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Networking and wireless

Analysis: Voice over IP (VoIP)

At a glance

- Public digital networks largely use the internet protocol (IP) to transfer packets of data, irrespective of the content of that data.
- Voice over IP (VoIP) can now be used for telephone calls with an acceptable quality of service (QoS).
- Consumer VoIP can enhance learning experiences and support both students with parents living overseas and trainee teachers.
- Switching to VoIP provides opportunities for additional services but introduces new risks.
- IP telephony can be used to bring communications systems into a unified structure.
- Connecting VoIP systems requires bridging of differing protocols and centrally held registries for device addresses.
- Both fixed and mobile networks are moving towards an 'all-IP' environment.
- The analogue public switched telephone network (PSTN) also uses packet technology, but the existing infrastructure and 'last mile' of copper make it extremely expensive to upgrade to a fully digital network.

The rise of digital telephony

Transfer of digital data across the internet relies on the internet protocol (IP) to divide information into packets, to route them to the correct address and reassemble the original communication. Ordinary telephones work using entirely different analogue protocols and hardware, but companies and individual are increasingly questioning the need for duplicate wiring and the cost of providing a separate voice network. Voice over IP (VoIP) describes the transmission technologies that take audio conversations and converts them into a form suited to digital networks.

One of the most well known VoIP applications is Skype, although Vonage, Jajah, GrandCentral and RingCentral are just a few of the alternative commercial applications, plus a range of open source projects. In addition to supporting voice conversations, these services may also provide text chat, file transfer, simple videoconferencing and other collaborative facilities. Many services now have some form of central interconnect with the normal telephone network, allowing users to call landline and mobile numbers and to purchase calls in bulk packages or using regular calling plans.

The original telephone network connected two phones across a unique set of copper wires to form an analogue circuit. Electrical relays were introduced to automatically switch circuits as users dialled, leading to the formation of the public switched telephone network (PSTN).

Providing unique copper circuits is expensive, so telephone operators used multiplexing techniques to combine call streams over trunk networks built from

copper and, more recently, optical fibre. With the introduction of digital technologies, these trunk networks started sampling audio data from conversations and dividing the results into packets. The telephone networks use robust protocols to route these packets on the network to ensure that they arrive on time and in order.

The internet also routes packets, but IP is not as strict, resulting in lower digital call quality over narrowband connections.

IP underlies much of the modern communications network, to the extent that the next generation mobile '4G' services will be 'all-IP'. VoIP is likely to become the de facto standard for mobile conversations, making it much easier to route between different domains - whether cabled, mobile or satellite - as they will essentially all be using the same system.

IP advantages
What does IP offer beyond a unified communications network? It can provide:

- A single telephone number that can be associated with multiple devices, such as a mobile phone, a computer or a normal handset.
- Services that can be based on time rules or caller identity, automatically forwarding calls to a different device or to voicemail.
- Rules which are managed by the user using a software client.
- The ability to process a conversation as a digital file without further conversion: voicemail messages can be sent as MP3 attachments to emails; or messages can be held centrally and played back over the internet.
- A channel to send other media across the same link simultaneously, such as pictures, documents, or video. These can be worked on collaboratively using software that provides a shared workspace.

What does VoIP offer education?
Many consumers first meet VoIP as a way to make cheap or free calls to remote family members, which is equally true of many in education. Chris Smith, editor of the Shambles site, says,

> "In International Schools communities VoIP has been welcomed with open arms especially by families... living 'overseas' and keeping in touch with sons and daughters who have moved to university has highlighted the real cost effectiveness of this option."

Since VoIP applications like Skype are available to a wide range of operating systems, it is possible to set up free audio or simple videoconferences with external experts, specialist languages teachers, classes in other countries or learners on field trips or work experience. So long as their PC and network are working, users can also work live with technical support. (More sophisticated videoconferencing systems are covered in the *Telepresence* article in TechNews 3/08.)

Tutors in initial teacher education have used VoIP to mentor trainees while on placement, using the video link for the trainee to do a dry run of a presentation or

science experiment. These conversations have often proven more helpful than asynchronous support systems offered by email or electronic forums. Trainees can also work together in groups (since VoIP allows teleconferencing), to develop resources and discuss approaches to issues that arise during their placements. (See Gallant and Wright, 2007.)

VoIP, IPT and unified communications

The promise of unified communications, a single infrastructure and lower bills has led some businesses to replace telephone PBXs (private branch exchanges) with IP telephony (IPT) or complex unified communications (UC) systems. Consumer VoIP solutions rely on locally installed clients and separate address books, which makes managing such systems almost impractical for multiple users. Replacing normal telephone systems with a UC server brings management back to the centre and allows VoIP to be combined with other services delivered over the IP network.

Nottingham Trent University (NTU) has recently signed a £1.6 million contract to replace its existing network by a UC system, with a view to enhancing collaboration between staff and (in future) among students. Unity City Academy in Middlesbrough and Leeds Metropolitan University already have such solutions, while Leeds City Council has integrated schools into its IPT structure. NTU's IT director, David Swayne, makes clear that UC is about far more than hardware:

> "I think the biggest challenge isn't the technology one, it's the one around how the technology can enable people to work differently and that being received as a potential benefit rather than a threat."

ENUM

Connecting diverse VoIP systems requires a central registry that maps dialled numbers with the correct device according to the rules defined by the user. ENUM is being developed internationally to allow VoIP servers to communicate directly and negotiate IP connections, transferring calls to devices attached to the PSTN as required. ENUM, managed by Nominet in the UK, embeds the international E.164 telephone numbering standard and uses name authority pointer records (Naptrs) to direct communications to the correct device.

The problem of protocols

VoIP systems use different protocols: Skype's is proprietary, whilst many others use either H.323 or SIP, requiring gateways to connect these diverse systems. H.323 was originally developed to enable videoconferencing on local area networks but has been modified for broader uses. Session initiation protocol (SIP) is also widely used and is now embedded into standards used by 3G mobile networks to transfer multimedia information.

Issues

The traditional PSTN is unaffected by local power outages as it is independently powered. Most consumer VoIP systems will fail without power, necessitating an alternative means to reach the emergency services. Since VoIP devices can be mobile, or switched to one at a different location, some carriers argue that it is

impossible to fulfil Ofcom's requirement to provide a geographical location and give no '999' access to emergency services.

VoIP produces large amounts of data, putting pressure on the carrier's bandwidth. To maintain quality of service (QoS), some argue that VoIP applications require higher prioritisation, but this goes against principles of 'net neutrality' (where every application is treated the same) and could add significantly to core infrastructure costs as these services grow in popularity.

Skype can add to network security issues as the format of its packets is protected. Not only does this prevent snooping, but also limits the ability of firewalls and anti-virus products to protect users and networks from malware, which could be transmitted using the system's file-sharing features.

Future

Public communications are moving towards an 'IP-everything' environment: femtocells (TechNews 9/08) allow mobile phone calls to be routed over the internet; mobile providers are increasingly adding VoIP clients to handsets; and 4G services (TechNews 11/07) will be 'all-IP'. However, the PSTN has a huge established infrastructure, especially the 'last mile' of copper from the roadside cabinet to individual houses and businesses, making upgrades to entirely digital 'next generation' fibre networks hugely expensive. The Government has not responded to calls for it to pay for this upgrade, which will cost an estimated £29 billion if the 'last mile' is included.

VoIP is an area where educators who understand its limitations can use VoIP to enhance learning experiences, but institutional adoption needs careful planning and clear strategic direction to succeed. Nevertheless, this is the direction in which communications systems are evolving.

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GrandCentral http://www.grandcentral.com
RingCentral http://www.ringcentral.com
Shambles (VoIP links) http://www.shambles.net/pages/staff/voiceip
Gallant, A and Wright, P (2007). 'Money, Distance, Time and Support: Virtual Mentoring of Pre-Service Teachers During School Placements', I-Manager's Journal of Educational Technology, 4 (1), 2007.
Nottingham Trent uni bets £1.6m on unified comms
http://networks.silicon.com/lans/0,39024663,39383810,00.htm
Leeds Metro Uni upgrades 3,800 extensions and moves to IP telephony
http://www.computerweekly.com/Articles/2007/06/13/224750/leeds-metro-uni-upgrades-3800-extensions-and-moves-to-ip.htm
ENUM http://www.nominet.org.uk/tech/enum
VoIP providers' compliance with General Condition 4 (Emergency Call Numbers)

http://www.ofcom.org.uk/bulletins/comp_bull_index/comp_bull_ocases/open_all/cw_996
Femtocells (TechNews, September 2008)
http://emergingtechnologies.becta.org.uk/index.php?section=etn&rid=14138
Rural areas short changed on next-gen broadband
http://www.vnunet.com/vnunet/news/2225559/rural-areas-short-changed

Networking and wireless news

Digital Britain

The Department for Business, Enterprise & Regulatory Reform has published its interim *Digital Britain* report, also known as the Carter report. This examines the country's communications infrastructure and the distribution of digital information across a range of media, from broadband, through mobile networks and 'free-to-air' television, to digital radio. A series of 22 specific actions will be undertaken as a result of this report before and subsequent to publication of the final report, due late in the spring.

The report identifies five main objectives, which may be summarised as:

- Upgrading and modernising digital networks
- Creating a dynamic investment climate for UK digital content, applications and services
- Producing UK content for UK users
- Providing fairness and access for all
- Delivering public services and business through an online interface with Government

One of the main recommendations is a commitment to universal access to broadband. Many parts of the country, through physical remoteness or geographical barriers, cannot access ADSL (or similar) broadband services. Although the report states that 93 per cent of homes connected to BT landlines already have potential access to 2Mbps, and that a third of the remaining customers will be connected at that speed by 2012, 'not-spots' present a considerable barrier to home access in many education authorities.

The authors express a preference for 2Mbps as the minimum 'Universal Service Commitment' (USC), delivered through both fixed and mobile solutions, but Action 17 says that the consultation will look at, 'options up to 2Mbps'. Although the speed experienced by consumers also depends on factors such as the number of others using the service at the same time, the report states that 2Mbps is adequate to download a music album in 5 minutes or to provide video conferencing by TV.

The final action says that the Government 'will ask Ofcom to make an assessment of its current responsibilities in relation to media literacy and, working with the BBC and others, to recommend a new definition and ambition for a National Media Literacy

Plan.' This will be linked to the work of the UK Council for Child Internet Safety, following the recommendations of the Byron review.

The report also emphasises DAB (digital audio broadcasting) as 'a primary distribution network for radio' (Action 9); provides for realignment of the radio spectrum licences to enable more effective mobile services; suggests a tie-up between Channel 4 and BBC Worldwide; and covers new measures to control digital piracy of copyright material.

A *Write to Reply* blog is open for public comment on the interim report.

Digital Britain - interim report
http://www.culture.gov.uk/what_we_do/broadcasting/5631.aspx
Write to Reply blog http://writetoreply.org/digitalbritain

Universal broadband and filling the 'not-spots'

In addition to the Digital Britain report, the European Commission has proposed expenditure of a billion euros on providing universal access to broadband across the EU. According to the press release, 30 per cent of homes are in 'white spots' without broadband access. In the EU's European Economic Recovery Plan, a target was set for achieving a full 100% high-speed internet coverage by 2010, although a specific speed is not stated. The money will be channelled through the EU's Rural Development Fund.

Commission proposes €5 billion new investment in energy and Internet broadband...
http://europa.eu/rapid/pressReleasesAction.do?reference=IP/09/142&format=HTML&aged=0&language=EN&guiLanguage=en
Commission earmarks €1bn for investment in broadband...
http://europa.eu/rapid/pressReleasesAction.do?reference=MEMO/09/35&format=HTML&aged=0&language=EN&guiLanguage=en

In January, the Oxford Media Convention heard that providing universal broadband access was an even higher priority than rolling out 'next generation' networks (based on fibre or high-speed coaxial cable technologies). The Chief Executive of the Broadband Stakeholder Group, Anthony Walker, said that "broadband is increasingly being seen as a basic utility for households". Although broadband is widely available, around 40 per cent of households have not connected, with many not seeing the value of doing so. Speakers identified building users' confidence and providing compelling content as two of the barriers to wider adoption.

Broadband Britain: 'Forget fibre - let's plug UK's notspots'
http://networks.silicon.com/broadband/0,39024661,39383811,00.htm

Research from Point Topic reveals a far more widespread problem of 'not-spots' than suggested in Lord Carter's interim *Digital Britain* report. Lord Carter launched a consultation that included a minimum Universal Service Commitment (USC) to 2Mbps for broadband across the country, on the basis that 93 per cent of BT connected homes could already access 2Mbps. However Point Topic suggests that

this actually works out at 84 per cent, due to sharing bandwidth between customers, lack of suitable landlines and other factors.

Point Topic identifies considerable regional disparities: consumers in Northern Ireland have a nearly one in three chance of being in an area where 2Mbps is unavailable; Wales comes next with 27 per cent of the population out of range of the USC; whereas in London availability reaches nearly 99 per cent, of whom the vast majority could get over 8Mbps. 'Not-spots' will considerably limit pupil's home access.

Point Topic analysts argue that even the apparently modest 2Mbps USC will require widespread deployment of FTTC (fibre-to-the-cabinet), needed to build 'next generation' networks, so that more distant consumers can get the proposed minimum. Tim Johnson, their Chief Analyst, contends that 2Mbps will be worthless without a minimum guaranteed level of service. Given that Ofcom research has shown that peak speeds are, on average, 30 per cent lower than at less popular times, Johnson says that the USC should also embrace a 99.9 per cent availability commitment for 2Mbps. This would, Point Topic says, 'mean falling below the minimum for about a minute a day during the peak period'.

Digital Britain (in TechNews 3/09)
http://emergingtechnologies.becta.org.uk/index.php?section=etn&catcode=ETN_0001&rid=14335
Broadband Britain - from novelty to necessity http://point-topic.com/content/dslanalysis/BBAbbb090225.htm
2Mbps? That'll do nicely! (Requires free registration) http://point-topic.com/cgi-bin/showdocument.asp?Doc=dslanalysis/bba2mbps090209.htm

Eurosat has signed an agreement with SES ASTRA to market an Astra2Connect satellite broadband service under its BeyonDSL brand in the UK. Unlike other satellite services, this can provide for 'not-spot' areas without a landline connection, although at £24.99 per month, plus a one-off fee of £299.99 for equipment and an optional £50 for connection, the price for the basic service is high compared to normal ADSL broadband.

Service options vary from 256Kbps to 2Mbps, with limited connection speed once a data download threshold is passed, and upload speeds between 64Kbps and 128Kbps. No information is given about the delays (latency) within the system, which are often high due to the round-trip time for data to travel between earth and the geostationary satellite. However, BeyonDSL is promising a Voice over IP (VoIP) service later in the year.

SES ASTRA signs agreement with Eurosat... http://www.ses-astra.com/business/en/news-events/press-archive/2008/08-12-10/index.php
BeyonDSL http://www.beyondsl.net/a2cinfo.htm

4G update

LTE (Long Term Evolution) is a mobile phone technology based on standards set out by 3GPP as a successor to current 3G services. Peak throughput on theoretical systems could reach substantially above 100Mbps, depending on the spectrum slice chosen and antenna configuration, but actual speeds available to users will be significantly less due to contention ratios, signal propagation and various overheads. The main competitor is mobile WiMAX, although some developments of the latter have been hindered by the current global economic situation. Implementation of either technology will require substantial investment in new network infrastructure.

Telecommunications equipment manufacturer, Motorola, has developed its research centre in Swindon to trial LTE hardware and services. This facility will enable mobile operators to develop LTE migration strategies and allow vendors to trial their equipment in a facility designed to offer 'field trials and detailed real-world equipment testing'. Motorola will launch its first LTE base station products on the 700MHz and 2.6GHz wavebands in the US later this year, but Ericsson's John Cunliffe told Silicon.com not to expect UK consumer products before the end of 2010.

Motorola launches LTE trial in the UK
http://www.techworld.com/news/index.cfm?RSS&NewsID=110335
Motorola launches long term evolution (LTE) trial network in the UK
http://mediacenter.motorola.com/content/Detail.aspx?ReleaseID=10649&NewsAreaID=2
Motorola... first commercial product release
http://mediacenter.motorola.com/content/Detail.aspx?ReleaseID=6162&NewsAreaID=2
Don't expect a UK LTE network before 2011
http://networks.silicon.com/telecoms/0,39024659,39351692,00.htm

Mobile broadband update

Lord Carter's *Digital Britain* report initiated a consultation on use of the existing mobile radio spectrum to fulfil the Universal Service Commitment for minimum availability of 2Mbps broadband nationally. The 900MHz region is licensed to O2 and Vodafone, who use it for older '2G' services, but it would provide improved reception in 'not-spots' and buildings for services, such as mobile broadband on 3G. (The spectrum used for 3G services in the UK is in the higher frequency 1800MHz range, which is more readily absorbed by building materials and the atmosphere.) Due to the way that spectrum is used, two 5MHz slots from the lower frequency band could also provide a greater range of 3G services. Lord Carter intends that an agreement be reached by the end of April with any spectrum released auctioned in the summer of 2010.

More room for mobile broadband coming soon?
http://networks.silicon.com/mobile/0,39024665,39396807,00.htm

Vodafone is trialling '3.5G' HSPA+ technology in the real world. HSPA+ is an extension of existing 3G technologies, which will enable faster internet access with download speeds reaching 42Mbps in ideal circumstances, compared with

theoretical 14.4Mbps speeds that will soon be offered in the UK using standard HSPA. HSPA+ can be added into the existing network infrastructure with little additional hardware.

A trial on Vodafone's Spanish network achieved peak rates of 16Mbps and, the press release states, 'experts estimate that the technology would be capable of delivering a typical video download experience of more than 13Mbps in good conditions and an average of more than 4Mbps across a full range of typical cell locations including urban environments.' Vodafone hope to reach speeds of 21Mbps soon and hopes to begin rolling out a UK service at the end of this year, although consumers will need new handsets to take advantage of such speeds.

Vodafone trials HSPA+ mobile broadband at speeds of up to 16Mbps
http://www.vodafone.com/start/media_relations/news/group_press_releases/2009/vodafone_trials_hspa.html
Vodafone trials hit 16Mbps
http://news.zdnet.co.uk/communications/0,1000000085,39593271,00.htm

Mobile internet use

Analysts ComScore tracked one billion unique internet users in December, compared to four billion mobile phone connections announced by the GSM Association (GSMA). ComScore say that the US and China have a combined share of 34 per cent of all internet users, while the UK is fifth in the list with 3.6 per cent.

The GSMA's four billion milestone, reached in February, presumably includes users with multiple handsets, mobile broadband dongles, redundant devices and users under the age of 15 years. (ComScore omitted minors in their calculations.) While they estimate that there will be six billion connections by 2013, the GSMA say that fewer than 100 million of the current connections use mobile broadband.

A Gartner research report predicts that nearly a quarter of US office workers with a mobile will have relinquished landlines in favour of their mobile connection by 2012. Although only 4 per cent have done so to date, Gartner believes that the other functions of a mobile (including calendar, contacts and mobile internet) will draw users away from fixed connections.

A provider of mobile advertising, BuzzCity, has found that 70 per cent of worldwide mobile internet access occurs in the home, while only six per cent is performed while travelling or out of doors. Over half of these users connect more than five times daily and four out of five spend at least 15 minutes browsing in a single session. The main activity for 60 per cent of users relates to some form of online social interaction, such as chat or accessing blogs.

The growth in mobile internet use will fuel increased demand for network capacity and speed, although it will remain to be seen whether providers are able to satisfy such need, especially with the huge investment required to introduce new infrastructure for 4G networks more suited to broadband. The typical office worker is also more likely to be in an urban centre, where signal strength and network capacity

are higher, compared to learners at home. Thus broadband may not be sufficiently available to prevent a mobile digital divide developing between groups of learners.

Global internet audience surpasses 1 billion visitors, according to comScore
http://www.comscore.com/press/release.asp?press=2698
Mobile world celebrates four billion connections
http://www.gsmworld.com/newsroom/press-releases/2009/2521.htm
Desire to connect with peers is fuelling global uptake of mobile internet...
http://www.buzzcity.com/f/pr160209.html

Children and mobile phones

When and why do children use mobile phones? The mobile communications industry body, the GSMA, and manufacturer NTT DoCoMo, have published an international comparison on how children use mobile phones. Over 6,000 children were interviewed with their parents in five countries: Japan, Korea, China, India and Mexico.

Unsurprisingly, the research found that phone use increased with age - on average, for each year another four per cent of the population of children would acquire a mobile phone. But the underlying driver in adoption is, according to the report, 'network externality'. This relates to the need to communicate with the child's peer group - almost a quarter of children started using a mobile phone when one of their three closest friends had acquired one. Use was also correlated to parental income, use of other technologies, gender (higher for females) and expenditure on education. The researchers found that children particularly favoured use of phones for text-based communications (SMS and email), rather than voice, and that the most frequent users showed higher levels of trust in information from new media sources, such as the internet.

The study found significant cultural differences, for example: in India children often share a phone with their parents; Chinese boys start using mobiles at an earlier age than girls; Korean children are earlier adopters over all; and design plays a greater part in phone selection in Mexico than in the other countries.

Mobile Society Research Institute, GSMA publish study... http://www.moba-ken.jp/topics_e/021009.html
Children's use of mobile phones - an international comparison
http://www.gsmworld.com/documents/Final_report.pdf

Making the most of the cloud

Applications delivered via the internet generally run on large arrays of high-end blade servers. These consume large amounts of power - in some cases as much as 70 per cent is used just for cooling - so redesigning hardware and control systems will both save money and reduce greenhouse gas emissions. The whole issue of *Green data centres* was covered in TechNews, January 2009.

Microsoft has launched a new research group to examine Cloud Computing Futures. The company realised that existing data centres, where many cloud environments

are hosted, are largely built using 'off-the-shelf' parts. As the director of the new group, Dan Reed, expressed it, "one common analogy is that if one built utility power plants as we build data centres, we would start by going to Home Depot and buying millions of gasoline-powered generators". His team is looking to reduce power consumption in a number of ways:

- Using power efficient processors, such as Intel's Atom, rather than high-end, multi-core chips. Although more processors would be required, the net outcome would be more operations per joule of energy used.
- Removing fans that would be no longer needed and various irrelevant ports and processors, such as graphics chips.
- Intelligently managing the sleep states of processors throughout a group to ensure that sufficient were available to meet anticipated demand while others saved energy. This control system is known as Marlowe.
- Re-engineering networking protocols to ensure that information is passed efficiently between functional units. The most developed of these technologies is called Monsoon.
- Developing Orleans, a new application management and delivery platform, based on Microsoft's new Windows Azure technology.

Microsoft has set up, with its Hotmail team, a small-scale prototype array of Atom-based servers, which the company demonstrated at the recent TechFest showcase event for its research projects.

This research may result in improved hardware for use in organisations' server rooms and lower cost hosted solutions. Other large companies, including Amazon, Dell, Google, IBM and Sun, as well as university partnerships, are creating a range of data centre and cloud computing test beds.

Green data centres (TechNews, 01/09)
http://emergingtechnologies.becta.org.uk/index.php?section=etr&catcode=ETRE_0001&rid=14248
Peering into future of cloud computing http://research.microsoft.com/en-us/news/features/ccf-022409.aspx
Cloud Computing Futures http://research.microsoft.com/en-us/labs/ccf/default.aspx
Netbook chips could work in data centres, say boffins
http://www.techworld.com/news/index.cfm?RSS&NewsID=111313

Running applications and storing data in the 'cloud' makes these available to users anywhere via the internet, without the need for clients to provide the infrastructure required. Processing power and storage are paid for on a leased or 'per use' basis, while scale economies have the potential to reduce costs for all users. Administration services and learning platforms for schools and colleges could be delivered using cloud-based approaches. Cloud computing was covered in more detail in TechNews, November 2008.

Much of the debate around cloud computing has tended to present a polarised, 'either-or' view of moving applications and data from local servers into the cloud.

However, VMware - just one of many suppliers of virtualisation and 'cloud' products and services - has outlined a technology roadmap that links services delivered via an 'internal cloud' to resources available through the internet. VMware's vCloud initiative will enable companies to construct secure 'private clouds' from a range of resources and services, allowing system managers to combine their own infrastructure with additional capacity delivered by external providers. VMware president and chief executive Paul Maritz recently termed this the 'software mainframe'.

The Virtual Datacenter Operating System (VDC-OS), expected to be shipped later in 2009, will allow companies to merge server, storage and networking resources into flexible pools that can be allocated according to demand. External vCloud service providers will offer robust, secure environments that will interoperate with those managed under VDC-OS. VMware is reported to be working with standards bodies and others to develop an Open Virtualisation Format that will govern interoperability across a range of competing platforms and services.

Cloud computing (TechNews 11/08)
http://emergingtechnologies.becta.org.uk/index.php?section=etn&rid=14132
VMware to merge public and private 'clouds'
http://www.techworld.com/news/index.cfm?RSS&NewsID=111294
VMware outlines roadmap to the cloud
http://www.vnunet.com/vnunet/news/2237136/vmware-outlines-roadmap-cloud
VMware initiatives will help customers embrace cloud computing
http://www.vmware.com/company/news/releases/cloud-initiatives-vmworld.html
Q&A: VMware talks up cloud interoperability
http://www.vnunet.com/vnunet/analysis/2237371/q-vmware-talks-cloud

Virtualisation update

Virtualisation permits a logical separation between hardware and the software and services it supports. A 'bare metal' hypervisor runs directly on the hardware and creates secure logical partitions in which operating systems are led to believe they have direct control of the hardware, although they may be just one of several different software stacks, each running in its own 'instance'. This allows dissimilar operating systems to co-exist on the same hardware, or applications to run side-by-side without knowledge of the other's existence. Desktop virtualisation is used to create a controlled user environment, often on low specification hardware, that can be accessed across a range of hardware and locations. (See *Thin clients and desktop virtualisation* in TechNews, January 2009.)

Citrix and Microsoft have announced an extension of their collaboration around virtualisation products. Project Encore unites Microsoft Hyper-V, which is the company's Windows Server 2008 hypervisor, with Citrix's Essentials management and delivery system. This is designed to improve workflow and dynamic provisioning of services, and to present a unified view of resources (such as storage) to client applications. Citrix has also announced that it intends to make its 'enterprise-class' bare metal XenServer software available for free from late March. This 64-bit platform can be used to manage multiple hardware nodes, allowing live transfer of virtual machines between servers. Customers requiring greater automation and

management control can purchase the appropriate Citrix Essentials product. (Microsoft and VMware also offer their main hypervisor products free of charge.)

Thin clients and desktop virtualisation (TechNews 01/09)
http://emergingtechnologies.becta.org.uk/index.php?section=etr&catcode=ETRE_0001&rid=14277
Citrix Extends 20-Year Partnership with Microsoft into Server...
http://www.citrix.com/English/NE/news/news.asp?newsID=1687128
New Citrix XenServer release makes... virtualization free for everyone
http://www.citrix.com/English/NE/news/news.asp?newsID=1687130

Both Citrix and (its largest competitor) VMware have announced bare metal desktop virtualisation products optimised to work with PCs based on Intel's vPro technology in Core2 and Centrino 2 processors. vPro offers hardware management and security support for virtualised systems, permitting low level operations to be performed even when the operating system has been compromised.

The hypervisor on the client can download an image containing both the operating system and approved applications from a central server. Although this process is initially bandwidth intense, thereafter patches and minor changes can be readily applied by sending only the changed portions from the server to the cache on the client. Users can operate without a connection, as synchronisation software controls changes and also returns new files generated on the client back to the server when the connection is next restored.

These hypervisors can be installed onto hardware (within specification) selected by users, creating the possibility of a personally owned device with a range of software and settings selected by the user, but providing a secure virtual machine running the applications needed by the business or (potentially) a school. Updates could be performed wirelessly overnight, with the host system on the server 'waking' client machines in order to perform maintenance tasks.

Citrix collaborating with Intel to deliver Xen-based client virtualization solutions
http://www.citrix.com/English/NE/news/news.asp?newsID=1685762
VMware to Deliver Client Virtualization Platform on Intel vPro Technology
http://www.vmware.com/company/news/releases/cvp-intel-vmworld.html

VMware has also demonstrated virtualisation for a Nokia mobile device. The N800 is a small internet 'tablet', somewhat bigger than a mobile phone (144 x 75mm, approximately 6 x 3 inches). During the demonstration in France, a game was loaded under the Windows CE operating system, while Google's Android was used to check the time in the US. According to one report, there was no 'discernable lag' when switching between the two virtual machines, which were running concurrently.

This proof of concept, although not operating on a standard mobile phone, shows that completely distinct environments could be running side-by-side. This would again permit personal and business or school use to be segregated in a single device, possibly with a different number or other billing control for each. Also, when

upgrading, the complete virtual machine, along with all the user's customisations, could simply be ported to new hardware.

VMware demos mobile virtualisation http://www.itpro.co.uk/609992/vmware-demos-mobile-virtualisation

60GHz wireless standard published

60GHz wireless systems could transfer data at 15Gbps across short (1m) distances - that is 25 times as fast as the maximum possible speed for the new 802.11n draft standard that is just being ratified. This speed would be sufficient for wireless transmission of uncompressed HD video information in a home multimedia environment, or to connect fast access storage devices. It could be used to wirelessly connect laptops to projectors in classrooms and school halls, although distances become critical over five metres. This is not yet a full international standard, with consultations continuing in advance of a submission to ISO.

WirelessHD (or WiHD) is a proprietary 60GHz standard, backed by a group of industry players, which was being promised by a number of manufacturers at January's Computer Electronics Show (CES) using SiBeam's 60GHz chips.

UWB (ultra-wideband) is a competing technology that uses the 5GHz spectrum, which travels better through walls but cannot deliver such high data rates. It has been embraced by the WiMedia Alliance for multimedia and various wireless USB solutions.

60 GHz radio implements standard for multi-gigabit wireless applications
http://www.ecma-international.org/news/PressReleases/PR_Ecma publishes 60 GHz Standard.htm
WirelessHD http://www.wirelesshd.org
60GHz gains traction at CES
http://www.eetimes.com/news/latest/showArticle.jhtml?articleID=212800003
High-Def is in the air http://www.technologyreview.com/computing/20086

Gigabit data over 802.11n Wi-Fi

MIMO (multiple input, multiple output) antenna arrays and beam forming are often associated with 4G mobile technologies but can have applications in many other areas of wireless communications. Multiple-antenna arrays can be manipulated by adjusting the power to each to form beams by creating interference patterns - areas of constructive interference are 'focussed' towards the client device.

A new company, Quantenna, has produced a chip to control an 802.11n antenna array to produce data rates of up to 1Gbps (with compression) on Wi-Fi. The draft specification for 802.11n is usually implemented using paired antennae, but an array of four is also permitted, although beam forming requires a gap of several centimetres between them. Combined with specialist video processors from Cavium Networks, the Quantenna system can compress and deliver HD video wirelessly within a room or small building. However, signal propagation is affected by interference from objects and line of sight is required for beam forming to work

effectively. Base units and chipsets in televisions are expected to appear in Asian markets in the coming months, but it is possible that laptops and smaller form-factor mobile devices could embed the system too.

Quantenna Demonstrates Technology Leadership in Wi-Fi
http://www.quantenna.com/pressrelease-01_07_09.html
High-Definition Video over Wi-Fi
http://www.technologyreview.com/computing/22195/?a=f

Multimedia

Analysis: HD video in networked environments

At a glance

- HD video content is becoming widely used and produces considerable quantities of data.
- The bandwidth required to transmit HD content depends on a number of factors, including the compression algorithms and HD format chosen.
- A range of alternative cabled and wireless network standards are available, or still in process of being ratified. No single standard has emerged as the clear leader.

The rise of HD video

A considerable quantity of HD content is already available to schools: many films are being released in high definition (HD) and both online and digital media sources are looking to provide some form of HD output, while more recent camcorders and cameras, Blu-Ray disks and many games consoles produce HD images. YouTube, the popular video sharing site, recently allowed users to upload HD video and the BBC Trust is consulting on a new 'Canvas' platform that would (among other services offered) deliver HD content to Freeview set-top boxes and through Freesat to satellite receivers.

HD formats and video bandwidth

HD video comes in three main formats: 720p, 1080i and 1080p. The number represents the horizontal scan lines, while 'p' means progressive (where the picture is refreshed each time) and 'i' is for interlaced (where alternate lines are refreshed on each pass). The associated horizontal resolutions are 1,280 pixels for 720p and 1,920 pixels for the 1080 formats. A further 2160p Quad HDTV format may lead to devices in 2015.

The amount of data produced by an HD video stream depends on the HD format, frame rate (frames per second or fps), colour sampling and audio codec chosen. Analogue television is currently broadcast at 25fps in the UK (24fps in US), but HD does not give optimum visual quality at this frame rate, so equipment manufacturers are tending towards 60fps.

According to Microsoft, 1080i HD video at 60fps requires nearly a 1Gbps to deliver uncompressed content to devices, whereas compressed 720p video at 24 frames

per second produces 25Mbps. (If recording HD video, these equate to 410GB and 11GB of data per hour, respectively.) Transmitting this data across any form of network will require additional data for error correction and other network overheads.

A number of techniques can compress HD data, but each will introduce loss (with consequent reduction in picture quality). Down sampling, which reduces picture quality, converts to lower resolution formats, while upscaling (which can also create video artefacts) is used to create a video stream for higher resolution displays. TechNews covered HDTV in June 2006.

HD video in school environments
Schools and colleges benefit from high speed, switched Ethernet networks. While 100Mbps is inadequate for reasonable quality HD video, gigabit Ethernet provides plenty of bandwidth, if HD is not widely used or in contention with other significant network traffic. Nevertheless, as HD video traffic increases, even with prioritisation in quality of service (QoS) schemas, networks will come under considerable pressure.

Inevitably, what happens in the consumer market will have a knock-on effect for educational institutions. It was not so long ago that wireless projectors seemed far off, yet they are now used by many schools, so it may not be long before the wireless HD video technologies from the home become available too.

The digital living room
A number of developments covered by TechNews in July 2005 are coming to fruition. Set-top boxes and online television streaming services are converging people's viewing habits, while Wi-Fi or 3G enabled mobile devices are delivering such content throughout the home. A BBC blog post gives a short case study of how the current 'connected home' might look, but implies a complex web of devices, wires and software hook-ups beyond either the capability or interest of most consumers.

Delivering HD video wirelessly to displays throughout the home is one of the industry's immediate goals, with a range of technologies competing in this arena:

- **Wi-Fi**. The latest 802.11n draft standard could give a theoretical maximum throughput of 300Mbps in the 2.5 to 5GHz spectrum. In the real world, this would be inadequate for either of the 1080 HD formats without significant compression and loss of quality.

- **Ultra-wideband (UWB)**. This is not a standard but a range of technologies that produces a series of simultaneous, short, low-power pulses across a set of frequencies in a broad spectrum. The low power reduces interference with other devices, while the spectrum spread allows for signal propagation issues created by objects in the room.

- **Wireless USB**. This standard is based on the WiMedia Alliance's implementation of UWB, which can deliver a maximum of 480Mbps at 3m and 110Mbps at 10m, using selected frequencies between 3.1GHz and 10.6GHz.

- **WHDI**. This draft standard relies on compression algorithms that intelligently examine a video stream to identify the least and most significant portions for the viewer. By applying greater compression to the least significant information, the developers can broadcast HD video in the unlicensed 5GHz spectrum. Depending on local spectrum restrictions, Amimom claim that they can deliver compressed 720p or 1080i HD video in a 20MHz channel and full 1080p in 40MHz. While the coding schemes are different, WHDI could share Wi-Fi antennas, which operate on the same frequencies.

- **WirelessHD**. This is targeted at delivering 1080p HD video at 24 fps using 60GHz frequencies. This spectrum, which is also unlicensed, can deliver far higher data rates over greater distances than 5GHz, although walls and other objects are a more significant hindrance to signal propagation. An array of antennas is used to form a beam through constructive interference, which focuses the signal into a particular spatial region. Fast switching of these arrays can rapidly reroute the signal to avoid fixed objects, or even people moving within the room.

Cabled home networks

Given the challenges faced by wireless systems, which can realistically be expected to provide 'in-room' HD video for the time being, are there cabled alternatives? A 'high speed' HDMI cable can reliably transfer 1080p data about 6m (25 feet), above which the HDMI web site recommends use of active components to ensure signal quality. Cat 5 and Cat 6 cabling can be used with boosters to give cable runs of up to 50m, but these will be relatively expensive and only connect pairs of devices.

The CoAir chipset from Sigma Designs employs multicast technology and Ethernet or standard coaxial cable (installed to provide television outlets for the aerial in most houses) to network the home; UWB transmitters provide the final wireless link to attached hardware. Since it is based on UWB, CoAir can only provide a maximum data rate of 480Mbps at a range of 3m.

'Power line' networks have also been promoted for pervasive home networking, but have struggled to gain acceptance in the market place. (Power line networks impose a high frequency data signal over the standard 50Hz AC mains power supply. While attractive in principle, poor wiring and interference have proven problematic.) A developing G.hn standard incorporates power line connections alongside telephone and coaxial cabling to deliver multimedia, voice over IP (VOIP) and other digital services around the home. Reports indicate data rates of 200Mbps over power lines and double that for coaxial cabling. Although adequate for compressed 720p, these speeds are some way short of what is required for uncompressed 1080p. A number of other power line communications groups have recently joined the HomeGrid Forum to promote the new standard and ensure interoperability. G.hn is a 'place holder' title, with the final name yet to be agreed.

Buying in to HD video networks

Manufacturers' claims regarding transmission of HD video must be examined carefully - outcomes will depend on the video format chosen and the image quality that is deemed as acceptable by the user, which will largely be governed by the level of compression applied. While Ethernet networks may be capable of transmitting the large quantities of data involved, they will rapidly become overwhelmed if too many users generate too much high quality video. Although there are a number of wireless and alternative cabled technologies available, there is no widely agreed standard and each has some significant drawbacks or has yet to be proven in the field.

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Understanding HD Formats
http://www.microsoft.com/windows/windowsmedia/howto/articles/UnderstandingHDFormats.aspx
Wi-Fi Alliance http://www.wi-fi.org
Wireless USB from the USB-IF http://www.usb.org/developers/wusb
WHDI http://www.whdi.org
WirelessHD http://www.wirelesshd.org
Connecting with HDMI http://www.hdmi.org/consumer/how_to_connect.aspx
Sigma Designs CoAir http://www.sigmadesigns.com/public/Products/coair/coair.html
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ITU-T G.hn Specification Achieves Key Milestone...
http://www.homegridforum.org/news_events/pr/12_15_08
Technology organisations align to support United Nations' ITU-T G.hn standard
http://www.homegridforum.org/news_events/pr/02_25_09

Multimedia news

HD video on netbooks

Netbooks are meant to have an extended battery life, but the chipsets used often do not contribute as much to that aim as desired. Processing HD video is highly intensive and can generate large amounts of heat as well as draining significant power, making it a difficult option for netbook developers who wish to optimise battery life. Most graphics processors use some form of SIMD (single instruction, multiple data) instruction set, implemented in hardware, which allows rapid, parallel processing of similar data without requiring multiple instruction fetches. Such hardware generally requires high voltages and is subject to signal leakage, making it difficult to implement in modern, small-scale processor designs.

An Intel researcher, interviewed early in February, talked about a new SIMD Accelerator that the company is developing. Current Atom processors do not have integrated SIMD graphics hardware, which needs 1.1V to 1.2V to run - the Atom runs at 1.16V maximum. Engineers are seeking to reduce the SIMD requirement to just 0.3V, with low leakage, so that graphics could be integrated into low power Atom designs. However, Shekhar Borkar expected that it would take five to eight years to complete this development process.

Other chip designers are looking at ways to integrate HD video into chipsets designed for netbooks and SoC (system-on-a-chip) processors.

Intel looks to bring HD video to handheld gadgets
http://www.pcworld.com/article/159239/intel_looks_to_bring_hd_video_to_handheld_gadgets.html

New chip for 'greener' graphics

Nearly all modern processors are based on a CMOS (complementary metal-oxide semiconductor) design which behaves in a highly predictable manner. As CMOS designs are miniaturised, the operating voltage has to be increased to overcome noise introduced through current leakage and imperfections in chips. In turn, this increases the power consumption of such processors.

While it may seem that knowing that the outcome of a calculation will always be right, if programmed correctly, is essential in computing, this is not always true. Any algorithm, such as encryption or many computer simulations, which relies on random numbers, does not need a fixed input. Also, the human brain will often compensate for observed errors, such as video display artefacts, and accept the result as adequate.

Researchers at two universities, in Singapore and the US, have developed an extremely low-power, probabilistic CMOS (PCMOS) design that takes account of likely errors to produce less than perfect results for use in graphics and stochastic applications. The team claims that their chips run seven times faster while using 30 times less power than modern equivalents, which would make batteries on mobile devices to last far longer. While not replacing standard CMOS designs, they see these being introduced as a subsystem for commercial devices in about four years' time.

Scientists develop revolutionary microchip that uses 30 times less energy
http://www.physorg.com/news153398964.html

Streaming games and movies to mobile devices

Generating and displaying real time HD-quality video on mobile phones might sound a complex task, but AMD and software developer OTOY believe they have a solution. First person games generate huge amounts of video data, which is normally derived and rendered on highly parallel graphics processors separate from the main CPU in modern PCs. However, mobile phones do not have the power or physical

space to provide such facilities - if they did, all kinds of rich applications could be delivered to handsets, including detailed location dependent maps, graphical guides for visitors and immersive learning content, as well as '3D' game environments and films. These would be provided through a web browser (which could also be on a netbook or laptop), without the user needing to install new applications or fill up storage media with all the data that an application might need.

AMD and OTOY's solution is to shift the graphics processing to a petaflop class supercomputer, yet to be completed, and stream the required image across the mobile network in a compressed format suited to the phone. The supercomputer behind the AMD Fusion Render Cloud will contain over 1,000 AMD graphics processors and be capable of a thousand, million, million floating point instructions every second (ie. a petaflop).

The central processing system is expected to be complete in the second half of this year. AMD see this as delivering thin client graphics through the 'cloud'.

AMD supercomputer to deliver next-generation games... http://www.amd.com/us-en/Corporate/VirtualPressRoom/0,,51_104_543~129743,00.html

JPEG XR standard close to final publication

The Joint Photographic Experts Group developed the first JPEG format, for compressing and saving images, which was formally ratified as ISO standard 10918-1 in 1994. JPEG files normally contain graphics data that has been compressed using an algorithm that prevents the original image from being displayed exactly when the file is opened - in other words, JPEG is a 'lossy' format. Within the specification, there is opportunity to store information about the colour space used - that is, the range of red, blue and green information in the image that can be displayed and how it has been sampled.

Microsoft has published a new specification, which it has submitted as JPEG XR, that it hopes will overcome some of the existing standard's shortcomings. The new 'eXtended Range' format uses 16-bit encoding, unlike the 8-bit standard of current JPEGs, allowing much greater colour depth, wider dynamic range (between the lightest and darkest pixels) and finer gradations between each colour sampled from the original image. The compression routine is more efficient - either halving the file size for a given image quality, or doubling the image quality for the same file size - and makes it easier to extract a portion of the image when zooming.

The specification is designed to be simpler for manufacturers to implement directly in hardware (which would make it far quicker to process images) and is supported as Microsoft's 'HD Photo' format in Windows Vista, Adobe Photoshop and Mac OS X. The JPEG group hopes that the standard will be ratified later this year.

Better JPEG standard due in 2009 http://news.cnet.com/8301-13580_3-10152810-39.html?part=rss&subj=news&tag=2547-1_3-0-20

Touchscreen via 'sixth sense'

Researchers from the Fluid Interfaces Group at MIT in the US have developed a device based on common 'touch' gestures that does not need an actual touch surface to operate. Dubbed 'Wear ur world' (WUW), the 'sixth sense' hardware combines a mini-video projector, a webcam, a smartphone and some sensors, with a total cost of about $300 (£215).

A display is projected onto any surface in front of the user, who can make gestures in mid-air in order to: draw or write; request a wristwatch display by making a circle on the wrist; dial a number using a keypad displayed on a hand; or take a photo by framing part of a scene using both hands. The system can also process images and recognise certain objects, so it will retrieve information and reviews on a book being held, or display the latest video news for an article on the page of a newspaper. The prototype relies on the user wearing coloured tags on the fingers. It is not clear whether the smartphone or a remote service is doing the processing, but it is more likely to be the latter.

No launch details have been announced, but this kind of 'augmented reality' could be a boon in all kinds of learning contexts, including at visitor attractions, in small group work or other locations where no interactive whiteboard is available, or for users with visual impairment (as feedback could be auditory rather than video).

Sixth sense http://fluid.media.mit.edu/projects.php?action=details&id=68
MIT researchers make 'sixth sense' gadget
http://www.physorg.com/news153051942.html
MIT's 6th Sense device could trump Apple's multitouch http://news.cnet.com/8301-17938_105-10159601-1.html

Linja Zax is currently a Firefox browser plug-in for touch-screen computers, although the developers intend it to appear on touch-screen phones. In addition to concern about Apple's patent claim for its touch gestures, they cause some users difficulty as they require two fingers for many operations. Linja Zax zooms on pages by 'swirling' the finger in a clockwise direction, while zooming out requires an anticlockwise motion; 'double-tapping' restores the default zoom.

Apple secures multitouch technology patent
http://www.macworld.com/article/138465/2009/01/multitouch_patent.html?lsrc=rss_news
Linja Zax replaces 'multitouch' with one finger gestures http://news.cnet.com/8301-17939_109-10151690-2.html
Linja Zax http://www.linjadesign.fi/linjazax

iPoint 3D - gesture control in 3D

Developers from the Fraunhofer Institute for Telecommunications in Munich have developed a gesture-based 3D control system that needs no special gloves or other devices. The hardware, which can be suspended above the user or integrated into a table top, combines a pair of cameras in a unit 'not much larger than a keyboard' to track hand movements in front of the associated 3D display.

The team envisages the system being used with computer games, interactive control systems in operating theatres, in environments where hands may be too soiled to interact with touch devices or keyboards, for information systems and all kind of other 3D applications. Engadget has a video of two players working simultaneously with iPoint 3D in a simple game of 'pong'. No availability or pricing details were given in the press release, although the hardware is said to be based on 'inexpensive, off-the-shelf video cameras'.

iPoint 3D - Using fingers as a remote control
http://www.fraunhofer.de/EN/press/pi/2009/02/PressRelease02-19-09.jsp
iPoint 3D http://www.hhi.fraunhofer.de/en/departments/interactive-media-human-factors/overview/ipoint3d
Video: Fraunhofer-Gesellschaft's iPoint 3D Pong match gets heated
http://www.engadget.com/2009/03/03/video-fraunhofer-gesellschafts-ipoint-3d-pong-match-get/

E-book reader update

Amazon has launched its upgraded Kindle 2 e-book reader which will be available in the US at the end of February. Using an electrophoretic display, in which minute white capsules suspended in a near-black, viscous solution are manipulated using electrical charges to produce an image, e-book readers provide the user with a viewing experience more like a book than a computer. The 6-inch (15cm), 600 by 800 pixel display can produce 16 shades of grey and is said to generate a new page image 20 per cent faster than the original Kindle. Battery life has been improved, with Amazon stating that users can expect to get four to five days' reading from a single charge. Content can be downloaded using a built-in 3G wireless connection, onto the device's 2GB of flash memory, from 230,000 titles available in the Amazon bookstore. The company claims that electronic books now comprise 10 per cent of its book sales.

A new, 'experimental' feature is text-to-speech, which could be useful to users with sight impairments. Both male and female voices can be selected, page turning is automated and the user can switch modes without the e-reader losing track of the user's location in the text.

The new Kindle will be at the same price as the original: $359 (approximately £250), which includes free access to the wireless network to download titles; subscription services, such as news and blogs, can be added. Amazon would need to modify the hardware to account for the technical differences between 3G systems in the UK and US. No UK availability has been announced.

Other manufacturers have produced e-book readers, such as Sony's device, available in the UK for around £220, and Plastic Logic's prototype, which was due to be demonstrated during February.

Introducing Amazon Kindle 2 http://phx.corporate-ir.net/phoenix.zhtml?c=176060&p=irol-newsArticle&ID=1254544&highlight=

Google's open source operating system, initially targeted at mobile phones, is attracting attention from developers of other devices. An open source development group called MOTO has produced a proof-of-concept system that uses an electrophoretic display from E-Ink. (Electrophoretic displays use minute white capsules, suspended in a near-black, viscous solution, which are manipulated using electrical charges to produce an image. E-Ink produces displays for Amazon's Kindle and other e-reader systems.) Such displays are bi-stable, retaining an image until it needs to be changed, which means they consume very little power.

Although such a kit could be used to create an open source e-book reader, it could be equally applied to a range of application requiring a low-power, grey-scale display. MOTO are looking at developing display interfaces for Linux and other operating environments.

MOTO http://labs.moto.com
Android-powered eBook readers on the horizon? http://www.pcpro.co.uk/news/247253/androidpowered-ebook-readers-on-the-horizon.html

Google Book Search goes mobile

Google has been developing Book Search technology for some time, allowing users to read extracts and download complete scanned editions from the internet, although pricing of the resultant PDF files depends on the copyright status of the particular publication. (Public domain works, which are out of copyright, are free.) Towards the end of 2008, Google reached a settlement with a group of US publishers making more downloads available in that country.

The company has now announced a mobile version of its website and text versions optimised for the small screen of an Apple iPhone or mobiles based on its own open source Android operating system. In these instances, optical character recognition (OCR) has been used to extract the original text, which can then be re-flowed for a small screen. Although the display on a mobile phone is considerably smaller than the Kindle, this option may prove attractive to some users. Further, having converted the scanned images to text, it would take only a bit extra to add a text-to-speech engine, rendering the size of screen almost irrelevant for those who do mind the computerised style of reading.

Google Book Search http://books.google.com
The future of Google Book Search http://books.google.com/googlebooks/agreement
1.5 million books in your pocket http://booksearch.blogspot.com/2009/02/15-million-books-in-your-pocket.html
Google Book Search for mobile http://books.google.com/m

Printers without ink

ZINK ('zero ink') printers use a thermal imaging technique to produce colour prints from 'paper' that contains patented crystals. The printer produces heat pulses, the intensity and duration of which control whether the cyan, magenta or yellow layer is

activated at a given location, to produce a full colour image. The printer utilises special paper but has no other consumables, much in the same way that Polaroid cameras used to operate.

Dell gives a list price in the US for the recently launched Wasabi PZ310 printer, from ZINK, of $149 (about £105), while paper costs $0.40 to $0.50 (30-35p) per sheet, depending on quantity purchased. The printer measures 122x75x24mm (approximately 5x3x1 inches), weighs 225g and takes paper that is 76x51mm (3x2 inches).

ZINK, which was created with support from Polaroid, also supplies printing technology to Polaroid and Takara Tomy. Other 'inkless' printing technologies, many of which are greyscale only, are available.

ZINK Imaging announces the fourth ZINK-enabled product
http://www.zink.com/files/ZINK_Dell_Product_Announcement_Release_Final_2-9-09_2.pdf
ZINK http://www.zink.com

Latest Google Earth has oceans and historical data

The latest version of Google Earth adds an ocean layer to its geographical data. Users can now 'plunge' into the oceans and travel along an ocean canyon or the edge of the continental shelf. The map layers include sites of ocean wrecks, pictures and video of marine features and creatures, and journey information that you can follow for 'geotagged' marine predators. The latter is based on the new Touring feature, through which you can record and play back tours in any part of Google Earth. A number of terrestrial locations also have historical views, so you can examine the development of urban areas. The historical imagery is variable, dependent on the data available to Google.

UK teacher and blogger Ollie Bray gives a range of possible uses for Google Earth in the classroom. (Click the 'Google Earth' tag in the Categories cloud for more entries.)

Dive into the new Google Earth http://googleblog.blogspot.com/2009/02/dive-into-new-google-earth.html
New Google Earth Version 5.0...
http://olliebray.typepad.com/olliebraycom/2009/02/new-google-earth-version-50-oceans-historic-layer-and-new-easy-way-to-make-google-earth-tours.html

Hardware

Analysis: Auxiliary storage

At a glance

- External storage and media cards enable users to back up and transfer data between devices.
- Older magnetic media formats are being replaced by optical and flash memory technologies.

- Flash memory is more robust than hard disks, although wear levelling is required to prevent early drive failure through uneven wear.
- Flash memory is more expensive but likely to overtake hard drives on data transfer speeds in the near future, although this will depend on applications used and how the drive is connected.
- The storage strategy used in flash memory design affects performance, power consumption and price.
- Security of sensitive data and potential transfer of malware must be considered for all auxiliary storage.
- Online services will replace some types of auxiliary storage as reliable, fast internet access becomes ubiquitous.

The growing demand for storage

Demand for storage is growing rapidly as users amass more pictures and video content, all in higher resolution formats. Many new PCs actually have larger hard drives than many users require, but it is the need to transfer data between computers, or to save it on peripherals, such as cameras and camcorders, that is driving the auxiliary storage market.

Auxiliary storage is used for other purposes - many people back up files to an external hard disk or optical drive, while users' desktop environments and complete applications can be run without installation from a USB flash drive. Indeed, where supported by a computer's BIOS, an operating system can be booted from a flash drive.

Strictly, auxiliary (or secondary) storage is everything that is not the computer's working memory (RAM), including internal hard disks and solid state drives. Nevertheless, this article will largely look at external and removable storage. A number of companies will be given as examples, but there are many others working in this sector.

The main technologies

The main technology in the past has been the hard drive, with disk sizes as small as 1.3 inches fitted in music players and other devices. The technology has become very efficient, with extremely high data densities stored on magnetic platters that spin at 5,400rpm or more. Street prices for basic external hard drives are currently around £40 for 160GB, £50 for 250GB and £75 for 1TB. (A terabyte, 1TB, is a thousand gigabytes, or a million megabytes.)

Tape has long been used as additional storage - the media were relatively inexpensive and could be taken to an offsite location as part of a secure backup policy. DAT and AIT tape formats are still used by some companies, but serial access (having to run through a tape to the required point to retrieve data) makes them slow and less widely used.

Optical disks (CD or DVD) are popular for backing up data or transferring files, as the media cost very little and the format is supported on most hardware. However, a 4.8GB DVD can only store 600 high resolution photos at an average file size of 8MB.

Most writable optical disks now sold store files permanently, once the data has been 'finalised', with rewritable disks falling out of fashion compared to flash and other technologies.

Flash drives are solid state, built from integrated circuits with no moving parts. This makes them physically robust, not being nearly as prone to damage from shaking or (compared to hard drives and tapes) magnetic fields. Since they are based on similar technology to working memory, they can be fabricated in large volumes using common production techniques, allowing capacities to increase while prices drop. Low cost USB 'pen' drives are, at the time of writing, priced £4 for 2GB, £21 for 16GB and £110 for 64GB. Clearly, these prices are significantly higher than hard drives, but consumers find the small form factor and reliability highly desirable.

Flash

Flash memory is found in many auxiliary storage devices, including media cards, flash drives and solid state drives (SSDs). Most flash is built from NAND circuits, in which data must be read and written in large blocks. This mechanism makes operation very fast and simplifies controllers, but means that memory cells cannot be addressed individually. This is not a problem generally, as most files take several memory blocks, although SSDs used as hard disk replacements may experience slow performance where many small files are written.

Older flash drives could only store one level of charge in a cell, representing a binary digit. More recent designs can store 4, 8 or 16 levels of charge, representing 2, 3 or 4 data bits. These multi-level cells (MLCs) have higher storage densities as a result, but measuring the charge and the greater effects of leakage require more complex controllers. This makes single-level cells (SLCs) faster in operation and more robust, while drawing less power, but they take up more room in the target device and are more expensive to manufacture at a given data density.

One significant issue with all types of flash is longevity - each cell has a finite life measured in read-write cycles. Manufacturers may now guarantee their SLC-based drives for 100,000 or more cycles, but certain cells (such as those that store the main directory for the data) are changed more often. In order to achieve the guaranteed lifetime, 'wear-levelling' is implemented to remove bad blocks from future operations and to ensure that the same physical blocks are not used continually.

Flash memory can be very fast with low latency (delay times), as there is no head to move across a platter, unlike traditional hard drives. Read speeds are generally claimed to be similar to hard drives while write speeds are said to be lower. However, speeds experienced by users depend on the specific application, due to the way data is accessed in blocks.

External drives

Many smaller external drives are connected by USB or Firewire (IEEE 1394), the latter mainly used on Macintoshes. Both USB and Firewire will soon be available at higher speeds, increasing from 480Mbps to 4.8Gbps for USB and 800Mbps to 3.2Gbps for Firewire.

Hard disk drives are currently cheaper per gigabyte of data, compared to SSDs, but larger and heavier. An external SSD, for example the Buffalo MicroStation series, may cost from £75 for 32GB and £225 for 100GB. The higher capacity Buffalo MicroStation measures 89x57x14mm (approximately 3.5x2.25x0.5 inches), weighs 60g and uses a combination of SLC flash (for speed and durability) with MLC flash (to keep the cost down). A 1TB Buffalo DriveStation Turbo hard drive measures 175x156x45mm (roughly 8x6x1.75 inches) and weighs 1kg, but only costs around £85.

Media cards

Many types and sizes of flash-based media cards are available to expand the storage in mobile phones, media players, cameras and mini digital camcorders, although larger camcorders often need the speed and capacity of a hard disk or tape.

One of the more common formats is CompactFlash, which was designed to be compatible with PC Card (previously PCMCIA) interfaces, based on ATA standards used to connect many types of hard drive. 2GB of CompactFlash may cost £8, 8GB at least £15 and 32GB over £140. Faster devices are expected to be available later this year using the new CFast format, based on the SATA drive standard.

Secure Digital (SD) cards, which were designed to be smaller and, therefore, more suited to devices like mobile phones, have become very popular. A number of improvements have been made, yielding smaller 'mini' and 'micro' designs, and higher capacity SDHC (maximum 32GB) and SDXC (2TB) standards. SDXC is new, supports a much higher data throughput and is likely to be seen in products within a year - Pretec has recently demonstrated both 32GB SDXC and CFast cards.

The highest capacity (2GB) SD card is available for around £4, whereas a 4GB SDHC card may cost £6 and 8GB, £13. The much smaller microSDHC costs £7 for 4GB and £37 for 8GB. The size of these cards (microSDHC is 15x11x1mm) can make them fiddly to exchange, so camera users often prefer CompactFlash, which is easier to handle in the field.

There are a number of other card standards, such as the older MMC format (which is basically compatible with SD), the Memory Stick (which is a proprietary Sony format) and xD (used in Olympus cameras).

Issues

One of the greatest recent threats to personal data has been data drives left in public places, but there is also the possibility of transferring malware (viruses and trojans) between PCs. Manufacturers have a wide variety of drives with full encryption or secured partitions and some offer built-in malware protection, for example SanDisk drives that have McAfee protection pre-installed.

The rapid development of devices, formats and form-factors means that newer versions are not always backward compatible. Some media cards need to be

inserted into special holders to work with older readers, while others may be limited in speed or capacity. Although extensively tested, there is also concern about how long flash memory remains reliable, meaning that it may not be suited for long-term backup.

Future
What does the immediate future hold? Certainly falling prices and increasing capacities across the range of auxiliary storage; internal read/write speeds and data transfer rates will improve and some formats will be superseded. However, increasingly ubiquitous, high-speed connection to the internet, even for mobile devices, will lead many users to look to online storage and back-up services.

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CompactFlash Association http://www.compactflash.org
SD Association http://www.sdcard.org
SDXC signals new generation of removable memory with up to 2 terabytes of storage http://www.sdcard.org/press/SD_Association_Announces_SDXC_FINAL_1-6-2009.pdf
1st SDXC in the World - Pretec Demonstrates 32GB SDXC
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http://www.vnunet.com/vnunet/news/2231002/alarms-sounded-flash-drive
SanDisk beefs up flash drive security http://www.pcpro.co.uk/news/232122/sandisk-beefs-up-flash-drive-security.html

Hardware news

MLC flash stores 64GB in 4 bits per cell

Toshiba and SanDisk have announced that they have built the world's first 64GB flash memory chip that uses multi-level cell (MLC) technology. Two major types of NAND are now available: single-level cell (SLC) and multilevel-level cell (MLC). SLCs store one bit of data in each cell, but have faster access times, lower power consumption and greater endurance; MLCs, as the name suggests, can store four or more bits in each cell using multiple charge levels. MLCs are cheaper to produce but need more sophisticated control software to protect against higher data error rates.

The new chips, to be produced by SanDisk, are designed using a 43nm process and an advanced controller with in-built error correction. The size of the components and fine gradations in charge - 16 levels are needed to store 4 bits - mean that possible data loss is a considerable challenge at these scales.

SanDisk and Toshiba have also announced 32GB capacity NAND chips using 3-bit MLC on a 32nm process. SanDisk states that the data density of the new chips -

which are 'fingernail-sized' (just over 1cm^2) - is double that of their previous 43nm technology. The new designs will be available from the second half of the year.

These chips are intended for use in the popular microSD cards used to store data on phones and other portable devices. These developments will allow users to store many more photos and recordings than ever before. The introduction of higher capacity chips will inevitably mean reductions in prices of previous designs over the medium term.

Toshiba makes major advances in NAND flash memory...
http://www.toshiba.com/taec/news/press_releases/2009/memy_09_555.jsp
Sandisk develops 32-nanometer NAND flash technology...
http://www.sandisk.com/Corporate/PressRoom/PressReleases/PressRelease.aspx?ID=4505

Memristors becoming a reality

Memristors are the fourth fundamental circuit - effectively programmable resistors. HP announced the technological breakthrough that made these a real prospect in April 2008 and has now designed a basic circuit that demonstrates how they could be used. Normal computer memory - dynamic RAM (DRAM) - loses all information when switched off, so computers must have secondary storage (such as a disk or NAND-based solid-state drive) to make data available when the computer is next booted. Memristors potentially remove this requirement, as the state of the system would be 'frozen' at the point the power was switched off, ready to start from the same position as soon as power is restored.

Memristors vary the amount of resistance they introduce into a circuit according to the voltage applied across them - and remember this when that voltage is removed. Since they are 'programmable', they can be used as multi-function units to replace fixed transistor-based circuits on chips, which are hardware representations of logic functions. This would reduce the number of components required on a chip - in turn reducing chip size and power consumption - or they would allow designers to increase the computing capacity of a given size of processor. Memristors are fabricated from titanium dioxide, a common component of integrated circuits, potentially making them cheap to produce using existing technologies.

HP researchers have now built a simple field-programmable gate array (FPGA) chip using memristors. FPGAs are commonly used to test chip designs, allowing engineers to make modifications before committing to production runs of normal 'fixed-design' integrated circuits. Circuits incorporating memristors could be electronically re-configured as logic, signal routing or memory devices. Researchers showed that the output from a basic logic calculation could be fed back as a voltage across the memristors, to adjust their resistance, effectively forming a self-programming, 'learning' device. The lead researcher predicted that circuits incorporating memristors would enter production within three years.

HP Labs proves existence of new basic element for electronic circuits
http://www.hp.com/hpinfo/newsroom/press/2008/080430a.html?mtxs=rss-corp-news

Self-programming hybrid memristor/transistor circuit could continue Moore's Law
http://www.physorg.com/news154865950.html
Memristors make chips cheaper http://www.technologyreview.com/computing/21710

FeRAM memory

Ferroelectric RAM (FeRAM) can be used as a non-volatile alternative to standard dynamic RAM (DRAM) memory. One application would be to replace NAND storage (used in flash memory devices) with lower power circuits, which are more robust and can be written to more quickly. However, although FeRAM is faster, it is expensive and currently yields much lower storage densities than NAND-based systems. It is currently used in RFID chips and other small, low power circuits that need relatively little memory.

In FeRAM, the normal dielectric (insulating) layer in the semiconductor stack for a storage capacitor is replaced by a ferroelectric layer, which has the property of electrical polarisation that can be reversed by applying an external electrical field. Flipping the polarity to store a 0 or 1 bit can be achieved more rapidly than charging a capacitor in normal memory. In DRAM chips, the charge leaks away, requiring constant refreshing to maintain the stored data; whereas NAND chips retain charge but need a much higher voltage to write a value to be stored, requiring a 'charge pump' to be primed, taking as much as 100 times as long as FeRAM to write data.

Producing FeRAM on a commercial scale has been problematic, due to issues around miniaturisation - chips from TI use a 120nm process - which increases cost. Although FeRAM could be integrated into processor circuits using just a couple of extra steps, there is a significant possibility of contaminating the normal CMOS circuitry with the additional chemicals used for FeRAM.

Toshiba has announced that it has developed a new high-density 128Mbit (16MB) FeRAM chip that utilises a standard DDR2 memory interface and can be read or written at 1.6Gbit per second. The company sees FeRAM being used as secondary cache memory in low power PCs and as a replacement for the main memory of mobile phones and other handheld devices. No details were given for commercial production of these chips.

Other manufacturers are developing FeRAM, while competing technologies like MRAM are also seeking to provide similar benefits.

Toshiba develops world's highest-bandwidth, highest density non-volatile RAM
http://www.toshiba.com/taec/news/press_releases/2009/memy_09_554.jsp
FeRAM memory could replace DRAM
http://www.pcadvisor.co.uk/news/index.cfm?RSS&NewsID=110545

Desktop processor update

More transistors on a chip mean more powerful applications, but increased chip size creates greater heat and bigger problems for signal propagation. Reducing transistor size alleviates these issues, but brings further problems of signal leakage between closely packed components causing data errors. Manufacturers are replacing 65nm

technology with 45nm parts and, in the case of Intel, 32nm designs. Future generations are expected to reach 22nm, but at that point fundamental physical limits will stall the miniaturisation trend.

Intel is reported to be pushing its 32nm processor architecture forward, at the expense of some proposed 45nm dual-core designs, which would have contained integrated graphics processing units. This reduction in transistor size is the 'tick' phase, with a new micro-architecture - this time to be known as Sandy Bridge, released in 2010 - the 'tock', in Intel's annual tick-tock cycle.

AMD has launched five new processors based on its 45nm Phenom II ('Deneb') designs. These 3 and 4-core packages that fit new motherboards with an AM3 socket (which interfaces with modern DDR3 memory), but are also backward compatible with older AM2-based motherboards.

Intel's 2009 roadmap: full speed ahead to 32nm
http://arstechnica.com/hardware/news/2009/02/intel-talks-2009-its-32nm-full-speed-ahead.ars
Intel's Tick-Tock Model http://www.intel.com/technology/tick-tock/index.htm
AMD launches new X3, X4 parts; debuts DDR3 on Socket AM3
http://arstechnica.com/hardware/news/2009/02/amd-launches-new-x3-x4-parts-debuts-ddr3-on-socket-am3.ars

Multi-core bottleneck

Packing ever-increasing numbers of transistors more tightly into processors driven at multi-gigahertz speeds has become almost impractical due to the amounts of heat generated and problems caused by creating electronics on such small scales. Instead, most manufacturers are releasing multi-core chips, containing at least two distinct processors, and breaking tasks within those processors into multiple 'threads' that can be processed in parallel.

In a manufacturing environment, the idea of putting more workers on a task seems appealing, as it means a greater volume of output. However, at the same time it must be necessary to deliver sufficient raw materials, channel them to the production lines, collect the waste and distribute the output. Where one part of the manufacturing process relies on output from several others, the whole process control system becomes more complex to manage. In essence, this is exactly the problem with multi-core processors: doubling the number of 'production lines' may not double output if they are constantly starved of input data or the memory buses cannot shift the finished calculations fast enough from the core. Using multiple processors (and threads) requires instructions to be split into separate streams, leaving possibilities like lockout, where two sets of instructions need to write to the same register.

Sandia, a commercial research laboratory working for the US government, has shown that adding more than eight processor cores in a 'conventional' system can dramatically reduce performance in complex applications, such that 16 cores only function as well as a solution based on two cores. The problem relates to memory

access, with additional processing cores experiencing more frequent waits for access to the memory bus.

An analyst for Gartner, Carl Claunch, recently described adding larger numbers of cores to processor packages as 'putting a Ferrari engine in a go-cart'. Operating systems and applications are often limited in the number of processors or threads that they can handle, so adding more cores to the hardware may bring no benefit at all. Claunch foresees common server systems within four years supporting 1,024 processors, but warns that embedded software limitations, even in operating systems and virtualisation environments, will prevent developers from using the hardware effectively. He suggests that systems managers will need to scale hardware and applications in a controlled way in order to find those limits and optimise performance.

More chip cores can mean slower supercomputing...
http://www.sandia.gov/news/resources/releases/2009/multicore.html
Software fails to cope with processor overload
http://www.techworld.com/news/index.cfm?RSS&NewsID=110241

Mobile processor update

Netbook and the smaller mobile internet devices (MIDs) sit between traditional laptops and high-end smartphones. These devices are now expected to be affordable (in the $350 to $100, £250 to £71 bracket), offer high levels of 3G and Wi-Fi connectivity and deliver a full web-based experience for browsing, web applications and email. These features have made netbooks popular in the education market as they increase options for class sets and providing personal device ownership.

A large range of manufacturers are aiming products at this sector, not least due to the perception that such devices may be more attractive to consumers with limited disposable income and they are 'of the moment', but specifications vary widely. High-end netbooks, with larger screens more suited to long-term use, may be out of this price bracket and have limited battery life. However, smaller handheld devices may lack full support for vital web applications. Purchasers need to be clear about the function of the device they seeking and draw up a list of requirements. Ultra low cost PCs (ULCPCs) were covered in TechNews 7/08.

ARM has demonstrated a working prototype of its 32nm Cortex processor, which is aimed at the mobile market, developed with the Common Platform (provided by IBM and partners) using its high-K metal gate (HKMG) technology. HKMG designs, which have also been developed by Intel, reduce power leakage and improve efficiency. ARM says the new Cortex processors, which will be available in 2010, will use five to ten per cent less power while integrating more features into the package. Manufacturers of mobile devices often use multiple ARM chips in their hardware, due to their low power consumption and small size. The company claims it has shipped over 10 billion of its processors for mobile phones.

The latest OMAP 4 platform from Texas Instruments (TI), based on ARM dual-core Cortex A9 processors, will be capable of recording full 1080p (1920×1080) HD video and capturing 20 megapixel still images. TI also states that web pages will load ten times faster and computing performance will increase seven-fold. The platform will be based on ARM's 45nm dual-core Cortex A9 chip, with TI's signal and image processing capabilities built into the same processor package. TI intends to scale up to full production during the second half of 2010, aiming OMAP 4 at both smartphones and mobile internet devices (MIDs).

TI has also extended its OMAP 3 platform with new 45nm solutions, which it claims will save approximately 25 per cent in power while showing 75 per cent improvement in graphics performance compared to 65nm designs.

Freescale Semiconductor has also launched a new processor, the i.MX515, and a reference design aimed at the netbook market. The hardware model integrates 3G connectivity, can operate for up to eight hours on a single battery charge and will run Google's new open source Android operating system or Canonical's Ubuntu, as well as solutions from Phoenix Technologies and Xandros. Systems are expected to become available in the second half or the year.

LG and Intel have reached an agreement to develop MIDs based on Intel's Atom processor. The 'Moorestown' platform contains a 45nm system-on-a-chip (SoC) processor. The latter combines compute, graphics, memory and other functions into a single unit to reduce power and increase throughput (as more efficient channels can be used and less buffering is needed between discrete devices). The new platform is designed to reduce power consumption while idle by a factor of ten compared to existing Atom-based MID products. The hardware will run the Moblin 2.0 open source mobile operating system, based on Linux, which is backed by Intel.

NVIDIA has also produced a new SoC platform for MIDs, which it says creates the possibility of a $99 (about £70) device for browsing the internet and processing HD video information, without needing a battery charge for several days. The always-on device, based on NVIDIA's Tegra processor, will run Microsoft Windows Embedded CE and will offer both integrated 3G and Wi-Fi connectivity. There are reports of higher specification alternatives and Android-based units to come.

Ultra low cost PCs (ULCPC) (TechNews July 2008)
http://emergingtechnologies.becta.org.uk/index.php?section=etn&rid=14149
ARM... the First Cortex Processor on 32nm Process
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ARM shows off 32nm mobile processor
http://news.zdnet.co.uk/communications/0,1000000085,39616106,00.htm
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http://focus.ti.com/pr/docs/preldetail.tsp?sectionId=594&prelId=sc09021
Texas Instruments extends OMAP 3 family with 45 nm products...
http://focus.ti.com/pr/docs/preldetail.tsp?sectionId=594&prelId=sc09020
TI escalates ARM (chip) race http://news.cnet.com/8301-13924_3-10165230-64.html

Collaboration... enables 3G connectivity and additional OS choices
http://media.freescale.com/phoenix.zhtml?c=196520&p=irol-newsArticle&ID=1256766&highlight=
LG Electronics, Intel Collaborate on Future Mobile Internet Devices
http://www.intel.com/pressroom/archive/releases/20090216comp.htm
NVIDIA enables the world's first $99 HD Mobile Internet Device
http://www.nvidia.com/object/io_1234768488347.html
Nvidia Plans To Power $99 Mobile Internet Devices
http://www.mobilecrunch.com/2009/02/16/nvidia-plans-to-power-99-mobile-internet-devices

Mobile phone developments

Increasing integration of mobile devices (phone, camera and music player) and growing use of touch controls are becoming evident in the mobile market. Following Apple's generally praised iPhone products, a whole range of manufacturers are trying to emulate that success. Many had already launched 'single touch' devices but Apple, arguably, was the first to introduce a usable multi-touch interface. Apple is reported to have secured patents for this technology, but other problems exist for competitors. Among these are battery life; features based on the (sometimes unreliable) edge of technological advances; trade-offs between the touch-screen and other devices, such as a better camera; high prices to consumers; and the potential wiles of gadget fashion.

These phones are attractive to students, but may be limited as learning devices. Beyond features available on most new phones (SMS, camera, video and basic web browsing), support for web applications is patchy, such that the iPhone does not directly support Adobe's Flash standard. Nevertheless, the touch screen may help some users who struggle with small buttons and controls, and the opportunity for third parties to write applications for the emerging 'application stores' may create a market for educationally valid content.

Palm has unveiled its first multi-touch phone based on a completely new operating system, webOS. The Palm Pre was shown at the Consumer Electronics Show in January and more recently at the Mobile World Congress (MWC). The phone has built-in Wi-Fi, Bluetooth, GPS and high speed 3G connectivity. (In the UK, the latter will employ the HSDPA protocol.) WebOS will be 'constantly connected', will run XHTML and JavaScript for web applications and will automatically integrate contacts, calendar details and messages from several internet and PC sources, including Outlook, Google and Facebook. The phone is expected to launch in US during the first half of the year and later in Europe and other regions. No pricing is available at the time of writing.

The second 'Google phone' was launched by HTC at MWC in Barcelona. Strictly, the phone is not Google branded, but based on the open source Android operating system first developed and generally co-ordinated by Google. (See *Developments in mobile operating systems,* in TechNews 9/08.) The HTC Magic, unlike the original HTC G1 or the Palm Pre, has no slide-out keyboard, but relies on a the touch screen for text input like the iPhone. It has HSDPA (fast 3G) data access, embedded GPS,

Wi-Fi and a 3.2 megapixel camera (but no accompanying flash). HTC have done a semi-exclusive deal with Vodafone in Europe, where the phone will first be launched sometime in the spring.

Huawei and Samsung have also revealed Android-based phones, due out in the autumn.

Apple secures multitouch technology patent
http://www.macworld.com/article/138465/2009/01/multitouch_patent.html?lsrc=rss_news
Palm unveils all-new webOS...
http://investor.palm.com/releasedetail.cfm?ReleaseID=358392
Developments in mobile operating systems (TechNews 9/08)
http://emergingtechnologies.becta.org.uk/index.php?section=etn&rid=14155
Vodafone and HTC unveil Android-powered HTC Magic
http://www.htc.com/www/press.aspx?id=85048&lang=1033

At the recent Mobile World Congress in Barcelona, Toshiba demonstrated its latest TG01 phone. Although there are many competing products, this is the first model to use Qualcomm's 1GHz Snapdragon chip. The Snapdragon platform is based on an ARM processor and incorporates a graphics engine, signal processing for 3G mobile, Wi-Fi and Bluetooth, 720p HD video decoding and GPS location functions.

Toshiba has added a user-configurable 'three stripe' touch interface to the underlying Windows Mobile 6.1 operating system. Although only three are visible at any one time, there are eight menu stripes available, each of which can display ten shortcuts. A motion sensor will change the orientation of the display according to how the phone is held, while shaking it will return the user to the home screen. The interface can be seen on a ZDNet video interview. Despite being a smartphone with a fast processor, Toshiba claims that battery life will be good, with users getting 11 days on standby or 5 hours of talk time.

Toshiba TG01 http://www.toshiba-europe.com/mobilerevolution/default.aspx
Toshiba demonstrates its 1GHz smartphone
http://news.zdnet.co.uk/hardware/0,1000000091,39616175,00.htm

Details are sketchy, but Samsung was expected to unveil a device that it claims is the world's first solar powered mobile phone. The solar panels are on the rear of the handset, which is manufactured from recycled drinks bottles. Features, such as an adjustable backlight, will help consumers manage power consumption and an inbuilt pedometer will allow people see how much carbon they have saved by walking rather than using powered transport. Inclusion of an AC power adaptor might suggest that the solar panels are (by themselves) insufficient to keep the battery topped up. The Korean Samsung website has a picture.

LG has also developed a solar-power device, but has released few details.

Samsung to unveil solar-powered mobile http://www.businessgreen.com/business-green/news/2236482/samsung-unveil-solar-powered
Samsung (Korean script)
http://www.samsung.com/sec/news/newsRead.do?news_group=productnews&news_type=consumer&news_ctgry=mobilephone&news_seq=12398
LG bridges the gap between ideas and reality
http://www.lge.com/about/press_release/detail/21104_1.jhtml

Universal chargers coming for mobile phones

Purchasing a new mobile phone often requires updating all the associated cabling for data and power. Not only is this an expense but it generates large amounts of 'electrical' waste. The GSM Association, the industry body for mobile sector, has announced that a 'universal charging solution' (UCS) will be available for the majority of mobiles by 1st January 2012. The new standard will not just embed a common plug - in this case micro-USB - but also energy efficient power conversion technology. The GSMA says that widespread adoption could save 50 per cent on power consumption and eliminate up to 51,000 tonnes of landfill. This would also considerably simplify recharging for a mixed economy of mobile phones in learning environments that make widespread use of handheld devices.

All the main UK mobile operators have signed up to this initiative, along with a long list of major manufacturers. Whether the landfill reductions are achieved will depend, in part, on whether manufacturers opt to cease automatically distributing chargers with all new equipment. The new standard will not unify the many data interchange protocols and connections adopted by manufacturers.

This move comes amid reports that the EU Commissioner Günther Verheugen is threatening the mobile industry with 'severe measures' if a single standard for chargers is not adopted.

Mobile industry unites to drive universal charging solution for mobile phones
http://www.gsmworld.com/newsroom/press-releases/2009/2548.htm
EU commissioner calls for unified mobile cable standard
http://arstechnica.com/gadgets/news/2009/02/eu-commissioner-calls-for-unified-mobile-cable-standard.ars

Personal information and new hardware data encryption standards

Sensitive data lost on trains or remaining on hard drives of second hand computers has received much media attention recently. This has prompted many existing vendors to emphasise security in their products and the Information Commissioner to announce the Personal Information Promise, whereby companies commit to 'going further than the letter of the law' in data protection. The promise brings no new legal obligations, but companies involved will use best practice to inform design of new systems and monitor implementation of existing policy. 20 companies and organisations had signed up at the launch of the promise.

ICO launches Personal Information Promise
http://www.ico.gov.uk/upload/documents/pressreleases/2009/personal_information_promise_280109.pdf
The Personal Information Promise - for organisations
http://www.ico.gov.uk/Global/faqs/personal_information_promise.aspx

The Trusted Computing Group - an industry standards body - has announced a new set of standards governing encryption for hardware-enabled data security. Separate 'Opal' specifications are available for PC clients and data centre storage. A third specification relates specifically to the hardware interface with SCSI devices, SATA drives, fibre channel communications and other storage technologies. Systems that use these standards will have self-encrypting storage devices that lock data and which can be 'erased' in a single operation. An optional Trusted Platform Module (TPM) can be incorporated to store security credentials. A separate standard for DVD and other optical drives was released late in 2008.

A wide range of hardware manufacturers, who are participants in the Trusted Computing Group, are expected to ship products that embed these standards.

Better data protection from client to data centre made possible...
https://www.trustedcomputinggroup.org/news/press/TCG_storage_spec_release_final_jan_26_pm_09.pdf

Computer in a 'plug'

Marvell has published a reference design and development kit for computers that can be housed in a box that is not much larger than a standard mains plug. The SheevaPlug, which is designed for low power, always-on computing tasks, contains a 1.2MHz Marvell processor, 512MB of memory and 512MB of flash storage. Peripherals can be connected to it using a USB 2.0 port and it can be networked to other devices using its gigabit Ethernet port. Applications can be programmed using a development platform that works with a variety of Linux kernel 2.6 distributions.

Manufacturers have already developed home media servers, internet connected hard drives and network addressed storage (NAS) applications for the new platform.

Marvell introduces Plug Computing - high-performance...
http://www.marvell.com/products/embedded_processors/plug_computing_small_computer_digital_media/release/1256
Plug Computing http://www.marvell.com/featured/plugcomputing.jsp

Software and internet

Analysis: Micro-blogging in education

At a glance

- Micro-blogging encourages users to regularly update their status in short (often 140-character) posts.

- Posts can be used to pose questions, seek views, find leads for research or publish information for other users.
- Tools can be used to aggregate posts on particular themes, while 'hashtags' signal posts that belong to a particular thread.
- Twitter is one of the most popular services, receiving much media attention, but it is also a very public and potentially insecure environment. Many learners need guidance on using such tools.
- Teachers can use micro-blogging tools for their own professional development, to further research, to engage learners or to receive feedback from learning activities.
- Many of the same advantages can be achieved through other tools, such as instant messaging, chat rooms and forums.

More than Twitter

The initial invitation of micro-blogging was for users to chronicle their daily lives in short 'status' updates: 'What are you doing now?' However, this has led to an explosion of interaction ranging from the trivial to the enlightening.

One of the most publicised services has been Twitter, but there are many others. Each message - or 'tweet' in Twitter terminology - is constrained, often to 140 characters. This has not proven as limiting as might be imagined, forcing users to condense thought, observations and questions into a brief but meaningful form. URL compression services, for example TinyURL and Bit.ly, can be used to shorten references to 25 characters or less, allowing users to point out web sites and make a comment within the defined limit.

Traffic to Twitter has increased 1000 per cent in the last year, putting it in the top 100 UK sites, and has drawn a lot of attention through celebrity endorsement from media favourites like Stephen Fry. Each person has their own Twitter identity, such as @StephenFry (who has over 200,000 'followers'), while topics can be formally tracked using 'hashtags', like the recent #uksnow.

Updates to micro-blogs can normally be posted through the service's own website, using a separate client, sending an SMS from a mobile phone or updating via an application installed on a mobile.

There are many services trying to compete in this market, with some specifically aimed at education.

Traditional blogging

There are several differences between 'traditional' blogging (covered in TechNews, September 2005) and micro-blogging:

- The length of a blog post permits more detailed description, gives space for reflection and encourages writers to embed links to referenced articles
- Micro-blogging forces users to be concise and convey a single, main point

- Comments can be added to most blog posts, drawing a contributory stream around a central text
- Micro-blogging is more fragmented, making it harder to follow a thread, but comments arrive rapidly and are more spontaneous
- Blogs leave a permanent record, whereas a separate application may be needed to capture the stream of micro-blog updates.

Education
Many educators are looking at ways to use micro-blogging in the classroom. Tom Barrett has posted a collaboratively-developed presentation with suggestions (currently 19) from teachers, such as compressing the plot of a story into 140 characters; following updates from NASA scientists; seeking instant points of view on a topic; and building on a sub-plot within a literary work studied, by tweeting in the 'voice' of two characters involved. This list gives something of the diversity of potential uses rather than a 'good classroom guide'.

A recent blog post from Ollie Bray shows how the immediacy of Twitter can be combined with Google Earth to bring an instant perspective on weather to a classroom in Scotland: a 'shout' was sent via Twitter asking users for their location and a picture of the weather, leading to plotting locations on Google Maps and a discussion on spatial differences.

Some micro-blogging services offer closed environments to businesses and educators, for example:

- Yammer - is a service that requires a 'business' email address to sign in, based on master accounts set up by that organisation.
- ShoutEm - allows anyone to create a community, which may be either public or closed.
- Edmodo - focuses on education communities, with teachers able to set up classes and other groups.

Nik Peachey has written about Plurk in language teaching. This tool describes itself as a 'social journal', so posts are arranged on a timeline and grouped into threads.

Real time feedback
Conference organisers are beginning to use micro-blogs as a tool for direct, real time feedback during keynotes. There is a danger that the stream of updates becomes the 'star attraction', but it can form a way for the audience to engage with the topic, to ask for clarification, to expand on the point or to supplement it with relevant internet links.

Ira Socol refers to this as the 'back channel' and argues that it is better to have it explicitly recognised rather than secreted behind seats as students whisper or text each other or, worse, drift off into unrelated online activities. While recognising that such feedback could be threatening to the teacher, he also considers the opportunities afforded to the more hesitant student, to the one who has trouble

speaking good English, or to the reflective type who wants to consider an answer before contributing. The tool he used was Today's Meet.

Personal learning networks
Many educators are now stressing the importance of their personal learning networks (PLNs) - contact webs drawn from a range of offline gatherings and social tools - who act as peer mentors and information repositories related to that professional's work. Faced by a pedagogical, research or technical issue, a quick 'shout' brings back a set of immediate answers or starting points.

Micro-blogging can be used to create 'crowd-sourced' wisdom. While the crowd may not always be correct, it can often contribute to a process of knowledge co-construction, which may be formalised using other tools such as wikis.

Tools, add-ons, widgets
There is a range of add-on services and tools that can enhance or structure the output from micro-blogging services. The precise nature of these will depend on the application programming interface (API) exposed by each tool, but many are written to work with the Twitter API. Tools include (for Twitter):

- Desktop clients (such as Tweetdeck or Twhirl, both written using Adobe AIR).
- Picture and video publishing (for example TwitPic and Twiddeo).
- Aggregators and search tools (such as Twitterfall, Twitscoop or TweetVolume).

These tools add to the Twitter environment, but may demand log in details and could be prone to all kinds of unknown vulnerabilities through the way they have been coded.

Other messaging technologies
Micro-blogging has caught the popular imagination - or at least the media's attention - but does it offer anything new? The functions mentioned above could all be carried out using tools which are, arguably, more robust and secure.

Instant messaging (IM) carries well-known risks, but can be used for direct conversations in real time, while chat rooms can draw such discussions into a central location that can be moderated and logged. For asynchronous debate, forums offer threaded conversations with embedded archives.

These tools are often provided as features of virtual learning environments (VLEs) and learning platforms (LPs), allowing teachers to experiment with these approaches using applications already available in school or college.

Security and other issues
Recently, a new Twitter user caused a stir: @OHHDL purported to be a Twitter feed from the Office of His Holiness the Dalai Lama, but proved to be an impersonator. Such instances may cause some to distrust the environment, but they also open up discussion around identity and authenticity.

Teachers must be wary that the Twitter 'stream' (in particular) is a public environment with few controls, leading to increasing levels of spam tweets and a recent (apparently harmless) 'Don't Click' clickjacking attack. Blogger DigMo suggests ten e-safety tips, which generally accord with the e-safety advice given to young people.

The future of micro-blogging

This article has concentrated on text-based services but others, such as Seesmic and 12seconds, offer similar features for video updates. The short comment also forms the basis of reviews and reflection in Blippr and Blip.fm, both of which could be carefully used in an educational context.

Most of the companies running micro-blogging services are recent start-ups that have yet to prove their long term viability. It is likely that popular services will endure and will increase levels of security, offering more embedded tools for grouping and threading conversations. In common with many social technologies, micro-blogging tools are subject to a degree of 'fashion' which may place them in the category of 'un-cool' in the minds of young people within a couple of years, but educators can use these tools in a controlled manner to engage students now.

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Blip.fm http://blip.fm

Software and internet news

E-safety update

The sixth European Safer Internet Day on 10th February 2009 brought a range of linked announcements from various agencies and suppliers. Research by MSN among 20,000 14- to 19-year-olds across Europe found that half had completely unrestricted internet access and over a quarter had experienced online bullying. The European Commission estimates that use of social networking sites has increased by 35 per cent in the last year and will further double by 2012.

A group of 17 major social networking and internet search organisations has signed an agreement with the Commission, through which they undertake to limit risks to under-18s by:

- Providing an easy to use and accessible 'report abuse' button on websites, which would lead to clear procedures for dealing with inappropriate content
- Setting the full profiles and contact lists of under-18s as 'private' by default and ensuring such profiles are not searchable
- Guaranteeing that privacy options are prominent and accessible at all times
- Preventing under-age users from accessing their services.

Actions under the last point include clear notifications and labelling, refusal to re-register users who attempt to change dates of birth, and other unspecified 'technical and legal constraints'.

Mobile operator O2 has announced, in conjunction with Childnet International, the availability of a free book for 8- to 12-year-olds called *who wnts 2 no?* Written by children's authors Steve Barlow and Steve Skidmore, the story embeds an internet safety message, but is designed to be read for enjoyment. The book will be published on 5th March.

Safer Internet Day http://www.saferinternet.org/ww/en/pub/insafe/sid.htm
Teens targeted in net safety push http://news.bbc.co.uk/1/hi/technology/7879755.stm
Safer Internet Day 2009: Commission starts campaign... http://europa.eu/rapid/pressReleasesAction.do?reference=MEMO/09/58&format=HTML&aged=0&language=EN&guiLanguage=en

Social Networking: Commission brokers agreement...
http://europa.eu/rapid/pressReleasesAction.do?reference=IP/09/232&format=HTML&aged=0&language=EN&guiLanguage=en
Safer Social Networking Principles for the EU
http://ec.europa.eu/information_society/activities/social_networking/docs/sn_principles.pdf
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O2 announces free internet safety book for UK schools
http://www.o2.com/media/press_releases/press_release_14345.asp?archive=yes

Learning in the Family report

Intuitive Media recently posted a summary presentation of its *Learning in the Family - Parental Engagement in Children's Learning with Technology* research, which was funded by a Becta grant. Over 4,600 six to fourteen year-old children, drawn from their SuperClubsPLUS and GoldStarCafe online communities, took part in web surveys, while some were selected for more in-depth interviews with their parents. Although they were already committed to engaging with online activities, the selected sample was otherwise in line with the general UK demographic of such children. Both of the online surveys consisted of significantly more (57% and 59%) girls than boys.

The large majority (92%) of participants used a television at home, while nearly three in five had a mobile phone. Use of all kinds of technology increased with age and, in line with other surveys, boys were somewhat more likely to have a games console and girls a mobile phone. Around one in five of all children used such consoles or phones to access the internet, but use of a PC (91%) was highest.

Of the internet activities identified, boys were more frequent users across the board, with games dominating and homework coming in sixth place. The most frequent use was immediately after learners returned from school, but nearly three fifths were online after their evening meal. Spending time on the internet came just above friends and only second to spending time with family; television and games came third and fourth respectively.

Almost two thirds of children have their internet use supervised, more often by mum than dad or siblings, while supervision shows a gradual downward trend with age of the respondent. Nearly a third, more of whom are boys, have internet access in their own room. Over half the children sought help with the web and two fifths with homework, more often from mum than other family members. However, the report does not go on to examine whether this might be due to more mums being at home or more girls forming the sample. Four out of five also help their own parents with internet activities. Young people are more likely to ask parents for help with technical problems or homework than 'fun' activities involving computers and other devices.

A large majority of parents are actively involved in their children's use of technology, although over a third of respondents commented that parents were concerned about the amount of time they spent online, or were irritated by them asking too many questions. 84 per cent of children would like more help from their parents.

Learning in the Family http://www.intuitivemedia.com/np.html
Learning in the Family - Research Report
http://www.intuitivemedia.com/nm.html?1234863662

Mobile OS update

Common operating systems allow mobile service providers and developers to work on a common platform, making it quicker and less expensive to develop engaging applications that will drive up mobile phone usage. 'Application stores' for third-party software are springing up around a variety of platforms, not least Apple's iPhone, Google's Android and Microsoft's Windows Mobile. Mobile operating systems were covered in a TechNews analysis article in September 2008.

Microsoft has announced its latest version of Windows Mobile. Handsets built around Windows Mobile 6.5 will be known as 'Windows Phones'. Microsoft says that it has improved the touch interface, updated Internet Explorer Mobile and introduced a 'dashboard' home screen, which notifies the user of up-coming appointments, new emails, missed calls and similar information. New Windows Phones from manufacturers such as LG and HTC will be available during the second half of this year. Microsoft also announced a new application store and a free, invitation-only, beta (test) version of a new My Phone service that will automatically synchronise and back up phone data onto the internet.

LiMo is 'middleware' stack, built on an open source Linux foundation, that manages the interoperation of the operating system and applications. A range of global operators, including Orange, Telefonica (O2 in UK) and Vodafone, recently announced a commitment to release handsets based on LiMo. The LiMo Foundation stated in February that 33 handsets from companies such as NEC and Panasonic had been certified as LiMo compliant, while LG and Samsung were to demonstrate prototypes. LiMo phones are expected to be publicly released later this year.

The LiMo Foundation also announced support for the BONDI specification, so that developers can write web widgets and create applications that control the interface between phone features (such as contacts, calendar or a camera) and the LiMo web runtime. This will provide a common platform for Web 2.0 services to run across a range of LiMo handsets. It is easy to envisage applications that could have an educational function, for example, using geopositioning features to link information to current location while on a field trip; to geotag and submit photographs to a collaborative project; or to synchronise a mobile calendar to a central one used by the institution. The BONDI specification ensures consistency in the way that such applications are developed.

Texas Instruments (TI) was due to demonstrate Google's Android (which is also based on Linux) running on its OMAP 3 processor platform. These processors are

designed to run in all kinds of devices, such as embedded systems, netbooks smaller mobile internet devices (MIDs) and mobile phones. (For further details of OMAP see the 'Mobile processor update' article in this edition of TechNews.) It is reported that various manufacturers, including TI's partner companies, will be releasing touch screen landline phones, medical devices, touch screen menus, digital photo frames and audio and video players - all based on Android - within the next few months.

Palm has also launched a new operating system along with its new Palm Pre handset. See the 'Touch screen mobile phone update' article in this edition of TechNews.

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Touch screen mobile phone update (TechNews 03/09)
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Adobe Flash and web applications update

Web applications have the potential to deliver rich learning experiences within a browser across a range of devices from desktop PCs to mobile phones. They were covered in a TechNews analysis article, *Web applications*, in January 2009.

One of the major web applications platform developers is Adobe, who has recently made a series of announcements around its Flash environment and Open Screen Project. Flash is now used by many sites as a front end to the user interface and to deliver streaming video. However, this experience is limited on some hardware and operating systems, especially mobile phones. Adobe has announced a new release of its Flash Lite player, version 3.1, suited to mobile devices based on the Symbian S60 and Windows Mobile operating systems. (Many higher-end Nokia phones use S60.) However, widely reported public comment from Apple says that Flash is proving difficult to implement on the iPhone.

Adobe will be releasing details of its Real-Time Messaging Protocol (RTMP), used to deliver audio and video for embedded Flash applications, later this year. This should enable developers to work directly with multimedia information to deliver more responsive and interactive applications. Adobe has further announced a $10 million developer fund, in conjunction with Nokia, to develop applications that will work across a wide variety of devices and screens, including Nokia mobile phones. Finally, Adobe claims that the most recent Flash Player, version 10, is already installed on 55 per cent of all PCs and that its AIR platform (that allows web applications to run outside the browser) has an installed base of at least 100 million computers.

Microsoft's Silverlight platform (and open source Moonlight implementation) is the main direct competitor to Adobe Flash.

Web applications (TechNews January 2009)
http://emergingtechnologies.becta.org.uk/index.php?section=etn&rid=14278
Adobe announces new Flash Lite distributable player
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Adobe struggling to bring Flash to iPhone
http://www.pcadvisor.co.uk/news/index.cfm?RSS&NewsID=110339
Adobe to open up Flash streaming protocol
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JavaFX to come to mobiles

JavaFX is Sun Microsystems application development platform that competes, to a large degree, with Adobe AIR, Adobe Flash, Microsoft .Net and Microsoft Silverlight. Producing applications for mobile phones, which use a variety of graphics hardware, operating systems and web browsers, is problematic for developers; using a single platform across a majority of phones would be highly desirable for education as well as business and pleasure uses.

'Porting' programming environments to mobile phones has proven difficult, with Apple reportedly holding back expectations of Flash Player arriving on its iPhone in the near future. (Flash Player is nearly ubiquitous on PCs and expected on most phones by 2010.) JavaFX Mobile builds on the Java Micro Edition, employing a scripting language to deliver animation, audio and video, to control web services and to create user interaction. Sun claims that the Java platform is already available on 2.6 billion mobile phones. JavaFX enabled phones are expected early in 2010.

Sun launches JavaFX Mobile http://www.sun.com/aboutsun/pr/2009-02/sunflash.20090212.1.xml
Flash 10 coming to most smartphones in 2010 http://reviews.cnet.com/8301-13970_7-10164745-78.html?part=rss&subj=news&tag=2547-1_3-0-20
Sun renews phone ambitions with JavaFX Mobile http://news.cnet.com/8301-1001_3-10161780-92.html

Google applications update

Web applications create wide opportunities for delivering 'real time' data, collaborative document development and co-ordinating groups of people; they can be extremely flexible as the underlying data can be read (potentially) using any internet connected device that has the application installed. However, these applications normally fail without an internet connection, which considerably limits their usefulness. Google's Gears system allows users to run appropriately configured web applications, such as Google Reader, offline.

Google has now extended Gears to its own Gmail environment, so users can now download emails in the background to read offline, or write responses, and then automatically synchronise changes with the online environment when they are next able to connect. This service is officially in a 'beta' development phase, but this is true of a number of other widely used Google applications. Google has also told VNUnet.com that it intends to make offline access available in the next few weeks to read Google Calendars, and has announced plans to enable a wide range of smartphones to synchronise contact and calendar data with Google's servers.

The Google Applications suite (including online word processor, spreadsheet, presentations, mail and calendar) is becoming increasingly popular, as it provides advantages of online collaboration while reducing licensing costs, because it does not include features of desktop productivity applications that most users do not exploit. Computing reports that the Guardian newspaper has decided to move all its 2,400 staff onto Google Apps as it main productivity and communications platform. In addition to enhancing collaboration and saving on storage, server and licence costs, the newspaper expects to reduce time on support by about a third, since users find the environment more intuitive. (Presumably specialist software will remain in use for functions like page layout and corporate management.)

Primary schools in Sheffield now have Google's Gmail service available through their learning platform, while schools across the London Grid for Learning (LGfL) are using Microsoft's Live@Edu collaboration suite. Other application suites include Zoho, Yahoo's Zimbra and Thinkfree.

Google promises offline Calendar support
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Calendar and contact syncing for iPhone and Windows Mobile devices
http://googleblog.blogspot.com/2009/02/calendar-and-contact-syncing-for-iphone.html
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Guardian newspaper migrates to Google Apps
http://www.computing.co.uk/computing/news/2236276/guardian-migrates-google-apps
Sheffield primaries put free Google mail to the test http://merlin.gemin-i.org/index.php?option=com_content&view=article&id=270%3Asheffield-primaries-put-free-google-mail-to-the-test&catid=77%3Aonline-services&Itemid=189

Web 2.0 tools having limited business impact

Reports of research by analysts at Forrester, on behalf of Adobe, suggest that employees remain reluctant to use enterprise web 2.0 tools, despite the fact that many routinely collaborate as part of their regular working pattern - more than 80 per cent of knowledge workers regularly collaborate with two or more people from other time zones, which would appear to make them prime users of tools that would enable these interactions.

Workers are concerned about security and control of the information that they commit to new systems, and the potential they offer for engaging recipients in the process. Nevertheless, about half of those surveyed wished to reduce the amount of paper they used and nearly two thirds wanted faster information collection systems. According to the Forrester analyst, Tim Walters, "The survey data shows a marked propensity among knowledge workers to stick with what they know for team collaboration - email and attachments - despite the recognition of needed improvements and potentially better alternatives". Surprisingly, only 15 per cent of workers used general instant messaging, videoconferencing or team collaboration sites either inside or beyond work.

The finding may be pertinent to education, where the adoption of new tools is also as much about 'culture change' as providing compelling reasons to adopt different working practices. An appropriate programme to train workers, 'transition' working practices and migrate different groups of employees to new systems (as their own requirements develop) also need to be considered.

Latest collaboration tools failing to take off
http://www.vnunet.com/vnunet/news/2236179/adoption-gen-collaboration

Games, brains and education

A press release from the European Parliament's Internal Market Committee says that computer games 'have a broadly beneficial effect on the mental development of children'. According to the Guardian, the report (available in French) says that, 'video games can stimulate learning of facts and skills such as strategic thinking, creativity, cooperation and innovative thinking, which are important skills in the information society'. These benefits are in line with the findings of Becta's Computer Games in Education project report.

The Committee did find that the European countries needed to align their rules governing the sale and labelling of games, especially with the growing trend towards playing online or downloading Flash games to mobile devices. While not intending to produce legislation, the Committee would like to see more widespread adoption of

the PEGI ratings system for games and active consideration for the PEGI online system, as it becomes available.

The Committee's report also suggests that consoles and other games controllers are fitted with a parental 'red button' that could be used to disable access to a game or restrict use to certain times of the day. The details of this proposed system remain very sketchy.

Video games: a red button for parents
http://www.europarl.europa.eu/news/expert/infopress_page/063-48809-040-02-07-911-20090209IPR48788-09-02-2009-2009-false/default_en.htm
Communication... in respect of the use of video games
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Video games are good for children - EU report
http://www.guardian.co.uk/technology/2009/feb/12/computer-games-eu-study
Computer Games in Education project: report
http://partners.becta.org.uk/index.php?section=rh&rid=13595
PEGI http://www.pegi.info/en/index
PEGI Online http://www.pegionline.eu/en/index

French research has cast doubt on the efficacy of so-called 'brain-training' packages as an aid to learning. Alain Lieury, professor of cognitive psychology at the University of Rennes, split 67 ten-year-olds into four groups, two of which used a Nintendo DS package over a period of seven weeks, while others did puzzles on paper or nothing in addition to their normal school work. Overall, those using the console showed no improvement in 'before and after' memory tests and a similar gain in mathematics and logic scores compared with the other two groups. In some areas, the Nintendo-using group fared worse. Given that the sub-groups must have comprised 15-17 children, the statistical validity of these results may be open to question.

This research stands in contrast with a much larger Scottish study, recently reported in *TechNews*.

Nintendo brain-trainer 'no better than pencil and paper'
http://technology.timesonline.co.uk/tol/news/tech_and_web/gadgets_and_gaming/article5587314.ece
Games and learning (TechNews)
http://emergingtechnologies.becta.org.uk/index.php?section=etn&catcode=ETN_0001&rid=14227

An article in the *BMC Neuroscience* journal is reported to show that people's brains respond differently dependent on whether they thought they were playing a gambling game against a real or virtual opponent. Brain scans revealed that brain regions associated with planning and anticipation were much more active when participants

felt they were playing against a human opponent. The study also found differences between genders, although no apparent reference is made to children.

Effects of brain exercise depend on opponent
http://www.physorg.com/news152949450.html
Are women better mindreaders? Sex differences...
http://www.biomedcentral.com/1471-2202/10/9/abstract

Government and open source software

Open source software (OSS) is developed collaboratively, allowing third-party developers to patch and improve code, or to derive new functions based on existing programs. A few examples of the many open source projects are the Apache web server, Mozilla's Firefox browser, the Moodle learning platform and the whole Linux operating system.

Open source software should be available for free, but system installers and support services generally charge implementation and management fees, where this is not done 'in house'. Although many users install Firefox for themselves, these costs may be significant for more complex applications and environments, so institutions must carefully consider 'total cost of ownership' (TCO). Proprietary software may also have hidden costs, for example, associated with taking institutional data out of one system and using it in a complementary or replacement application. These can give rise to exit and transition costs, which may be mitigated where both applications are based on a common set of open standards.

The Government has reiterated its commitment to use of open source software solutions, where '...the main test should be what is best value for the taxpayer'. This approach was last formally stated in 2004, but the Government has committed itself to a new policy and action plan. Quoting from 'The way forward' on the Chief Information Officer Council's website:

> The Government considers that in order to deliver its key objectives a programme of positive action is now needed to ensure that there is an effective ‘level playing field’ between open source and proprietary software and to realise the potential contribution open source software can make to wider aims of re-use and open standards. This programme needs to consist both of a more detailed statement of policies and of practical actions by government and its suppliers.

The policy, as well as the action plan, details a number of points, including:

> Procurement decisions will be made on the basis on the best value for money solution to the business requirement, taking account of total lifetime cost of ownership of the solution, including exit and transition costs, after ensuring that solutions fulfil minimum and essential capability, security, scalability, transferability, support and manageability requirements...

> The Government will use open standards in its procurement specifications and require solutions to comply with open standards. The Government will support the development of open standards and specifications.

The policy stresses a commitment to re-use of code in existing applications (including from proprietary ones) and to release of in-house code using open source licences.

The Becta website contains a range of resources relating to best value, procurement and TCO.

Open source, open standards and re-use: Government action plan
http://www.cio.gov.uk/transformational_government/open_source/index.asp
Best Value (Becta) http://www.becta.org.uk/bestvalue.php

Becta launches 'Generator' for FE and Skills

Becta, with partners from across the further education and skills sector, has launched a new tool to assist leadership teams in leveraging the most effective use of technology in learning and management. The new tool allows you to:

- consider current deployment
- reflect on results
- identify strengths and opportunities to improve
- gain insights to inform your strategy and develop plans
- review pointers towards advice and guidance based upon your responses.

Generator tracks themes, including:

- Informed demand
- Equitable access
- Proactive support
- Tailored resources
- Flexible delivery
- Personalised assessment
- Confident capable workforce
- Innovative use of technology

Generator is designed to be used across the sector, by individuals and teams across time and geographical sites. It is highly collaborative allowing users to share reviews and compare the results. The tool can produce high level summaries or more detailed analyses around specific themes. Institutions' results can be anonymised, creating an opportunity to benchmark results between similar providers.

Becta launches new 'Generator' to boost technology use...
http://news.becta.org.uk/display.cfm?resID=39555&page=1658&catID=1633
Generator http://www.generatorfeandskills.com

TechNews Information

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