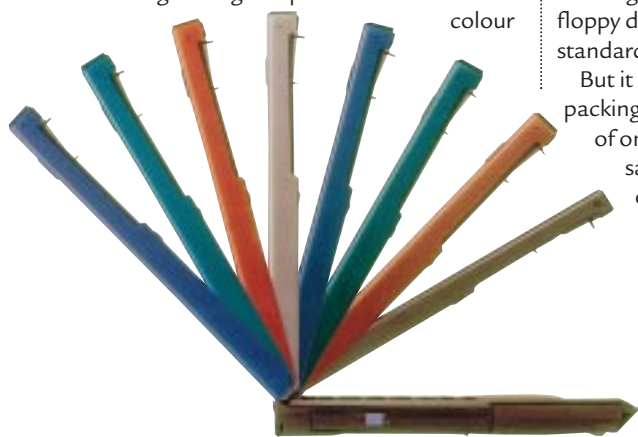Several UK vendors also had 820 boards withdrawn.

Some analysts doubted whether Intel could persuade vendors to jump back on the RAMBUS wagon.

But Intel says SDRAM does not have the performance to keep up with its emerging range of 700MHz-plus processors.

Ironically, rising prices have eroded SDRAM's price edge over RAMBUS. And RAMBUS prices are expected to fall when it goes into mass use.

IBM launches a mini ThinkPad

IBM has launched its first mini notebook. The ThinkPad 240 (right) weighs 1.3kg complete with a 10.4in SVGA colour screen, a full-size keyboard, 64MB of RAM, and a 6.4GB hard disk. It keeps the weight down by using an external floppy drive, which is bundled as standard.

But it differs from many minis in packing all the ports on board, instead of on a bundled extension unit as on, say, the Sony Vaio 505. An optional CD drive links via a PC Card. The ThinkPad will cost £1,495 ex VAT.

IBM has also launched a range of new multimedia ThinkPads. The i series models are all based on 400MHz and 433MHz Celerons and come with a selection of coloured lid covers (left), Prices start at £1,106 ex VAT.

IBM is plugging security as the big selling point of its new 300PL business models. They pack encryption chips which offer several ways to protect your files. The lower-end 300GL PCs have IBM's new Smart Card starter kit as an optional measure to prevent data theft.

Both ranges feature the latest Intels up to 600MHz and a 133MHz front-side bus (see above). Prices (ex VAT) start at £816 for the GLs and £993 for the PLs.
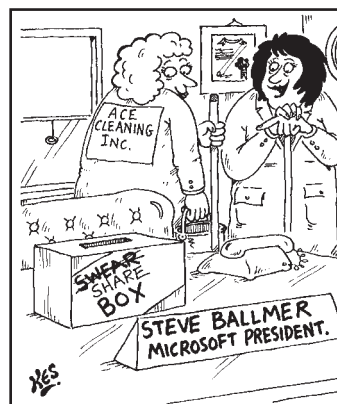
Ballmer's $1bn clanger

A throwaway remark by Microsoft president Steve Ballmer cost him around $1bn last month.

'There is such an overvaluation of technology stocks, it is absurd. I could put our own company and others in that category,' he told journalists at a Society of American Business Editors and Writers conference.

Asked then what Microsoft's stock price should be, he said: 'Less.' Ballmer, who has a propensity for making off-the-cuff remarks, added: 'I used to believe in the theory of perfect markets, but I no longer believe that.'

They certainly weren't perfect for him. Microsoft stocks fell $23bn in value the next day, representing a $1bn loss to Ballmer himself. **TIM BAJARIN**

'He has to put in $1bn each time he mentions the words stock or share.'

Upgrade cost warning as final Win2K beta ships

Microsoft released the last major beta version of Windows 2000 last month as analysts warned that migration to the new operating system, successor to NT4, will be 'prohibitive' for many businesses.

The operating system is set for what Microsofties call RTM (release to manufacturing) on 15 November. Another beta, Release Candidate 3 (RC3), due on 27 October, is a last minute build for top testers and vendors.

The claimed benefits of Windows 2000 are improved manageability, performance, and application compatibility; simplified Internet connection and domain-name server configuration; a cleaner interface and better drive support.

Win2K was originally conceived as the convergence of Microsoft's Win 9x and NT operating systems, most usefully in supporting a common set of drivers. But the two OS strains will now lead separate lives at least for the next couple of years.

Adoption of Win2K is likely to be slowed by fears over the Y2K bug. But analysts at the Gartner Group also warned that most companies migrating from NT4 or Windows 9x will be hard pushed to recoup their investment within three years. Analyst Michael Gartenberg reckoned it cost organisations as much as $2,050 per seat to migrate from NT Workstation and up to $3,100 per seat from Win 9x. And these estimates do not take into account the costs of implementing back-end servers or Active Directory, which are needed to optimise performance.

Mark Tenant, Windows NT Server product manager at Microsoft, claimed the figures were based on incorrect licensing information and included costs that were not part of migration. 'Many of our large customers will have special licence and multi-user agreements that will bring the cost down... The [Gartner] costs are artificially inflated, and definitely flawed,' he said.

He cited a report estimating huge savings for one big customer. One cost-saver is the ability to load Win2k on both laptops and desktops - many companies have had problems trying to use NT4 on laptops,

Meanwhile, Darren Kessner, a researcher at anti-virus company Symantec, warned that some Win2K enhancements may provide new avenues of virus infection.

Digital camcorder goes mega

Sony claims its DCR PC-100 digital video camcoder is the first boasting a megapixel image chip. It uses Sony's Memory Sticks for storage, but with only a maximum 32Mb of memory they will hardly be big enough to film War and Peace. Hitachi, by contrast, has a digital camcorder in the pipeline, using reusable DVD RAM for storage. It was shown at a tradefair in Germany last month but a shipping date has yet to be announced. Panasonic showed a sub-£1,000 digital camcorder boasting a 10x optical zoom.

Nokia unveils fast wireless kit

Nokia has unveiled some of its third-generation mobile technology in the run-up to Telecoms 99, the world's largest telecoms conference.

The company plans to integrate GSM-based, wide-area voice and data coverage with local technologies like DSL and Bluetooth to provide global communication. Devices utilising GPRS (General Packet Radio Service), also known as GSM IP, are the first step to a goal of offering fast, wireless Internet access in addition to voice calls.

Nokia displayed three reference designs for devices that will use the new technology. As well as a 'traditional' phone with a numeric keyboard and small display there was a design that took the communicator

concept a little bit further, with a landscape display and touch-screen input. The third design sat midway between the two, with a portrait screen but no keyboard.

The third generation phones would use EPOC, the operating system from Symbian, WAP (Wireless Application Protocol) and Bluetooth for short-range communications.

Nokia also had something new for the network operators. The UltraSite is the first triple-mode transmitter available, combining GSM (the current standard) with EDGE and WCDMA technologies that will help provide greater mobile bandwidth. The flexible base station can accommodate all three technologies in various combinations, allowing for incremental rollout of the new standards based on consumer demand.

Also showing was Nokia's wireless local area network, based on the 802.11 standard. This provides Ethernet access with no physical link, over a large area at up to 11Mbit/sec. Connection

RIGHT: Design for a mobile with graphical interface
BELOW LEFT: Concept video link

to the network is via a simple type II PC card and the system can even cope with a roaming user, walking across the office with a laptop for instance, without dropping the connection.

Software support is currently only available for Windows 98, NT and CE 2.11 or greater – and not EPOC. The technology is primarily aimed at large corporates, there were suggestions that it could be supplied to hotels and airports, providing simple web and email access to workers on the move. It will be available early next year. **WILL HEAD**

WWW.NOKIA.COM

Battle of baffling freephone net offers

Cheap Internet access deals grew in number and complexity last month as service providers fight to win and retain customers.

News that shares in Freeserve, which launched the battle with its fee-free service last year, had fallen below their float price added an edge to the competition. It reflected uncertainty over Freeserve's ability to retain or even to capitalise on its 1.3 million users.

Freeserve, itself now under pressure from freephone access offers, launched a deal allowing users to accumulate up to 10 hours of toll-free access a month. AOL, which has just launched the fee-free service Netscape

Always-on and freephone links make radio net services viable. Virgin Radio is targeting this new audience with what it calls a GIMP, which acts as a PC window on its programs.

Online, countered with a flat-rate, 1p-a-minute phone charge for the 600,000 UK users of its £9.99-a-month, paid-for service. Unlike most such offers, it is not restricted to off-peak times.

Line charges of up to 4p per minute are seen as the biggest barrier to greater Internet use in Britain. AOL's UK managing director Karen Thomson said the new flat rate was a significant step in reducing the barrier.

Meanwhile, service provider FreeCall offered unlimited freephone off-peak access to users who top a threshold of paid-for use. And users of screaming.net, which started the freephone bonanza, complained that the company was still cutting users off after two hours of toll-free access – though its site still claimed this was a timeout

triggered by two hours of inactivity.

How these various offers measure up depends on how much you use the Internet, how big your phone bills are and where you call to, and difficult-to-quantify factors such as quality of service.

Telinco, another cut-price pioneer, warned that freephone calls had to be paid for in some way, and this was being done by tying users unneccesarily to complicated tariffs.

A company statement said free unmetered access could increase Internet use dramatically, 'but will only succeed if the customer proposition is simple.'

Running parallel to the sign-up battle is one for content, with providers launching services such as chat rooms, financial deals, games and music in a bid to become a preferred first call for users when e-commerce takes off fully.

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www.0800connect.co.uk; www.freeservce.net; www.aol.co.uk; www.telinco.net
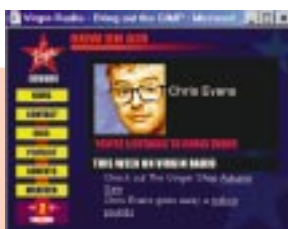
news

GREY EMINENCE
A new site edited by *PCW* ex-editor Ben Tisdall has become one of a small number to target the growing number of older Internet users. Vavo-com, the idea of Richard Spinks, former business development director of Lycos Bertelsmann, is designed for UK 45-year-olds, an estimated 13.6m of them, controlling 80 per cent of the wealth. Among the attractions is an easy-to-use, do-it-yourself website kit.
www.vavo.com

GIFT EXPRESS
The web is increasingly the first resort for anyone who needs to buy a present quickly for a forgotten birthday or anniversary. The latest site to target this market sells gift vouchers for a wide variety of high street shops. It's at *www.voucherexpress.com*

SECOND-HAND PCS
Refurbishing specialist Frazier International launches an online auction site this month to sell used PC and peripherals such as DVD players, hard drives and graphics cards, as well as PCs, notebooks and printers. The site has been running as a pilot since January and is expected to be ready for business this month.
www.lot1.com

PET TEACHERS
Did a teacher change your life? If so, you may wish to vote at a teacher's Hall of Fame at *www.teachersupport.org.uk*. Closing date is 30th November.

Cutting the ties to your desk

Intelligent surfaces can allow mobiles to be linked into a network – simply by placing them in any position on a desk, research at Cambridge University has shown.

The system could even link up a pocket device through your trousers when you sit down, researchers say – only half in jest. Unlike other types of wireless link, it can pipe power as well as data.

It relies on a programmable grid of contacts that can be laid onto a surface like skin (complete with nerves). The base of the connecting device carries the contacts – say two each for data and power.

Spacings are such that, whatever the orientation of the mobile, each contact can make only one connection with the grid. The system can figure out for itself how each contact point should be used, researcher Frank Hoffman told a conference at the university's department of engineering.

The smart surface is one of several rather eerie experiments in advanced networking environments being carried out at Cambridge's Laboratory for Communication Engineering (LCE), which works closely with the nearby AT&T (formerly Olivetti) labs.

The latter pioneered the use of Active Badges, a mini-cellular network which lets you stay logged into a network as you walk through a building. The lab has used today's larger bandwidths to extend the idea to a video link which would allow, say, a hospital consultant to stay in visual contact with a critically ill patient or operation as he walks around wards.

The system, which involves tracking every movement its target makes, is an application of what Andy Hopper, professor of communications engineering, calls 'sentient computing'. This provides computers with an equivalent of the models our brains use to negotiate the real world.

While Hopper includes 'feeling' in his definition of the word sentient, he stops short at the implication of awareness. 'I know of no program that can simulate consciousness,' he said.
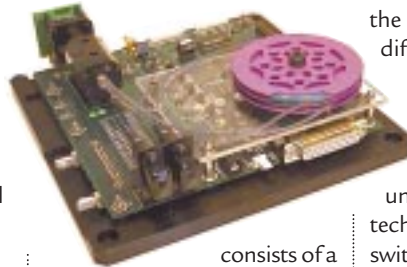
CLIVE AKASS
www-lce.eng.cam.ac.uk

Tripping the light fantastic

Pictured here is a test-bed for an amazing device which uses configurable holograms to switch an optical signal. Exotic new switches like this are needed to exploit broadband optical data pipelines to the full.

First-generation devices translate optical signals into electrical ones for switching purposes, and then convert them back again. This relatively slow process amounts to a bottleneck in fast data pipes.

The new device is the culmination of two years of research by a team led by Professor Bill Crossland at Cambridge. He demonstrated the principle by shining a pencil laser through a fixed hologram to produce a clear grid of dots on a wall.

The switch his team has produced is at the top left of the pictured board – the bit the optical fibre is plugged into. It consists of a ferroelectric, liquid-crystal layer, modulated by a mini-pixel array the size of those used in virtual-reality headsets. The array is controlled by a PC to produce the holograms needed for different switching patterns.

The prototype shown can switch a single fibre between eight other channels, but work is under way to show that the technology can be used to switch many channels between many other fibre channels. This would allow fibre switches to be built with the same capabilities as existing electrical switches.
www2.eng.cam.ac.uk/rose1.html

Online shopping swings

One-in-10 Internet users regularly shop on the Internet, according to a Which Online? report conducted by Mori.

Computer products accounted for the majority of online purchases in 1998, but these have now been superseded by books (13 per cent) and flights and holidays (12 per cent).

Fifty-eight per cent of those who have been online for more than two years have bought something online, compared with a quarter of those who have connected within the past year.
www.which.net

news

A holo victory …

You should stop and take a breath as you hurtle towards the millennium with headloads of get-rich-quick ideas for the Internet. There are others out there who are putting all their energies into hi-tech products that are going to change our lives off-line too.

HoloTag is a young Cambridge company whose data-tagging expertise could put pay to all that queueing in the supermarket. It could also help protect brands and keep an eye on products. One use for its data tags is to keep track of goods in computerised warehousing associated with the distribution of goods bought over the Internet.

It is a technological spin-out of Sentec, a company specialising in sensors, magnetic and otherwise. Sentec

developed two generations of magnetic multibit data tagging technology and worked in the field of retail anti-shoplifting (EAS) for more than eight years. HoloTag has developed a label which uses layers of magnetic material in different orientations to store information. The sequin-sized 'smart' memory tag is recognised and read using a rotating magnetic field. HoloTag is in negotiation with multinationals about future concepts with a view to licensing its reader technology.

For the long-term (or sooner if it can get funding), HoloTag has its eye on the multi-million pound retail market with data-tagged shopping passing through its all-encompassing tunnel reader. It has also developed a handheld model as well as a version for monitoring products on an assembly line.

Right now, though, it is hoping to clean up the process control side of large corporate laundries where there is a demand for a method of cutting back on the millions of pounds worth of laundry that goes missing each year. This is apparently a serious problem for large hotel groups. The same tracking device can identify where goods are in a delivery process.

Final trials of the laundry system have been completed. At this stage its robust little tags can be sold to laundries for 30p each – a lot on, say, the price of tin of beans but a tenth of the cost of rival laundry tags.

'What we have done is create a system where every item has a unique identity, so that a company knows exactly how many items it has, where they are, and whether they are real,' says Melinda Rigby, HoloTag's dynamic managing director. 'What we need now is funding to get us into producing the high volumes the market needs, lowering costs.'

She believes that the technology, which is compatible with existing electronic-management technologies, is well positioned to be picked up by the retail market. 'Y2K trends associate a massive new investment by retailers in new electronic reading technology and there is a wave of interest in us forming the de facto standard in reader technology.'
www.HoloTag.co.uk

Caroline Swift *reports from Silicon Fen*

Voice data hits monopolies

Major telephone companies are still locked into 'arcane monopolistic practices', says a leading telecoms analyst.

Voice over IP (VoIP), which lets you use the Internet to ring Timbuktoo for the price of a local call, bypasses some of these practices, which is why it works out so cheap, says Ovum's principal consultant John Matthews.

But oddly it is the 'carriers', the companies that charge huge sums for the use of their lines, who stand to benefit in the long run.

The price advantage to users of VoIP will erode in time, as carriers move away from traditional 'circuit-switched telephone lines, towards integrating voice and data on a simple network.

Carriers can make great savings by integrating their networks, because packetised IP uses lines far more

efficiently than circuit-switched connections – which dedicate an end-to-end connection to each call.

Some corporates have already integrated their networks in this way, but they are in a position to guarantee connection quality.

The quality of a VoIP cannot be guaranteed on the wider internet, which was not designed for time-critical multimedia data. 'IP must be reworked if it is to be an ubiquitous carrier protocol,' says Matthews.

'The timescale for these changes is real and they will happen. Some of the best minds in telecoms are working on these issues right now,' he says. Yet phone companies are still buying traditional circuit switches and few are preparing for the change.

Matthews says it is in the big operators' own interests to move to an IP-based phone network, as this would allow smaller players to boost and encourage broadband use.
www.ovum.com
● See Point of view page 28

PC users can use Voice over IP to call any phone in the world, using a new system from a company called Callserve. Normally you need a PC at each end of a VoIP call. But Callserve uses high-quality links to carry calls to overseas centres, where they are rerouted at local rates. Per-minute charges to the US work out at 3p. A free client is available from www.callserve.com.

Visio takes the Gates shilling

Microsoft has entered the diagramming and technical drawing market – typically by buying its way in with the $1.3bn purchase of Visio.

The companies, both based in Seattle, have long had a close relationship. Visio's drawing products, aimed mainly at people who are not drawing specialists, have long been tied closely into the Windows environment and were among the first non-Microsoft software to support Visual Basic for Applications.

Microsoft will retain the Visio brand and plans to market the products as

complementary to the Office suite. Visio products have been bundled with Office in the past.

The move comes as Visio faces renewed competition from Autodesk, which publishes the de facto standard high-cost professional drawing package AutoCAD. AutoDesk has launched a number of products challenging Visio's core markets.

Visio, which pioneered the idea of smart shapes to facilitate drawing by non-specialists, has also been pushing up into AutoCAD's market.

Microsoft has a long history of buying in core technology, starting with its very first operating system. It got into routing software by buying the UK AutoRoute developer NextBase; but a bid to buy Intuit for its personal finance software was blocked by regulatory authorities.

Visio's chief financial officer Steve Gordon said the current deal was not likely to have similar problems as there was 'no product overlap.'
VNU NEWSWIRE

Digital Video Interface revealed

After much squabbling over rival designs, DVI has finally been accepted as a standard

PC users and buyers, who are just beginning to accept USB as a replacement for the venerable parallel and RS232 serial links, are now going to have to get used to another new port.

The open Digital Video Interface, revealed at the Intel Developers Forum (IDF) in Florida, seems to have been accepted as a standard, after a lengthy squabble over rival designs.

As with USB, there will be a transition period during which old and new are mixed – DVI needs only a cheap simple dongle to link to common legacy devices.

IBM, for instance, bundles one of these dongles with the DVI-enabled Savage4 Xtreme graphics card it bundles with its latest PC 300 GL desktop systems.

The old analog VGA port is not an efficient way to feed digital flat-panel displays – the digital signal has to be converted to analog and then back to digital again.

The effect on picture quality is quite noticeable, as Nokia showed recently, at a press briefing by display vendors, when it fed the same picture via digital and analog feeds to two of its latest 18.1in 800 Pro LCD panels, which can take either.

Viewsonic was the only vendor to show a digital-only model, a version of its VP-150. These digital-enabled models all use the older DFP link, which again can link to DVI via a dongle – they will soon boast native DVI.

The DVI spec was drawn up by the Digital Display Working Group (DDWG), and launched by Intel, Compaq, Fujitsu, HP, IBM, NEC and Silicon Image. It employs the Transition Minimised Differential Signalling (TDMS) interface used by some current systems, but with a new plug.

Among the first displays to use it will be analog cathode-ray displays. The digital signal will be converted within the unit rather than on a graphics card as at present – this allows designers to optimise performance for their display. Entry-level monitors are likely to stay analog to keep prices down.

Chipsets on graphics cards generally integrate digital-to-analog conversion, but vendors do not seem bothered by the changes and are already beginning to adjust. Matrox has just announced a DVI adaptor for its latest G400 accelerator.

Early DVI monitors are expected to cost up to 15 per cent more than analog-only models, a premium that is expected to vanish within a year.

DVI can theoretically carry any data at up to 3.3GB/sec (using dual channels). DDWG representatives did not dismiss the possibility that DVI could be used to link high-definition TV sets and set-top boxes – an interface many thought might be 1394.

CLIVE AKASS IN LONDON AND GORDON LAING IN FLORIDA

Three types of ambiguity

DVI packs both analog and digital paths and specifies three types of connectors, labelled DVI-a, DVI-d, and DVI-i. The suffix, as you may have guessed, means that the respective connector implements either analog or digital or both (i for integrated). The diagram (lower right) shows the pinout of the DVI-i socket (lower left). The five pins to the right carry only analog: C1 to C3 are red, green and blue video; C4 is horizontal sync and C5 is ground.

In the other 24-pin block, the 18 pins to the left are digital only. The remaining six, at the right, pack a mix of analog, digital and common functions and feature on both a-type and d-type links. You can see this on the DVI-d plug (top), note that this uses pin C5 as a locator.

In more detail the left-block pins are: 1-5, 9-13 and 17-21 – data and shield connections for two TMDS channels; 6 and 7 – DDC clock and data; 8 – analog vertical sync; 14 – power +5 volts; 15 – ground, analog h/v sync; 16 – hot-plug detect; 22-24 –TMDS clock and shield.
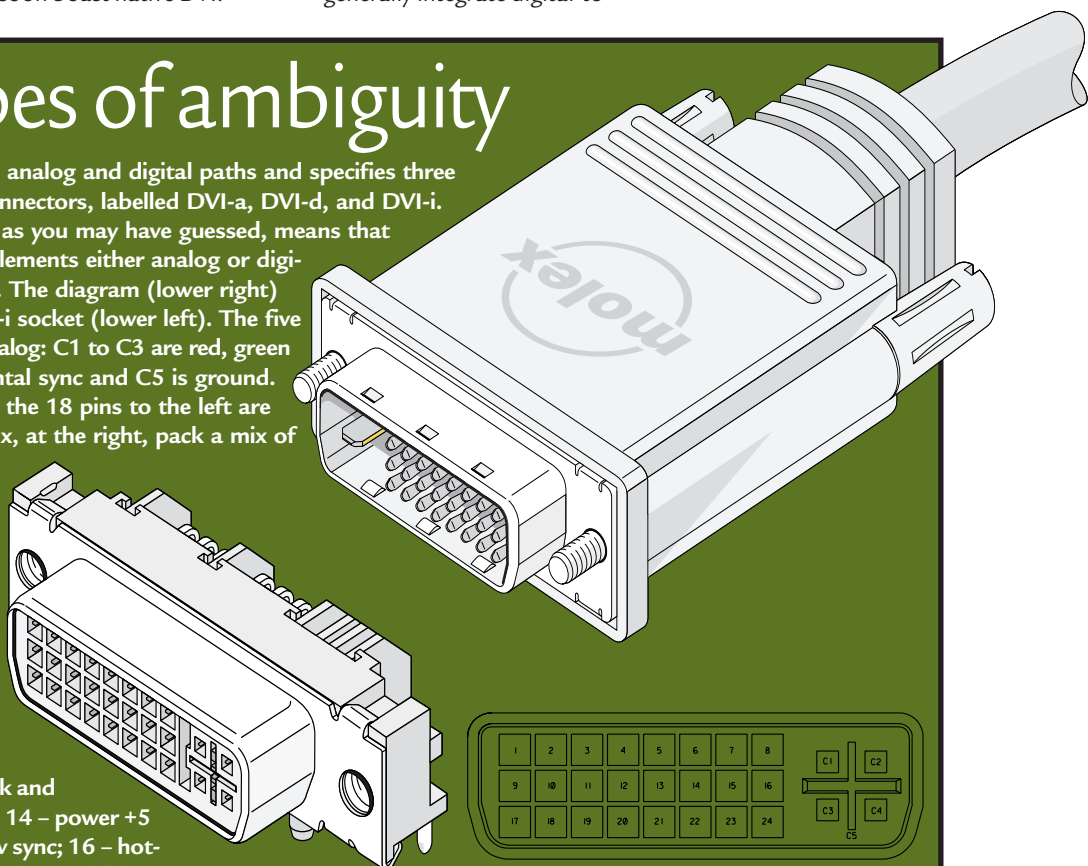
Glimpse of the 64bit future

The bi-annual Intel's Developer Forum is becoming an essential venue for IT analysts and journalists. This year I joined more than 2,500 participants there.

The first keynote was given by Intel's head honcho Craig Barrett. He was described by desktop products vice-president Pat Gelsinger as a ruthless dictator, yet he explained rather humanly how he couldn't get the images off his new digital camera nor install a screensaver on his wife's notebook.

The moral being that current PCs are not easy enough to use. It was driven home in a presentation by Gelsinger on the EasyPC initiative which aims to simplify and speed up every aspect of consumer IT.

Barrett described all future homes as eHomes and businesses as moving to eCommerce – citing estimates that 10 per cent of the US GDP will be generated through online commerce by 2002.

Rather more interestingly he revealed that Intel would

deliver its first 0.18 micron Coppermine Pentium III processors as soon as October, hinting that one had a seven at the beginning (best guesses are that the first will run at 667 MHz and 700MHz, the former avoiding the number of the beast).

Barrett was short on details of the long-anticipated 64bit Merced, due to ship next summer and clocking a likely 1GHz, but gave a first public demonstration of the silicon. It was shown briefly running 64bit Windows and Apache server under Linux, which sadly gave little indication of

what 64bit Intel Architecture (IA-64) will be capable of – that will happen only with applications optimised for running 64bit native.

One of the IA-64 team said 32bit apps which made plenty of disk and memory calls could benefit greatly from running on IA-64 and a 64bit operating system. Otherwise Intel played down IA-64 as a 32bit replacement and seemed keen to position it for servers and serious business (although when I said I'd buy one if it ran Photoshop and Quake faster than a PIII, our IA-64 man looked happier than he had all night).

Pat Gelsinger demonstrated an 800MHz PIII, and mocked alternatives which need additional cooling. This was a bit unfair on AMD, as Intel's 800MHz PIII is a 0.18 micron part with no shipping date or price.

Gelsinger described the PalmPilot as the only successful non-PC IT product, and claimed the PC would continue to be the best

Internet-access platform. Pressed on the subject, mainly by Europeans, he totally dismissed games consoles and mobile phones as a threat.

(I'd agree they are far from competing with the richness of the PC experience, but among connected devices in Europe they outnumber the PC by four to one. People are satisfied with the basic cashpoint interface and would be more than happy to see it transferred to mobile phones for making similar transactions.)

I asked Gelsinger how he felt about overclocked and multi-processed Celerons (*PCW*, October, p58). He replied that Intel designed and guaranteed products for a specific environment, but customers were free to do what they liked with them. 'You could prop a truck up with a Celeron if you wanted,' he said.

He also said the launch of 0.18 micron PIIIs increases the gap between PIIIs and Celerons, the performance of which are currently close.

GORDON LAING

▲ CRAIG BARRETT – HIS REPUTATION PRECEDES HIM, AND DECEIVED US

Geyserville kicks in at 600MHz

Frank Spindler, Intel's director of mobile marketing and all-round nice guy, said the first mobile Pentium IIIs (using the fine 0.18 process debuted in the 400MHz mobile PII) are imminent. They will launch at 500MHz rather than matching the fastest desktop chips.

Battery-saving Geyserville technology won't be included until the 600MHz Mobile PIII arrives in the new year – because that's the speed at which it starts to become effective, according to Spindler. We suspected the technology had been delayed.

Current mobile processors can double battery life by dropping clock speed from 500MHz to 250MHz – but they also cut performance by half. Geyserville allows the supply voltage to be dropped, and as power drain varies by the square of the voltage, a

small drop results in big savings. Intel claims up to 40 per cent less power is needed, with little reduction in performance. Geyserville chips can match desktop performance when connected to the mains, but give a good innings under battery power.

S3 Savages mobiles

3Dfx and Nvidia (with its new G-Force 256-bit chipset) seemed totally focused on maximising desktop PC performance. However, this leaves mobile gamers siding with S3's new Savage Mobile chipset, which drew envious looks from passing ATi developers.

The Savage Mobile, with optional 4-16MB on-die memory, looked very impressive in Quake and motion-compensated DVD playback.

But a greedy ProAGP graphics card on a proposed IA-64 machine actually required its own power supply, making the future look grim for high performance mobile graphics chipsets.

Faster USB threatens 1394

A question mark hangs over the future of 1394 as a fast mainstream PC link following a further boost in the specification for the next-generation USB link. The speed of the Intel-backed USB 2.0 spec has been increased twice this year – first to a maximum 240Mbit/sec, and lately to a speed of between 360 to 480Mbit/sec.

There is headroom in the cabling for speeds as high as 500Mbit/sec according to the USB 2.0 Group at the Intel Developers Forum, where the new spec was announced.

The compares with the current 400Mbit/sec of the non-Intel FireWire port, aka IEEE 1394. So could USB 2.0 be playing a numbers game?

High speed interfaces such as USB 2.0 have to be located carefully on motherboards, although the Group does not expect it to cost more than current USB ports. It also claims USB 2.0 is both backwards and forwards compatible with USB 1.1: that is 2.0 peripherals will work, albeit more slowly, on 1.1 ports; and 1.1 peripherals can be mixed with 2.0 units without perceptibly slowing the USB 2.0 bus.

This kind of functionality has taken the SCSI world years to achieve, although the USB 2.0 group is confident it can deliver systems and peripherals during the second half of next year.

Other developers believed USB 2.0 could be as long as two years away. The main sceptics were none other than the 1394 Trade Association, huddled in the corner of the show pavilion with the appearance of a small army making a last stand. They claimed that by the time USB 2.0 arrived, 1394 would have rates of 1.6Gbit/sec – although it has to be said that projected increases to 800Mbit/sec and 1.6Gbit/sec have been a long time coming.

Firewire's unique selling point is that it is a peer to peer interface which, unlike USB, does not require a PC or Mac to host the bus. However, apart from a new Asus P3B motherboard and Gateway notebook with built-in FireWire, the 1394 TA wasn't showing anything other than

the same old DV Camcorder-to-PC digital-editing suite.

Another sign of how the wind was blowing was in the design of 'concept PCs'– ideas for models of the future (see below). Common to these were drives and devices housed in small boxes which could hot-slot in and out of large sockets as required; let's call them devices which sit in bays. These bays used only USB links; unlike the original Device Bay specification, which employed both USB and 1394.

Intel claims it's up to the market to vote for its preferred technology. However, I left the forum with a feeling that we may not see much of 1394 outside of Apple Macs and DV Camcorders.

Cooking up PCs for the kitchen

Intel showed off numerous concept PC designs, most of them small and aimed at traditionally IT-free regions of the home. There was the Vesta splash-proof kitchen PC, the Magic Bean's Kids platform and even Sozo Design's Ottoman foot-stool cushion PC.

All used the new compact FlexATX motherboards which measure just 9 x 7in. Cape Blanco's concept FlexATX motherboard featured a right-angled AGP slot to reduce volume further.

All new boards housed socketed Pentium III processors, and some pre-printed literature described them as using the Socket 370. This is the very same Socket 370 used by current socketed

Celerons, so a current motherboard with a BX, 810 or 820 chipset should in theory be able to run future socketed PIIIs.

Bluetooth radio technology, designed to get small devices talking to each other, was much mentioned, but little demonstrated. However, we could ask questions about infra-red and competing radio technologies.

An IrDA representative urged notebook

developers to continue fitting IR to their portables, citing higher speeds than radio and describing line of sight as a security benefit. During an enormously technical presentation, the effects of Bluetooth, IEEE-802.11 wireless ethernet and Home RF all working in the same room were discussed. Fortunately it would appear that short packet lengths and frequency-hopping allow all three to share the same space with only a slight reduction in overall bandwidth (known as graceful degradation).
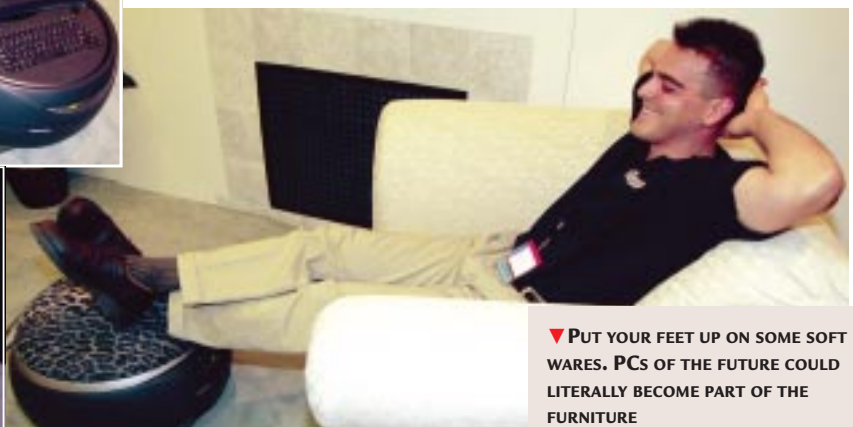
▼ **PUT YOUR FEET UP ON SOME SOFT WARES. PCS OF THE FUTURE COULD LITERALLY BECOME PART OF THE FURNITURE**

The second coming

Tim Bajarin reports on Sony's PlayStation 2, a possible Trojan Horse for digital entertainment.

Last month I visited Tokyo for a week and had the opportunity to spend some time with top Sony executives, including chairman Nobuyuki Idei and Ken Kutaragi, who is in charge of PlayStation 2.

The first Sony PlayStation had yet to reach the market the last time I visited the company in Japan more than five years ago. Since then Sony has sold more than 60 million PlayStations worldwide, making it king of the gaming world. It has also entered the desktop PC market (although not in Europe) and came from nowhere to gain 50 per cent of Japan's retail laptop market with its Vaio range. Sony is becoming a force to reckon with in three contexts:

■ A new Digital Studio line of Vaio desktops aims at the creative consumer market by packing high-end video and audio-editing features. This has gone down well with US power users who are starting to take advantage of the latest digital still and video cameras.

■ The Vaio 505 ultralight laptop forced rivals to come out with imitations. Sony has followed the success with its new line of A4 laptops, using a clever hinge that increases airflow to help cool fast PII and PIII chips.

■ The forthcoming PlayStation 2 has the potential to become the central control for digital entertainment in the living room and could morph into a critical component of the digital home of the future.

The PlayStation 2, besides having an amazing processor and graphics engine, has a great deal of expansion capability and should not just be considered a dedicated games machine. The media format used is DVD, so right away the unit can double as a DVD video player and CD audio player.

PlayStation 2 also includes two PC card and two memory card slots, as well as optical digital output, two USB ports, one IEEE 1394 FireWire port and two controller ports. A third-party vendor can thus create a browser, bundle it with a PC card modem, and turn the PlayStation 2 into a web-access device.

A cable modem with an IEEE 1394 link could also connect the PlayStation 2 to the Internet as well as to cable programming. And don't forget the two USB ports. Third-party vendors can now provide printers, scanners, and a whole host of other USB peripherals with the PlayStation 2, making it a very versatile digital entertainment system.

It could be the Trojan Horse that gets digital technology into the home, a task many believe will be performed by the digital set-top box or cable modem. But these cannot serve so many needs within the home entertainment system.

Sony will not have this space to itself. Sega's Dreamcast console has already set the game world buzzing, but it is limited by a lack of I/O

ports for expansion.

I expected Nintendo to go to school on PlayStation 2 and try and make a version just as versatile. Of course, it will have to give up its proprietary cartridge model if it wants to really take a shot; but as it will not have a system out until late 2000 at the earliest, it has some time left to deal with this opportunity.

Looming in the wings is the rumoured 'game' system from Microsoft, said to be similar to the PlayStation 2, especially in expansion capability. This is ironic as Microsoft provided the base operating system for the Dreamcast.

Microsoft sees the game element as key to any home digital-entertainment system, so the rumours make sense. Details are scarce, but sources say that the new system will have Web TV at its centre. Like Sony's PlayStation 2, it will use the DVD media format.

As you can see from all the new activity in the gaming space, this is quickly becoming the real battlefield for consumer attention within the home. And, while Sony appears to have hit the sweet spot with its PlayStation 2 system, competition from Sega, Nintendo and Microsoft should make this home computing war very interesting in the days to come.

Quark takes a stroll down the avenue

**A belated Quark add-on should consolidate XML as the global file format. Clive Akass reports**

Quark, the Microsoft of professional desktop publishing, has taken a belated step towards fully integrating traditional print into the world of interactive electronic media. It comes in the form of avenue.quark, an add-on to QuarkXPress, the package used (on both Macs and PCs) to publish most of the newspapers and magazines in Britain.

The add-on (or Xtension, in Mac terminology) translates Quark pages into eXtended Markup Language (XML) – which is taking over many tasks from the related, but more limited, web page description language HTML.

This may appear to be a fairly trivial task, but it has far-reaching ramifications and finally addresses a major problem that has faced print publications since the dawn of the web boom five years ago – how do you extract information from Quark pages for republishing on the web?

A bigger question is why Quark has not done it (or something like it) before? Quark freely admits to having been slow to latch on to the web, but points out that so was its biggest rival, Adobe.

However, Adobe did move fast when it spotted the trend, and quickly bought out a range of web products. One reason for Adobe's reaction could have been that it was not so locked into traditional

▲ CONVERTING PAGES FROM QUARKXPRESS INTO XML WILL ALLOW THEM TO BE REPUBLISHED ON THE WEB
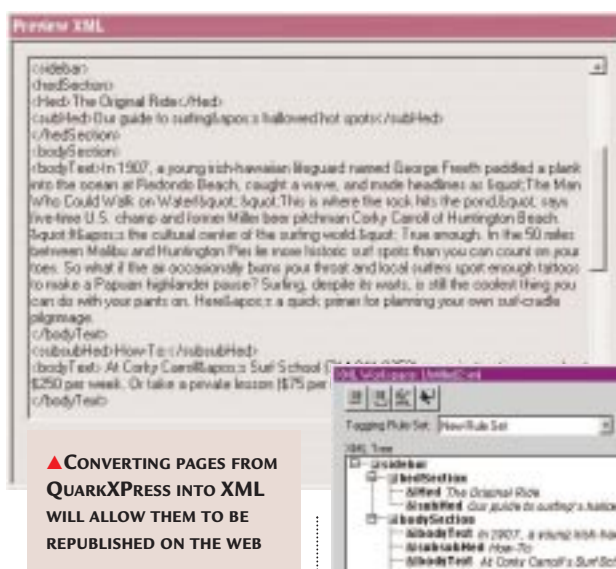
print. Its flagship product, PageMaker – a direct descendant of the first graphical publishing package – was widely used for in-house and other small-scale publications, but had long ceded the mass-publishing market to XPress. This wasn't necessarily because Quark software was better. The industry simply gravitated to XPress for much the same reason it gravitated to PC architecture and Microsoft's operating systems: it needed some kind of standard.

This should have given Quark a commanding position when the need arose for web publishing packages. There seemed no reason why it should not simply adapt XPress, allowing its users to extend their existing skills to the web.

Yet Quark Immedia, which aims to do just that, didn't come out until two years ago, by which time it was too late. Immedia, now in release 1.5, has hardly taken the world by storm, and Quark has no plans to develop it further. Instead, Immedia features will be incorporated into future versions of QuarkXPress (see boxout).

Quark has partly been a victim of its early success. So many publications have so much invested in its software that it has a virtual monopoly. No company facing the full force of competition could have gotten away with being so slow to adapt to change.

However, Quark does seem to have finally developed a sensible web roadmap, on which avenue.quark is merely an early milepost. But users are still left with the problem of what to do with the XML files.

As a short-term solution Quark has worked with Vignette to integrate avenue with its StoryTeller system, for automatic republishing on the web.

Quark will follow up with facilities for creating web page templates and flowing XML files into them. Then the next stage will be to integrate this automatic re-publication system with web servers.

But all this is transition software, adapting the old to the new, and for the long-term it really needs to be turned on its head. All of the big publishers are now multi-platform publishers, formatting the same material in several different ways – including having to format for the various display sizes found on the web. Therefore, XML, which is designed for just this purpose, is a more efficient starting point than the printed page.

So Quark, which sits on the World Wide Web Consortium's XML committee, will have to make the avenue.quark process bi-directional, allowing XPress to interpret XML files.

XML will become a defacto standard Quark file format, just as Microsoft Word has adopted HTML. This is bound to consolidate XML as the global information file format, which means that virtually all publishing will essentially become XML publishing.

Avenue.quark is expected to ship next spring. Details can be found at *www.quark.com*.

Future versions of QuarkXPress will export pages as HTML, says the company. This means full HTML support, with the page designed as much as possible in HTML. But many DTP packages that claim such support just add basic HTML tags, with no attempt to match the page design. The export will also support advanced features like wrapping text to a curve – but as HTML can't cope with such trickery, the result will be used in the form of a JPEG picture file.

BT offers freephone net PC deal

British Telecom is offering customers a PC and Internet-access package for just under 90p a day, over three years. The deal includes unlimited freephone Internet access at weekends.

The package, a joint venture with Fujitsu, costs £25.99 (inc VAT) a month. Access via BT Internet normally costs £11.75 per month so

customers will effectively be paying £16.24 a month hire purchase for a 400MHz Celeron-based Fujitsu PC, local-rate support lines and home delivery.

The deal is targeted at novices and includes installation by a Fujitsu engineer who will offer a free tutorial. However, there is no trial period and the deal

is covered by the same rules as a loan agreement – if broken the remainder of payments have to be made plus two months interest. Over three years the package costs £935.64.

'We did not feel a trial period was necessary as there is now enough on the Internet to keep any family happy,' explained a spokesperson for

BT. 'Plus we are not just selling Internet access here, the PC today is capable of much more, including games and office applications.'

BT said it plans to build in some kind of upgradeability so customers are not stuck with out-of-date technology.
Details on 0800 800 001 or www.btinternet.net

JAN HOWELLS

Brilliant boxes

It seems the days of 'you can have any colour PC, so long as it is beige' have long gone. You can thank Steve Jobs for starting the trend with those flashy new Apples, but now other vendors are getting in on the act.

Dan Technology's new PCs come in a choice of shades, including Aubergine, Aquamarine and Grenadine. Prices (ex VAT) range from £747 for a Celeron 466-based Xplora Plus to £1,119 for a 500MHz PIII Home Studio.
Dan Technology 0181 830 1100

Powerline data plans get short circuited

A plan to use powerlines for fast data delivery has been scrapped in the face of emerging competition from ADSL and cable links.

Nortel and United Utilities created a joint venture called Norweb to exploit what it called Digital Powerline Technology (DPL). This pumps a high-frequency carrier wave down lines carrying low-frequency AC power.

Norweb hoped DPL would provide homes with Internet access at around 1Mbit/sec – 10 times faster than ISDN, but slower than ADSL's 1.5Mbit/sec. It believed costs would be lower because the mains network is already in place.

However, after three years of development, the investors concluded that the market had changed to an extent that did not justify the costs.

Nick Gibson, Internet analyst at Durclacher, said 'The economics just weren't right in what will become the highly-competitive consumer broadband market.'

DPL was criticised when it was first announced as being a likely cause of radio interference. There were reports of street lamps in DPL trial areas turning into radio

transmitters, amateur radio buffs feared their bands would be swamped and the government's Radio Communications Agency was concerned about problems with military and emergency services.

Norweb dismissed these fears and insisted the decision to scrap the project was taken purely on commercial grounds.

'The product worked. We proved there was no interference,' said marketing manager Jane London. 'We conducted various trials with power utilities in Europe, so we proved the technology works, but it was perceived by the parent companies as too niche to make money out of,' she explained.

ANGELA SOANE

Microsoft gears up for a direct hit

Microsoft has released its DirectX7 programming interface, which is designed to help developers of games and other applications to use advanced 3D graphics and sound effects, as well as giving a significant performance boost.

According to Microsoft, DirectX7 produces faster code, which means it boosts application performance by up to 20 per cent over DirectX6.1.

Notably there is increased support for dedicated 3D accelerators, which free the main processor to do other calculations. It supports environment mapping for visual effects, such as reflections in water or light passing through a stained-glass window.

And for the first time DirectX is open to Visual Basic developers, who are provided with sample code and helper controls.
The DirectX7 kit can be ordered from www.microsoft. com/directx/developer/downloads/default.asp.

Scare wars: episode Y2K

Predictions of patent-pending, demo viruses dismissed as hot air.

Anti-virus software vendors, who have a long history of slanging matches, have been at each other's throats again – this time over allegations of scaremongering.

UK-based Sophos accused arch-rivals Symantec and Network Associates of hyping the threat from rogue code. It cited a claim by Symantec's chief researcher that up to 200,000 new viruses might be written especially for the millennium.

Sophos said confusing statements from anti-virus companies trivialised the problem and damaged the credibility of the industry at a time when many businesses were deeply concerned about the date-change issue.

Graham Cluley, Sophos' senior technology consultant, commented: 'Predictions of this type are unhelpful. We are surprised to see anti-virus companies trying to capitalise on Y2K worries.'

Sophos accused Network Associates of warning on its website of the threat from viruses that are not in the wild and are never likely to be. (Some viruses are developed and stored as proof of

A virus has been attached to hoax emails purporting to come from support@microsoft.com, Microsoft says. It warns that the file called Y2Kcount.exe should not be opened.

Separately, Network Associates said it has placed a medium risk assessment on the Suppl Word macro virus that has been posted to 25 alt.sex newsgroups.

concept. The original macro virus appeared to have been just such a demonstration, but 'escaped' to become one of the fastest-spreading ever.)

Symantec's technical director Kevin Street said its research chief's comments had been taken out of context. 'What he meant was that there could be between one and 20,000 new viruses, but the numbers aren't what matter. What matters is that we are prepared.'

He added: 'There will be a great temptation for virus writers to write the first Y2K virus to get the attention.'

David Emms, product manager at Network Associates, said information was posted on its website 'because people are concerned'.

He added: 'We don't know exactly what the numbers of viruses will be yet, but it is most likely that virus writers will tack on to Y2K because of the date.'

JO PETTIT

Tough and ready

Panasonic has hardwired GSM radio into its latest rugged notebook, adding further evidence that wireless links are starting to supersede the plug-in modem. The ToughBook 27, designed in conjunction with Vodafone, is the newest member of a range designed to withstand rough handling.

A 226 MMX-based version with a 4GB hard drive, 32MB of RAM, and a 12.1in TFT colour screen costs £3,699, including a three-year warranty.
Panasonic 0500 404041

IBM ponders Linux port to IA-64

IBM has refused to confirm speculation that it will join a consortium porting Linux to Intel's emerging 64bit architecture (IA-64).

HP, SGI, Intel and Cygnus are among those working on the Trillian project to make the open source code available when Merced launches next year. IBM, SCO and Sequent are working on a common version of Unix for IA-64.

Jonathan Prial, director of integrated solutions and Linux marketing for IBM, said that the two projects were targeting different markets and he refused to give a date when IBM would join Trillian. But he reiterated 'IBM's commitment to complete Linux solutions', suggesting that IBM may join Trillian.

Andy Butler, Gartner Group analyst, said: 'The maximum market opportunity for Linux is and will be on Intel. Linux delivers the most reliable operating system on Intel.'

LISA KELLY VNU NEWSWIRE