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TechNews is a technology, news and analysis service aimed at those in the education sector keen to stay informed about technology developments, trends and issues. Please navigate the newsletter by clicking on items within the table of contents.

Networking and wireless

Analysis: Fibre to the home

Currently the most common Wide Area Network (WAN) solution is ADSL which is delivered over existing copper telephone lines. Broadband wireless solutions, such as WiMAX, will offer links across cites and towns. However, as broadband moves to becoming a data pipe providing a variety of services including web, email, video conferencing, gaming, voice and video/TV, current provision looks increasingly inadequate for long term needs.

BT, other telcos and the cable network providers all use fibre optic technology, using glass fibre cables to transmit digital data as light, between their exchanges and concentrators. This gives very high speed backbone networks, but most connections to buildings are still copper. Cable networks often have shorter distances of copper between a premises and the fibre optic backbone as they use large numbers of small cabinets rather than BT's smaller number of large exchanges.

The length of copper connection has an effect on the speed of network that can be delivered across it. Technologies such as xDSL are distance dependent and the longer the length of copper cable the lower the available speed. This last mile is normally the limiting factor in a network. The solution is to reduce the length of copper involved in the link either through taking fibre direct to each home or to deploy more curb side boxes that terminate fibre much closer. This first approach is called Fibre to the Home (FTTH) and the second Fibre to the Curb (FTTC).

Some schools already have fibre to the premises (FTTP), but there is a significant cost to install the cables. Telecommunications companies hope that this is a one-time cost as fibre can offer very high capacity and ducting that is used to contain cables can take a high volume of individual fibres.

There are two main types of fibre optic technology that use infrared light to transmit data at around 200,000 km/s. These are single-mode and multi-mode fibres. Single mode fibre uses narrow fibre to send a single path of light along it. Current systems will deliver a bandwidth of 40Gbps over 80km. Multimode fibres can have many paths over a wider fibre and can carry more power, but are restricted in range (10Gbps over 300m). It is possible to use different wavelengths of light in a single path to multiply the amount of data carried. This is called Wavelength-Division Multiplexing (WDM) and current products use this to deliver up to 160 different wavelengths on the same fibre with a maximum bandwidth of 1.6Tbps. Technology is also continually improving and performance is expected to increase further. Signals on a fibre can be maintained during their travels using optical repeaters, which effectively receive then retransmit signals; and optical amplifiers that regenerate signals. The latter are now more common.

Services carried over fibre to end users can either be active or passive. Active connections use powered equipment, similar to a network switch, placed in each neighbourhood to switch only a single customer’s traffic over a line. Passive equipment keeps the powered equipment closer to the centre and, similar to a

network hub, sends traffic to all customers. This approach relies on overcapacity in the technology to give enough bandwidth to all and encryption to prevent eavesdropping. Passive technologies, such as EPON (Ethernet PON) and GPON (Gigabit PON) are standards defined by IEEE and offer between 1Gbps and 2Gbps symmetric bandwidth.

Even the most excitable futurologists are not predicting a need for 1.6Tbps to the home any time now, but many commentators believe that the growth of interactive services and high definition video streams will increase the demand on the last mile of networks. Consumer quality HDTV channels currently will use between 6-12Mbps when compressed with the MPEG-4 standard: a household with two HD televisions plus 2 PCs and IP-based telephone system could easily use 50-100Mbps. More and more devices in the home and institutions are likely to become connected and new bandwidth intensive services continue to appear.

France Telecom is trialling Fibre to the Home in areas of Paris and is offering a flat rate package for €70 per month that offers unlimited telephone, television and broadband. This "three-play" offering is becoming popular around the world, but bandwidth is often a restriction. Faster xDSL connections, such as ADSL2+ or VDSL may help in the short term, but their faster speeds are only available over short distances from the exchange.

Many analysts believe that a move to fibre connections to (or close to) the home is necessary. However, this would involve a massive investment which could take decades to payback, making it difficult for companies to commit to at present. Currently, parts of NE England are looking to do a large scale install of FTTH. The Digital Region project involves a number of councils and is seeking to use broadband developments to stimulate economic development. Planning on a slightly longer scale, but in a similar direction can also be found in Somerset.
http://www.presence-pc.com/actualite/ftth-experience-18331/
http://www.digitalregion.co.uk/index.html
http://www.ispreview.co.uk/cgi-bin/news/viewnews.cgi?id=EEVpkZEFkZjtgJlozs

It is possible to use the benefits of fibre without the expense of providing individual connections to homes. In many countries fibre is now being extended from the local exchange to curb-side cabinets. Bringing the high speed network this close means that the run to the customer premises is short enough to use very high speed DSL links such as VDSL.

Far Eastern countries, encouraged by government incentives, are currently the fastest developing markets for fibre deployments and have demonstrated how with high volume, the deployment costs can drop. Japan, which is expected to have 30 million fibre subscribers by 2010, currently enjoys install prices between $600 and $1000 down from $6500 a few years ago. However, the population densities and environment in the Far East can be very different from in Europe. For example, in Japan aerial deployment of fibre is common, which avoids the costs of digging up roads. http://fibers.org/articles/news/7/12/5/1

No other network technology comes close to the bandwidth performance of fibre optic cable. It seems likely that to retain long term economic competitiveness fibre deployments will need to increase. However, while there is no real dispute over 'if' there is a big question over 'when' and how it will be funded. The UK and the US share the concept of Universal Service Obligation where companies must deliver a minimum suite of services to all customers, but it will be many years before fibre is part of this.

Networking and wireless news

WiMAX update

Pipex Wireless plans to use the national licence it owns to roll out WiMAX wireless broadband services across the UK's most densely populated areas over the next few years, starting with London and Manchester. The company has carried out successful trials in Stratford-Upon-Avon where the service offered speeds of 2Mbps in both directions indoors up to 1.2km from the antenna; and 4Mbps in both directions using an external antenna up to 6km. Pipex claims to be planning a large scale six to nine month trial to test how the systems manage under stress. The other UK licence with suitable WiMAX spectrum is owned by Hong Kong-based telco PCCW. WiMAX is a next-generation wireless networking technology that is expected to offer DSL-like speeds over a wide area.
http://www.pipexgroup.com/pg.asp?pressrelease

In the US the telco Sprint has announced it will be rolling out a $3bn WiMAX network to 100 million Americans by 2008. The company sees this technology as a foundation for next generation broadband services including mobile internet access and video on demand. This is partly based on the assumption that WiMAX chipsets will continue to shrink and by 2008 be found in mobile telephone handsets.
http://www2.sprint.com/mr/news_dtl.do?id=12960

Intel has announced the Rosedale 2 chip which offers support for fixed and mobile WiMAX (802.16-2004 and 802.16e-2005). Intel provides wireless chips for a number of manufacturers, not just its own brand equipment. The chip should be launched at the end of this year.
http://www.intel.com/network/connectivity/products/wireless/prowireless_5116.htm

Wi-Fi Alliance to ratify pre-standard 802.11n

The Wi-Fi Alliance has announced that it intends certifying pre-standard 802.11n equipment for interoperability in the first half of 2007, before the standard is expected to be fully ratified by the IEEE in 2008. This is an unusual move, but comes as manufacturers are releasing a variety of 'pre 802.11n' devices to market. Although the Wi-Fi Alliance will use the yet to be agreed second draft of 802.11n, there are no guarantees of future compatibility with the final standard. This could produce a confusing situation where users are eventually faced with "pre-standard uncertified"; "pre-standard certified" and "standard and certified" equipment. 802.11n

is a standard for faster Wi-Fi networks, allowing for real world speeds greater than 100Mbps.
http://news.com.com/2100-7351_3-6110366.html?part=rss&tag=6110366&subj=news

Wi-Fi protected set up announced

Wi-Fi networks have a number of different security options including complex authentication and encryption protocols. The Wi-Fi Alliance has announced a program to develop a certification scheme called Wi-Fi Protected Setup. This scheme will result in a standardised security setup process for all kinds of devices that will promote understanding and ease of implementation. This should make it easier for consumers to implement the right level of security for their environment.
http://wi-fi.org/news/pressrelease-081606-WiFiProtectedSetup/en/

Norwich free city-wide Wi-Fi

Norfolk County Council and the East of England Development Agency have started an 18 month trial offering free wireless internet access across a large area of Norwich city. The Norfolk Open Link network, built using a mesh approach, will offer 256kbps to the public and 1Mbps to council workers. Public utility infrastructure, such as lamp posts and council buildings, are being used to host transmitters that communicate wirelessly to each other to provide resilience and easy deployment. The network is hoped to raise the profile of the city and stimulate high-tech growth without competing with private sector wireless services.
http://www.norfolkopenlink.com/

Integrated LAN and WLAN management

A new range of equipment has been launched that integrates 802.3 (wired) and 802.11 (wireless) networks in a single switch. These work by using access points that hand over all management of the traffic and routing to a connected wired switch. Switch-based wireless networks have been around for some time, but this is the first product to offer a fully integrated single point of management for both types of network. This allows for a more holistic view of the network by the switch and encourages better management and the use of port based authentication.
http://www.nexthop.com/news/press_archive/20060510.html

Mobile Broadband - HSDPA update

As of mid-2006 the UK is starting to benefit from High-Speed Downlink Packet Access (HSDPA) services and devices from a number of mobile providers. This technology, sometimes referred to as 3.5G, can theoretically offer speeds of up to 14.4Mbps (download) though services are initially restricted to 1.8Mbps. All 5 UK operators intend to offer the service by late 2006, however coverage will be limited. T-Mobile and Vodafone are both offering laptop cards and this is likely to also be the approach of the other companies. Vodafone has also partnered with Dell, HP and Lenovo to incorporate the appropriate hardware in laptops. This approach is likely to encourage adoption through ease of deployment and activation. Vodafone are also set to offer a hardware router that uses HSDPA.
http://www.theregister.co.uk/2006/06/20/vodafone_hsdpa_data_cards/

http://www.vodafone.com
http://www.t-mobilepressoffice.co.uk/press/uk/2006/20.06.06-HSDPA_launch.htm
http://www.3g.co.uk/PR/June2006/3240.htm
http://news.zdnet.co.uk/0,39020330,39280766,00.htm

10Gbps Ethernet over copper

The IEEE has approved a new standard for 10Gbps networking over copper cable (IEEE 802.3an-2006). This technology is expected to be initially used for backplane links between servers. 10GBase-T requires higher quality copper cable to deliver services at this higher speed (up to 100m). As a result cabling vendors have set out a new specification TIA/EIA-568 Addendum 10 to create Category 6A cables. Some suppliers are already selling pre-6A standard cable that they expect to meet the final standard.
http://www.techworld.com/networking/features/index.cfm?featureid=2752

RFID update

Applications for RFID chips continue to emerge. RFID (Radio Frequency Identification) tags work as mobile electronic barcodes that respond with information when scanned. Philips has produced chips with a security extension. This extension helps both control access to information and the ability to change data on a chip. The manufacturer claims that even with the extra work involved in processing this information, up to 200 chips can be read per second. One suggested application is in a library. Using this technology the tag could securely store the current borrower information. Such information would be concealed from unauthorised interrogators but would be a useful backup to centralised data systems.
http://www.rfidjournal.com/article/articleview/2459/1/1/

First large scale IPv6 networks

China and India hope to steal a march on the western world with large scale production networks running IPv6 – the next generation of internet protocol. These two countries have signed a memorandum of understanding to share knowledge and experiences as networks are rolled out. The nations see fast efficient modern networks as catalysts for economic growth.
http://www.moneycontrol.com/india/news/technology/ipv6networkchina/ipv6indiachinatoshowway/market/stocks/article/235046
The US Federal Government has mandated that all agencies will move to IPv6 by June 2008, a move that is likely to stimulate wider adoption and development amongst other parties. Some companies are concerned about the costs of upgrading hardware but consultants are suggesting that roughly 20% of the total cost of migration will be on new hardware and the rest will go on people and services.
http://www.washingtontechnology.com/news/21_15/cover-stories/29062-1.html

Broadband take up in the UK

The Omnibus survey from the UK government's Office for National Statistics states that at the end of June 2006 some 14.3m households were connected to the internet and 69% of these (9.87m households) had broadband. In terms of the total number

of UK households this means that 40% of households have broadband. The South East has the highest level of internet connections and Scotland has the least.
http://media.guardian.co.uk/site/story/0,,1856531,00.html
A number of media companies are encouraging customers to buy "three-play" or "four-play" bundled services. In addition to previously reported takeovers and mergers, Wanadoo and Orange are merging their operations under the Orange brand and all the media companies are offering free or discounted bundles. For example Sky and Orange are both offering ‘free’ broadband to their customers. The drive continues towards "three-play" of internet, digital television and fixed line telephony and "four-play" that adds mobile telephony to this package.
http://www.voipnow.org/2006/04/forget_three_pl.html

Multimedia

Analysis: online video

Faster broadband and inexpensive storage has allowed the downloading and sharing of video content to become a major internet phenomenon. This mirrors the huge growth in online digital music and many portable media players, such as the iPod, now support video playback.

The internet has fuelled the development of a range of technologies and approaches to storing and delivering video. Modern computers have the processing power to handle processor intensive codecs, which have improved the quality and file size of online video. Video is either "streamed" or "downloaded" to a computer. The former delivers the data of the file sequentially so the viewer can start watching before the whole file is downloaded; whereas downloaded files must be received in full before they can be watched. Streaming video used to require a special server but many modern clients can start playing files before they have been completely received with no special server set-up.

Video on PCs normally consists of a container format and a codec. The container format packages and organises multimedia data in a file, but the data itself is digitised and compressed according to the codec used. For example, AVI is a container format first introduced in 1992 and can contain video that is encoded using formats such as MPEG-4, DivX, and Real Video. Some container formats are more efficient than others.

The growth of broadband, new video formats and inexpensive, easy to use digital video equipment, has led to a massive increase in online video sharing and user created content. Sites such as YouTube and Google Video encourage users to upload video files. These files are then converted into a small online format, tagged with metadata and made available to the world. Web publishing gave writers and image makers a world wide audience; these sites do the same for video. YouTube currently has 100 million downloads a day.

However, such sites also commonly host copyrighted and offensive/obscene material. This poses a problem for educational institutions where students may be

storing this material on school servers and using it in their work. Some copyrighted content owners see these services as a threat, whereas others are actively using them to market their products. It is important to have suitable controls in place and to educate users about appropriate access and use of these materials.

Video upload support has become much more common and has been adopted by sites such as MySpace in response to the popularity of YouTube. There are a number of different revenue models. Most of these sharing sites are supported by advertising and some, like Google Video, also sell content. Portable video players, such as the iPod video and the Sony PSP have further developed the market for commercial downloads of material such as TV shows and movies. Many traditional broadcasters such as the BBC, Channel 4 and Sky are offering content over the internet and BT and others will soon be offering IPTV services via set top boxes. By removing the need for the PC, the market for video delivered over the internet is likely to increase, but download times for high quality content remain relatively long.

Video downloads concern network managers. The sheer amount of bandwidth that could be consumed by video can lead to congested networks and storage at the cost of other, more 'business critical' applications. Suppliers of video material have the same problem and some commentators estimate YouTube's bandwidth bill to be in the region of $1m per month.

These demands have led to the developments of alternative business and delivery models. The television company Sky has launched a broadband delivery service for movies and other programming. Rather than use a more traditional central download store (or similar centralised distribution) this service uses peer to peer technology. This means that each subscriber becomes a node on a distribution network that reduces the load on the centre. The BBC has trialled a similar system.

Online delivery of television and video is likely to revolutionise our leisure time and lead to true on demand scheduling and personalised viewing. The potential gain for education, as has been demonstrated with the British Pathe archive, is significant. Professional development can also benefit from on-demand viewing of, for example, Teachers TV. As more classrooms have high quality projectors and interactive whiteboards, integrating video into lessons has become more practical. When teachers have the right tools to discover appropriate content, video can be of great benefit, illustrating points, adding variety and motivating students. Students can also find opportunities for creative use of video clips, remixing clips to create new content, sampling and creating/sharing their own content.

Video is however not without cost. Network connections to both suppliers and viewers may need to be expanded in order to cope with widespread use and offer traffic shaping to ensure that time-critical applications are not ruined by congestion. Large local libraries of video, as might be developed by a local authority or school will require large amounts of storage and bandwidth. All this is an example of how 'free content' does not necessarily mean 'free implementation'.

Multimedia news

Internet use overtakes TV viewing

A poll conducted by YouGov, combined with data collected by Ofcom, suggest that users of the internet in the UK spend an average of 23 hours per week online, compared to only 19 hours per week watching television. The research suggests that online gaming, video streaming and IP telephony are popular activities, but that old favourites such as online banking, shopping and email still play a significant part.
http://www.theregister.co.uk/2006/08/08/net_use_uk/

Digital TV

Hot on the heels of the announcement that more households in the UK have the digital Freeview service than traditional analogue TV, analysts Datamonitor predict that by 2010 around 95% of households will have at least one Digital TV service (Freeview, Sky satellite or ntl:/Telewest cable). This estimate would place the UK at the forefront of world adoption, with the US in second place at 66% and Germany leading the rest of Europe with 50%. Currently 70% of UK viewers have Digital TV compared with the US at 55%, but no other European country has more than 50% digital viewers. The UK will have no analogue TV by 2012 and the first town to lose this signal will be Whitehaven in Cumbria in 2007. Many countries will soon benefit from IPTV where TV signals are distributed over IP-based broadband infrastructure as an alternative to the traditional broadcast approach. France in particular is expected to deploy this widely and many companies in the UK, including BT, are expected to offer services soon.
http://www.electronicsweekly.com/Articles/2006/08/23/39531/Digital+TV+big+in+UK+but+France+switches+on+IPTV.htm

Next Generation DVD format update

Releases of players, PC drives and content on the next-generation optical disc formats continue. Plextor has announced a $1000 Blu-ray Disc drive for PCs that can read and write 25GB and 50GB discs. Sony and Pioneer are amongst those already offering internal PC drives at roughly equivalent price points. Increased market demand is expected to reduce the price of this equipment.
http://tomshardware.co.uk/2006/08/28/plextor_blu_ray/
Hollywood studio support seems to be swinging in favour of Blu-Ray Disc despite it not being first to market. A number of studios announced support for Blu-Ray with a 75 film line-up though two studios will also be releasing content on HD-DVD. One major studio, Universal, is still not planning to support Blu-Ray at all.
http://www.pcpro.co.uk/news/92727/hollywood-accelerating-towards-bluray.html
Hardware is expected to continue to be an issue with both next generation formats. Some analysts suggest that parts shortages will keep stocks of players low and prices high in the short term. TDK have launched 50GB Blu-Ray discs and has announced prototypes that will store 100GB and 200GB.
http://www.tdk.com/procommon/press/article.asp?site=corp&recid=128
http://www.tdk.com/procommon/press/article.asp?site=corp&recid=127

Rise in video download services

Few areas of the internet are growing as fast as video download services. The growth of broadband and the relatively low cost of bandwidth compared to a few years ago have fed this growth. Google Video and YouTube continue to offer viewable material of varying sources and quality. Traditional broadcasters such as the BBC, Channel 4 and Sky are proposing the use of broadband to provide alternative access routes to their content; Apple offers shows through iTunes and Amazon.com has launched a video download store to complement its other services. BT has announced a download service in the UK in partnership with content providers such as Universal Pictures and NBC Universal International Television. It delivers two versions – one for viewing on PC and a compressed version for mobile devices. http://www.btvision.bt.com/

Analysts are questioning how long this bubble will continue to grow and following the almost-inevitable burst – which companies will survive? Network managers need to be aware of increased demands on networks and watch for users storing GBs of video rather than the MBs of MP3s that were more common until recently.

New projector technology focuses on size

Small portable projectors have been demonstrated in the lab before, but Sony have announced production of a unit little bigger than the palm of a hand. The projector uses 14 LEDs to ensure low power consumption. However portability has come at a cost in performance as the unit is about half as bright as a typical standard projector. To compensate, Sony has created a new projector screen designed to enhance the brightness to more expected levels.

http://www.reghardware.co.uk/2006/06/15/sony_unveils_worlds_smallest_projector/

Israeli researches at Explay have announced they are developing a matchbox sized projector that will be capable of illuminating a 35” display. This device is expected to be popular with users of cellphones and PDAs. It is not clear when this technology hopes to reach the market.

http://www.explay.co.il/news.html

Electronic Paper

Seiko Epson has demonstrated a new electronic paper product. This device, equivalent in size to A6 paper uses a new plastic substrate to offer high contrast and resolution text using a memory display that only requires power when changing the screen. This 1536x2048 pixel display is one of the new generation of electronic paper solutions in development that promise a range of applications, particularly for mobile devices.

(http://www.learningcenter.sony.us/assets/pa/prs/reader_features.html)

http://www.epson.co.jp/e/newsroom/2006/news_20060612.htm

3D TV takes a step forward

Philips has released a new range of 3D televisions. These screens use transparent lenses over the pixels of LCD TVs to make the left and right eyes of a viewer see slightly different images. Combined with the right image processing chip inside the TV this can give a 3D image without the need for cumbersome coloured glasses. Current versions of the hardware suffer from some image blurring, but researchers

hope further improvements will be made over the next few months.
http://www.business-sites.philips.com/3dsolutions/About/Index.html

Google listens to TV content

Researchers at Google have announced work on linking search engines with audio information. This might, for example, involve your PC listening to a TV programme being watched, identifying it and then presenting tailored search results such as the IMDB entry of a film or the website of the star currently on screen. This kind of advanced search technology could have several educational applications.
http://www.dtg.org.uk/news/news.php?class=countries&subclass=0&id=1741

Photo Messaging

Closer integration with websites such as Flickr and the unchecked growth of blogging are seen by analysts as possible reasons for the rise in photo messaging using camera-enabled mobile phones. Researchers M:Metrics report that over 50% of mobile users in France, Germany, the US and the UK now own camera phones. This is a significant increase over the 22% figure for the same group at the start of 2006. Camera phones have now hit 8 megapixels (the Samsung SPH-V8200), but the quality of the images produced by these devices can be negatively affected by the small size of the sensors and lenses used. M:Metrics research identifies a correlation between resolution and the amount of use of photo messaging so expects the rise in use to continue.
http://www.mmetrics.com/press/PressRelease.aspx?article=20060807-photo-messaging

Force feedback for phones

A common complaint from users of smartphones with software rather than hardware buttons is the lack of any feedback. Put simply, buttons on screen do not "feel" like real buttons. Haptic technology, concerned with the sense of touch, is slowly becoming offered in consumer technology. For example Immersion Technology have developed systems that can offer ‘force feedback’ in mobile phone handsets so pressing soft-buttons can feel more like a real keypad. Haptic technology has traditionally been high cost and only deployed in niche applications such as remote operations by surgeons and in flight simulators. Some basic haptic applications can be found in video game console controllers, but compared to modern applications these are fairly basic and imprecise.
http://www.pcworld.com/article/id,126228-page,1/article.html
http://www.immersion.com/mobility/solutions/oem.php

Hardware

Analysis: biometrics and authentication

Authentication is about controlling access through some mechanism that often involves identity management. Most computer systems require some kind of authentication. Examples include logging onto a computer, downloading email and online banking. Systems may be implemented with different levels of security depending on considerations such as the likelihood of attack and the value of the

information protected. The level of complexity of systems can be set either by the service provider (such as a bank) or a user (for example login security of a PC). It is important to be aware that systems may only be as strong as their weakest links – and a low level of security on a home PC might expose a number of saved passwords for other security systems if the computer is stolen.

There are two parts to an authentication system – the type of authentication being used (referred to as a factor) and the strength of that factor. Additionally it is important to consider how information about this factor is communicated to the secured system. For example a recent fingerprint scanning system, while reasonably secure in itself, was found to communicate with the operating system using unencrypted data. This data could be faked by other software or devices, bypassing the real authentication checks. This is a type of 'man in the middle' attack that can be used to either capture data or fool systems.

The most common authentication systems are one-factor. These use one piece of information to identify an individual, for example a password or fingerprint. Multiple factors can be applied as part of the same authentication system. These can be the same factor, for example a pair of passwords, or different factors such as a fingerprint and a password.

There are a number of different types of authentication factor. Analysts sometimes divide them up by type. The first type is 'knowledge'. This includes passwords and personal information such as date of birth. This is perhaps the weakest of the types of factor as it is easily compromised directly or indirectly. For example users often write passwords down, use the same password on different systems and personal information like date of birth is relatively easy to obtain by research or subterfuge.

The second type of factor is 'object'. This type includes swipe cards, smart cards, USB keys, dongles and mobile phones (with wireless chips). Properly implemented these have a high degree of effectiveness and security but are vulnerable to theft and loss which is at the very least an inconvenience. These objects are often combined with another form of authentication, such as a password. Number generators are commonly used as a second factor for some online banks and corporate VPN systems.

The final type of factor is 'biometric'. Biometric factors are something about the individual that can be successfully measured and are sufficiently unique to prevent impersonation. The most popular is fingerprint and retina or iris scans. There are a number of other related biometric factors that might be used including voice print, facial recognition, hand measurements and behavioural factors such as handwriting or typing patterns. Biometric authentication is a growing market, but automatic recognition is not yet a precise science. Systems are normally rated for their false accept, false reject and failure to recognise rate. There are also two stages to the use of biometrics – enrolment (capturing the data on an individual) and verification (reading unknown data and matching this). The accuracy is improving as newer tests and equipment are developed, but the need for immediate feedback precludes some

of the more accurate tests such as DNA profiling. Most systems can have their parameters adjusted to allow for increased security or lower reject rates.

A comparison of different techniques is available at http://www.itsc.org.sg/synthesis/2002/biometric.pdf. This study compares a number of different characteristics of each test and demonstrates how no one method is perfect. Each approach may have a weakness in accuracy or might be seen by the public as untrustworthy or invasive. Another common concern with biometric data is how it is stored. New passports from many countries will include machine-readable biometric data stored in the passport. This will nominally allow inspecting officials to check the person presenting the passport against what the passport says, but the passport itself might have been tampered with to include an impostor's data. An alternative would be to use the passport as a key to a database, but this raises privacy and civil liberties concerns and the database itself might have been hacked.

One-factor systems are the most common in computer systems, but two or even more factors are required in some cases. A decision over the number of factors used is a compromise between system security and ease of use. Online banking is a good application to reference when planning authentication systems. Until recently most UK online banks only used one-factor authentication using passwords, perhaps combined with personal information. Personal information alone cannot be relied upon as it is easily compromised or discovered through research. However in October 2005 Lloyds TSB began the first UK trials of a hardware device that generated a series of codes which were asked for by the site. This means that physical possession of the device was required as well as the secret information. This is more common in businesses, for example in authenticating remote access, but large scale consumer deployments are still rare.
http://www.finextra.com/fullstory.asp?id=14391

It is possible to separate the issues of identity and authentication through other forms of service restriction. For example access to a system might only be allowed during certain hours or from certain computers. Other forms of control can then be applied for example, to access to a room containing a terminal, in order to prevent abuse.

Biometric readers are increasingly being included in hardware systems. A number of laptops are available from manufacturers such as Lenovo (IBM) with fingerprint scanners built into the case. It is also possible to buy USB keyboards and mice containing sensors.
http://www.pc.ibm.com/uk/thinkpad/?uk&cc=uk
http://www5.pc.ibm.com/europe/products.nsf/$wwwPartnumLookup/_73P47XX?OpenDocument
http://www.eyenetwatch.com/biosecurity/biolink-usb-fingerprint-mouse.htm
http://www.microsoft.com/hardware/mouseandkeyboard/productdetails.aspx?pid=035

There are a number of biometric applications that have been targeted specifically at schools. Some of these are general purpose devices, such as fingerprint scanners for computer log-on or door entry; others are specific applications such as for

attendance, cashless catering and library systems. Some privacy activists and parents have expressed concern that thousands of pupils have been catalogued in this way without their parents consent. The Information Commissioner is currently developing guidance for the use of fingerprints by non-police organisations.
http://www.ico.gov.uk/

Performance of biometric sensors can be variable. In 2004 a school that had implemented a retina scanning system for cashless catering removed the system because identification was taking on average 12 seconds per pupil, causing congestion. Fingerprint attendance systems are also available. Some commentators have suggested that traditional registration is not simply about marking attendance; and that teachers carrying out this task can learn more about a pupil during this time than simply if they are present or not. Physical authentication, such as swipe cards, has been used in some schools for many years but has not achieved widespread market penetration.
http://technology.guardian.co.uk/weekly/story/0,,1742091,00.html
http://www.theregister.co.uk/2004/09/15/school_cans_biometric_scanner/
http://news.zdnet.co.uk/hardware/emergingtech/0,39020357,39279096,00.htm

Fingerprints are one of the most common biometric attributes used and serve as a good example to consider a number of issues. Fingerprint systems usually capture a number of points in the print that are stored as data. This means that if the data is compromised then some key characteristics of the actual fingerprint (the stored points) can be extracted but the whole print cannot be recreated. The more points measured the more accurate the scan, but equally the less tolerant the system is. Next generation fingerprint technology being developed in Japan looks at the vein patterns in the finger rather than the skin patterns, reducing the chance of spoofing. fingerprints. http://www.newscientist.com/article.ns?id=mg18725174.500
http://www.hitachi.com/New/cnews/051017.html

Authentication systems beyond the common username/password approach are becoming more popular, but as fast as devices and solutions come on the market there are fresh concerns raised about the operations of schemes including issues of privacy and anonymity. A minority of schools are already investing in these systems and it is likely more will try and automate mundane tasks to free up teacher time and improve administration. However, care needs to be taken to consider the concerns of parents in this area.

The UK government is one of many countries that have conducted research into biometrics. In a survey from 2005 the UK Passports Agency looked at facial identification, fingerprint verification and iris recognition technologies. They found that facial identification was the most successful enrolment technology (used for capturing biometric information that is subsequently used) but was the least successful recognition technology. This demonstrates how complicated scanning and retrieving data can be. Disabled users in particular were less able to benefit from biometric techniques.
http://www.passport.gov.uk/downloads/UKPSBiometrics_Enrolment_Trial_Report.pdf#search=%22biometric%20enrolment%22

http://europa.eu.int/idabc/en/document/4333/194
http://www.csrc.lse.ac.uk/idcard/LSE_DaugmanResponse.pdf#search=%22lse%20biometrics%22

It seems likely that two-factor authentication will become more common for online banking transactions to replace a physical card/pin two-factor authentication for transactions, but only the financial institutions can guess if the costs of these systems outweigh the losses they would prevent. It is of course important to be clear that biometric authentication is just that – one part of the overall security policy.

Hardware news

New Intel Core 2 duo launched

Intel has launched its Next Generation Micro-Architecture processors called Core 2 Duo. The mobile, desktop and server chips increase performance whilst being more power efficient than previous Intel processors.The mobile (Merom) processors have a 667MHz front-side bus (FSB) and 2MB or 4MB Level 2 cache. The clock speeds range between 1.66Ghz and 2.33GHz. The desktop (Conroe) chips all have a 1,066MHz FSB, also have 2MB or 4MB Level 2 cache and clock between 1.86GHz and 2.66GHz. Independent test results reported in the media suggest that the new chips match or beat the performance of rivals for most applications. Manufacturers, including Apple, are already offering PCs using the new chips.
http://www.intel.com
http://amd.com

Memory Technology - MRAM breakthrough

Freescale, the manufacturer of embedded computing chips, has announced the beginning of volume manufacture of Magnetoresistive Random Access Memory (MRAM). This technology is still quite immature and only currently offers low-density memory chips. However, it offers the potential of providing “universal memory” with the speed of RAM and the persistence of Flash. DRAM requires more power and Flash memory has a finite lifespan of read/writes. MRAM is non-volatile and holds its data without power. However, MRAM is a long way from mainstream adoption and will find it difficult to compete with the price and capacity of established technologies. It has been suggested that it could provide a solution for RFID applications where speed and power efficiency are key.
http://arstechnica.com/news.ars/post/20060710-7224.html

Handhelds in education –new reports

A report by the Wireless World Forum in the US has been analysing the size of the youth spending market. The group have identified a 25-year window from age 10-35 where users are likely to spend some $15,000 on mobile services and applications. The report hopes to emphasise the importance of portable computing in all kinds of applications and implies that if markets embrace this technology they are more likely to attract youth customers.
Another US survey, "America's Digital Schools 2006", also emphasises the importance of mobile computing. It estimates that more than half of student

computing devices in the top 2500 US school districts will be mobile by the year 2011.
http://www.w2forum.com/i/mobileYouth06_part_one
http://www.ads2006.org/
http://wgfl.wolverhampton.gov.uk/PDASite/index.html

PC failure rates drop

PC reliability is reported to be increasing. Gartner research has produced figures that show how laptops and desktop computers are less prone to failure in 2005/06 compared to the 2003/04. Laptop computers had a first year failure rate of 15% rather than 20%; and desktop computers were down from 7% to 5%.
http://www.webtechgeek.com/NEWS/06-28-06/PC-Failure-Rates-Drop-But-Not-Far-Enough.htm

Quad core chips to become commonplace

Intel and AMD are both preparing to launch new quad-core processors. Intel has announced Core 2 Extreme to be shipped at the end of 2006, which will be two Core 2 Duo CPUs combined. AMD is expected to offer a similar product – its 4x4 platform. This chip has power-saving features that let the four-core chip run using only two-cores when the additional power is not required. These advances show that the use of multiple cores, rather than clock speed, is likely to be the major way of improving processor performance in the medium term.
http://www.reghardware.co.uk/2006/08/17/intel_extreme_roadmap_aug_06/
http://www.reghardware.co.uk/2006/08/23/amd_quad-core_details/

Rise of flash memory

Flash memory is becoming increasingly popular. Already the market has seen the first laptops (from Samsung) using Flash memory rather than hard drives and now Microsoft has released details of support in Windows Vista for external memory stores. The Vista system, called Readyboost, is one of a number of memory management improvements in the new operating system. Normal system memory will be better managed by the OS to locate frequently used applications for quick access and it can use external memory devices, such as high capacity flash memory cards, as if they were system memory.
The other two memory improvements in Vista are ReadyDrive, which is support for hybrid hard disk/flash memory drives that combine a high capacity hard disk with the fast access and low power consumption of flash memory; and SuperFetch which is designed to preload popular applications from the hard disk into memory for increased performance.
http://articles.techrepublic.com.com/5100-10877_11-6060817.html#
Intel has also spoken more about their Robson technology which builds flash memory into the system board. This is an alternative approach to building it into hard disk drives.
http://www.intel.com/pressroom/archive/releases/20060307corp_b.htm

Processors reach 500Ghz

Researchers at IBM have produced a 500GHz Silicon-Germanium (SiGe) chip. This is part of research into high-speed signalling equipment rather than standard computer processors. This speed was achieved through super-cooling the chip to just 4.5degrees above absolute zero, but at room temperature it still operates at 350GHz. Normal production chips currently in such equipment normally runs around 2GHz.
http://www.electronicsweekly.com/ARTICLES/2006/06/20/39015/IBMs+500GHz+transistor+is+physical+limit+of+silicon.HTM
Although slower, researches at the University of Southampton have clocked a different transistor design at 110GHz. This team used a bi-polar transistor of the type commonly found in mobile phones and could introduce real performance gains in this equipment.
http://www.techworld.com/mobility/news/index.cfm?newsID=6673&pagtype=samechan

Motes – Embedded computing sensors

A number of companies, including HP and Intel have been researching "motes". These are very small integrated computers that have a CPU, I/O and memory in a compact unit designed for use in embedded computing devices such as sensors. HP has announced that it is perhaps two years away from production of tiny (2-4mm) devices that can hold 512KB of data and transfer it at speeds of 10Mbps, which is faster than both Bluetooth and RFID standards. The HP 'Memory Spot' motes could be embedded into paper or photos and the data or audio clips read with devices such as mobile phones.
http://news.bbc.co.uk/1/hi/technology/5186650.stm

Personal consumer portable devices

Sony's latest device for the portable internet access device is mylo. This unit, similar to a small PlayStation Portable, offers Wi-Fi access and a suite of software including some instant messenger applications in a compact unit. This is the latest in a line of lifestyle devices designed to offer low-cost personal computing through limited functionality devices. The unit is similar in look to a smartphone but does not have any support for mobile phone networks, however it can use VoIP applications such as Skype over Wi-Fi. A number of other manufacturers have tried devices of this kind, such as the Nokia Internet Tablet, but the markets remain quite small. This is the kind of device, aimed at personal ownership by young people that could present a management challenge to school network managers. The presence of large numbers of unofficial wireless devices increases the need for robust policies and network security infrastructure. The Nokia Internet tablet has been updated to allow VoIP and offer improved support for RSS news feeds.
http://www.learningcenter.sony.us/assets/itpd/mylo/prod/
http://www.maemo.org/nokia/os2006_featurenote.html

PC – the first 25 years

The IBM PC is now 25 years old. The original device cost over $1500 and had just 16KB of memory. The original PC was designed using off the shelf parts from different manufacturers and an open architecture. IBM did design the BIOS that

managed the different components, but this was soon reverse engineered and duplicated by rivals thus destroying IBM's monopoly but also making an ownership explosion possible. It is estimated there are some 1 billion PCs in use in the world at the moment. Analysts are divided on the future of the general purpose PC device when faced with competition from mobile computing (including PDAs and phones), the rise of other specialist devices and online applications that move the focus to the network rather than individual computers. Wherever the technology goes, it's certainly going to an interesting next 25 years.
http://news.bbc.co.uk/1/hi/technology/4780963.stm

Software and internet

Analysis: office productivity file formats

Office productivity software is currently dominated by Microsoft which has around 90% of the market, making their file formats de facto standards. However, the emergence of the Open Document Format could move the market towards open standards.
http://www.informationweek.com/software/showArticle.jhtml?articleID=192300431

An office productivity application will commonly support a number of file formats, though will have one as its default option. Most current documents use either binary (eg .doc) or XML based formats. XML is a relatively new, text-based format that uses tags, much like HTML, to describe content. The XML format offers a number of advantages such as easier integration between applications and back end systems.

For software to access binary files and decode meaningful information they must know technical details about how the file was constructed. Binary file conversion routines may not be 100% accurate and it is not uncommon for different office suites to only offer partial file format compatibility because of the way the different programmes work. For example one word processor might be able to load and display a rival format's document, but it might not be able to display all formatting correctly, edit embedded graphics or use macros. Many organisations choose Microsoft Office to ensure compatibility with the large number of people using the suite and file formats.

Increasingly, governments and others concerned with digital preservation have raised issues with the use of proprietary formats, over which they have no control and which may change over time making older documents unreadable. Consequently, there is a move towards using formats based on open standards.

OpenDocument Format was developed as an open standard based on the original Open Office XML format. The OpenDocument Format is backed by OASIS (Organization for the Advancement of Structured Information Standards) and has now been ratified by the International Standards Organisation (ISO).

Microsoft has announced that Office 2007 will use an XML-based open format called Microsoft Office Open XML. Microsoft has submitted Open XML to Ecma

(http://www.ecma-international.org) for development and ratification as a standard. Open XML was expected to be then submitted to the ISO for ratification. However, it is now unclear whether the ISO will ratify two document formats.

The public sector has played an important role in promoting the use of open formats. The best known case is the Commonwealth of Massachusetts which announced that all electronic documents saved and created by state employees have to use open formats from the beginning of 2007. Other institutions looking to standardise on ODF include the City of Bristol; the states of Minnesota and California; and government bodies in Belgium, Denmark, France, Australia, South Korea, and Malaysia. Microsoft has recently announced that it will help Open Source developers to produce a plug-in to Office 2007 that will provide support for ODF. However, much of the functionality of Office 2007 and other Microsoft products will rely on the use of Open XML.

It is still too early to say whether Open XML or ODF will become the most widely used document format in the long term. It was thought that various governments' support for open standards could also increase the use of alternative office productivity suites. However, the addition of ODF support in Office 2007 combined with backwards compatibility with current, widely used document formats may mean that Microsoft Office continues its dominance for some time.
http://www.oasis-open.org/
http://www.microsoft.com
http://www.odfalliance.org/

Software and internet news

Social networking

Lawmakers in the US are seeking to extend the existing legislation around internet filtering on public computers in schools and libraries. The existing Children's Internet Protection Act (CIPA) signed by President Clinton in 2000 requires schools and libraries to block access to undesirable content. The new bill, the Deleting Online Predators Act (DOPA), requires such locations to ban access to social networking sites where children may be exposed to sexual material or be subject to sexual advantages – except for supervised education purposes. In a variation from CIPA the proposed new law would not apply blanket restrictions to adults however.
http://news.com.com/Congress+targets+social+network+sites/2100-1028_3-6071040.html
The UK's Child Exploitation and Online Protection (CEOP) Centre, tackling child sex abuse, has announced a partnership with Microsoft to include its "Report Abuse" button (http://www.ceop.gov.uk) in MSN Messenger and Windows Live Messenger. The button enables users to report suspicious behaviour to local police forces easily. However, critics have warned that this issue will need to be implemented sensitively to prevent the feature being used maliciously to target innocent individuals or waste police resources.
http://www.ceop.gov.uk/news_items/article_20060821_ceop.htm
In the US, social networking site MySpace has been sued by the mother of a teenager who was sexually assaulted by someone she met through Myspace. The

lawsuit claims that the site is more concerned with making money than protecting teenagers. MySpace have initially responded with a statement encouraging smart web practices and sensible surfing.
http://www.theregister.co.uk/2006/06/20/myspace_sued/
Net-ID-me is a service offering secure identification for children, recently launched in the UK. It checks and holds basic information on its users and is designed to help identify the genuine age of users as a "trusted third party". Registration of this service includes getting permission from suitable adults however critics question how well this can be enforced in practice.
https://www.netidme.com/netidme.asp
http://www.spy.org.uk/spyblog/2006/08/netidme_privacy_and_security_p_1.html

Windows 98/98SE and ME support ends

Schools with old PC equipment running earlier versions of the Windows operating system are warned that Microsoft has finally ended free public support for its aging Windows 98, Windows 98SE and Windows ME software. Online support will be available until at least July 2007 but there will be no further security updates or patches from the software company. Microsoft typically offers 8-10 years minimum overall support for products including a number of years full support followed by a further period of self-help.
http://support.microsoft.com/gp/lifean18
Later this year Microsoft will end support, including security updates for Windows XP SP1. From October 10, 2006 customers will be expected to upgrade to Windows XP Service Pack 2 which was released initially in September 2004.
http://support.microsoft.com/gp/lifean19
Microsoft do offer longer term support for older applications under specific agreements and licences.

Microsoft Office 2006 and Open Document Format

Microsoft has announced additional support for the Open Document Format in the next version of Microsoft Office, due in early 2007. This new version of Microsoft Office will natively use an alternative XML based format, Open XML. However, Microsoft is paying external companies to develop an open source software translator that will add support for the Open Document Format.
http://news.com.com/Microsoft+Office+to+get+a+dose+of+OpenDocument/2100-1013_3-6069188.html
Microsoft had also intended to bundle support for Adobe's PDF in Office 2007 however under pressure from Adobe this will now be an optional, free component rather than part of the core distribution. Adobe had raised serious concerns that free PDF creation in Office would have damaged sales of its Acrobat PDF authoring software.http://www.pcworld.com/article/id,125960-page,1/article.html

Open source software update

OSS Watch, the JISC funded body supporting open source developments in UK HE and FE, has released its latest report on the use of OSS and its role in procurements. The survey noted that that 77% of institutions consider open source when procuring software, 56% of institutions use the OSS VLE Moodle and 69% use OSS on at least part of their server infrastructure. According to the report HE/FE

institutions mostly rely on in house support for applications. This reflects the higher level of technical expertise available in these organisations compared, for example, to schools. The full OSS Watch Survey 2006 is available online:
http://www.oss-watch.ac.uk/studies/survey2006/

Apple Leopard due 2007, previewed

The next generation Mac OS X version, codenamed Leopard, has been previewed by Apple. This new version, designed to both introduce new features and consolidate previously downloadable enhancements has met a mixed response from commentators. New features that have been announced are "under the hood" alterations to graphics systems, improved support for 64-bit Intel processors and dual boot support to allow the hardware to run Windows XP and Mac OS X.
http://www.apple.com/macosx/leopard/index.html
http://www.applematters.com/index.php/section/comments/leopard-preview-gives-clue-to-top-secret-new-feature/

W3C guidelines for mobile device websites

Modern phones and PDAs are increasingly likely to be used to access websites as mobile wireless access grows. The W3C (World Wide Web Consortium) has published a new set of guidelines aimed at helping website managers better design for mobile devices. Mobile Web Best Practices 1.0 offers practical guidance to content authors on how to offer mobile users on a range of devices a consistent and effective experience. Mobile devices often vary in their actual implementation and delivery of content and there are more variations in software and hardware interface than combinations of standard PC and browser. The overall aim of W3C is to deliver 'One Web', where a truly device independent experience is available to users.
http://www.w3.org/TR/mobile-bp/

SML – XML to support data centres

A number of big names in computing, including Microsoft, IBM, Cisco, Intel and HP, have announced a plan to create a new approach for all kinds of computer resources to share information via XML. This proposed standard, Service Modelling Language (SML), will allow all data centre devices such as servers, routers, switches and firewalls to share information on their status and activity using a common vocabulary. This should simplify management and operation of IT services and give benefits even on the comparatively small scale of a school or college. This proposal will be further defined and then submitted to an appropriate standards body for ratification.
http://news.com.com/2100-1013_3-6100384.html

Microsoft add support for AJAX

Microsoft's ASP.NET 2.0 AJAX features, aka 'Atlas', is now available as a Community Technology Preview download. This is designed to bring the power and flexibility of AJAX to Microsoft Web Services platforms and is already in use in a number of high profile sites such as the BBC. AJAX (Asynchronous JavaScript and XML) is concerned with web applications that use scripting downloaded to the client browser that interrogates remote websites and presents the results in a self-updating format. This allows online services to look and behave more like desktop

applications. AJAX has been very successful and is one of the foundations of the Web 2.0 concept of interactive, user-defined content. It can be implemented solely in the browser but more commonly also requires special server-side components. Microsoft's Atlas is designed to integrate tightly with its Visual Studio development environment. Further advances in improving the ease of implementation and speed of web services development are likely to accelerate the appearance of new, interactive content and services.
http://www.adtmag.com/article.aspx?id=19087

Time magazine announce 50 cool websites

TIME magazine has released its annual "50 Cool Websites" list. This list showcases a range of different sites across seven categories. Entries on the list demonstrate novel applications, effective implementation of simple ideas and often interactive community based Web 2.0 concepts.
Looking through the sites can give the web developer an idea of what people are using on the web and stimulate critical thinking skills. The focus on Web 2.0 showcases how content and presentation are being separated; and how users are demanding more control over how they use the web. The TIME website also contains lists from previous years, back to its beginnings in 2003.
http://www.time.com/time/2006/50coolest/index.html

Google announce search for “visually impaired” and free book downloads

Google Labs have released a special search aimed at blind and partially sighted users. In addition to the normal Google search functions this search engine adds in metrics about accessibility to the partially sighted. It includes, for example, a judgement on how well a site can be navigated using keyboard navigation and the amount of visual imagery. Google refers site developers to the World Wide Web Consortium (W3C)'s document on Web Content Accessibility Guidelines, but it is generally recognized that graphically rich sites can be hard to navigate for disabled users. http://www.w3.org/TR/WAI-WEBCONTENT/
http://labs.google.com/accessible/
Google has also begun offering free downloads of some out-of-copyright books on its book search service:
http://books.google.com/

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