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Networking and wireless

Analysis: Femtocells

At a glance:

- Femtocells are low power indoor mobile phone base stations using fixed broadband for backhaul.
- Femtocells extend the mobile network, improve indoor coverage, relieve congestion and offer potential for new, high-bandwidth services.
- Further work is being carried out to define standards and develop pricing structures that are attractive to consumers.
- Products are just coming to market but uptake remains uncertain.

Introduction

Femtocells are low power indoor mobile phone base stations designed to supplement the network by providing a signal in hard to reach places and additional services using a broadband connection to the carrier for 'backhaul'.

Many households now have cordless digital phones linked to the landline, a number of Wi-Fi enabled devices and several mobiles. While most of these connect to outside services through a local base station, typically the mobile phones link to the wider world via a distant tower and are charged against a separate contract. Both the building's location and construction may actually create a mobile data black spot, especially for 3G services. Manufacturers believe that there is a market for femtocells to provide coverage and offer improved connection for bandwidth intensive mobile services, such as mobile browsing and video calling.

Femtocell concept

A femtocell would connect up to eight mobile devices simultaneously and, using an existing ADSL, cable or fibre connection as the 'backhaul', create coverage in dead spots. By providing an alternative to the existing network, femtocells avoid increasingly congested cellular networks, routing IP-based services directly back to the mobile carrier's fixed infrastructure. (IP-based services will be a standard part of 4G specifications when they arrive in the next three to five years.)

Superficially, picocells already provide a similar service in buildings and limited geographical areas, such as shopping centres, schools and offices. However, picocells have a base station controller (requiring specialist installation, configuration and management) cabled to multiple reception points, or 'heads', to provide the network coverage. By collapsing the main functions of the base station controller into a single device, it is envisaged that a femtocell will be installed by the consumer. During a mobile call or data connection, the user should be able to seamlessly move from the normal wireless network of the carrier to a local connection mediated by the femtocell and connected to the carrier's core network by broadband.

Femtocells use the consumer's existing, compatible 3G handset and a relatively inexpensive, self-installed wireless device. In contrast, BT's Fusion product uses a

standard wireless router but requires new Wi-Fi enabled mobile handsets - continuity is provided by switching between wireless technologies: Wi-Fi when near the router and 3G or GSM when further afield.

Applications

An industry association, the Femto Forum, lists a range of benefits to the consumer that includes:

- A single 'virtual home number' which will ring authorised phones in range of the base station
- Capability to automatically back up phone content, such as pictures and video, to a PC
- Use of a mobile phone as a remote to control your TV or music centre
- Increased battery life for phones connected to the local base station, as they will need less power to communicate.

More sophisticated units could also be used to integrate other technologies, including Wi-Fi, and act as the centre for a wireless home media network. Pricing may give users cheaper calls when routed through the broadband network. The carriers also benefit:

- Improving network coverage using small, relatively cheap units
- Removing traffic from normal mobile networks, where technical limitations lead to congestion as users demand greater bandwidth for data intensive applications
- Opening up new applications and services for the home with minimal impact on the wider mobile network
- Locking users to a single provider of mobile and broadband network services
- Providing an infrastructure that can quickly be deployed to roll out future standards such as LTE, WiMAX and eventually 4G.

US carrier Sprint is supplying Samsung AIRAVE branded base stations following a pilot in 2007 around Denver, Colorado. Users can connect up to three Sprint mobile phones simultaneously on a \$20 monthly unlimited 'family' tariff, after paying \$99.99 for the base station and \$4.99 per month per connected phone. Both O2 (in UK) and Vodafone (Spain) announced pilots in February, but have yet to provide details of further plans.

Femtocell issues

A key advantage of femtocells - use of wireless spectrum already licensed to the carrier - also creates the greatest technical challenges: managing localised interference and 'handoff'. Typically, the towers for base stations are located several kilometres apart, making allocation of radio frequencies within the licensed spectrum fairly straight-forward. However, a single block of flats may contain ten or more femtocells, each of which needs to create a reliable radio connection to its own authorised devices; as these devices move around, they may try to connect to the standard carrier network as well as one or more femtocells, and then need to break such connections as another, stronger signal is identified. The latter process is

known as handoff. The carrier must also implement additional security measures and switching capability within its core network to handle non-wireless IP-based traffic from a large number of 'mini base stations'. These problems are being addressed as new standards are developed, some of which will give little benefit until they are integrated into new handsets.

Carriers and ISPs are concerned about who will pay for the new services and resulting demand for bandwidth. The current mobile infrastructure cannot sustain ever-growing traffic but ISPs do not want the problem passed on to them without recompense, while fixed line telephone providers fear large parts of their business being turned over to various voice over IP (VOIP) and data services delivered via broadband connections. In the first instance, femtocells are more likely to be supplied by companies that can create combined 'triple-play' price plans for fixed line, broadband and mobile services.

Analysts believe that the greatest advantages rest with the carrier, so pricing would need to be fairly aggressive to promote widespread adoption. Nevertheless, Informa Telecoms & Media have predicted 40 million femtocell installations by the end of 2013, producing a net saving for carriers of \$5.3 billion, depending on deployment strategies and greater interoperability through improved standardisation.

The Femto Forum has adopted the TR-069 protocol for connecting new devices to the network, remotely installing upgrades and identifying and resolving faults. This provides a common basis for customer installation of equipment that, along with new technical standards relating to handoff and radio interference, will improve interoperability and increase uptake of femtocells.

Fixed-mobile convergence

These developments are part of a wider trend of fixed-mobile convergence, which allows subscribers to move devices seamlessly between local wireless networks and national mobile services; while in range of a local base station, users get stronger wireless signals and gain the speed and reliability of a cabled connection back to the carrier, but can use the same devices in the wider world. The connection to the local base station could be made using any high speed wireless technology, including Bluetooth and Wi-Fi.

Ofcom's 2008 UK Communications Market Report reveals a significant rise in the number of mobile broadband users, particularly driven through purchases of 3G USB 'dongles' to attach to laptops and netbooks. Three quarters of these users access the internet via their dongle while at home, even though most also have landline access. 70 per cent also make mobile voice calls within the home. Femtocells could improve signal quality and data rates, offer access to a wider range of services and reduce congestion on the mobile network.

Implications

Femtocells running multiple protocols could also be used to deploy 'pre-4G' mobile services by providing users with LTE or mobile WiMAX signals before the main network infrastructure has been rolled out, especially in rural areas. This would

enable carriers to develop the handsets and services, encouraging faster adoption by consumers and providing a revenue stream, while building the infrastructure required to provide near-national coverage. UK manufacturer picoChip announced a reference design for an LTE femtocell base station in May this year.

Femtocells may make use of newer, bandwidth intensive mobile applications more affordable and practical, but opinion remains divided about the willingness of consumers to bear the associated costs where they already have a sufficient signal from the regular base station network. ABI Research predicts shipments of '45 million units per annum in 2013', but believes that the next nine months is a key window for carriers to roll out this technology.

References

BT Fusion <http://www.bt.com/btfusion>

Femto Forum <http://www.femtoforum.org>

Sprint AIRAVE <http://airave.sprint.com>

Sprint press release 30/7/08

http://newsreleases.sprint.com/phoenix.zhtml?c=127149&p=irol-newsArticle_newsroom&ID=1181288&highlight=airave

Femtocells tipped to save operators over \$5bn

<http://news.zdnet.co.uk/communications/0,1000000085,39461436,00.htm>

O2 trials femtocells with NEC and Ubiquisys

http://www.o2.com/media/press_releases/press_release_14135.asp

Vodafone Group trials 3G femtocell technology

http://www.vodafone.com/start/media_relations/news/group_press_releases/2007/vodafone_group_trials.html

Femtocells may usher in next-gen mobile networks

<http://news.zdnet.co.uk/communications/0,1000000085,39440962,00.htm>

Femto Forum adopts field-proven management protocol

<http://www.femtoforum.org/femto/pressreleases.php?id=88>

The Communications Market 2008 <http://www.ofcom.org.uk/research/cm/cmr08>

picoChip readies industry's first LTE femtocell <http://www.picochip.com/pr/industry-first-lte-femtocell--home-enodeb--reference-design>

Communication Nation: UK consumers paying less but getting more

http://www.ofcom.org.uk/media/news/2008/08/nr_20080814

The femtocell market: boom or bust?

http://www.abiresearch.com/Blog/Wireless_Blog/510

Networking and wireless news

Pre-4G developments

Full specifications for 4G remain to be agreed, but a number of technologies claim to be 'pre-4G', representing a developmental path towards the final standards. Key technologies for 4G will be IP, OFDM (orthogonal frequency division multiplexing) and MIMO (multiple-input, multiple-output), requiring new masts and network infrastructure.

The main competing technologies are mobile WiMAX and 3GPP's LTE (long term evolution) strategy for enhancing and redeveloping 3G systems towards a true 4G implementation. The first mobile WiMAX protocols were ratified as the IEEE's 802.16e-2005 standard in 2005, so products are already reaching the market, whereas the key initial components for LTE are to be agreed later this year. The next step for WiMAX is the anticipated IEEE 802.16m standard, to be ratified in 2009, while the 3GPP is developing LTE Advanced.

Intel is to increase the range of WiMAX frequencies supported in its chipsets. Currently, only the 2.5GHz spectrum used in the US is supported on Intel's Centrino 2 chip package for laptops, but from 2009 Intel's Garth Collier said it will support "other spectrum profiles". The WiMAX Forum has standardised on two further frequencies, 2.3GHz and 3.5GHz, with significant deployments in South Korea and Pakistan, respectively.

At the recent Intel Developer Forum, Intel's Chairman, Craig Barrett, claimed that WiMAX would reach a billion people by 2012. According to The Register, he suggested that many of these would be in less developed countries which did not have a commitment to an existing infrastructure.

Ericsson has run a 'proof of concept' demonstration for LTE with a laptop paired directly to a local base station. At 160Mbps for downloads and 40Mbps for uploads, the system was able to transfer 300MB of email attachments to the laptop in just over ten seconds. Such speeds would be extremely unlikely in reality since the bandwidth in a given cell would be shared between users.

HSPA+ is seen as an interim development, providing higher wireless network speeds by extending the existing 3G UMTS protocols. Basic High Speed Packet Access (HSPA), available in UK, can theoretically achieve 14.4 Mbit/s for downloads and 5.76 Mbit/s when uploading, although real world speed will be substantially lower. HSPA+ at least triples these values. Technology developers Qualcomm recently claimed to have demonstrated a call that transferred data at 20Mbit/s.

The road to 4G: WiMax leads the way <http://www.technewsworld.com/story/The-Road-to-4G-WiMax-Leads-the-Way-63903.html>

Intel chipset to support new Wimax spectrums

<http://www.pcadvisor.co.uk/news/index.cfm?RSS&NewsID=103180>

WiMax to cover 1 billion by 2012, says Intel

http://www.theregister.co.uk/2008/08/19/barrett_wimax_prediction

Ericsson demonstrates 160Mbps '4G' mobile broadband

<http://www.pcadvisor.co.uk/news/index.cfm?RSS&NewsID=103743>

Qualcomm achieves world's first HSPA+ data call

http://www.qualcomm.com/news/releases/2008/080731_Qualcomm_Achieves_Worlds_First_HSPA_Data_Call.html

Wi-Fi fast roaming standard published

The IEEE has published a final standard for roaming between Wi-Fi access points. It can take 100ms or longer to establish a connection to an access point (AP) when

roaming from AP to AP, making it difficult to maintain a roaming voice over internet protocol (VOIP) connection. A lack of standards has led some manufacturers to implement proprietary standards or to lower security requirements. The new standard ensures 'handoff' to a new access point is completed within 50ms, ensuring continuity for the user.

The new standard opens up the possibility of institution-wide provision of non-proprietary wireless VOIP services, so that all telephony could be provided wirelessly through access points attached to the LAN, with new handsets available from a much wider range of manufacturers.

IEEE standardises fast Wi-Fi roaming

<http://www.techworld.com/news/index.cfm?RSS&NewsID=103501>

IEEE 802.11r <http://ieeexplore.ieee.org/servlet/opac?punumber=4573290>

Mobile trends

Research for Intel suggests that the number of mobile internet devices (MIDs) will increase to 1.2 billion by 2012. Although some way behind ARM, Texas and Qualcomm, Intel hope to make big inroads into this growing market. As part of their strategy, they have released details of eight 'system on a chip' processors that integrate four major functions, saving up to a third in power and reducing physical space requirements by as much as 45 per cent.

Browser developer Opera released its June 'State of the mobile web' report, giving details of the phones and websites utilising its Opera Mini application. Although focused on results created through a single technology, the report gives a startling insight into the growth of the mobile web, with data consumption increasing by 8.4 per cent in a single month. The usage in the 'top ten' countries, including the United Kingdom, is analysed. The extent to which these results are applicable to other mobile browsers is unclear.

The Q2 2008 UK Mobile Trends Report from the Mobile Data Association reveals that the number of people accessing the web from mobile phones increasing by 25 per cent since May 2006 and predicts a further rise of 20 per cent during 2009. However, Steve Reynolds, MDA's Chairman, says, "the findings of this report suggest a real consumer appetite, but confusion and fear over costs may be holding back growth." The report also contains updated figures on text and multimedia messaging.

Orange has introduced a minimum 24-month contract, £25 'Internet Everywhere' mobile data tariff that includes a free Asus Eee PC 900 16G and data dongle, with a 3GB monthly allowance and 100 free inclusive texts from the laptop. T-Mobile already offers an Acer Travel Mate 5320 laptop on a two year, £30 per month contract. Suppliers like Carphone Warehouse and PC World have a number of similar deals with a range of carriers.

Finally, internet standards organisation W3C has released mobile web standards guidance for developers. These include use of XHTML Basic 1.1, conformity to which can be tested using the beta 'W3C mobileOK checker'.

Boom times ahead for mobile web

<http://news.bbc.co.uk/1/hi/technology/7522305.stm>

Intel outlines plans for... 'System on Chip' designs, products

<http://www.intel.com/pressroom/archive/releases/20080724comp.htm>

State of the Mobile Web, June 2008 http://www.opera.com/mobile_report/2008/06

Q2 2008 UK Mobile Trends report

http://www.text.it/mediacentre/press_release_list.cfm?thePublicationID=6F5A90F5-15C5-F4C0-992D5F8DDAF2BDCA

Orange's first connected laptop offer in orange shops from tomorrow

<http://pressoffice.orange.co.uk/Content/Detail.asp?ReleaseID=827&NewsAreaID=2>

Carphone Warehouse <http://www.carphonewarehouse.com>

W3C standards make mobile web experience more inviting

<http://www.w3.org/2008/07/mwbp-pressrelease>

Wireless security loopholes revealed

A hacker, known as RenderMan, told a conference in July that many people continued to leave their electronic data open to theft. Although users are becoming more cautious about using unencrypted public Wi-Fi connections, they may fail to turn off Wi-fi connectivity when it is not in use or secure Bluetooth connections. Bluetooth devices are often authorised using the default password, so security loopholes can be exploited to steal data from phones, to make unauthorised calls and even to turn them into bugging devices. Weak encryption used with RFID chips in some new passports and poor physical protection makes it fairly simple for thieves to copy data, while building access systems based on RFID could be equally insecure.

Protecting against Wi-Fi, Bluetooth, RFID data attacks http://news.cnet.com/8301-1009_3-9995022-83.html

Future directions for mobile and broadband

Ofcom has published 'Mobile citizens, mobile consumers', a consultation document on the future regulation of mobile services and products. Ofcom identifies gaps in network coverage, problems with callings plans and inequality of access for particular groups as significant among consumers' concerns. The consultation contains no specific proposals but attempts to open up debate as the groundwork for producing these in future; the accompanying document provides considerable background information and analysis.

In addition to direct consultation responses, moderated comments can be added to the consultation's blog. Formal responses, such as completion of the online consultation response form, must be with Ofcom by 6 November 2008.

Mobile citizens, mobile consumers <http://www.ofcom.org.uk/consult/condocs/msa08>

A report from the Broadband Stakeholder Group (BSG) has found that the rollout cost for 'next generation' fibre broadband will be £5.1-28.8 billion, depending on the deployment strategy. The lower figure would involve reusing existing ducting or sharing infrastructure with utilities (such as water companies) and terminating fibre at the local street-side distribution cabinet. Taking the fibre into the home and extensive new 'dig' would result in much higher costs, especially in rural areas.

BSG publishes costs of deploying fibre based superfast broadband
<http://www.broadbanduk.org/content/view/303/7>

MUSE and next generation broadband

The EU funded Multi-Service Access Everywhere initiative, known as MUSE, was funded as a pair of two-year projects. The first phase (2004-06) looked at improving the architecture for the next generation of broadband, working with various international bodies to produce a set of standards known collectively as Global System for Broadband (GSB). These covered security, quality of service and bandwidth issues for extending networks based on Ethernet protocols from local networks into the 'public space'.

Phase two of the project, which concentrated on creating standards for services delivered across the network, was completed in March this year. IPTV, whereby television is delivered across the internet, can suffer from 'bursty noise' on the cabling; by building intelligence into the access network, the data can be retransmitted before the user notices a significant degradation. Further, by developing cache technologies for deployment nearer to the home, users can catch up with their television viewing without congesting key parts of the central infrastructure - evidence revealed that consumers tended to download programmes some 30-60 minutes after the initial broadcast, creating a sudden demand for bandwidth.

Phase two also produced technical innovations in transmission of vDSL (very high speed DSL) data over copper and improvements in the capabilities of fibre to increase speed, reach and usage. Research identified improved fixed-mobile convergence technologies enabling more seamless transition for devices as they pass between different networking environments; and an architecture for residential gateways has also been proposed that handles authentication, automated remote management for installation, quality of service and security. According to Peter Vetter, coordinator for the project, "there are lot of companies working in bilateral arrangements to validate many of the technologies we worked on."

Europe's next-generation broadband
[http://cordis.europa.eu/ictresults/index.cfm/section/news/tpl/article/BrowsingType/Fatures/ID/89912](http://cordis.europa.eu/ictresults/index.cfm/section/news/tpl/article/BrowsingType/Features/ID/89912)

Next-gen broadband at your service
<http://cordis.europa.eu/ictresults/index.cfm/section/news/tpl/article/BrowsingType/Fatures/ID/89916>

MUSE <http://www.ist-muse.org>

Server virtualisation for free

Basic server virtualisation allows multiple hardware instances to operate as a single, virtual unit; or for a larger server, or server cluster, to run alternative or multiple instances of the operating system and applications. This is achieved by introducing an 'abstraction' layer between the operating system provided to applications and either the underlying operating system or the hardware itself - the latter uses a hypervisor and is often referred to as a 'bare metal' installation. Virtualisation permits better management and resource utilisation.

One of the major software developers in this field, VMware, has made its entry-level, bare metal ESXi hypervisor product free to download, so that IT managers can explore the advantages of creating limited virtual machines. Microsoft has done the same with its new Hyper-V Server 2008. The company will also launch its System Virtual Machine Manager 2008. This software permits system managers live 'migration' of virtual operating systems between physical servers. Other virtualisation technologies are available, such as from Citrix, Sun's new xVM and open source projects like Xen.

VMware sets its hypervisor free <http://www.itpro.co.uk/604830/vmware-sets-its-hypervisor-free>

VMware ESXi Hypervisor

<https://www.vmware.com/tryvmware/login.php?eval=esxi&t=1>

Microsoft sets Hyper-V free http://news.cnet.com/8301-13860_3-10034886-56.html

Virtualization with Hyper-V

<http://www.microsoft.com/windowsserver2008/en/us/hyperv.aspx>

Meanwhile, Microsoft has made the rules governing licenses for products running in virtual environments less restrictive. Previously, server instances could only be moved between physical hardware at most once in 90 days. These restrictions have now been dropped for many products in Microsoft's server application portfolio.

Microsoft eases virtualisation licensing

<http://www.techworld.com/news/index.cfm?RSS&NewsID=103252>

The increasingly crowded cloud

Cloud computing is rapidly becoming the next 'big thing' in IT, as companies rush to stake their claims. Named after network illustrations of the internet as a nebulous cloud symbol, reliable data connections make it possible for IT resources to be offered to users as a service delivered over the internet. Placing resources into the 'cloud' makes it possible to improve utilisation; to create temporary project test beds; to lease capacity for temporary peak loads; and to outsource the management of infrastructure and services to specialist companies. Cloud computing increases opportunities to offer 'software as a service' (SaaS) and to provide other services, such as remote data storage. Many companies are investing in the large data centres needed to support such initiatives.

In addition to practical problems of maintaining connectivity, migrating applications to this remote resource and ensuring service level agreements take proper account of bandwidth demands, capacity overruns and backup, the sheer scale of the most recent data centres creates new challenges for managing hardware, data and applications.

In late July, HP, Intel and Yahoo! announced that they would put 1,000-4,000 cores in each of six centres around the world, based largely on HP and Intel hardware managed by an open source distributed computing product, Apache Hadoop. Yahoo has experience in this field, in addition to its own Pig open source parallel programming language. Research will be partnered with academic institutions in Germany, Singapore and the US.

IBM has also revealed plans to spend \$360m (£205m) on a new state-of-the-art data centre in North Carolina, to add to existing developments in Ireland, China and South Africa and a new facility in Japan. The new data centre will exploit modern modular design, advanced water cooling and air conditioning systems and energy efficient technologies as examples of Big Blue's commitment to its Project Big Green initiative.

Finally, AT&T announced that their planned \$1bn network investment programme included five 'Internet data centres' in US, Asia and Europe, to back the AT&T Synaptic Hosting offer. The US Olympic Committee has their website hosted within this environment.

All these join smaller scale projects, such as Amazon's 'Elastic Compute Cloud' - an existing, commercial virtual hosting service.

Managed services in education may make increased use of virtualised resources and applications; a number of browser-based management information systems and learning platforms are already employing such techniques. Improved access to the 'cloud' could make 'anywhere, any time, any device' services more accessible to staff and students. Nevertheless, the inherent risks of moving control to third parties, such as service continuity, data security, contingency planning and backup, must be considered by managers and advisers.

HP, Intel and Yahoo! create global cloud computing research test bed

<http://www.hp.com/hpinfo/newsroom/press/2008/080729xa.html>

IBM unveils plans for \$360 million data centre in North Carolina <http://www-03.ibm.com/press/us/en/pressrelease/24786.wss>

AT&T launches global 'next-generation' utility computing service

<http://www.att.com/gen/press-room?pid=4800&cdvn=news&newsarticleid=26005>

Amazon Elastic Compute Cloud (Amazon EC2) - Beta

<http://www.amazon.com/gp/browse.html?node=201590011>

Is your backup as good as you think?

A survey by online backup specialists, Databarracks, reveals that many companies have a false sense of security in their backup regime. 91 per cent of the respondents

claim they are confident, but of these 74 per cent do not replicate backups, use encryption or take copies off site. Further, 67 per cent do not keep or monitor backup logs, or test their ability to restore files. System resilience and recovery are becoming highly critical as companies and educational establishments come to rely on electronic information, so users are much less forgiving when data is lost or - as in many recent, high profile examples - copies are left unencrypted in the public domain.

Databarracks also found that human error has rapidly become the biggest contributor to data loss, with hardware failures becoming much less common. The latter fell from 61 per cent to 26 per cent since 2006, while human error increased from 2 per cent to 27 per cent.

The company suggests that these results are based on a fairly representative set of 500 organisations, although the self-selective nature of participation in such online surveys may make meaningful statistical comparisons invalid. The survey tool remains open, with companies participating receiving a report that benchmarks their responses against the full data set.

Becta's technical specification contains recommendations for backup policy, in addition to many other requirements for creating and extending ICT infrastructure.

Companies have a false sense of confidence in their backup solutions

<http://www.databarracks.com/Company/News/CompanyNews/news.asp?nid=50>

Technical specification: institutional infrastructure

http://schools.becta.org.uk/index.php?section=lv&&catcode=ss_lv_pla_02&rid=1128

[1](#)

Liverpool AIMES Centre assists digitally excluded

Liverpool University's Advanced Internet Methods and Emergent Systems (AIMES) Centre has been working with housing associations and local schools to provide thin client access to ICT resources via the internet in homes that were previously without a connection. 12-month pilots involving 650 homes are under way in two areas, with a strategy to expand the service (on an ad-funded basis) to 5,000 homes. A thin client solution was chosen so that families without the technical know-how could be connected, and problems resolved remotely, using expert technicians. Connectivity is provided through a wireless mesh service, with the backhaul supplied in the St Helens pilot by the same metropolitan network that serves the local school.

Professor Dennis Kehoe, director of AIMES, told Silicon.com that the managed service cost £2 per week per user, excluding the initial hardware. He envisaged local services paying to use the system for targeted messages on health, jobs and housing, as part of the future funding model. He asserts that digital exclusion and social exclusion are closely correlated, so that the project would help in both these aspects of people's lives.

The Becta report 'Thin client technology in schools' provides information on the advantages and issues with this technology, much of which will have relevance to providing thin clients solutions in homes.

Thin clients switch on digitally excluded

<http://www.silicon.com/publicsector/0,3800010403,39247043,00.htm?r=1>

AIMES project announcement <http://www.aimes.net/shownews.php?id=52>

Thin client technology in schools

<http://publications.becta.org.uk/display.cfm?resID=30655>

Multimedia

Analysis: GPU computing

At a glance:

- GPUs can do more than carry out computational tasks related to graphics.
- Graphics processing units (GPUs) are capable of extremely rapid parallel computational tasks.
- Parallel data processing adds complexity to programming and task scheduling.
- Programming language extensions give access to GPU hardware to provide an independent processing resource for media, mathematical, design and scientific problems that involve processing large data sets.

The GPU as processing subsystem

The graphics processing unit (GPU) was originally designed to augment the central processing unit (CPU) in dealing with high volume, repetitive calculations involved in processing graphical information. In applications like CAD, 3D design, video transcoding (such as displaying Blu-ray content) and games, the CPU deals with the main logic while the GPU renders the required image. In most other applications the GPU has little to do as display updates are relatively trivial. A significant processing resource capable of performing large numbers of parallel mathematical operations is being underutilised on many computers; this could be harnessed to support the CPU in other tasks related to large data sets and complex processing tasks.

Purpose of the GPU

Processing graphical data requires the same operations to be carried out repeatedly on large data sets - individual frames in a 3D game need to be rendered, shaded and incorporate lighting effects in 'real time', to provide the gamer with a realistic virtual environment. These tasks need to be accomplished at extremely high speeds, requiring considerable parallel processing power. Graphics cards now contain multiple 'stream' processors bundled into a single unit, each of which performs the calculations necessary to create part of the image. GPUs represent a huge supply of raw 'compute' power - the hardware required to undertake the basic mathematical operations involved in processing the correct values for every pixel in the final frame.

The GPGPU concept

System designers have realised that there is nothing particularly unique about graphical data - many other sets of data contain closely related values that need to be repeatedly manipulated using the same algorithm. General purpose GPUs (GPGPUs) are being developed to assist application developers with complex modelling and analysis tasks in the fields such as oil exploration, biochemistry and meteorology.

Modern workstations already have multicore processors, so why not just scale these up further? The answer lies in the underlying design of CPUs, which are multi-purpose, flexible devices called on to run many types of program dealing with a large variety of data structures. However, GPUs are specifically designed to handle repetitive computational tasks within smaller, cooler processors.

GPUs make significantly more use of parallel pipelines and multithreading than CPUs. A series of computational tasks can be represented in hardware as an ordered set of logic elements, which receive data at the start of each clock cycle as an output from the logic unit that precedes it in the pipeline. Since the same operations are repeated on multiple data elements, as each one moves down the pipeline a new one can be fed in at the 'top' to optimise the processor's capacity. Where tasks are held up awaiting data from another pipeline or memory, a new task (or thread) can start to be processed to further increase efficiency. Complex scheduling algorithms control the pipelines, allocating threads and directing output as required.

Parallel processing in hardware

Parallel computing is very difficult to manage, since one thread may be dependent on the output of another that has yet to run; separate threads may be programmed to write data to the same register simultaneously; or two threads may place locks on registers that the other thread needs, preventing both from executing. Special programming techniques and instruction sets are required - to limit and overcome such conditions - in order for the hardware to operate efficiently.

AMD have produced Brook+ extensions for the C programming language which interface with its Compute Abstraction Layer (CAL), while NVIDIA have developed a C programming environment called CUDA. In addition to accessing the floating point capabilities of existing high end graphics cards, these tools enable programmers to develop complete applications that make use of the GPU. Both AMD and NVIDIA announced GPGPU products in June that will provide one teraflop of computing power - the FireStream 9250 and Tesla 10 series C1060 Computing Processor, respectively. (1 teraflop approximates to one million, million floating point calculations per second.) Microsoft has announced that DirectX 11 will directly support the GPGPU capabilities of some graphics cards in Windows Vista.

At SIGGRAPH in August, Intel released some of the details of its new Larrabee architecture, expected to launch in 2009 or 2010. This multicore product, based on standard x86 processor designs, will provide a new set of tools for developing 3D games and other graphics intensive applications, but the press release also notes

that 'a broad potential range of highly parallel applications including scientific and engineering software will benefit from the Larrabee native C/C++ programming model'. The company has introduced its Intel Parallel Studio as a plug-in for the Microsoft Visual Studio to simplify programming of multicore processors.

Toshiba are selling Qosmio laptops featuring quad-core GPUs based on the Cell processor architecture it designed alongside Intel and IBM. These computers will use the GPU for graphics tasks related to HD video and to implement new functions, such as 'gesture control' of playback.

It is the view of Dave Patterson, head of the Parallel Computing Laboratory at UC Berkeley, that "we are in a parallel revolution, ready or not, and it is the end of the way we built microprocessors for the past 40 years".

Applications

The Stanford University 'Folding@Home' distributed computing project has supported processing on the GPU as well as the CPU for some time. This research project uses idle time on a computer to investigate the way that proteins fold and how this fails in a number of diseases, such as CJD, Alzheimer's and Parkinson's. Although modern computers are fast, simulating protein folding could involve 30 CPU years to analyse a single problem, so breaking the task into multiple units and distributing these around numerous PCs is extremely beneficial. If the computation can be carried out on the nearly idle GPU found in many PCs, it will produce faster results with minimum performance impact noticeable to the user.

NVIDIA released a GeForce 'Power Pack' in August that included Folding@Home and a trial version of Elemental Technologies' Badaboom video transcoding program. The press release implied that using the GPU and the latest software could reduce the time taken to convert the format of a 2 hour video from 6 hours to around 20 minutes, although precise hardware details were not supplied.

Steve Purves, technical director of FFA, a company that provides seismic analysis software, told IT PRO, "We can now mix volumes of seismic data on the fly. By having this computer power on the desktop, geophysicists will be able to screen the dataset much more quickly, which will greatly speed up classification." He estimated that NVIDIA's Tesla GPGPUs gave a 10- to 30-fold performance improvement.

Other applications for GPU computing include geographical information systems (GIS), weather forecasting, processing audio and video streams in real time, image analysis, cryptography and financial simulations.

Educational applications

Although the price of a GPGPU may be out of reach for many educational establishments, with reports that the ATI FireStream 9250 will be priced at \$999 and NVIDIA's C1060 Computing Processor \$1699, the same programming languages can be used on much cheaper GPUs. Use of ATI's Brook+ with CAL, NVIDIA's CUDA, or the Intel Parallel Studio, brings practical application of these principles within the grasp of higher level students.

Some system managers may feel able to support projects like Folding@Home using hardware idle time; simulation and analysis software written specifically to utilise the spare processing capacity of the GPU will become available in future years, with media applications benefiting significantly from graphics cards designed to support processing on the GPU; while appropriately programmed GIS and modelling software should run more rapidly, producing less heat from the hardware.

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http://ati.amd.com/technology/streamcomputing/product_firestream_9250.html

NVIDIA Tesla Computing Solutions now with the world's first teraflop parallel processor http://www.nvidia.com/object/io_1213744368983.html

NVIDIA Tesla <http://www.nvidia.com/tesla>

Microsoft announces DirectX 11 <http://www.pcpro.co.uk/news/214404/microsoft-announces-directx-11.html>

First details on a future Intel design codenamed 'Larrabee'

<http://www.intel.com/pressroom/archive/releases/20080804fact.htm>

Toshiba quad core HD processor <http://explore.toshiba.com/innovation-lab/quad-core-processor>

Serial computing is dead; the future is parallelism

http://searchdatacenter.techtarget.com/news/article/0,289142,sid80_gci1319113,00.html

Folding@Home <http://folding.stanford.edu>

NVIDIA taps processing power of GeForce GPUs...

http://www.nvidia.com/object/io_1218525021960.html

New line of CUDA powered high-performance computing orientated NVIDIA GPUs...

<http://www.itpro.co.uk/604017/nvidia-tesla-processors-boost-oil-industry>

Multimedia news

Graphics update

AMD, owners of the ATI graphics brand, launched two new dual core graphics cards called the Radeon HD 4870 X2 and the HD 4850 X2. These cards combine two ATI Radeon HD 4800 series GPUs with a more advanced cross-GPU connection based on the PCIe 2.0 standard. AMD claim that the HD 4870 X2 can process data at 2.4 teraflops. (1 teraflop approximates to 1 million, million floating point calculations per second.) The HD 4870 X2 is available at a recommended price of \$549 and the HD 4850 X2 will be available at \$399.

AMD has introduced a range of ATI FirePro cards aimed at the CAD market: the DualLink DVI port FirePro V3700 with 256Mb memory is recommended to retail at \$99, while the dual DisplayPort V5700 version with 512Mb memory and a 'true 30-bit display engine' will cost \$599. AMD has also announced that it will drop out of

producing processors for handheld and digital television applications. These have proven a drain on the company, despite earlier promises of new products.

NVIDIA has revealed support for the desktop 'Bloomfield' version of Intel's up-coming Core i7 'Nehalem' processors. (See IDF update article below for further details of the Core i7.) Using its own Scalable Link Interconnect (SLI) technology, up to three NVIDIA GeForce graphics cards can be harnessed on Intel Tylersburg (X58) chipset-based motherboards to provide enormous quantities of processing power.

AMD launches world's fastest graphics card http://www.amd.com/us-en/Corporate/VirtualPressRoom/0,,51_104_543~127542,00.html

AMD quitting handheld, TV chips amid more losses http://news.cnet.com/8301-1001_3-9993595-92.html

AMD reports second quarter results http://www.amd.com/us-en/Corporate/VirtualPressRoom/0,,51_104_543~127059,00.html

New ATI FirePro Graphics Accelerator... http://www.amd.com/us-en/Corporate/VirtualPressRoom/0,,51_104_543~127444,00.html

NVIDIA brings SLI technology to Intel Bloomfield CPU platforms http://www.nvidia.com/object/io_1216019719164.html

Live Widgets to enhance TV

Yahoo and Intel have announced a collaboration that uses an internet connection to add 'TV Widgets' to any broadcast television signal. New receivers would need Intel's 'system on a chip' (SoC) Media Processor CE 3100 and a broadband connection to deliver the Widget Channel as an icon-based menu system for information related to the current programme and other items of interest selected by the viewer. Information might include updated weather, news and share prices, progress of items placed in online auctions, or links to etailers selling a featured item. In the past consumers have been resistant to using their television to view the internet, preferring a separate PC. The companies hope that people will accept losing a little of the available television screen area in return for immediate access to live information.

In addition to working on the Intel project, Samsung has developed a similar InfoLive service with Yahoo. Available on selected television sets, this service will be available in some parts of Europe later this year.

Intel and Yahoo! to bring the internet to television

<http://yhoo.client.shareholder.com/press/releasedetail.cfm?ReleaseID=328918>

Intel brings the internet to TV <http://www.intelconsumerelectronics.com>

Samsung teams up with Yahoo...

http://business.timesonline.co.uk/tol/business/industry_sectors/technology/article4607621.ece

3D imagery

A large Indian company, Infosys, has developed technology to project 3D holograms from portable handsets. Collections of ordinary images are combined using Fourier

transformations to render a 3D image, which is then projected using lasers and micro holographic optical element lenses. Infosys suggests that, 'by 2010 the devices will routinely beam 3D films, games and virtual goods into our laps'. Medics could display anatomical 3D images, accident investigators provide 3D views of a crash scene and educators construct a variety of virtual 3D objects to demonstrate to students. Little information is available on the Infosys website, except a press release announcing the grant of two patents.

Microsoft has released a Live Labs project called Photosynth where users can combine and display images as a virtual 3D environment. Collections of photos - not necessarily from a single user - are examined for overlapping features. According to the Photosynth website, 'Photosynth examines images for similarities to each other and uses that information to estimate the shape of the subject and the vantage point the photos were taken from. With this information, we recreate the space and use it as a canvas to display and navigate through the photos.' Underlying the website is the Seadragon engine that provides the specific data needed to render the image from your current viewpoint. Using the site requires users to download and install an 8MB plug-in for Internet Explorer and Firefox on Windows. Depending on the photo set uploaded, users can tour around a single object, or navigate through a 3D environment.

This tool could be very useful in education for exploring depth, perspective and detail, or for displaying completed design projects on a school's website. On the other hand, teachers may just encourage younger pupils to try and create a set of photos which have a high degree of 'synth' (as Microsoft call it) and see how it works out when rendered in 3D

Holograms on handsets by 2010

<http://networks.silicon.com/mobile/0,39024665,39248826,00.htm>

Infosys awarded two patents by the United...

<http://www.infosys.com/newsroom/press-releases/2008/patents-awards.asp>

Photosynth <http://photosynth.net>

MS Live Labs <http://livelabs.com/photosynth>

New Microsoft tech converts photo soup into 3-D image

<http://www.technewsworld.com/rsstory/64248.html>

HD formats update

Since Toshiba dropped its development of new HD recording formats, when its HD-DVD optical disk failed to win sufficient industry support (see TechNews March 2008), Blu-ray has been the de facto standard in the sector. However, a survey finds that consumers have not rushed to purchase Blu-ray disks, since to do so they would also need to purchase additional hardware for playback and display. Indeed, some respondents were not particularly enamoured with the format, with 40 per cent saying it was only 'somewhat better' than standard definition DVDs. Sales of Blu-ray disks are upheld in part by users of Sony PS3 games consoles, which have Blu-ray readers installed as standard.

Toshiba has responded by concentrating instead on improving playback of standard DVDs on HD displays. Their new XD-E500 player uses XDE (eXtended Detail Enhancement) technology to interpolate and enhance detail from ordinary DVDs to give 'near HD' quality on HD televisions. Like most recent Blu-ray players which can also 'upscale' standard definition content, the Toshiba player supports the highest (1080p) quality HDTV output, with users able to select the degree of enhancement that they prefer. The new player is on sale with a recommended price of \$149.99 in the US.

Consumers Delaying Blu-ray Player Purchases

<http://www.abiresearch.com/press/1203-Consumers%20Delaying%20Blu-ray%20Player%20Purchases>

Toshiba 'breathes new life' into DVD with XDE technology

<http://www.tacp.toshiba.comX>

WHDI

Six companies have joined forces to create a new Wireless Home Digital Interface (WHDI) standard for wireless television connectivity. Existing standards for wireless transmission of HDTV signals have disadvantages, such as being short range or connecting devices on a near line of sight basis. Intelligent quality of service prioritisation leads to minimal signal loss in WHDI, according to core technology developer Amimon. They claim a range of 30m, even through walls, and capability for providing 3Gbps encrypted bandwidth for the highest HD standard (1080p) in a 40MHz channel using unlicensed 5GHz spectrum.

Connecting receivers and high definition televisions (HDTVs) wirelessly is the aim of a range of competing technologies. Until there are widely accepted standards for technologies that can carry uncompressed HDTV, or compress it with minimal data loss, the market will remain fragmented and users will be frustrated by the lack of interoperability.

Competing technologies include Wireless HDMI (high definition multimedia interface), which is a description of a range of technologies largely implemented using Ultra wideband (UWB). Pulse~LINK's CWave technology is a UWB implementation, for which they claim throughput of 890Mbps over very short distances, but this is significantly lower than the potential promised by WHDI. The WiMedia Alliance is an industry grouping that is developing other UWB standards.

Wireless spectrum around 60GHz, often known as 'millimetre wave', is also unlicensed in many countries and is seen as a potential solution for home multimedia networking. WirelessHD is a short range 60GHz protocol for the HDTV market. The IEEE 802.11 group is also looking at a 60GHz gigabit version of Wi-Fi whilst the 802.15 wireless personal area network (WPAN) group is exploring 60GHz and UWB. A number of proprietary solutions are also in development.

Industry group working on yet another wireless HD standard

<http://arstechnica.com/news.ars/post/20080723-industry-group-working-on-yet-another-wireless-hd-standard.html>

The state of Wireless HDMI and WirelessHD

<http://arstechnica.com/news.ars/post/20070725-the-state-of-wireless-hdmi-and-wireless-hd.html>

Pulse~LINK claims 890Mbps UWB breakthrough for wireless HD

<http://arstechnica.com/news.ars/post/20071214-pulselink-promises-uwb-performance-breakthrough.html>

WiMedia Alliance <http://www.wimedia.org/en/index.asp>

IEEE 802.15 Working Group for WPAN <http://grouper.ieee.org/groups/802/15>

Displays update

OLED (organic light emitting diode) devices are being commercialised as an alternative to liquid crystal displays (LCDs) in mobile devices and larger displays. OLED displays potentially have several advantages over existing flat panel technologies. OLED displays are capable of producing extremely bright, high contrast images with a wide viewing angle and fast response times. Crucially, OLED displays emit light rather than selectively blocking it as with LCD based screens. This makes OLED technology power efficient and helps reduce the size and weight of displays. OLED displays typically use 3 times less power than an equivalent LCD-TFT device. The ultimate goal is to develop flexible display substrates with polymer transistors.

OLEDs can also be used for lighting, but have been hampered by inefficiencies that prevent up to 80 per cent of the light generated being emitted by the device. The internal structure of the organic layer creates reflections in the horizontal plane, so researchers have developed a grid to refract the light and steer it towards a micro lens substrate on a glass layer to 'release' it in the desired direction. Researchers state that the technology release 70 lumens of light per watt, compared to 15 lumens for traditional incandescent bulbs and 90 lumens for environmentally unfriendly fluorescent lights. Estimates suggest that 22 per cent of electricity generated goes into lighting buildings.

The report is unclear whether this particular technology can also be used in displays, but OLED-based products are just coming to market. Sony are to distribute their first 11-inch OLED television next year in Europe - a device that first went on display in Japan last December. OLED displays have already been used in some PDAs and cameras, while Samsung has shown one in a mobile phone. (See TechNews 03/08.)

Traditional LCDs use less power than older display technologies, but inability to switch rapidly can blur fast moving images and they generate insufficient light to work well in daylight. Microsoft researchers have created a new 'telescopic' pixel technology that switches much faster and allows four to six times more light to pass through from the backlight to create the displayed image. Two micromirrors reflect light internally until an electrode creates a magnetic field to bend one of the mirrors and release the light. This technology could use standard manufacturing processes to produce brighter, more responsive displays.

Fujitsu Siemens's high end P20W-5 ECO and 22in P22W-5 ECO Scenicview Premium monitors now feature 'zero watt' technology in standby mode. The

manufacturers have invented a switch that needs no power to detect that the signal has been restored, causing the monitor to be powered up again as a connected PC returns from standby mode. Sensors also detect the level of ambient light and adjust the operational power output as required.

Kodak is producing a 50-megapixel CCD sensor for cameras that will provide 'unprecedented resolution' for imaging technologies, including aerial photography and professional markets. The image is captured using a 8176 x 6132 array of 6.0 micron pixels, which the company states is more responsive and uses less power than previous technologies. Phase One go one step further in announcing their P 65+ medium format camera, also due to be marketed late in 2008, which has a resolution of 60 megapixels, also based on 6.0 micron technology. They suggest that this is the first 'what you see is what you get' digital camera of this type, due to images being displayed on the camera back without optical magnification. Although prices are expected to be around \$40,000, users can expect knock-on price cuts for lower resolution competitors.

More-efficient OLED lighting <http://www.technologyreview.com/Energy/21116>

Sony to release first OLED TV in Europe

<http://www.pcadvisor.co.uk/news/index.cfm?RSS&NewsID=102939>

A new competitor to LCD <http://www.technologyreview.com/Infotech/21104>

Fujitsu Siemens launches 'zero watt' monitors

<http://www.pcadvisor.co.uk/news/index.cfm?RSS&NewsID=102945>

World's first 50 Megapixel CCD sensor...

http://www.kodak.com/eknec/PageQuerier.jhtml?pg-path=2709&pg-locale=en_GB&gpcid=0900688a80935956&ignoreLocale=true

Announcing P 65+

<http://www.phaseone.com/Content/p1digitalbacks/P65plus/Introduction.aspx>

E-paper and e-books

E-books have the potential to put a 'library' of content in the hands of students, using a low powered device that is easy to carry, lasts many hours between charges and is clearly visible in ordinary daylight. In addition to commercial content, students could author and distribute text in formats suited to e-books. Flexible substrates will enable the technology to be used for flexible e-paper, which could eventually be used on a range of surfaces, or for rollable displays for mobile devices. While bundled content may make e-books an attractive proposition, e-paper applications may be hindered by the price of the technology in the short term and competition from PDAs, netbooks and other small computing devices that have a far wider range of applications and functionality.

Esquire magazine has announced plans to put a moving digital image on the cover of its US October 2008 issue, according to TechNewsWorld, printing 100,000 copies to celebrate its 75th anniversary. To be released in September, using an flexible electrophoretic display, the cover will show scrolling text and images, while the inside cover will be an advertisement for the latest Ford Flex car. The display will use technology from E Ink, which uses circuitry to manipulate suspended black and white microcapsules positioned on a circuit layer - the polarity of a given pixel controlling

which colour of particles rise to the surface. These displays will underpin a \$1.7 billion industry by 2013, according to analysts iSuppli.

The latest Sony Reader model PRS-505 will support the XML-based standard EPUB format from the International Digital Publishing Forum. The Reader also displays Adobe eBooks and standard PDF e-books, using the downloadable Adobe Digital Editions 1.5 software. Older PRS-505 units will need to be updated via the Sony website. Owners will now be able to read a much wider range of books, while unknown authors can readily format and supply their works in digital format via their websites. Author Toby Young foresees a YouTube-style of publishing in which, "Essentially you are cutting out the filtering device whereby only established voices are able to speak. First time authors will simply be able to make their books available to anyone with an e-book reader without having to get an agent and a publishing deal."

Waterstones will be the first outlet in the UK for the £199 device. The device uses technology from E Ink, with content viewable in direct sunlight and from angles across nearly 180 degrees. Sony claims that a single battery charge will display 7,500 digital pages for continuous reading.

The e-book reader with the largest audience is the Kindle from Amazon, who are reported to have made sales of 240,000 units. TechCrunch uses these numbers to suggest turnover of nearly \$100m and a business, including content, worth \$1 billion. Analyst Mark Mahaney has revised predicted sales to nearly a million for 2009 and 4.4m for 2010. Once again the screen is provided by E Ink and content can be uploaded from a computer, but books can also be downloaded using the built-in mobile phone network connection. The Kindle, currently unavailable in the UK, is available through Amazon.com for \$359. (This compares to Sony's \$300 dollar price for the Reader PRS-505.)

Other e-book readers are available, including the iLiad from iRex, which features pen-based input.

Esquire to put digital moving pix on mag cover

<http://www.technewsworld.com/story/Esquire-to-Put-Digital-Moving-Pix-on-Mag-Cover-63900.html>

Esquire becomes first magazine to merge digital technology with printed pages

http://media.ford.com/newsroom/release_display.cfm?release=28680

Reader digital book by Sony opens a new chapter on ebook formats

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E-books spell the end for publishers <http://www.iwr.co.uk/information-world-review/news/2222494/books-spell-publishers>

Get your hands on the new Reader from Sony

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We know how many kindles Amazon has sold

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What is the iLiad? <http://www.irextechnologies.com/products/iliad>

Music & copyright

Educational establishments and students are becoming increasingly aware of the issues surrounding copyright for music and other audio recordings. Digital formats make it simpler to copy and distribute content in ways that may infringe the author's or distributor's rights, so the music industry has introduced digital rights management (DRM) techniques to limit copying or the quality of such copies. However, some key voices have questioned the effectiveness of DRM measures in protecting intellectual property rights and the unfair restrictions they often place on users. More recently there have been moves by several providers, such as Universal Music, EMI, Amazon, Apple, HMV and Sky, to provide DRM free content, or more flexibility in how people can use content across a range of devices. Educators need to monitor these changes to ensure that their use of music is both legal and cost-effective.

In the face of pressure from the music industry and research that claims that the average teenager's MP3 player contains more than 800 unlicensed tracks, the Government has reached agreement with six major ISPs to try to limit the number of songs illegally downloaded from file-sharing sites. The trade body representing the UK music industry, the British Phonographic Industry (BPI), has been pressing for measures for a long time. It is expected that the ISPs will send letters to customers whose records show that they have been downloading copyright material from peer-to-peer (P2P) sites. The Government has also initiated a consultation on the details of the scheme. One suggested sanction has been to implement a 'three strikes and you are out' policy, although this has met resistance from ISPs. A survey from Envisional reveals which ISP's customers had the worst record for downloading illegal content, while PC Pro reports the concerns of an industry expert that some of the proposed solutions may infringe the data protection rights of consumers.

The EU has been reviewing laws governing copyright across its 27 member nations. Songwriters and other copyright holders currently license their works and gather royalties through national 'collection societies', such as the UK's MCPS-PRS Alliance. These societies will be made to compete with each other so that copyright holders can choose to license their works across the whole EU using the society of their choice. In a separate move, the EU is seeking approval from member states to extend copyright for songwriters to 70 years after their death (as already pertains in UK) and for performers to 95 years (compared to 50 years in UK) from the first recorded performance of a work. 17 senior academics and experts in copyright law wrote an open letter in the Times on 21 July objecting to the move.

The BBC is providing background notes and discographies for many of the artists heard on its stations through its new beta Music site. Data is drawn from MusicBrainz, Wikipedia biographies and a wider community of contributors.

Music: what does the 'MySpace generation' really want?

<http://www.bmr.org/page/press-release-29>

New measures to address online file-sharing

<http://nds.coi.gov.uk/environment/fullDetail.asp?ReleaseID=375009&NewsAreaID=2&NavigatedFromDepartment=True>

Consultation on legislative options to address illicit P2P file-sharing

<http://www.berr.gov.uk/consultations/page47141.html>

Government's proposed solutions for dealing with illegal file sharers

<http://www.pcpro.co.uk/news/215454>

ISP threatens to walk out of illegal file-sharing pact

<http://www.pcpro.co.uk/news/214896>

Illegal downloads: which ISP's customers are the worst?

<http://www.pcpro.co.uk/news/215967>

Government 'trying to make law vanish' for file sharers

<http://www.pcpro.co.uk/news/215451>

EU moves to free up music rights

<http://news.bbc.co.uk/1/hi/world/europe/7510166.stm>

EU offers royalty scheme for pension-age rockers

<http://uk.reuters.com/article/technology-media-telco-SP/idUKL1677970220080716>

Copyright extension is the enemy of innovation

<http://www.timesonline.co.uk/tol/comment/letters/article4374115.ece>

Universal Music Catalogue launches Lost Tunes download ...

<http://new.umusic.com/News.aspx?NewsId=650>

Lost Tunes <http://www.losttunes.com>

Sky to partner with Universal Music... [http://phx.corporate-](http://phx.corporate-ir.net/phoenix.zhtml?c=104016&p=irol-newsArticle_Print&ID=1177591&highlight=)

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MySpace's DeWolfe says new music joint venture to launch in September

<http://www.techcrunch.com/2008/07/23/myspaces-dewolfesays-new-music-joint-venture-to-launch-in-september>

Amazon to power upcoming MySpace music downloads

<http://www.techcrunch.com/2008/07/25/amazon-to-power-upcoming-myspace-music-downloads>

New BBC Music beta site <http://www.bbc.co.uk/music/beta>

Communication Nation - Ofcom report

Seven hours, nine minutes - that's how long the average British person spends using all kinds of communications channels, from television to mobile phones. Between 2002 and 2007 the average time spent texting or talking on a mobile has doubled to reach 10 minutes, while PC and laptop use quadrupled to 24 minutes. Nevertheless, prices have come down and consumers have become more savvy about switching suppliers, so total monthly costs for a household have dropped 4.4 per cent since 2004.

Upgrading from dial-up to broadband connections has largely been responsible for the 6 point growth in the last twelve months for broadband penetration - now at 58 per cent - but the bigger news 'has been a surge in take-up' for mobile internet services, especially using 3G USB 'dongles' connected to laptops. Monthly sales of these devices increased from 69,000 to 133,000 during February to June this year. Ofcom's research found that 75 per cent of dongle owners used them at home despite the fact that over two thirds of them also had fixed line broadband. However,

only 15 per cent of mobile phone owners used the mobile internet weekly or more often via their phone.

Digital video recorders are found in 23 per cent of households, although television viewing minutes had increased only marginally over the previous year, to 218 minutes per day. Ofcom note a rapidly increasing trend to use online catchup services, with the BBC's iPlayer providing more than 700,000 daily streams in May 2008; YouTube attracted 9 million UK visitors in April. Radio is also being received by more people via the internet, with 14.5 million listening in May 2008, while more than a quarter of households now have a DAB radio set.

Across the board 52 per cent of people said that they would miss watching television most out of their communication activities, but 42 per cent of teenagers were more concerned about their mobile phone. Survey findings also revealed that adults prefer email, while young people were more likely to use instant messaging.

In the 8-11 age range, more than double the number of boys are likely to have used the internet daily compared to girls; for young people aged 12-15, girls are significantly more likely than boys to have used their mobile phone.

Communication Nation: UK consumers paying less but getting more
http://www.ofcom.org.uk/media/news/2008/08/nr_20080814

(Also see 'Internet access: location, mobility and age differences' in Software and Internet news.)

Sous-veillance

In May BBC News reported that we may be under surveillance from 'more than 4.2 million' CCTV cameras, while another survey released by ATL in August suggested that nearly 85 per cent of schools had installed at least one CCTV device. These are largely in public areas, such as entrance halls or sensitively positioned in toilets, but 7 per cent of the teachers said that CCTV had been installed in classrooms. CCTV can be used to ensure safety of teachers and students, to monitor behaviour and to assist in teacher training and Inset.

A new trend is emerging that turns the idea of 'the surveillance society' on its head - 'sous-veillance', or watching from below. Citizens with camera phones record images and video of public service failings which can be shared as YouTube clips collated through 'name-and-shame' websites. Targets could include vital lapses, such as unacceptable hygiene in a hospital ward, failed service delivery, or evidence of things that need fixing. A UK think tank that brings together politicians, officials and industry, suggests in one of its 'Transformational Government Dialogues' that such an initiative 'might transform political engagement due to its ease of use, by engaging even the time-poor majority and extending citizenship beyond the usual special interest groups', although the group also recognised the danger of facilitating public vendettas or distracting strategic direction from more important long term goals.

The EURIM report cites the Tidy Oldham project, while another example is the FixMyStreet website from MySociety. These initiatives reflect the trend towards citizen led democracy and e-participation.

CCTV boom 'failing to cut crime' <http://news.bbc.co.uk/1/hi/uk/7384843.stm>

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Citizens use YouTube to keep gov't in check

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How to achieve citizen-centric service delivery

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FixMyStreet <http://www.fixmystreet.com>

Hardware

Analysis: Mobile fuel cells

At a glance:

- Mobile fuel cells use catalysts at the anode to produce protons and electrons from hydrogen-based fuels; a membrane allows the protons to pass through to the cathode where they combine with oxygen to emit water.
- Electrons must flow from anode to the cathode through an external circuit, producing power.
- Fuel cells are most likely to supplement rather than replace batteries in the short term.
- Standards to ensure interoperability and distribution of fuel cartridges are essential to the success of the technology.
- Prototypes have been demonstrated and specialised commercial products are just coming to market.
- New battery technologies and charge-storage devices, such as 'ultracapacitors', are potential alternative solutions to mobile energy requirements.

Mobile power requirements

Unlike rechargeable batteries, which store energy, fuel cells produce energy through non-combustive chemical reactions.

Modern devices are power-hungry! Although the efficiency of processors is increasing with greater transistor densities, speed and capacity continue to drive the demand for power. More features, such as Wi-Fi connectivity, cameras and audio playback, demand more than ever from the batteries. Whether in a small 'netbook' PC, a PDA or a mobile phone, batteries create problems - they are heavy, they never last as long as the user would like, they take time to recharge and society is only just getting to grips with recycling the heavy metals they contain.

Power efficient processing

Manufacturers are working hard to alleviate these issues by reducing power demands of processors, integrating functions in smaller chips, and increasing efficiency of displays and other hardware. Intel is working on 'platform power management' techniques to better control motherboard resources and peripheral devices: when reading email, the screen need not be refreshed until the user scrolls and keyboards, mice and network interfaces could be switched off while idle. Intel suggests that effective power management could save 50 per cent on energy consumption.

Batteries are likely to remain with us for a long time yet, but manufacturers are looking to substitute or augment them with other energy sources. One area of research being actively pursued is that of fuel cells. These use hydrogen, or a fuel containing hydrogen, to produce electricity, with water and (depending on technology) small amounts of carbon dioxide as waste products. The aim is to produce a light-weight, high efficiency device that is both simple and cheap to refill.

Fuel cell research covers a wide range of applications from producing electricity for 'green' vehicles to powering mobile phones. This article updates that published in TechNews in January 2005.

Principles of fuel cell operation

One of the cleanest technologies, producing only water as waste, uses a proton exchange membrane (PEM) to manipulate hydrogen ions. At the anode, positively charged H⁺ ions (protons) and electrons are produced from hydrogen gas. The protons pass through a non-conducting, permeable membrane, via an electrolyte layer, to the cathode. The electrons are routed out of the fuel cell to provide power, returning at the cathode where they recombine with protons and oxygen from air to produce water. The efficiency of this process has increased through extensive engineering of the catalysts operating at both anode and cathode, as well as improvements in the structure of the intermediate membrane.

A typical small-scale PEM fuel cell produces 0.6-0.7v, compared to a standard alkaline AA battery which provides 1.5v. Fuel cells can be 'stacked' in parallel to provide greater sustained power and in series to produce a higher voltage.

Like the catalysts used, proton exchange membranes are expensive to manufacture and need to be kept hydrated to prevent cracking, which would create a gas 'short circuit' within the unit. Fuel and waste flows have to be closely controlled and the internal temperature must be kept within fairly strict bounds. Recent research has provided solutions to these issues, but hydrogen remains a dangerous product to manufacture, compress, store and distribute.

Alternative systems

Although hydrogen may be the 'greenest' fuel, researchers have been led to consider other sources of energy. Methanol is seen by many as the best alternative, not least because it is a cheap, commonly available feedstock for industrial processes. In some devices (such as the UltraCell unit described below) the

methanol is split to create hydrogen before being introduced into the fuel cell, whereas more recent technologies have produced the direct methanol fuel cell (DMFC), in which dilute methanol produces hydrogen within the fuel cell itself, creating water and some carbon dioxide as waste products. DMFCs operate at room temperature and low pressure.

Active DMFCs use a pump or fan to increase the flows of methanol and oxygen, respectively, to give higher sustained power outputs, whereas passive systems rely on the chemical reactions to induce the necessary flows. The dynamic power demands of laptop computers require active fuel cell designs, but publicly demonstrated prototypes do not dispense with batteries entirely. PolyFuel has developed a 'fully integrated' fuel cell power system for a Lenovo T40 ThinkPad that uses a detachable fuel cartridge which is 'about the size of a deck of cards'. This system has not been seen in public.

Methanol has a much higher 'energy density' than hydrogen, depending on dilution. In an interview with TechNewsWorld, PolyFuel's CEO Jim Balcom claims that DMFC units are seven to ten times more efficient, weight-for-weight, compared to traditional Li-ion rechargeable batteries used in most consumer devices.

Biofuels like ethanol - which has an even higher energy density than methanol - are being considered, but complex technical barriers are yet to be resolved. Researchers at Saint Louis University in Missouri are working on sugar as the feedstock for a fuel cell containing enzymes.

Example products

UltraCell are distributing a ruggedised, external XX25 power pack, aimed largely at the military, which is 'about the size of a hardback book'. The unit, producing 25w continuous maximum power, weighs 1.24kg. A single 'recharge' from a 250ml, 350g methanol cartridge can power the unit for up to 9 hours. UltraCell claim that compared to standard batteries, soldiers can save 70 per cent in the load they must carry to power mobile devices for the duration of a 72 hour mission.

Many hardware manufacturers - including Canon, Hitachi, NEC, Samsung and Panasonic - have expressed interest in fuel cells, but few prototypes have been exhibited, let alone gone into production. Toshiba demonstrated a system at CES in January 2007 that could provide an average 10w of power for approximately 5 hours, on 70ml of fuel, using active DMFC technology. A year later at CES, The Register noted a Toshiba UMPC system powered by a fuel cell fitted to the docking station. Toshiba have also designed passive units more suited to low power consumption devices like mobile phones and MP3 players: in October 2007, IT World reported a demonstration of a Gigabeat media player running for 10 hours on 10ml of methanol. In a document published a year ago, Toshiba suggested that they would manufacture systems for limited commercial distribution in 2008, but these have yet to appear.

In July 2008, MTI Micro announced that its Mobion fuel cell 'chips' would be integrated into some of Neosolar's Wibrain UMPCs for release early in 2009. The

chip weighs one ounce and fits in the palm of a hand, although fuel cartridges add to the overall size.

Other devices are available for external power, such as Medis 24-7 Power Pack, which claims to give up to 30 hours talk time for a mobile phone on a sub-\$30 cartridge, Horizon's \$99 Bio-Energy Kit that runs on ordinary alcohol and APC's FCXR power supply backup aimed at data centres.

One of the greatest non-technical barriers to adoption has been a ban on carriage of fuel supplies on international flights, due to the threat of terrorism. A final US Department of Transport ruling, published in April this year, permits the inclusion of approved fuel cell cartridges in carry-on baggage from October 2008. Now this hurdle has been cleared, manufacturers can actively develop distribution systems and agree design standards through the IEC that will ensure interoperability and fuel cartridge availability. Standardisation is seen as vital for wide uptake of products by consumers.

Other power sources

Aluminium-air ('Al-air') batteries were available as backup power sources for telephone exchanges in the 1970s, but research on commercially viable products is still in its early stages. A French company, Metaelectrique, have made a 'Trash Power Battery' that produces 6v from discarded aluminium cans. Silver-zinc batteries, which have been used for years in submarines, are much closer to commercialisation, but the cost of raw materials would have to be offset by highly efficient recycling schemes.

A significant alternative to batteries and fuel cells might be found in 'ultracapacitors'. Commonly used in all kinds of electronic circuits, capacitors temporarily store power; the level of charge retained depends on the surface area of the electrodes. MIT reports that a nanotech solution, creating a huge surface area on minute filaments in a small volume, could be used as the basis for ultracapacitors. Such devices would charge much more rapidly than batteries, release power more quickly and, the researcher claims, will have a much better life expectancy. A Texan company, EESstor, is said to be developing a commercial product, but few details have been made public.

Role in education

The less expensive laptops normally purchased by schools and students rarely provide enough power for continuous operation through the timetabled day, especially when using wireless connections and after numerous recharge cycles; a typical laptop may run for 2.5 hours on a single charge. Schools that have adopted an 'anywhere, any time' learning philosophy based around access to portable computers are becoming accustomed to providing charging points and spare batteries, but such solutions are at best awkward and may pose health and safety concerns if not properly managed. Fuel cells would enable students in all kinds of educational establishments to keep working throughout the day without worrying whether their PC is about to fail through lack of power.

Fuel cell technology is an attractive prospect, but has been plagued by many false dawns. None less than the CEO of PolyFuel, Jim Balcom, in his interview with TechNewsWorld, stated that "Fuel cells have been five years away for the last 15 years". Even after the technical and interoperability issues have been resolved, doubts remain over the cost-effectiveness of fuel cells against improvements to battery technologies and the power efficiency of devices.

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Hardware news

Server news

IBM leads the server market and Hewlett Packard has held onto second place, but the third slot has come under heavy contention, with news that Dell is marginally ahead of Sun Microsystems, according to Gartner Research. These positions are based on revenue; when actual units are considered, HP heads the list, followed by Dell and IBM. The market is worth \$13.8 billion, a growth in revenue of 5.7 per cent from the same quarter last year. These increases, in spite of the economic trend, are explained in part by delays in the purchasing cycle and in moves towards 'cloud' computing, with large data centres serving applications over the internet.

ARM's new processor due to ship next year, the Cortex A9 MPCore, will contain up to 4 cores and, claims ARM, will deliver scalable processing power sufficient for a small server.

AMD's new 'Shanghai' 45nm processor technology will be first shipped in servers later this year. The company will launch its own chipsets early in 2009, rivalling those from Broadcom and NVIDIA, with multiple sockets connected using its HyperTransport 3.0 bus technology

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<http://www.pcadvisor.co.uk/news/index.cfm?newsid=103142>

Supercomputer update

The UK remains number two in the world's top 500 users of supercomputers, although with 53 compared to the United States' 257 we are never likely to head the list. These machines are used for large-scale modelling functions, such as weather forecasting, molecular research, investigating climate change and simulating the explosion of nuclear warheads.

IBM's new RoadRunner machine heads the list, having broken the petaflop barrier. (A petaflop is 1,000 million, million floating-point operations per second.) It is built from 6,562 AMD Opteron Dual-Core processors, which perform general computing operations, and 12,240 IBM PowerXCell 8i Cell Broadband Engine processors to do the heavy-duty mathematical calculations. The latter is a high-performance version of the Cell processor used in the Sony PlayStation 3 games console.

The Green500.org has also put IBM at the head of its Green 500 list of supercomputers, although Roadrunner is positioned at number 3. Due to the number of processors, energy efficiency becomes an issue in terms of cost and dissipating the large quantities of heat generated. Computers are ranked according to the

number of flops (floating-point operations per second) they can perform per watt of energy consumed.

The UK is number two in super computers

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Low cost PC update

The whole market for ultra low cost PC (ULCPCs, see TechNews 07/08), netbooks/mini-notebooks and other low cost devices designed for internet access is moving rapidly. From predicted sales of 5.2 million this year, Gartner foresees a market of around 50 million netbooks by 2012. Although initially aimed towards education and developing countries, a Gartner analyst said that 70 per cent of sales would be made to consumers.

Designed 'from the ground up' as a low power, low cost processor for embedded systems, ultra mobile devices, mobile internet devices (MIDs) and netbooks, Intel's new Atom processor is expected to take a significant share of devices aimed at this market. The Atom will be competing against Via's latest 64-bit Nano range in the desktop and laptop markets, and NVIDIA's new Tegra 'computer-on-a-chip' processors for smaller devices.

Acer launched the first Atom-based netbook in the UK in June, followed by the ASUS Eee PC 901 (see previous TechNews editions). The entry of Dell, Lenovo and LG into the market shows just how significant the market has become. Dell's Inspiron Mini 9 starts at £299 (including VAT and shipping) for an 8.9-inch LED display, 1GB memory, 16GB solid state drive, Wi-Fi, webcam and Windows XP. Lenovo's IdeaPad range will feature an 8.9-inch or larger screen, Wi-Fi, two USB ports, built-in webcam, up to 1GB memory, either a 160GB hard drive or 4GB SSD storage and either Linux or Windows XP. To be released in October, recommended prices will start from £279 (including VAT). Also available in October, LG's new Netbook X110 will contain 'embedded 3G' in some countries (using '3.5G' HSPA protocols), in addition to 1MB memory, Wi-Fi, Ethernet, an 80GB hard drive, a 10-inch display and Windows XP. UK pricing has yet to be announced and it will need a 3G dongle to connect to the mobile network here. Several mobile network operators and suppliers are now offering free mini-notebooks with certain mobile broadband contracts.

Intel has signed a deal with the Portuguese government for 500,000 Classmate PCs for use in primary schools. The Magellan Initiative complements Portugal's e-Escola project, which is already providing laptops and internet connectivity to secondary students and teachers. In addition to hardware, Intel will be assisting with managing, promoting and implementing the two programmes.

Classmate PCs are distributed under local brands with pilots and larger roll outs in more than 60 countries and 20 languages. Intel has announced that the next

generation of Classmate (version 3) will have touchscreens, an optional tablet PC mode and software improvements for collaboration and connectivity. Intel state that the new design is based on experience from pilots and research which 'also suggested that learning and teaching becomes more effective when the option of natural input and touch screen is offered, especially for subjects such as math and science where drawing graphs and diagrams are prominent.' Final specifications have not been announced, but products are expected to ship at the end of this year.

The Indian government, also a customer for Classmate PCs, briefly stunned journalists with the announcement of a \$10 dollar PC. The mistake was a typographical error in a press release, which should have read \$100. Although this has been the aim of the One Laptop Per Child (OLPC) initiative, reaching this price point has proven nearly impossible under current manufacturing constraints. An Indian government minister said that research was being carried out by the Indian Institute of Science in Bangalore and the Indian Institute of Technology in Chennai, although she gave no details of the proposed specification.

A Chinese company, Impulse, is marketing a laptop that has been dubbed 'the world's cheapest'. For shipments of at least 100 units, the NPX-9000 can be purchased at \$130 (approximately £75). Based on a 400MHz processor, with 128MB of RAM and 1GB of flash storage, it features a 7-inch screen and comes with a Linux operating system. Wireless networking is provided through an optional dongle.

Finally, students at MIT have been working on a project to create a \$12 computer based on early Apple II PC designs. MIT run an annual 4-week International Development Design Summit where teams work on designs and prototype technologies that aim to 'create equity in the distribution of research and development resources by focusing on the needs of the world's poor'. The team see access to very low cost PCs as a significant step-up for people in developing nations, with one commenting, "if you just know how to type, that can be the difference between earning \$1 an hour instead of \$1 a day."

Netbook sales to top 50 million by 2012

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IDF Update

Intel made a range of announcements around its Intel Developer Forum (IDF) event in August. Just before the conference it said that its next generation 45nm chips, codenamed Nehalem, would be branded Intel Core i7. These chips will feature Intel's Hyper-Threading Technology, to handle eight software threads across four or more processor cores, and QuickPath Interconnect, to improve data transfer between processor, memory and the chipset. The latter mirrors features of AMD's Direct Connect architecture, available on AMD64 processors for some years, which eliminates the front-side bus by integrating the memory controller into the main processor chip. Due to go into production later this year, desktop and server versions of the Core i7 will appear first, followed by an expansion of these ranges and the addition of dedicated 'Calpella' mobile processors.

Multicore chip performance will benefit from 'power gating'. Intel already puts inactive processor cores to sleep, but leakage continues to draw power even in this idle state. New transistor designs bring this leakage close to zero, allowing the other

cores in the chip to enter a turbo mode, by increasing clock speed and voltage, without raising the overall power requirements (or heat flux) of the chip. This has been achieved by introducing a brand new power control unit (PCU) that takes readings from on-die sensors and monitors code execution to optimise power usage.

This turbo mode should not be confused with 'Turbo Memory' technology that is available for new Centrino 2 processors. This will allow users to select applications to accelerate in a process known as 'User Pinning', whereby regularly used applications are cached on fast Flash memory for rapid access.

The new Intel Parallel Studio is a plug-in for Microsoft Visual Studio designed to assist developers take full advantage of the new multicore designs. Many applications still run on a single processor thread, not taking full advantage of multiple core processors. Effective use of parallel processing brings considerable challenges to programmers, as outlined in the GPU computing article above. This software development toolkit will go into public beta in November, with a final release next year.

To power the new generation of consumer electronics devices, Intel detailed new 'System on a Chip' (SoC) processors to support set-top boxes, media players and digital televisions. These combine a range of functions, such as audio, graphics and video decoding, which are normally discrete units of the chipset, into a single chip with the CPU. This reduces overall size, increases performance and lowers power consumption. Other SoC designs in the Integrated Processor Product Line, combining functions including the I/O controller and memory controller, are aimed at embedded applications from industrial robots to home internet gateways.

Intel will launch 6-core 'Dunnington' Xeon processors for the server market this month, based on the older 45nm 'Penryn' designs. These processors are aimed at larger servers running at least 4 parallel processing units. Virtualisation makes extensive use of parallel processing capabilities, so Intel sees a significant market for these products. Larger on-board caches and reduction in transistor size will lead to faster, more efficient operation. This product line will be replaced by Nehalem-based servers next year.

Intel has published an updated roadmap for its processors, showing how the older 45nm 'Penryn' designs will be replaced by the new 'Nehalem' architecture. These will begin to appear in Xeon server platforms this year followed by Core i7 desktop and other mainstream products next year. Having updated architecture, the next move will see a reduction in transistor size with new 32nm 'Westmere' chips in 2009, in line with Intel's alternating 'tick-tock' strategy for architecture and transistor size. After that comes the 'Sandy Bridge' microarchitecture and then 22nm transistor technology.

Key to AMD's roadmap is the introduction of 45nm technology - to be formally announced early in 2009 - initially in quad-core 'Deneb' processors for Phenom-branded chips, followed by further 6-core and 12-core chips into 2010.

Next-generation Intel PC chips to carry Intel Core name

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Graphics processors

Toshiba have announced a range of Qosmio laptops featuring quad core HD graphics processors based on Cell technology. (The Cell processor line was originally designed by a consortium of IBM, Sony and Toshiba for use in Sony PS3 games consoles and other devices.) The four cores run at 1.5GHz, half the speed used in the PS3, to support transcoding video data ready for playback, 'upscaling' ordinary digital television streams into HD formats and face recognition within a set of digital photographs. An unusual feature will be the ability to use gesture controls detected via the laptop's webcam, to control video playback on the PC.

Intel pre-announced some details for its Larrabee processor range at the SIGGRAPH conference in August. These chips will be based on the same basic x86 processor architecture found across most of Intel's range, but will be aimed at a different class of applications, such as high end graphics and mathematical modelling. (See main analysis article on GPU computing.) Development tools may need little modification to support Larrabee, since the x86 architecture has inherent support for existing C/C++ programming models. The underlying assumption is that hundreds or thousands of processing cores will operate in parallel, with a 1024 bits-wide, bi-directional ring network permitting super fast communication between cores.

Each main core will contain optimised short execution pipelines and support carefully selected graphics functions, multi-threading, 64-bit extensions and sophisticated pre-fetching; and task scheduling will be performed entirely within software, allowing programmers to fine tune the use of system resources. The latter creates flexibility to reallocate logic units according to the nature of the problem to be solved - each application can upload a custom micro-OS and software renderer specific to the task in hand.

Toshiba Quad Core HD processor <http://explore.toshiba.com/innovation-lab/quad-core-processor>

First details on a future Intel design codenamed 'Larrabee'

<http://www.intel.com/pressroom/archive/releases/20080804fact.htm?cid=rss-90004-c1-210459>

Larrabee: Intel's biggest leap since the Pentium Pro

<http://arstechnica.com/news.ars/post/20080804-larrabee-intels-biggest-leap-ahead-since-the-pentium-pro.html>

New USB and Firewire specifications

Intel has released a draft specification for the USB Extensible Host Controller Interface (xHCI). This prepares the way for production of USB 3.0, or SuperSpeed USB devices, due to market in 2009 or 2010. The interface defines how software should communicate with a range of USB hardware devices and promotes full interoperability between suppliers. The new specification is designed to be ten times faster (4.8Gbps) than existing USB 2.0 communication - sufficient to drive a range of HD graphics hardware, but also backwards compatible with older USB standards. Intel's draft is available royalty free to all USB 3.0 Promoter Group members and a further draft is expected by the end of the year.

The IEEE 1394 group has approved standards for next generation S1600 and S3200 FireWire, running at 1.6 and 3.2Gbps, respectively. FireWire is a high speed serial interface that competes directly with USB. It has found a niche market in imaging products, especially digital video, and on Apple computers. The standard will be made publicly available in October 2008. Versions supporting 6.4Gbps or higher are expected in future.

Intel unveils Extensible Host Controller ...

<http://www.intel.com/pressroom/archive/releases/20080813corp.htm?cid=rss-90004-c1-210999>

USB 3.0 Promoter Group <http://www.usb.org/usb30>

New 3.2Gbps FireWire spec approved, not as fast as USB 3.0

<http://arstechnica.com/news.ars/post/20080731-new-3-2gbps-firewire-spec-approved-not-as-fast-as-usb-3-0.html>

New version of IEEE 1394 standard approved

<http://standards.ieee.org/announcements/ieee1394.html>

New input devices

Steve Prentice, an analyst from Gartner, has made a bold prediction of the demise of the computer mouse within 3 to 5 years. Gestures can be used to control applications, as demonstrated by Panasonic at CES in January and now implemented in Toshiba Qosmio laptops (see above). Other input technologies include touch devices, such as Microsoft's Surface and the Apple iPhone; face recognition; eye tracking; handwriting and speech recognition; and Emotiv Systems's headsets that can control simple applications by detecting brain outputs using sensors.

Microsoft has taken the principles behind Surface a step further by demonstrating a touch sphere. In principle, the sphere's metaphor encourages collaboration on an equitable basis since no individual has a dominant position. Touch gestures allow the user to 'flick' photographs to the 'dark side'; rotate a virtual globe and explore night/day displays; navigate 360 degree images generated by a ring camera; and play simple multi-user games like 'pong' in three dimensions. In a YouTube video, Microsoft developer Hrvoje Benko admits that "there are some contention issues" in a multi-user environment which have not been addressed by this conceptual prototype. The system is based on the Magic Planet global projection system from Global Imagination, currently on sale for around £6,500 in the UK.

Say goodbye to the computer mouse

<http://news.bbc.co.uk/1/hi/technology/7508842.stm>

Panasonic unveils diverse high definition technologies...

<http://www2.panasonic.com/webapp/wcs/stores/servlet/prModelDetail?storeId=11301&catalogId=13251&itemId=215668&modelNo=Content01072008033815749&surfModel=Content01072008033815749>

Microsoft Surface <http://www.microsoft.com/surface>

Emotiv Systems <http://emotiv.com>

Microsoft's touchscreen Sphere appears on video

<http://www.pcpro.co.uk/news/215457/microsofts-touchscreen-sphere-appears-on-video.html>

Microsoft Surface Sphere (YouTube) http://uk.youtube.com/watch?v=V3HGfly_zCI

Global Imagination <http://www.globalimagination.com>

Android phone approved for market

The first phone based on Google's Android software platform (see Opening the mobile OS analysis for exploration of Android and alternative platforms) has been approved for sale in the US. The 'Dream' phone, available on the T-Mobile network, is manufactured by HTC. The approval date is 10 November 2008, although (due to the way that FCC confidentiality rules work) this is the latest release date.

Meanwhile, MobileCrunch and Ars Technica give an overview of the likely 'look and feel' of the operating system, based on the latest Software Developers Kit (SDK). The home screen is wider than the visible area, allowing developers to put icons, like the Google search box, out of immediate sight; launchers for common applications can be dragged to this screen directly from the menu. Using an emulator, John Biggs

has posted a video to the MobileCrunch website demonstrating some of the features and revealing a number of items that remain to be implemented. One major omission will be a full Bluetooth stack, as Google have stated, 'a comprehensive Bluetooth API will not be possible or present in Android 1.0'. The SDK version is 0.9, meaning that it remains, technically, in beta.

Google has announced that it will launch an application store for Android, in similar vein to that already available for the Apple iPhone.

Google's Android phone, the HTC Dream, is apparently approved by FCC ...

<http://venturebeat.com/2008/08/18/android-phone-is-approved-by-fcc-nov-10-the-apparent-release-date>

Android video walk-through <http://mobilecrunch.com/2008/08/19/android-video-walk-through>

Robotripping: hands on with the Android SDK beta

<http://arstechnica.com/news.ars/post/20080819-robotripping-hands-on-with-the-android-sdk-beta.html>

In anticipation of an actual phone, Android releases a new SDK

<http://www.techcrunch.com/2008/08/18/in-anticipation-of-an-actual-phone-android-releases-a-new-sdk>

Android 0.9 SDK Beta (r1) <http://code.google.com/android/RELEASENOTES.html>

App Stores: Microsoft, Google Follow Apple

<http://www.technewsworld.com/rsstory/64400.html?wlc=1220867229>

Battery recycling

From 26 September 2008, all retailers must accept batteries for recycling if they also sell them - the customer need not be buying batteries, although the shop must have the same type of battery for sale. This is a legal requirement of a European directive designed to reduce the quantities of harmful metals, like cadmium and mercury, getting into the environment. The actual responsibility for recycling or safe disposal remains with the manufacturer. Government figures show that only 2 per cent of batteries are currently recycled, despite an EU target for 25 per cent to be returned by 2012. (These rules complement the WEEE requirements, covered in TechNews 02/05.)

Retailers will have to take back old batteries

<http://www.computeractive.co.uk/computeractive/news/2222670/retailers-back-old-batteries>

Information on relevant EU legislation

<http://ec.europa.eu/environment/waste/batteries/index.htm>

WEEE: Waste Electrical and Electronic Equipment <http://www.environment-agency.gov.uk/business/1745440/444663/1106248>

Environmental sustainability

http://partners.becta.org.uk/index.php?section=pv&catcode=pv_ip_02&rid=14635

Whitehall to be green by 2012

The Cabinet Office reveals that ICT systems 'are responsible for up to 20 per cent of carbon emissions generated by Government offices - around 460,000 tonnes a year.' More than a quarter of these emissions would be slashed immediately if every desktop PC was switched off during non-working hours, reducing carbon output by the equivalent of 40,000 cars per annum. A carbon neutral target for 2012 is based on such measures plus some limited offsetting. However, the plan is more ambitious for 2020, stating that ICT usage should be carbon neutral across the life-cycle of equipment, including manufacture and disposal. The full plan outlines 18 guideline strategies, to be adopted immediately by the Cabinet Office and rolled out across other departments as soon as practical.

Recommended measures include setting monitors to switch to standby mode after five minutes' inactivity; reusing as much hardware as possible; auditing data centres for efficiency; consolidating mobile devices so that officials carry a single smart phone rather than a mobile and a PDA; greater use of videoconferencing and other remote technologies; replacing as many physical servers as possible with virtual servers; and implementing thin client technology where it can provide a net benefit.

Schools also have a responsibility to consider these issues, as outlined in the Sustainable Schools section of the TeacherNet website, with specific carbon neutral targets for new school buildings by 2016. The Becta website also has advice on environmental sustainability.

Whitehall IT to be carbon neutral by 2020

<http://www.silicon.com/publicsector/0,3800010403,39261023,00.htm>

World first as Government computers go green

http://www.cabinetoffice.gov.uk/newsroom/news_releases/2008/080717_green.aspx

Greening Government ICT

http://www.cabinetoffice.gov.uk/~media/assets/www.cabinetoffice.gov.uk/publications/reports/greening_government/greening_government_ict%20pdf.ashx

Sustainable Schools <http://www.teachernet.gov.uk/sustainableschools>

First step to making all new school buildings zero carbon

http://www.dcsf.gov.uk/pns/DisplayPN.cgi?pn_id=2008_0113

Environmental sustainability

http://schools.becta.org.uk/index.php?section=re&catcode=ss_res_env_02&rid=14635

Software and internet

Analysis: Developments in mobile operating systems

At a glance:

- The operating systems and applications available for mobile devices vary considerably between manufacturers and mobile carriers; many of these are incompatible with alternative devices and platforms.

- Developing new applications is hampered by the range of platforms, necessitating custom software versions for each.
- Publicly documented application programming interfaces and software development kits ease these problems, but there are moves in the industry to open up developer access even further.
- Several industry groups are focussing on new open source projects and code that is now being put into the public arena.
- Windows XP is being made available for 'netbooks' as well as various Linux installations.

Introduction

The number of different platforms and operating systems in the mobile world creates issues for manufacturers and software developers potentially inhibits innovation and interoperability - Vodafone's Chief Executive, Arun Sarin, has emphasised his desire for fewer mobile platforms and operating systems and access to a greater variety of applications on a number of occasions. The range of different mobile platforms makes software development more expensive and time consuming.

Mobile data access

Ofcom's recent Communication Nation report reveals that uptake of mobile broadband data cards and 3G 'dongles' has risen markedly over the last six months in the UK, with three quarters of device owners using mobile internet technology at home.

Some mobile network operators fear becoming 'bit pipes', providing mobile data access at a rate that will stress their networks while producing limited revenue. They face difficult decisions about providing mobile access: should mobile bandwidth be throttled in favour of voice or should 'net neutrality' prevail? Should they encourage browsing on the phone or support access through laptops, 'nettops' and smaller handheld computing devices? Should they create 'open networks' accessible by any device and application or, as currently prevails in the UK, lock devices to their own network and limit the range of software that can be used?

Most phones run unobtrusive proprietary operating systems, but the smartphone market is largely divided between Symbian, Windows Mobile, Palm, Linux, RIM and Apple. Developers of mobile applications are watching the market to gauge which route to follow. Java, Flash, or custom applications can be used to build independent 'widgets' that give specific access to internet resources like news, weather, auction sites, voice over IP (VOIP) and video. Alternatively, access could be through mobile browsers and embedded objects built using browser plug-ins running similar technologies or Microsoft's Silverlight. New widgets and plug-ins may be available either as part of the operating system bundle distributed with the phone, or as a download from a developer site or manufacturer-approved application store. Some manufacturers, such as Adobe with its Open Screen Project, are trying to create a consistent runtime environment for a range of devices to ease the problem of developing for multiple platforms.

Software developer kits (SDKs) give programmers access to the resources and features of the operating system through the Application Programming Interface (API), allowing them to build custom applications or add functions to existing software. The open source approach, where programming code is made publicly available, also allows developers to modify existing applications - or the operating system itself - to enhance and extend the available features. Nevertheless, handset manufacturers and mobile carriers may restrict the applications that can be used, or introduce quality control measures on the applications they make available through an online application 'store'.

Common platforms

The range of available environments is largely governed by the operating system and the constraints of given hardware, meaning that developers may need to create custom applications for each combination of processor and operating system. Reducing the number of permutations should speed up application development, lower costs and bring an enhanced and more consistent user experience.

Phone manufacturers have recognised the commercial potential for moving in this direction and are supporting a number of collaborative developments aimed at simplifying the whole field. Some projects are designed to open up existing platforms (especially Symbian) and others to focus open source options into a unified alternative. Google has laid down a challenge by creating a completely new development environment.

Symbian

Nokia is the majority shareholder for Symbian Ltd, owner of the Symbian operating system, installed on over 225 million phones and mobile devices from manufacturers including Motorola, Samsung, Panasonic, Sony Ericsson and Nokia. Nearly 20 million Symbian handsets were sold in the second quarter of 2008 and the company has just launched version 9.5 of its operating system.

Symbian already has a developer network for third parties wishing to create Symbian applications. Nokia announced in June 2008 that it intended buying the remaining Symbian shares and would put its software into a not-for-profit Symbian Foundation early in 2009. Some of the software would be open source at launch with the remainder becoming available over the next two years.

LiMo - Linux Mobile

A group of industry heavyweights - Motorola, NEC, NTT DoCoMo, Panasonic Mobile Communications, Samsung and Vodafone - created the LiMo Foundation in January 2007 as 'an industry consortium dedicated to creating the first truly open, hardware-independent, Linux-based operating system for mobile devices'. Using the GTK+ developer toolkit for the Gnome mobile Linux implementation, the aim is to develop a common 'middleware' platform, containing neither the basic operating system kernel nor the main user applications, on which developers can build exciting and useful software.

In June 2008 the Linux Phone Standards (LiPS) Forum announced that it was to close and merge its operations with the LiMo foundation. This brought the key industry players together in a single grouping, so that the LiMo foundation could boast over fifty members early in August 2008.

Google's Android

The media were taken off-guard in November 2007 when it emerged that Google was working on its own Android open source project rather than a much rumoured 'Gphone'. Google set up the Open Handset Alliance (OHA) - several of whose members were already in the LiMo foundation - to control this development. (This group should not be confused with the Open Mobile Alliance, or OMA, dedicated to creating interoperable services across mobile networks.) Key OHA members include LG, Samsung, Intel, NVIDIA, NTT DoCoMo, Sprint Nextel, China Mobile, T-Mobile, Google and eBay.

Android aims to provide a full software stack, from the operating system kernel, with network stack and device drivers at the bottom, through routines to manage applications and resources, to the common software found in most devices like calendars and a browser. The core is controlled, but the APIs are open and can be accessed through the Dalvik virtual machine, supplied C and C++ libraries or Java.

Google recently announced the winners of its \$10 million Android Developer Challenge, the release of a beta Android software development kit (SDK) and a new applications store, like that for Apple's iPhone. HTC has received regulatory approval for the first Android-based phone to be available on the US T-Mobile network in late October or November 2008.

Sugar

The OLPC Association also chose a Linux kernel for its XO ultra low cost PC (ULCPC) aimed at education in the developing world. The Sugar interface replaced the standard desktop metaphor with a radical new model emphasising collaboration and communication based on a networked mesh of users: applications are replaced by activities, files are called objects; and the file system is presented as the Journal. According to the OLPC website, this design means that 'every activity has the potential to be a networked activity'.

The interface is not directly dependent of the underlying operating system, so Microsoft was able to demonstrate an XO laptop running a version of Windows XP from a 2GB flash memory card in May 2008, albeit with a modified BIOS and specially written drivers for some of the hardware. Microsoft stated that OLPC would be working with third parties to create a version of Sugar for the XP-based XO.

Low cost laptops and desktops

A whole range of low cost, network-enabled laptops ('NetBooks') and desktops ('NetTops') has been released over the last year. The cheapest of these, such as the original Asus EeePC 701, were based on Linux. However Microsoft, despite discontinuing sales of XP through its regular channels on 30th June as expected, has promised to make the operating system available for such devices until 2010.

These implementations will come within Microsoft's Product Lifecycle for Windows XP, whereby 'extended support' for paid incidents and free security updates ceases in April 2014. Microsoft sets restrictions on the specifications of devices allowed to run XP.

Implications

Significant research has already focused on handheld devices in the learning context: Becta and Futurelab have produced reports on mobile learning, Wolverhampton has a Learning2Go project and Becta is involved in the HandHeld Learning 2008 conference. Becta is also due to publish the final report this autumn from Bristol University on '1:1 access to mobile learning devices'.

Reducing the number of mobile operating systems and opening them up by releasing developer toolkits, or going fully open source, creates exciting possibilities for educational projects and content. Development time can be optimised since the same code could theoretically be run a wider range of devices, from web-enabled phones through ULPCs to ordinary desktop computers.

The market is in a state of flux, with analysts reluctant to pick 'winners'. The iPhone 3G arrived to resounding praise following by more considered opinion; Nokia and other developers have many applications for Symbian, but need to make these available through the Symbian Foundation; Google's Android, although still in beta, will see a phone released before the end of the year; LiMo is consolidating its membership; and the OLPC XO is in the critical phase of initial rollout. Other platforms such as Windows Mobile also have large numbers of application available. During the next couple of years it may begin to become clear which platforms are most mature and likely to receive the widest market support. However, it is still uncertain whether the market will eventually coalesce around a limited number of platforms or whether a much more fragmented situation will continue.

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Vodafone CEO reiterates OS call

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The Wonderful Wireless Widget World

<http://www.wirelessweek.com/article.aspx?id=147145>

Symbian <http://www.symbian.com>

Symbian Developer Network <http://developer.symbian.com/main/index.jsp>

Symbian Foundation (limited content) <http://www.symbianfoundation.org>

No convergence for open mobile platforms

<http://arstechnica.com/news.ars/post/20080812-no-convergence-for-open-mobile-platforms-devs-go-own-way.html>

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OMA <http://www.openmobilealliance.org>

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<http://venturebeat.com/2008/08/18/android-phone-is-approved-by-fcc-nov-10-the-apparent-release-date>
OLPC <http://laptop.org/laptop>
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<http://www.microsoft.com/presspass/press/2008/may08/05-15MSOLPCPR.mspx>
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<http://www.microsoft.com/presspass/features/2008/apr08/04-03xpeos.mspx>
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Software and internet news

Harnessing Technology

DCSF, DIUS and Becta have launched the revised Harnessing Technology: Next Generation Learning strategy for 2008-14. Becta, the government body for technology in learning, was tasked with updating the strategy on behalf of the Department for Children Schools and Families, and the Department for Innovation, Universities and Skills. The revised strategy sets out a commitment to ensuring every school, college, university or training provider is 'technology confident', placing particular emphasis on achieving this through engagement with learners and parents and the professional development of teachers and trainers. Becta is now tasked with leading and working with education and skills providers, Government and national partners to ensure this ambitious strategy is delivered by 2014

This new cross-sector strategy aims to ensure technology supports improvements to services across the education and skills sector, but the strategy also identifies five particular areas for development:

- Promote a clear learner entitlement working in particular to enable disadvantaged learners to use technology effectively, safely and purposefully

- Put in place universal access to powerful learning tools, content and support for family and informal learning
- Help to secure better teaching by exploiting the benefits of technology to provide professional tools and support for teaching
- Develop a system-wide national digital infrastructure that supports personal ownership and environmental sustainability
- Mobilising leadership at all levels of the system through nationally recognised, innovative technology leadership networks.

Government says technology in learning is no longer optional

<http://news.becta.org.uk/display.cfm?resID=37361&page=1658&catID=1633>

Harnessing Technology: Next Generation Learning Strategy - full and summary versions: <http://publications.becta.org.uk/display.cfm?resID=37346>

Internet access: location, mobility and age differences

The latest figures from the Office of National Statistics (ONS) reveal that 65 per cent of households have internet access, with 56 per cent of these using broadband connections. These figures have increased since 2006 from 57 and 40 per cent, respectively. These figures mask continuing, distinct regional differences: homes in the South East (74%) have 20 per cent greater connection rates compared to the North East (54%). As a nation, Wales (67%) is marginally better connected than England (66%), followed by Scotland (61%) and Northern Ireland least connected (56%).

About a third of respondents who did not have a connection did not feel they needed the internet (up from a quarter in 2006) while around one in seven cited high costs of access or equipment to be the reason they had no connection.

The highest level of qualification held by an adult (aged less than 70 years) makes a considerable difference to the likelihood of home internet connection: 93 per cent of those with a degree level or higher have a connection as opposed to 56 per cent of those with no formal qualifications. These differences need to be taken into account when designing out of school and home access initiatives.

Women are less likely to have used the internet than men, younger people more than older people; 69 per cent of people use it nearly every day. The most popular activity is email (87% of all respondents), followed by searching for information on goods and services (84%); approaching half (43%) of young adults (16-24 year-olds) use it for learning. 23 per cent of adults have accessed the 'mobile web' using a wireless connection with a laptop and 15 per cent had used a GPRS service on a mobile phone. The report goes into further detail of the types of services accessed on the internet and use of mobile phones.

Generation Y describes the tech-savvy age range of 18 to 28 year-olds. Forrester Research's 2008 North America Technographics Benchmark survey finds that 42 per cent watch online video at least once per month and 72 per cent (from the 82 per cent that own a mobile phone) regularly send text messages. The older Generation

X (aged 29-42) use 'technology when it supports a "lifestyle need" whereas tech is "embedded into everything Gen Yers do" making them the first "native online population", according to Forrester's Charles Golvin. However, largely confirmed in UK by the ONS report above, Generation X are more likely to use internet banking or shop online than any other age group.

Internet Access 2008 <http://www.statistics.gov.uk/pdfdir/iahi0808.pdf>

What extended ICT access will you provide?

http://www.teachernet.gov.uk/wholeschool/extendedschools/practicalknowhow/ICT_detailed/ICTaccess/pupils

Generation Y keeping companies on their toes

<http://news.zdnet.co.uk/emergingtech/0,100000183,39453153,00.htm>

(Also see 'Communication Nation' in Multimedia News.)

Browser news

Google has begun a public beta test of Chrome, its new open source browser. Competing with Apple's Safari and Mozilla's Firefox against the dominant position of Microsoft's Internet Explorer, Google hopes to make the browser unobtrusive and fast. Tabs for each new page opened will be in their own 'sandbox', so that code in each is mutually isolated, to increase security. A new JavaScript engine (V8) has been built to enhance embedded applications and to support Google's own Gears offline environment. Built from elements of Apple's WebKit and Mozilla's Firefox, Chrome is initially available for Windows, with versions promised for Linux and Apple machines.

This move demonstrates the importance of web-based applications: many large software companies, including Microsoft, Google and Adobe, are developing software that will either work entirely within the browser or have versions for both online and offline use. It is also likely that Google will produce a mobile version of Chrome for its Android handsets and other mobile hardware, making development across a broad range of platforms simpler and more unified. (See Opening the mobile OS, above, for details of Android and other open source mobile operating systems.)

Microsoft has announced details of the next version of Internet Explorer, IE8. Designed with improved security in mind, IE8 has increased privacy options; visual previews of 'search suggestions' provided by user-selected sites; Web Slices (where available) to keep track of updates on favourite pages; and a compatibility mode for pages designed to work with older browsers. This version is now in a second, public, beta phase.

Firefox is moving through its next development phase with the release of a second alpha version of Firefox 3.1. This includes native support for HTML 5's 'video' element, giving developers direct control of playback using JavaScript rather than embedding a Flash object. Although not part of this build, the final release (intended for early in 2009) includes a new TraceMonkey engine, which uses just-in-time compilation for recursive segments written in JavaScript. According to Mozilla

developer Brendan Eich, this will 'boost [JavaScript] performance by an order of magnitude or more'.

A fresh take on the browser <http://googleblog.blogspot.com/2008/09/fresh-take-on-browser.html>

Windows Internet Explorer 8 <http://www.microsoft.com/windows/internet-explorer/beta/default.aspx>

Firefox 3.1 Alpha 2 now available for download

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TraceMonkey: JavaScript Lightspeed

http://weblogs.mozillazine.org/roadmap/archives/2008/08/tracemonkey_javascript_lig htsp.html

Search developments

A new search engine, Cuil ('cool') was launched by ex-Google software engineers in July. The aim of the project was to provide more relevant information related to the search terms entered - in addition to site summaries, a search for 'Becta' provides category boxes for 'Education in England', 'Departments of the United Kingdom' 'British professional bodies' and 'ECUK licensed bodies'. Reviewers have cast some doubt on the relevance of the results provided for many searches, but it is likely performance will improve over time.

Wikia Search, the 'social search engine' from Jimmy Wales, founder of Wikipedia, was launched in January, but (like Cuil) had considerably less than one per cent of the US search market share by mid-August. The site attempts to improve search results through collaboration, with users ranking results and providing spare CPU time to run a distributed 'Grub' service to explore the web.

Search metrics firm comScore has confirmed that more than three quarters of UK searches are performed through Google, while Hitwise attributed over 70 per cent of the US market to the same engine.

Google has given an indication of the 'size' of the web, namely 1 trillion (one million, million) 'unique URLs'. Each URL represents a page - the number now 'growing by several billion pages per day' - having increased from a mere billion back in 2000. The company has continued to explore new ways to improve searching, such as providing users the means to rank results. During July, a few randomly selected users saw voting controls against their search results.

Finally, although not strictly 'search', Google has launched its community built Knol encyclopaedia, as a competitor to Wikipedia. Knol aims to have experts publish under their own names and may have several entries ('knols') on the same item. Announced in December, Knol was previously in a private beta. (See TechNews 01/08 for both Knol and Wikia Search.)

Cuil <http://www.cuil.com>

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We knew the web was big... <http://googleblog.blogspot.com/2008/07/we-knew-web-was-big.html>

Google bucket testing new Digg-like search interface

<http://www.techcrunch.com/2008/07/14/google-bucket-testing-new-digg-like-search-interface>

Edit search results FAQ <http://www.google.com/support/faqs/?editresults>

Google launches Wikipedia rival

<http://cwflyris.computerworld.com/t/3376759/158204686/127972/0>

Knol <http://knol.google.com>

Advances in social networks and virtual worlds

IBM and Linden Labs (developer of Second Life) have teamed up to create standards for interoperating between virtual worlds. In a 'world first' this summer, they demonstrated that an avatar, the visual representation of a user, could be teleported from the Second Life Preview Grid to an OpenSim virtual world server. Protocols and software extensions are to be made available to the wider development community by the two companies involved. Previously, lack of standards has limited the uptake of virtual worlds and development of educational environments, so this development enormously expands the virtual 'area' potentially available, as well as allowing developers to plug in completely different environments into existing worlds. Many educational projects are running on private 'islands' as well as in the open world of Second Life. The Shambles website has a large range of educational links for Second Life and Becta has published an Open University research report on the use of Teen Second Life.

Google has also been working on virtual worlds, having produced its own Lively plug-in. To use it you must first download the file and can then log on to explore virtual rooms through your browser. This creates the possibility of embedding a room within a blog post or other web page, in much the same way people currently embed YouTube videos. Unlike Second Life or other virtual worlds, each room is an independent environment, making it more of a system for creating 3D chat spaces. Lively started life as a 'twenty per cent' project at Google, whereby employees can spend a day per week on a piece of work that particularly interests them.

Existing online social networks tend to be large and unwieldy, with little fine-grained control over who can see your details and for which purposes, whether social, recreational or business. Liz Lawley, director of the Lab for Social Computing at the Rochester Institute of Technology, said, "people want to create villages and they're

being forced into cities. That's creating a huge tension in social interactions". She feels that existing social networking sites do not reflect reality out of the virtual sphere, where people build small communities around particular aspects of their lives. Nevertheless, users could become smarter in their use of existing tools to share bookmarks and moderate comments on blogs.

Becta has produced a series of reports on the use of Web 2.0 technologies in learning at secondary level and Childnet International has released research on social networking (funded by Becta) in the report published through the 'digizen' (digital citizen) website.

Linden Lab and IBM achieve major virtual world interoperability milestone

<http://www-03.ibm.com/press/us/en/pressrelease/24589.wss>

Shambles - Second Life http://www.shambles.net/pages/learning/ict/sl_tandl

The schome-NAGTY Teen Second Life pilot

http://partners.becta.org.uk/index.php?section=rh&catcode=re_rp_02_a&rid=15490

Google gets into virtual worlds

<http://www.technologyreview.com/Infotech/21100/?a=f>

Google Lively <http://www.lively.com>

Researchers help define next-generation social networking

<http://cwflyris.computerworld.com/t/3386549/158204686/128944/0>

Lab for Social Computing <http://social.it.rit.edu>

Web 2.0 technologies for learning at KS3 and KS4

http://partners.becta.org.uk/index.php?section=rh&catcode=re_rp_02&rid=14543

Young people and social networking services

<http://www.digizen.org/socialnetworking>

Accessible technology

IBM has developed software for a collaborative Social Accessibility Project designed to improve the experience of web users with limited or no sight. Screen reading software typically fails to describe pictures and other graphic elements on pages where, commonly, designers have failed to enter alternate text for this purpose. Users who discover such problems can report the issue to a wider community that includes sighted users, who will create the appropriate information as a piece of external metadata. This leaves the original page unchanged, but when another person accesses the page using a screen reader with the appropriate extension installed, the metadata can be read to that user.

A computer science graduate from the University of Washington has released an alpha version of an open source internet application called WebAnywhere. Although partially sighted and blind users still need to log in and navigate to the host website, since the application does not rely on locally installed software (other than a browser and a recent version of Flash or a media player), it can be used in libraries or any other public place. The application uses JavaScript to send text to a remote server that produces text to speech for playback on the client machine.

BBC News reports on Lumisonic software, which converts sounds into an image of radiating rings, the nature of which depend on the particular sound waveform

received. The project, involving Goldsmiths, University of London and the London Philharmonic Orchestra, aims to help deaf children visualise sound.

The MobileASL project, also at University of Washington, is searching for ways to improve video compression so that signed speech can be streamed to mobile phones for deaf people. Video at sufficient quality for clear transmission of American Sign Language (ASL) occupied too much bandwidth, especially on non-3G signals. Complex algorithms have been developed to recognise and enhance the hands and face, while transmitting other less important parts of the image in lower resolution. This remains a lab research project with a small intended pilot of 20 users.

Another research project has investigated the use of a 3mm magnet attached to the tongue to control a computer. Sensors attached to the cheeks communicate movement to a headset, which the researchers acknowledge is overly large in the current system. Assistant professor Maysam Ghovanloo, from Georgia Institute of Technology, believes, "you could have full control over your environment by just being able to move your tongue".

An artist has painted a picture of Mount Fuji purely using a vocally controlled cursor. Again based at University of Washington, the Vocal Joystick project uses vowel sounds for each of the eight major points on the compass. In addition to painting, graduate student Jon Malkin demonstrated a simple game based on the technology to the recent Gnomedex conference.

New technology paves way for visually impaired internet users <http://www-03.ibm.com/press/us/en/pressrelease/24593.wss>

An open source seeing eye dog for web surfers
<http://www.linuxinsider.com/story/63849.html>

Helping the deaf to 'see sound' <http://news.bbc.co.uk/1/hi/technology/7558017.stm>

Cellular signing: making cell phones usable by the deaf
<http://arstechnica.com/news.ars/post/20080825-cellular-signing-making-cell-phones-usable-by-the-deaf.html>

Research aims to put tongues in control of devices
<http://www.physorg.com/news138805968.html>

Vocal Joystick controls PCs for those with hand injuries http://news.cnet.com/8301-13772_3-10024508-52.html

Update on technology for parental engagement

Parental involvement in a child's life and school work is one of the most important factors in the success of a child at school. A recent Populus survey commissioned by Becta has demonstrated that parents would like more feedback from schools about how their children are performing in the classroom. Over two-thirds of parents would like schools to use technologies such as text messaging and the internet to communicate with them more frequently. Currently, only 8% of parents surveyed are kept informed using these methods.

The May edition of TechNews included an analysis piece on using technology to improve parental engagement and the move towards online reporting.

Teachers2parents was mentioned as an example of a system with the ability to SMS

parents. We would like to make clear that other systems from companies such as Groupcall and Truancy Call are also available.

<http://news.becta.org.uk/display.cfm?resID=38299&page=1658&catID=1633>

IT careers and qualifications

The Sector Skills Council for IT, e-Skills, estimates that there are nearly a million posts in the IT and telecoms industry, with some employers reporting a continuing skills shortage. Statistics from the Higher Education Statistics Agency suggests that one in ten graduates from computer science courses had been unable to find employment after a year, although (in line with trends across all subjects) these numbers have been gradually falling. Graduates are advised to actively contact employers and to try big companies and public sector organisations, which are more willing to take on trainees. Speaking to IT PRO, a representative of the Association of Technology Staffing Companies (Atsco), 'called on industry to offer more apprenticeships and hire more entry-level IT workers, Davidson also said that universities must offer the right training and students must continue to take up those programmes in order to overcome the problem'.

Undergraduate students are optimistic about employment in the IT sector, although many feel that the work will be mundane. CRAC, the independent Career Development Organisation, found that 'over 60% of non-computing students cited boring work as the main reason they would not join the sector'. In large measure this may be down to poor careers advice: 'less than 10% of respondents felt that the benefits of a computing degree had been effectively communicated to them at school', while 'the research confirmed that work experience remains the strongest influence on career choice for undergraduates'.

A new degree course in complex IT systems is to be offered by Bristol University and other HE establishments, examining IT systems whose behaviour cannot be predicted.

ICT remains a popular area of vocational study, with 19 per cent of the 2.3 million adults and young people following vocational qualifications doing so in related subjects, but specific IT courses in sixth forms have continued to decline. According to figures from the Joint Council for Qualifications, numbers on AS and A-level courses have further declined, with just over 60 per cent taking IT or Computing courses compared to five years ago. The statistics also show the continued gender gap among IT students with a ratio of approximately 12:5 of males to females.

DCSF recently announced a £60 million capital fund to support implementation of diplomas - additional money designed 'to create world class exemplar facilities', which would be likely to include significant ICT resources. The Department will be looking for consortia bids led by local authorities and will announce assessment details this month.

Education continues to have a problem recruiting staff to teach IT and computing courses, as the latest bulletin from the Graduate Teacher Training Registry (GTTR)

revealed that numbers of applicants to date had fallen by nearly 11 per cent compared to last year.

IT skills body lays out state of the sector in the UK <http://www.itpro.co.uk/604758/it-skills-body-lays-out-state-of-the-sector-in-the-uk>

IT and telecoms insights 2008 <http://www.e-skills.com/Research-and-policy/Insights-2008/2180>

HESA destinations of leavers from higher education...

<http://www.hesa.ac.uk/index.php/content/view/1282/161>

Are there enough entry-level IT jobs? <http://www.itpro.co.uk/604683/are-there-enough-entry-level-it-jobs>

Undergraduates: IT sector has a bright future, but perceive the work to be boring

http://www.crac.org.uk/crac_new/Who_we_are/press_room/Press_Releases.asp#it

Students to take first complex IT systems degree

<http://www.computing.co.uk/computing/news/222243/omplex-system-degree-launch>

ICT tops vocational study <http://www.itpro.co.uk/604815/ict-tops-vocational-study>

JCQ - A, AS and AEA results http://www.jcq.org.uk/national_results/alevels

IT A-levels on decline again <http://www.vnunet.com/vnunet/news/2224015/levels-decline-again>

£60 million capital boost to create Diploma showpieces

http://www.dcsf.gov.uk/pns/DisplayPN.cgi?pn_id=2008_0152

Applicant numbers for IT teacher training still falling

<http://news.zdnet.co.uk/itmanagement/0,1000000308,39442135,00.htm>

GTR statistics <http://www.qtr.ac.uk/stats08/index.html>

NASA images

Working with the Internet Archive, NASA has opened its full image, audio and video archive for public use. In addition to a simple interactive timeline, images are categorised under five headings:

- Universe
- Solar System
- Earth
- Aeronautics
- Astronauts.

The resource is huge, including over 30,000 shuttle-related images, 27,000 for the solar system and 8,000 for the universe. Images are tagged, so searching for 'horsehead nebula' produced 48 results.

NASA are making the content available without licence: 'The NASA imagery offered on NASAIMAGES.ORG is generally not copyrighted. You may use this NASA imagery for educational or informational purposes, including photo collections, textbooks, public exhibits and Internet Web pages (personal or otherwise).'

Other useful resources includes Microsoft Research's Worldwide Telescope and Google's sky map, Google Sky. (See TechNews 05/08)

NASA images <http://nasaimages.org>

WorldWide Telescope <http://www.worldwidetelescope.org>

Google Sky <http://www.google.com/sky>

Digitisation and reCAPTCHA

CAPTCHA technology attempts to prevent spam bots accessing public websites by insisting that users type in a series of deformed letters and other characters. (CAPTCHA stands for 'Completely Automated Turing Test To Tell Computers and Humans Apart'.) Originally developed at Carnegie Mellon University in 2000, some of the same team have given the technology an additional purpose: deciphering old texts. ReCAPTCHA displays words from printed texts and manuscripts that standard OCR techniques have failed to read. As users enter a protected website, they read and transcribe the text, typically with greater than 99 per cent accuracy - providing both website security and a transcription service that meets commonly accepted standards. Over its first year of operation, more than 1.2 billion reCAPTCHAs have been solved, deciphering 440 million words - equivalent to more than 17,600 books. A variant of the system can be used by any website to hide email addresses from spam bots.

Computer users are digitizing books, newspapers quickly and accurately...

http://www.cmu.edu/news/archive/2008/August/aug14_recaptcha.shtml

reCAPTCHA Mailhide <http://mailhide.recaptcha.net>

TechNews Information

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