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## Networking and wireless

### Analysis: Upcoming 802.11 wireless standards

Over the past 7 years wireless networking has developed from a niche product to be a popular, flexible networking technology that has customers in the home, business and public arenas. Wireless networking technologies are built into most laptop computers, PDAs, Tablet PCs, some smartphones and increasingly a range of consumer electronics.

Like so many other technologies, interoperability between equipment developed by many different providers is based on the application of common standards. The wireless LAN revolution was driven by the IEEE 802.11b standard being ratified in 1999 but developments have been constant and rapid as equipment suppliers try to meet new requirements, for example high bandwidth wireless multimedia in the home.

This piece will look at some of the upcoming developments in wireless networking, focussing on 802.11 variations. IEEE 802.11 takes its name from the Institute of Electrical and Electronics Engineers working group 11 of the LAN/MAN standards committee (IEEE 802). The committee has defined, or is working on, over 20 standards ranging from extensions specific for certain countries and use of wireless in vehicles to more general purpose networking standards.

The standards under consideration for this article are:

- IEEE 802.11k – Access Point detection and roaming
- IEEE 802.11n – Higher Bandwidth WLAN
- IEEE 802.11r - Access Point detection and roaming
- IEEE 802.11s - Mesh Networking
- IEEE 802.11v - Wireless network management
- IEEE 802.11w – Security Improvements

For the majority of users the most important characteristic of a network is its speed. 802.11n aims to deliver real world data rates of over 100Mbps. Analysts hoped that the enthusiasm of the industry would see a quick ratification and adoption of the standard especially after rival technologies agreed to cooperate. However, developments are currently stalled with a failure to agree a version 1.0 of the draft specification. Final ratification is not expected until mid-2007. 802.11n is expected to deliver up to 540Mbps (though in practice more like 100Mbps), approximately 20x the practical bandwidth of 802.11b. Some vendors are already marketing 'pre-802.11n' equipment that may offer higher performance. However, these products are not standards compliant, may interfere with other networks and may not be upgradeable to the final standard once ratified.

A major advantage of 802.11n is its compatibility (at lower speeds of course) with previous network standards. As part of increasing speeds, 802.11n is more demanding of bandwidth and can use channels double the size of earlier standards (40Mhz rather than 20Mhz). Possible congestion in the spectrum may be partially compensated by 802.11n's use of the 5GHz (as with 802.11a) as well as 2.4Ghz (802.11b/g) band. 802.11n also improves performance by offering lower latency in processing signals. One key advance of 802.11n equipment will be its support for MIMO. MIMO involves the use of at least 2 antennas for transmitting data and an equal or greater number for receiving. The multiple antennas are tuned to the same channel, but each transmits a different data stream. This method of setting up multiple parallel data paths within the same channel requires the use of sophisticated algorithms to reassemble the data at the receiving end. MIMO allows for more efficient use of the spectrum and greater transmission ranges. However, there are cost and power implications in having multiple RF units.

802.11n equipment is likely to be demanding of the limited wireless bandwidth. Some manufacturers believe that the presence of an 802.11n network will interfere seriously with other 802.11b/g networks that also operate in the 2.4GHz spectrum.

<http://www.pcw.co.uk/personal-computer-world/news/2150453/broadcom-claims-first-official>

When wireless networks were first deployed there was a much lower concentration of Access Points (APs). Any city centre and many neighbourhoods now boast large numbers of different networks visible from any given point and there becomes a challenge for equipment manufacturers to work in a complex environment. Future models of use must take into account users moving from access point to access point while maintaining connectivity to persistent services such as VoIP and also come up with algorithms that help a user choose the best AP to connect to.

IEEE 802.11k is an emerging standard that introduces some basic intelligence into WLAN equipment. Current standards do not widely support feedback between wireless clients and access points or measurements of traffic that might allow more efficient use of spectrum. Currently WLAN clients will attempt to connect with the AP that has the highest signal strength, though if this AP is highly congested it might be more efficient to connect to a non-congested AP using a lower signal strength. 802.11k will allow algorithms to be developed that make this kind of determination due to the additional information collected and shared. Additionally this standard will support other operational adaptations designed to deliver a better functioning network. This proposed new standard is expected to be ratified in late 2007.

<http://www.networkworld.com/news/tech/2004/0329techupdate.html>

<http://www.networkcomputing.com/showitem.jhtml?articleID=59301901&pgno=6>

The IEEE 802.11r emerging standard reflects the changing priorities of networking and the move to more time critical applications. 802.11r seeks to improve the performance of wireless networks where client devices roam from AP to AP and wish to maintain connectivity of applications such as VoIP, where any delay will seriously degrade the user experience. It achieves this by anticipating movement and allowing pre-authentication with adjacent APs to speed up the roaming process. The 802.11r draft standard is still in development and is expected to be ratified in 2007.

<http://www.networkworld.com/news/tech/2005/082205techupdate.html>

IEEE 802.11s is a standard for wireless access points to form Mesh networks and is hoped to be ratified during 2007. Traditional wireless networks use APs linked together using a traditional routed wired backbone, while Mesh networks allow for APs to share information to allow traffic routing across and between each other. This allows networks to configure themselves without user intervention and operate with flexibility when new APs are added or removed from a network. These networks are resilient to failure and can cover large areas such as city centres. Mesh radio is reasonably well established in the WAN arena and is popular in community projects where its resilience and flexibility are seen as great strengths.

<http://www.networkworld.com/news/tech/2006/041706-80211s-wireless.html>

Current WLAN APs operate with fixed characteristics of power output (or can only vary using proprietary systems) and hence transmission strength. There are vendor specific and third party tools to manage security and configuration on APs, but no standard to support this. The 802.11v standard extends the feature set for management of WLAN equipment across different vendors. This includes scope for APs to increase and decrease their power output based on their situation and the other APs they are communicating with. For example it might be the case that in a congested area APs might wish to reduce their power output to decrease interference. Maximum power output is regulated, but minimum is not.

<http://www.techworld.com/networking/features/index.cfm?featureid=1135&Page=1&pagePos=14>

The 802.11w standard, expected to be agreed in 2008, looks at the security of management and configuration information contained in packets sent over 802.11 networks. Currently, 802.11i/WPA offers encryption and protection for data transmitted wirelessly, but not the associated management information so 802.11w hopes to address this gap. This will be especially important when combined with the other management and configuration information discussed above so as to prevent possible

attacks such as faking network information in order to channel all data in a WLAN through a compromised AP.

<http://www.networkworld.com/columnists/2006/052906-wireless-security.html?fsrc=rss-security>

The need for these standards demonstrates the developing applications that expect to be delivered over wireless networks and hints at a future where networks are much more aware and self-optimising, as will be required for mobile multimedia applications.

There is no doubt that IEEE 802.11-based WLANs are now a mature part of modern networks. WLANs are now being used for more demanding tasks and standards are being developed to support more complex and secure networks.

The key elements to draw from this overview are a growing demand for flexibility in terms of building networks and users moving in and out of the range of multiple Access Points. The demands for secure, robust high performance networking are no different to those for wired networks. Real time applications that are demanding delivery by wireless will include multimedia streaming such as for digital entertainment in the home and streaming to wireless tablets in the classroom; and support for communications such as VOIP and video conferencing. Currently Becta recommends that WLANs are used to complement a main wired network.

Becta technical paper WLANs: <http://foi.becta.org.uk/display.cfm?page=1702>

## **Networking and wireless news**

### **Wireless Cities in the UK**

The development of municipal wireless networks can often be a cause of tension between telecommunication companies and local councils, as in Philadelphia in the US. BT in the UK has taken a different approach and has sought out councils to partner with to trial new wireless technologies such as Wi-Fi and WiMAX. They hope that this technology will enable increased productivity for council workers as well as bring broadband to ICT-poor homes. The project plans to eventually cover 12 cities but is currently being trialled in Birmingham, Cardiff, Edinburgh, Leeds, Liverpool and Westminster. The technologies used will include WiMAX, medium-range broadband links and shorter range Wi-Fi mesh networks. One project that hopes to benefit from this wireless broadband is the Aston Pride project, part of Digital Birmingham that hopes to increase the skills and aspirations of an inner-city community through access to ICT and the internet.

[http://digital-lifestyles.info/display\\_page.asp?section=distribution&id=3276](http://digital-lifestyles.info/display_page.asp?section=distribution&id=3276)

<http://www.digitalbirmingham.co.uk/>

### **3.5G devices hit the market**

Data applications over 3G networks have stepped up a gear with new products and services being launched that use High-Speed Downlink Packet Access (HSDPA). This technology, referred by some commentators as 3.5G, has a theoretical maximum downstream speed of over 14Mbps; however in practice services will at least initially be limited to lower speeds (1.8 or 3.6Mbps). Samsung have recently launched the first HSDPA handset in South Korea, focussing on the emerging markets for video downloads. Dell is now taking orders for laptops with built in HSDPA hardware. In the UK T-Mobile has been the first operator to offer flat rate 3G data tariffs, which may help increase take-up of these technologies. However, the T-Mobile service currently does not allow VoIP, or video/audio downloads. Other handset manufacturers and service providers are expected to follow suit soon. However, the T-Mobile service currently does not allow VoIP, or video/audio downloads.

<http://news.zdnet.co.uk/communications/3ggprs/0,39020339,39267682,00.htm>

[http://www.letsgodigital.org/en/news/articles/story\\_5702.html](http://www.letsgodigital.org/en/news/articles/story_5702.html)

### **Next generation wireless draft rejected**

Agreement on the 802.11n next-generation fast wireless LAN standard remains elusive as the IEEE working group failed to meet the 75% approval required. 802.11n networks use the 2.4GHz and 5GHz

wireless spectra to deliver much faster wireless LANs (100Mbps+ real world data rates). Further significant changes to the standard are not expected and some manufacturers have already released "pre-n" equipment, but there is no guarantee that these will be compatible with the final standard. Independent tests of "pre-n" equipment have highlighted performance and interoperability issues. More information on upcoming 802.11 standards can be found in the Analysis section of this issue. <http://www.wired.com/news/technology/wireless/0,70806-0.html>

### **Wireless backbone networks pushed**

A US company has developed a wireless backbone for Wi-Fi networks creating the possibility of an all wireless network. Effectively this Meru Networks system uses multiple wireless channels as the equivalent of network cabling. The performance of this approach has yet to be proven. It may have niche applications where hard-wiring wireless access points is difficult. Traditionally Wireless LANs (WLAN) have focussed on delivering the last segment of a network to a client device and have been supported by wired infrastructure. The main alternative to this hybrid network with wired backhaul has been the use of mesh networks. Mesh networks are constructed from a number of peered access points that follow simple rules for routing across multiple links. [http://www.merunetworks.com/news/press\\_releases/050106a.shtml](http://www.merunetworks.com/news/press_releases/050106a.shtml)

### **WiMAX update**

Analysts at Juniper have released a report with very positive predictions for the global market for Mobile WiMAX equipment after certified equipment is released in early 2007. This technology, designed to offer wireless broadband over a wide area, is expected to have significant impacts for both businesses and consumers and may help extend education outside the school. The Jupiter researchers estimate that by 2012 the global market will be worth some \$2.53 billion and that services are expected to be driven by demand for data rather than voice. WiMAX is based on IEEE 802.16 standards (see TechNews July 2005). [http://www.juniperresearch.com/reports/38\\_mobilewimax/main.htm](http://www.juniperresearch.com/reports/38_mobilewimax/main.htm)

### **RFID update**

The controversy over personal privacy issues with Radio Frequency Identification (RFID) continues, but most companies continue to innovate with applications for these "radio barcodes". IBM has gone some way to addressing the concerns of privacy activists with a "tearable tag". Normally tags have antennae built alongside them in packaging, giving an effective range for stock control readers of some 10m, but IBM's idea allows consumers to rip the antenna to reduce range to about 5cm. This, they suggest, means that tags remain useful but are not subject to long-range privacy invasion. Another privacy idea under consideration is creating a standard for RFID "kill" commands that turn a tag off permanently, rendering it useless. <http://www.wired.com/news/technology/0,70793-0.html>

The US federal government has ambitious plans about the use of RFID tags in agriculture. It plans to tag every animal in the US from birth to ultimately consumption using RFID to manage the food chain, together with a rather grand plan of tracking tags by satellite. The EU, in contrast, is being more reserved and is investigating the potential impact of RFID on privacy. Several schools around the world have introduced RFID tags to monitor students, but privacy concerns have resulted in some schemes being abandoned. [http://www.rfidgazette.org/2006/03/on\\_tracking\\_all.html](http://www.rfidgazette.org/2006/03/on_tracking_all.html)

### **Mobile email goes Open Source**

Open source developers are taking on the already significant and growing market for mobile email applications. Devices like the BlackBerry use proprietary software to "push" email out to mobile devices when it arrives at a server, rather than wait for a user to "pull" messages down using a traditional IMAP or POP3 client. This market, now subject to intense competition between, amongst others, Microsoft, RIM and Visto is targeted by Lemonade (license to enhanced mobile oriented and diverse endpoints) developers. Lemonade seeks to set a standard protocol for mobile email functions. This, the developers hope, will lead to increased compatibility with existing email systems, simplify the user requirements and encourage companies to develop innovative value-add services rather than compete on different approaches for basic functionality. Adoption is likely to be a slow process due to

the level of existing investment made by the sector but already some handset providers (Sony Ericsson and Nokia) have expressed interest and have produced client software.

<http://www.isode.com/whitepapers/lemonade-open-standards.html>

### **Ofcom spectrum auction complete**

The Ofcom auction of 1781.7-1785 MHz/1876.7-1880 MHz GSM bands has been completed.

Services in this spectrum are likely to offer GSM mobile phone picocells covering a limited area, such as inside a building, train or aeroplane. Winning bids ranged in price from £1.5m to £50,000 and two bidders were unsuccessful.

It is not known when the first products will be available, but the larger bidders are expected to seek to recoup their investment as quickly as possible.

[http://www.ofcom.org.uk/media/news/2006/05/nr\\_20060503](http://www.ofcom.org.uk/media/news/2006/05/nr_20060503)

### **Quantum cryptography advance**

Quantum Cryptography is widely hailed as the ultimate in encryption. The premise is based on the idea that signals encoded in this fashion only have a defined state when read and that if they are intercepted this will change the message – making the tampering obvious. Scientists are slowly moving this idea from theory to practice, but until now have been unable to transmit useful amounts of data – the speeds of transfer have simply been too slow or short range. US scientists have just announced they have achieved a rate of 4Mbps over a 1km long link, which is fast enough for video. Scientists in Japan have previously demonstrated systems that operate at much slower speeds over 100km distances and UK researchers 25kbps over 122km.

<http://www.techworld.com/news/index.cfm?RSS&NewsID=5820>

### **Mobile handsets**

Despite mobile phone handset manufacturers continuing to tempt consumers to buy new handsets with enhanced features such as PC compatibility, megapixel cameras and even WLAN connectivity, manufacturers are developing simple, functional, low-cost designs that are aimed at emerging markets. However these devices are also attracting interest from markets where multimedia feature such as cameras are not desirable and also from consumers who are rejecting more complicated multi-function devices in preference for simple, usable phones. Research firm In-Stat has shown that multimedia functions such as MP3 players only appeal to a small market segment.

<http://www.vnunet.com/vnunet/news/2153812/consumers-unimpressed-multi>

Mobile phones in the developing world, such as Africa, are often stolen from the UK and sold in great volumes. The BBC recently investigated the journeys of stolen phones from the UK to Ghana.

<http://news.bbc.co.uk/1/hi/technology/4977898.stm>

After a UK company came up with a "teenager repellent" device that emitted a high-pitched noise that supposedly can only be heard by sensitive young ears, enterprising youngsters changed it into a ring tone. They speculated that this tone would not be heard by teachers (above a certain age) in a classroom situation.

[http://www.nytimes.com/2006/06/12/technology/12ring.html?\\_r=2&oref=slogin&oref=login](http://www.nytimes.com/2006/06/12/technology/12ring.html?_r=2&oref=slogin&oref=login)

## **Multimedia**

### **Analysis: HDTV**

The massive installed base of different display technologies, from televisions to PC monitors, has to some extent stifled innovation and development in new broadcast standards capable of delivering improved quality. Television picture standards, such as PAL in the majority of Europe and NTSC in North America and Japan, have been around for over 40 years without major changes other than clarifications in support of digital television. The development of computer displays from simple text terminals to high-resolution graphic displays has progressed at a much faster pace as users demand larger pixel counts and more colour variations.

High Definition Television (HDTV) is the umbrella term used for a number of different broadcast standards that represent a step change of quality for television pictures. The delivery of HDTV services to viewers required a number of different elements to be in place at the same time:

- Agreed standards
- Volume production of compatible television sets
- Suitable high-bandwidth transmitters and receivers
- Programming to be produced in HDTV-ready formats

HDTV has existed for sometime but only now has sufficient volume of supporting services been available to make widespread adoption practical.

In a similar way to computer monitors, TV sets support one or more different display modes. The common Standard Definition TV (SDTV) set typically offers a small number of modes. HDTV sets offer more (covering both HDTV and SDTV) but still far fewer than many modern computer monitors. Worldwide, SDTV is dominated by two standards PAL and NTSC. These offer the equivalent of 576 and 480 vertical lines respectively; while HDTV is commonly defined as being over 720 lines. There are two common HDTV standards, 720p and 1080i. The number refers to the number of active horizontal lines that make up the picture and the "p" or "i" to whether pictures are displayed in a single pass (p for progressive) or as alternate lines (i for interlace). 1080p, generally considered to be superior to both these standards, has the higher line count of 1080i without the interlacing. Interlace based systems are less suitable for fast moving pictures as each frame takes two cycles to display. 1080p signals may be supported on Blu-ray next generation DVD systems but are currently too bandwidth and processor intensive for widespread deployment.

In Europe the key label used on compatible devices is "HD Ready" (<http://www.hdready.org.uk/>). This is a label created by the European Information, Communications and Consumer Electronics Technology Industry Associations (EICTA) for television sets that meet standards for a minimum of 720 lines in widescreen mode; can display both 720p and 1080i pictures; and support HDCP copy protection through DVI or HDMI inputs. Some sets that are advertised as HD compatible may be of a lower resolution and specification. PC monitors that are capable of displaying images at a resolution higher than 1280x720 are also technically capable of displaying HDTV images. In May 2006, the majority of sets on the market are not high enough resolution to display 1080i without down-sampling to a 720 line display. In a similar fashion, displays that have 1080 lines have to upscale 720 line signals to fully fill the screen. The graphics processors used to perform this operation need to be reasonably powerful and along with screen quality serve to differentiate between different manufacturers' sets. Traditional CRT sets and many older flat-screen televisions cannot display HD content. HD content is widescreen and supports high quality surround sound.

HDTV has moved away from analogue SCART and Composite Video connectors used by SDTV to digital connections. Commonly, connections are made using Digital Visual Interface (DVI) or High-Definition Multi-media Interface (HDMI). These are digital connectors that are designed to offer high quality signals and in the case of HDMI compatibility with copy protection systems. DVI is already found in many personal computers where it is used to connect to digital displays such as LCD monitors. HDMI and DVI have different physical connectors but carry compatible video signals. HDMI supports HDCP copy protection while not all DVI does.

High-Bandwidth Digital Content Protection (HDCP) is an Intel-developed solution to Digital Rights Management (DRM) that is licensed to third parties. HDCP forces connected devices to exchange identifying information so that non-authorized devices are prevented from displaying content. This is aimed at preventing content copying and piracy as, for example, a HD-enabled DVD player might only output direct to authorised TV sets and not to an intermediary VCR or other recording device. If an HDCP connection is not successfully made, the player might not display any image or could reduce the quality of the output. This two-way link and authorisation between the source and output display could require users to upgrade their displays to get the most from content. This includes computer monitors and both Microsoft and Apple users may be forced to upgrade to HDCP compatible displays and video cards to watch next generation DVD content on their PCs. Only a handful of computer monitors and video cards currently support HDCP but this is expected to increase with Microsoft

Windows Vista and Mac OS X 10.5 support. It is expected that Vista will include Digital Rights Management (DRM) that will prevent display of HD content without an HDCP-certified display device.

Makers of film and television programmes have been recording in formats that would benefit from HDTV viewing for some time which has created a library of content, which will be available, once broadcasters switch to the new format. High Definition Video (HDV) and HDCAM cameras are becoming more common with professionals and consumers, and traditional film is normally of a sufficiently high resolution to benefit from HDTV. A number of feature films, pioneered by George Lucas and Robert Rodriguez, have been shot on digital formats. There is wide variety in the range and performance of such cameras from MiniDV-based handheld units to much larger, more expensive units that capture direct to disk at higher bitrates. Over the next few years HD-resolution devices are expected to gain ground in the consumer market for camcorders and compatible home editing software is already available. Already a number of manufacturers offer HDV camcorders, but purchasers should check the actual capture specifications to see whether the device uses 1080p, 1080i or 720p.

HDTV in the UK has recently been launched by Sky (Digital Satellite) and Telewest (Digital Cable through its upgraded PVR receiver). UK broadcasters are currently using both 720p and 1080i signals. The BBC has promised to make all programmes using HDTV by 2010 and has launched a small scale trial of some programming. Freeview (digital terrestrial) television does not have enough bandwidth at the moment to support the requirements of HDTV, although a trial is currently taking place. This situation might be improved when the analogue terrestrial signal is switched off between 2008 and 2012. Digital satellite boxes capable of receiving free to air HDTV are also available. As more programming becomes available, perhaps supported by high profile events such as the football World Cup being shown in HDTV, then the premium attached to services and compatible TV sets will drop. Games consoles, both current and future, support HDTV output (depending on the title) and the next generation consoles are expected to be drivers for increased adoption of the standard and sets. The new DVD standards (HD-DVD and Blu-Ray) will also encourage the distribution of HD quality movies as they will have the extra storage space to support it.

IPTV and broadband are natural distribution mechanisms for HD content and are expected to be a major source of content for consumers in the future. The use of different standards (720p or 1080i) affects the amount of bandwidth taken up by the signal and broadcasters are expected to consider the quality of HD picture versus the bandwidth requirements as more content is distributed simultaneously. Digital TV is of course simply data that is distributed through a different medium and broadcasters will come under pressure to make best use of the bandwidth they have. For example they could choose to compress signals to a higher level which will reduce quality but allow more channels to be transmitted.

HDTV, along with other digital advances such as IPTV, is evidence of convergence of standards and services. HDTV offers a more detailed, higher quality picture than standard digital TV, but will be encoded and transmitted in the same way using standards such as MPEG-4 AVC/H.264. In the future HDTV will obviously become the standard for picture quality and delivery, though it is unlikely it will maintain dominance for the 40 years of the previous generation of standards – the pace of change is much faster now.

<http://www.bbc.co.uk/digital/tv/hdtv.shtml>

## **Multimedia news**

### **BPI allows personal copying of music**

The BPI, the UK record industry trade body, has said that consumers would not be pursued for copying music they legally own between different formats or devices. Speaking at a House of Commons Select Committee into New Media and Creative Industries, the BPI said that despite copying being technically illegal, "We believe that we now need to make a clear and public distinction

between copying for your own use and copying for dissemination to third parties and make it unequivocally clear to the consumer that if they copy their CDs for their own private use in order to move the music from format to format we will not pursue them.”

<http://www.bpi.co.uk/>

### **Display connectors**

Competing next-generation display connectors are heading towards agreed standards. The DisplayPort, developed by Video Electronics Standards Association (VESA) has recently reached a version 1.0 while the competing Unified Display Interface (UDI) is not expected to reach the same point until later this year. DisplayPort is a new standard, different from all existing connectors that has the advantage of including support for 10.8Gbps of bandwidth to cover both high definition audio and video. The UDI consortium is hoping for a higher degree of compatibility with HDMI, the consumer high definition TV standard connector. Both rivals incorporate some copy protection which in the case of UDI is the HDCP from Intel that is used in HDMI. DisplayPort supports DPCP (DisplayPort Content Protection) from Philips.

Industry is split over support for these standards. Intel, Apple, LG and Samsung are amongst those supporting UDI while Dell, HP and Lenovo are signed up to DisplayPort.

[http://www.reghardware.co.uk/2006/05/04/vesa\\_completes\\_displayport/](http://www.reghardware.co.uk/2006/05/04/vesa_completes_displayport/)

### **Windows Media Photo**

Microsoft has unveiled plans for a new compressed still image format. Windows Media Photo will sit alongside Windows Media Audio and Windows Media Video in the Microsoft application space. When demonstrated at WinHEC it was shown to be superior quality to JPEG and JPEG 2000 when compressed to the same size. JPEG has dominated the online compressed photo format market since the beginning of the internet. This has partly been due to the features of the format and partly due to widespread support from major players in the graphics and photo-editing market like Apple and Adobe. Despite any technical superiority it is unlikely that all vendors will be keen to support a proprietary format. <http://www.microsoft.com/whdc/xps/wmphoto.msp>

### **Next generation DVD update**

The next generation DVD format wars have seen the first product launches for the rival HD-DVD and Blu-Ray Disc formats. Both Toshiba and Sony have announced laptops with the new drives for summer 2006, a key market for the format. Fujitsu have demonstrated an interest in both camps by announcing a desktop PC fitted with Blu-Ray Disc and a laptop with HD-DVD. Panasonic have announced an internal Blu-Ray Disc writer but it is expected to be initially expensive.

[http://www.reghardware.co.uk/2006/04/21/panasonic\\_blu-ray\\_writer\\_launch/](http://www.reghardware.co.uk/2006/04/21/panasonic_blu-ray_writer_launch/)

<http://www.computerworld.com/hardwaretopics/storage/story/0,10801,110437,00.html?source=x10>

Microsoft has strengthened support for HD-DVD by talking more about an add-on drive for the Xbox 360 console and comparing Blu-Ray Disc to Betamax.

[http://www.reghardware.co.uk/2006/04/21/ms\\_xbox\\_360\\_goes\\_hd\\_dvd/](http://www.reghardware.co.uk/2006/04/21/ms_xbox_360_goes_hd_dvd/)

Analysts at ABI Research have forecast that HD-DVD will outsell Blu-Ray Disc by some 2.5 to 1 in 2006 but are keen to stress this is not necessarily indicative of long term market share. HD-DVD is widely expected to be the most popular format in the short term due to lower prices and being first to market.

<http://www.abiresearch.com/>

[http://www.dvd-intelligence.com/main\\_sections/news\\_archive/2003\\_free/44\\_hddvd\\_70percent.htm](http://www.dvd-intelligence.com/main_sections/news_archive/2003_free/44_hddvd_70percent.htm)

### **Holographic discs**

Blu-Ray Disc and HD-DVD offer significant increases in storage capacity over existing DVD technology, but already the next generation of removable storage technologies are under development. There are at least three rival proposals for holographic storage standards that would have a capacity of up to around 4TB per disc, some 160x the capacity of a Blu-Ray Disc and offer faster data access. 200GB+ capacity discs are expected to reach the market in late 2006 but these will be very expensive and only suitable for data-centre applications such as high capacity backups. International standards are also expected to be agreed on this timescale (see TechNews May 2005)

<http://www.hvd-alliance.org/>

### **HDTV, PVR and IPTV**

The football World Cup has driven forward interest and take-up of HDTV equipment and services to the extent that Sky has admitted problems with supply of compatible receiving equipment. Meanwhile both Telewest and Freeview are gearing up for the release of PVR (Personal Video Recorder) equipment that stores programming on hard disk for subsequent viewing. Freeview has been very successful since its introduction, recently overtaking the number of homes who have no Digital services; and is expected to do very well with this digital recording device as well as lay more groundwork for the switchover from analogue to digital television signals.

[http://www.theregister.co.uk/2006/05/26/freeview\\_playback\\_dvrs/](http://www.theregister.co.uk/2006/05/26/freeview_playback_dvrs/)

<http://news.bbc.co.uk/1/hi/entertainment/5003728.stm>

<http://www.avinfo.co.uk/index.php?main=story&id=17142768>

BT has announced its IPTV service, called BT Vision, which is expected in Autumn 2006. This service uses a combination of Freeview digital terrestrial television, a high-capacity PVR and subscription content that is downloaded to the PVR across a BT broadband link. The first major content coup for this service is access to Premiership football matches for 50 hours after 10pm on the day the match has been played.

<http://www.radioandtelly.co.uk/btvision.html>

[http://www.theregister.co.uk/2006/05/25/bt\\_football/](http://www.theregister.co.uk/2006/05/25/bt_football/)

### **BBC futures**

The BBC has put online a prototype version of its programme catalogue. This is a massive searchable database that stores information about TV and radio programmes to a level of detail that includes individual news stories. It is not currently complete, nor does it link to actual audio or video resources however it is still an interesting research tool. This database is likely to be incorporated in the BBC's archive publishing plans when it does make old programming available for download.

<http://open.bbc.co.uk/catalogue/infax>

The future of the BBC editorial content has been revamped through a new initiative called Creative Future. This includes the corporation's mission statement on how it plans to bring together TV, Radio and the internet to deliver coherent linked services to the different segments of viewers and technologies such as online and mobile delivery

[http://www.bbc.co.uk/pressoffice/pressreleases/stories/2006/04\\_april/25/creative.shtml](http://www.bbc.co.uk/pressoffice/pressreleases/stories/2006/04_april/25/creative.shtml)

The BBC has launched its Open Schools Archive. This site includes a large number of clips that are downloadable under the Creative Archive Licence. At present this is as part of a demonstration.

Material is available in many different formats and covers a number of topics along with advice on how clips might be creatively used by teachers and students.

<http://www.bbc.co.uk/schools/archive/>

### **Video Online**

The legal movie download service CinemaNow have announced a partnership with Disney to add to their existing major agreements. This service, similar to Apples iTunes, works by allowing users to download DRM-restricted content to their PC. The growth of this service demonstrates how IP-distribution is becoming more mainstream and important to all media producers though commentators have questioned the cost of some of these services. CinemaNow currently charges \$20 for new releases and \$10 for older titles which competes unfavourably with next-day delivery on discount DVD titles that can be viewed without restriction.

<http://www.cinemanow.com/>

<http://www.cdfreaks.com/news/13494>

Online video searching and publication is a massive growth area with services like blinkx.com, YouTube and Google Video attempting to make sense of the content being made available. The low cost of editing and filmmaking equipment has encouraged a generation to embrace digital video.

YouTube.com has only been going a year but is already seeing 35,000 new videos daily, which gives some sense of scale to the market. More recently the end user agreements for some of these services have come under scrutiny, as uploaded content becomes the property of the website.

<http://www.youtube.com/>

<http://tv.blinkx.com/>

<http://video.google.com/>

Becta ran an award for Creativity in Digital Media in education. Details of this are available online at: <http://www.becta.org.uk/corporate/display.cfm?section=21&id=2663>

### **Digital camera fingerprinting**

Forensic experts in Law Enforcement have for some years been able to tell what gun fired a bullet based on specific characteristics of wear and markings. Researchers in the US have applied this idea to digital cameras and discovered that every device seems to have its own unique characteristics that can be used to match images with the device used to create them.

It is hoped that this approach can be used to trace the origin of illegal pornographic and paedophilic images from the internet and help in prosecuting the creators of this material.

<http://www.sciencedaily.com/upi/index.php?feed=Science&article=UPI-1-20060418-20280800-bc-us-cameras.xml>

### **Two-way screens**

Apple Computers has patented a two-way screen that incorporates elements of a monitor and a camera. No actual commercial applications have been announced but this has not stopped speculation. Analysts have been debating possible applications such as motion tracking displays, video conferencing systems where you look straight at the screen and mirror/screen combinations. There are currently significant practical barriers in building units with sufficient sensing and display pixels. <http://www.macobserver.com/columns/devilsadvocate/2006/20060125lookingglass.shtml>

## **Hardware**

### **Analysis: PC form factors**

This article looks at the different physical types of PC that are currently available in the market place. The scope is restricted to personal computers that run a desktop or equivalent operating system and does not include either PDAs or servers.

The desktop PC has in many ways changed very little since the early days of personal computing. The most common form factor is a rectangular box with drive bays at the front and interface plugs at the rear. There have been cosmetic changes and there is variation on colour, size and finish but the physical dimensions are defined by drive sizes and the ATX motherboard inside. ATX is still the dominant configuration for a motherboard despite being ten years old. Minor changes common in many modern PCs include USB and audio connectors duplicated at the front of the unit. Other common types are SFF (small form factor) designs and Intel's BTX or equivalents, which rearrange the layout of motherboards and cases to improve cooling.

Variations on this common design have been driven by the penetration of the PC into the home. Leisure users have no desire to clutter up their living rooms and bedrooms with large, bulky, noisy units so a number of more specialist designs were developed.

Media PCs are designed to sit alongside DVD players, PVRs and other set-top boxes. As such they are slimline devices and more commonly black or silver than beige. Internally they use a variety of motherboards and are often restricted by limited expandability.

Normal PCs can be quite noisy because of the fans needed to cool the components and this has led to a rise in specialist silent computing devices. These often look like slimline desktop PCs but commonly use passive cooling technology like heat sinks and engineered airflow rather than active fans or pumps to dissipate heat.

Various other niche formats have become popular. "Box" cases, using small, often square motherboards have become popular with gamers because of their portability and compact footprint. These units do not blend in with existing home entertainment as well as set-top box style designs but do not look out of place next to a games console. Apple has explored this type of unit with its Cube and MacMini designs.

In 1998 Apple shook up the market with the introduction of the iMac. Units that integrate the display and processing unit were not new but the styling and competitive pricing relaunched the idea on the public. These units are more like laptops as they can be difficult to upgrade and have limited user-servicable parts, however for ease-of-use they score highly. Integrated units are often found in schools and environments where swapping out units is easier than trying to repair them in situ. The death of the CRT and rise of the flat-panel display has made these units even more attractive as the desktop footprint is decreased.

Researchers interested in wearable and specialist PCs such as for in-car systems have designed much more compact PCs such as the famous matchbox PC (<http://matchbox.stanford.edu/cebit.html>). Where these use standard external peripherals they are more like desktop than laptop units.

Standard desktop PCs are expected to change little over time. The size and arrangement of the motherboards will likely alter, and new connectors (such as DisplayPort and UDI) will become more common. However the arrangement of base unit, external monitor and input devices is unlikely to change for some time.

Laptop PCs began with heavy "luggable" computers that used a tiny CRT screen. The laptop or notebook computer market has now evolved into a number of different strands depending on an individual's needs. The largest laptops, now often widescreen, have been designed as full desktop replacements. They may include removable drives, large screens and a full range of connectors. User maintenance is however still limited. These units may be quite heavy and are designed more to be "carried from desk to desk" rather than being used on the move.

At the other end of the spectrum of portability are ultraportable laptops. These normally have fewer connectors and smaller screens – but are designed to be light and mobile at the cost of performance and increased financial outlay.

The major technology changes in laptops expected are in integration of next-generation DVD drives (HD-DVD and Blu-Ray Disc), new display technologies (such as OLED) and battery advances (such as fuel cells). None of these advances however are likely to significantly change the styles of laptop computer – rather just tweak the components and performance.

A major restriction on laptops at the moment is the performance of batteries. Traditionally this has been a barrier to widespread use especially when laptops require tethering to power supplies every few hours at best. Many manufacturers are developing fuel cell technology which is expected to begin to appear in devices in 2007 when it they will be legal for carriage on flights. Current fuel cells are large – similar to docking stations in size and weight – but sizes are expected to decrease as the technology matures.

The Tablet PC is a relatively recent variation on the laptop PC. The underlying principle is to use a touch-sensitive screen for user interaction rather than a keyboard and mouse. Tablets are either "slates" with no integrated keyboard or "convertibles" that can operate in laptop or slate modes. Tablet PCs have not achieved the market volume some commentators predicted even in target markets such as education, mainly due to cost premiums. They are still being developed however and Windows Vista will incorporate Tablet PC features as part of the core operating system rather than the current XP model of having a different edition for this purpose.

The latest compact computer version is the handtop PC. These are small devices, halfway between large PDAs and laptops, that contain full PC functionality. They have three main purposes – the first is to be a mobile device, similar to a laptop though obviously with a much smaller screen and a second possible use is to be a "portable desktop unit" that can be taken from location to location and connected to a full size monitor and peripherals. Finally some examples have a cut-down instant power-on mode to play media files.

Examples of these devices include the OQO Model 1+ and more recently devices from Sony. Intel and Microsoft have developed a similar UMPC (Ultra Mobile PC) platform with models from Samsung amongst others.

The Thin Client computing model, where processing powers is moved off the desktop to a centralised server has very limited desktop requirements. This means devices used need to be little more than a monitor and keyboard. Manufacturers use a range of different form factors from "bricks" to building the network electronics into a display unit. These are smaller, quieter and cooler than the equivalent full PC designs.

A twist on Thin Client computing is to build a rack of PC motherboards into a blade enclosure then use the network to deliver access. This has similar client device hardware requirements to Thin Client networks but each user still has their own dedicated PC "blade" rather than a session on a server.

The rise of specialist hardware, such as media centre, tablet and ultra portable PCs has needed to be accompanied by changes to the computer operating system in the Windows PC arena. Apple computers are more tightly controlled and do not have to respond to a range of third party innovation in the same way as Microsoft do. Linux developers are generally creative and responsive to new hardware.

Microsoft is changing the approach with the next OS – Windows Vista. This will include the elements of Windows XP Media Center Edition and Windows XP Tablet PC Edition so no special software will be required. This is likely to further encourage innovation and experimentation.

There is significant interest in using solid state memory (flash) as an alternative or addition to hard disk storage. This will improve performance and extend battery life and may have an impact on the form factor if adding flash memory is a user task. For example it may be common to have a number of external bays for flash cards as found in the Psion Netbook portable computer.

A current focus for processor design is its performance per watt and considerations of power efficiency are growing in importance. This could potentially result in a much more efficiently designed PC form factor. More and more powerful PC components, such as the latest graphics cards, require higher levels of cooling which is wasteful and requires additional fans. Better design could improve airflow and reduce the reliance on active cooling systems.

Both laptops and desktops are likely to include secondary displays. Many computers already include programmable status screens that sit in the front, side or top of the case. In Windows Vista, Microsoft has developed support for a small separate display which could for example be used to display emails and would therefore save users starting up a PC just to check. Smarter auxiliary devices will no doubt influence the way computers are built to some degree.

<http://code-magazine.com/Article.aspx?quickid=0512122>

Beyond this, the future is likely to include PCs that are more at home in the home than the office and look more like consumer electronics. They will need more connectivity (wired or wireless) to other devices as IP becomes ubiquitous. Mobile computers will continue to change and come in a growing range from small wearable computers to larger powerful laptops that will replace desktops even for the most power-hungry gamers. The human computer interface is also likely to see advances in machine vision, eye-tracking, gesture and voice recognition and haptics.

Ultimately the incentive of the market is to sell more boxes and keep momentum in the upgrade cycle, and that requires continual innovation and advances.

## Hardware news

### Becta 2006 Review

Becta has published the latest edition of its annual review looking at the state of ICT in schools and colleges. It paints a generally positive picture of a culture of improvement and change in institutions but does highlight some areas of concern for future attention.

It reports that while existing technologies are being successfully used with new ideas such as broadband, online learning and mobile computing; there are challenges. These include achieving eMaturity and involving all staff and senior managers; together with issues over replacing aging equipment and safely disposing of existing PCs at the end of their lifespan.

The report itself runs to over 70 pages and can be downloaded or ordered from the Becta website.

[http://becta.org.uk/corporate/publications/publications\\_detail.cfm?show=latest&orderby=title\\_asc&letter=ALL&pubid=330&cart=](http://becta.org.uk/corporate/publications/publications_detail.cfm?show=latest&orderby=title_asc&letter=ALL&pubid=330&cart=)

### **Intel update**

Intel has announced the final branding for its Next Generation Micro-architecture 65nm dual core processors that were previously codenamed Conroe and Merom. The Core 2 Duo brand will be found in both desktop (Conroe) and notebook (Merom) computers. This naming scheme (name-iteration-processor cores) is intended to be part of Intel's plan for clear, consistent information on products to its customers.

Further information in each model number will include information on the power consumption of the chips. The Core name is likely to replace Pentium by the end of the year. Pentium has been Intel's flagship brand for some 13 years.

<http://www.intel.com/pressroom/archive/releases/20060508corp.htm>

### **AMD update**

AMD has announced new processors and has highlighted their green credentials with gains of 37% and 154% on performance per watt. More efficient chips mean that they can be run at lower temperatures and reducing the need for noisy cooling. Fanless units, currently premium products, are seen as essential if PCs are to move from studies and bedrooms into living rooms.

<http://www.vnunet.com/vnunet/news/2156298/amd-picks-speed-low-power-chip>

Another initiative being explored by AMD engineers is anti-HyperThreading. Current thinking with hardware designers is that multiple chips, or multiple cores on a single chip, offer high levels of performance for the cost. While this is true, most software is unable to exploit such facilities. AMD's proposed solution is to virtualise multiple processors to appear as one. This is an interesting reverse of other developments that try and get a single processor to run multiple simultaneous processes. This idea is far from manufacturing reality, but could be an interesting approach that would allow software developers to concentrate on the traditional single-processor model while abstraction and performance gains occur in hardware.

<http://www.techworld.com/opsys/news/index.cfm?newsID=5828&pagtype=samechan>

AMD are also planning quad-core processors for 2007 for both desktop computers and servers to significantly increase the performance of their products. The processor manufacturer is also moving its desktop product lines to a new processor interface known as AM2. This is expected to increase performance and be compatible with the latest DDR2 memory. AMD's new laptop chip, the Turion 64, is its first 64-bit chip for mobile applications.

<http://www.techspot.com/news/21675-amds-new-am2-motherboard-chipset.html>

[http://www.cbronline.com/article\\_news.asp?guid=5C043E9C-044F-4BA0-8BA0-F37800DE7DB1](http://www.cbronline.com/article_news.asp?guid=5C043E9C-044F-4BA0-8BA0-F37800DE7DB1)

[http://www.amd.com/us-en/Processors/ProductInformation/0,,30\\_118\\_13909\\_13911,00.html](http://www.amd.com/us-en/Processors/ProductInformation/0,,30_118_13909_13911,00.html)

### **New Ultra Mobile PCs**

The Ultra Mobile PC (UMPC) has caught the imagination of a number of hardware manufacturers after a teaser campaign for Origami around the time of CeBIT 2006. These small portable devices run Windows XP Tablet edition and are designed to be fully functional devices in a compact form factor. Manufacturers are now launching models using Flash memory instead of hard disks. Flash drive-based portable PCs are expected to become more common as they have a number of advantages including performance gains and lower power consumption than hard disks (around 95% less). These drives preserve their contents without power and do not have any moving parts. Samsung has announced such a device for launch in Korea in June. Samsung is also introducing Flash based laptops, but despite falling prices, hard disks still offer better value. Hybrid drives, designed to work with new memory management capabilities in Windows Vista, combine Flash and traditional hard disks to boost performance and battery life at a more reasonable price.

[http://www.reghardware.co.uk/2006/05/23/samsung\\_to\\_ship\\_flash\\_pcs/](http://www.reghardware.co.uk/2006/05/23/samsung_to_ship_flash_pcs/)

Sony has launched two versions of a UMPC-like device, the UX50. The first version uses a standard hard disk drive for storage while the other drives innovation forward by using a 16GB Flash card. This Flash drive has half the weight of the hard drive and has faster read (3x) and write (1.5x) speeds.  
[http://www.newlaunches.com/archives/sony\\_ux50\\_umpc\\_with\\_16gb\\_of\\_flash\\_memory.php](http://www.newlaunches.com/archives/sony_ux50_umpc_with_16gb_of_flash_memory.php)

### **Battery recycling laws**

The European Union has agreed the text of a proposed new law that will mandate battery recycling. At the moment only six EU countries recycle batteries and in the others dangerous chemicals are left for landfill. This directive sets out a number of requirements such as specific collection points, shops based returns of dead batteries and that all batteries are to be removable to make recycling easier. The cost of recycling is expected to be borne by the battery industry and all manufacturers will need to become registered. This cost may, of course, be passed onto consumers through higher retail prices. The regulations are expected to come into law across the EU states in the next two years.  
<http://news.bbc.co.uk/1/hi/world/europe/4969544.stm>

### **Microsoft Windows Vista hardware requirements**

As the Microsoft Windows Vista beta test continues, Microsoft has released guidance on the hardware requirements to run the operating system when it is released next year. The specifications have been published with reference to a logo accreditation scheme that uses "Windows Vista Capable PC" to demonstrate basic compatibility and an enhanced "Windows Vista Premium Ready" that includes compatibility with the more demanding Aero user interface.

<http://www.microsoft.com/technet/windowsvista/evaluate/hardware/vistarpc.aspx>

To help system managers plan ahead Microsoft have also released a tool that may be downloaded and executed on specific machines to test their compatibility.

<http://www.microsoft.com/windowsvista/getready/upgradeadvisor/default.aspx>

The online tool also helps users identify which edition of Vista is most appropriate. Microsoft is making a number of editions available designed to differentiate the needs of customers ranging from a basic home user to small and large businesses.

<http://www.microsoft.com/windowsvista/getready/editions/default.aspx>

### **PDA sales slip**

Research firm IDC has published a report on PDA sales that claims quarter of 2006 totalled 1.5m, a drop of 22.3 per cent since the equivalent period in 2005. Analysts at IDC note that the PDA market has now had nine consecutive quarters of falling sales (based on the previous year) and speculate on whether the market will reverse. Figures from different research companies in the area of PDAs are often not comparable as their terminology varies. IDC for example exclude any device that has telephony functions while some other research companies include these. IDC do include devices that include wireless capabilities that enable internet access and text communication. This is likely to impact significantly on figures as smartphones that include PDA features, are a significant market growth area.

[http://www.reghardware.co.uk/2006/04/28/handheld\\_sales\\_plummet/](http://www.reghardware.co.uk/2006/04/28/handheld_sales_plummet/)

### **Low cost laptops**

The proposed \$100 One Laptop Per Child suggested by MIT luminary Nicholas Negroponte caused quite a stir in the developed as well as developing world when it was announced. It remains some way from production. Some pictures of the laptop mock-ups and prototypes are available online using the Flickr photo-sharing service.

<http://laptop.media.mit.edu/laptopnews.nsf/latest/news?opendocument=>

<http://www.flickr.com/photos/pete/152018285/>

Hardware giant Intel has announced its own scheme aimed at delivering a sub-\$400 fully specified Wintel laptop combined with training and wireless access for 10 million educators worldwide. Training and support have been identified as key to adoption of ICT and maximising the benefit.

[http://www.ipdemocracy.com/archives/001492intel\\_aims\\_to\\_narrow\\_digital\\_divide.php](http://www.ipdemocracy.com/archives/001492intel_aims_to_narrow_digital_divide.php)

### **Flexible PC-ownership plans**

Low cost models for PC ownership are seen both as agents for social change and also a way of avoiding revenue loss through software piracy. Microsoft, perhaps the largest victim of widespread piracy in the developing world, is backing a series of initiatives aimed at increasing legal PC ownership through flexible payment schemes. Microsoft has launched the scheme called FlexGo that proposes two models. The first is subscription computing where users pay a regular monthly amount towards the ownership of the PC. This model looks similar to traditional financing but is billed through a telco or similar subscription rather than an arrangement with a finance house. The second model is "pay as you go". This allows users to buy hours of use in advance. Both these models end with the user gaining outright ownership of the device.

<http://www.microsoft.com/whdc/flexgo/default.mspx>

### **European Information Society - first report**

The European Union has presented its first report on a European Information Society initiative designed to encourage growth and jobs in the digital economy. The initiative has sought to address barriers in areas such as regulation across Europe.

The first report is cautiously optimistic about success for the initiative but stresses that the pace of development in encouraging access to broadband and removing regulations has been too slow and needs to be increased. The report calls for convergence of laws across the EU.

Much more detail is available on the i2010 website.

[http://europa.eu.int/information\\_society/eeurope/i2010/index\\_en.htm](http://europa.eu.int/information_society/eeurope/i2010/index_en.htm)

### **Software and internet**

#### **Analysis: Search**

Use of the World Wide Web can broadly be categorised into one of three types – popular sites that users visit time after time; specific addresses the user has been given or noticed through advertising/social networks and sites discovered through the use of search engines. Put simply, search engines and web directories allow users to find content, goods or services online based on either keywords or partial information such as part of a company's name and location. Web directories work through listing and organising sites in categories through moderation.

Search engines share a simple principle – pages on the World Wide Web are scanned, analysed then information on the page and its content is stored in a database. Users of the search engine then query this database and are presented with a list of web pages that hopefully meet the requirements of the searcher.

All search engines use automated web crawlers to categorize sites, but vary in both the algorithms used to identify the "right" result and tools that allow users to query the database. Search engines are now serious commercial and political tools as for many people they act as gatekeeper to the massive amount of information on the internet. This article will look at how search engines have evolved, what tools are available to users, why searching is big business and how education can best exploit these technologies.

The primary focus on the development of search engines has been about letting users find the right results. Early approaches were based on simple concepts such as counting the instances of particular terms but Google led the emergence of new ideas like weighting the number of pages that refer to the target. It is common for companies to tweak their algorithms on a monthly basis but significant changes are less common.

<http://www.pandia.com/sew/112-on-the-google-jagger-algo-update-part-1.html>

There are broadly two tiers of search site. Some sites actually implement their own search algorithms based on self-owned databases while others contract out the actual search process to one of the major providers. Microsoft have recently developed their own search engine to replace a contract with Yahoo and Yahoo themselves were powered by Google technology for some time. Google dominate the market currently, but are experiencing competition.

<http://www.searchengineguide.com/laycock/003261.html>

As with all products, the competitors for the same space have sought to differentiate their offerings. This is an area where larger companies have been able to lever a portfolio of products – for example the Microsoft search will pull definitions from its Encarta encyclopaedia product and embed the search into the MSN Messenger instant messenger software.

Most search engines and software use proprietary technology, but there are open source search engines (such as ASPSeek - <http://www.aspseek.org/> and ht://Dig - <http://www.htdig.org/>) and moves to establish common standards for search results. OpenSearch (<http://opensearch.a9.com/>) sets a standard for returning search results. This allows single interface searching of multiple sources and aggregated result presentation. This standard, not currently supported by Google, will be found in Microsoft's next Internet Explorer browser.

Public searching is funded by paid adverts and placements, but companies also license software and hardware for companies to run their own internal searches. These might be software that runs on any hardware or search appliances. Organisations then use this technology to build their own databases and delivery results direct to their own customers. There is a cost in migration as any databases created are unlikely to be transferable.

<http://www.google.com/enterprise/gsa/>

Search engine companies are also keen to embed their searches in software, focussing on the operating system through desktop extensions and world wide web browsers such as Microsoft Internet Explorer and Mozilla Firefox. Web browser software is often supplemented with downloaded toolbars that offer users searching, pop-up blocking, links to other software and even functions such as spellchecking on forms.

<http://toolbar.live.com/>

<http://toolbar.google.com/>

Searching is more accurate when it is grounded in some kind of context. There is great interest in achieving better results for users through personalisation and "learning". Google for example offers a personalised search that links previous searches with current parameters to try and "guess" more accurately the type of result desired. This is an example of "added value" intelligence that suits both the user and the company as adverts can also be more accurately targeted.

Personalisation can be combined with predictive searching that can analyse the current page and base future results on the context or by suggesting additional terms for more accuracy.

<http://www.google.com/psearch>

In addition to these free public online tools and services there has been a growth in desktop searching. These tools aim to replace the built-in search functions of operating systems such as Windows XP. In a similar fashion to the online searching, this software builds a database of files on a personal computer and then offers fast access and flexible searches that cover Office-style documents as well as email stores. Products in this market come from the expected Google, Microsoft and Yahoo but also less well known names like Copernic. Indeed the divide between online and offline searching is blurring and may disappear in future operating systems and search tools.

<http://www.pandia.com/resources/desktop.html>

Microsoft Windows Vista and the Mozilla Thunderbird email application are two examples of software where search or virtual folders are used to implement behind the scenes, passive searching. The function of these folders is to look like normal file system or email folders, but rather than containing actual data they show the results of a search. For example a "My Music" virtual folder could give access to all the music media files on a computer; and an "Unread Messages" search folder could show all the unread email messages stored in a mailbox and its subfolders. This flexibility redefines traditional on-demand searching by working passively to bring results together. This gives users much quicker access to results.

[http://www.computerperformance.co.uk/vista/vista\\_virtual.htm](http://www.computerperformance.co.uk/vista/vista_virtual.htm)

Next generation desktop searching will be based on improvements to the way data is stored on disk. Microsoft's WinFS filing system plans to change the way data is stored on disk, moving from a hierarchical filing approach to one based on an indexed database. This should improve the speed and performance of searching but will reduce the cross-platform compatibility of disks that use the system. WinFS is still in development although a Beta version has been released a final version is not expected until late 2007.

<http://blogs.msdn.com/winfs/>

There are continual improvements in text searching, but there is increasing interest in video and multimedia indexing and searching. The challenge with any kind of multimedia is to search inside the content rather than just the filename and metadata. This is accomplished through a combination of automatic speech-to-text processing and closed-captioning capture. The current tools are rapidly maturing. High performance multimedia search engines are likely to become increasingly important for finding resources in the future, especially as production of multimedia becomes much easier.

<http://www.blinkx.tv/>

<http://www.tvgenius.net/>

<http://video.google.com/>

Another specialist search sector being targeted by Microsoft and Google along with other specialist directories is academic searching. These searches, rather than search the entire World Wide Web, use specific databases of academic journals and peer reviewed articles. This highlights a particular market and how searching is likely to become more tailored to market segments.

<http://scholar.google.com/>

<http://academic.live.com/>

Both Google, Yahoo and Microsoft have announced projects to digitise books and make them searchable. These specific services are designed to help users discover new books that meet their interests. This has caused some controversy when copyrighted materials are included. Google faced a negative reaction due to their inclusion of copyrighted materials while Yahoo and Microsoft have instead decided to partner with the non-copyright Open Content Alliance.

<http://www.vnunet.com/vnunet/news/2143051/yahoo-kicks-book-digitisation>

<http://books.google.com/>

The aim of searching is to give users access to content, whether on their PC or online. In some cases this becomes a hot political issue. Microsoft, Yahoo and Google are all firms that have been widely criticised for restricting or censoring search results in China. All three firms have admitted that their localised versions of search engines have had certain categories of sites, including political sites, removed from their search databases. This has angered pro-democracy activists and groups that are affected by the ban, but the companies argue that this has been the only pragmatic solution to demands of the Chinese government. Despite their high market share in the western world, in China the search market leaders are local companies.

In Europe the search engine market is seen as dominated by US companies and English language resources. The French government has promoted a new European multimedia search engine called Quaero. Commentators have questioned the ability of this project to compete against the massive resources of Google and Microsoft but it does demonstrate the perceived importance of the search engine in defining culture.

<http://www.telegraph.co.uk/money/main.jhtml?xml=/money/2005/08/31/cnsearch31.xml>

Developments have also been undertaken in result presentation. Google has perhaps been most successful in using its Google Maps and Google Earth products to link search results to graphical, in this case map, representation. Meta-search engines such as KartOO attempt to revolutionise the way search results are presented and seek to represent links between sites graphically. As products seek to differentiate themselves, innovations like this are likely to become more widespread.

<http://www.kartoo.com/>

<http://maps.google.co.uk/>

<http://earth.google.com/>

Web 2.0 applications have not been slow in harnessing and providing alternative interfaces to searching. Frappr encourages people to consider arranging information spatially rather than just as text. This application links information to places so adding a search dimension. Digg works on a process of peer review, where articles and information are added to the service and the number of recommendations by real users raises the value of the result. These services are similar to user tagging (creating a folksonomy – rather than a formal, set taxonomy) found in sites such as Flickr where users upload their own photos, tag them as they wish, then can search the site for other people's images. This approach which sounds anarchic does tend to settle and certain tags emerge as a defacto taxonomy over time.

<http://www.frappr.com/>

<http://www.digg.com/>

<http://www.flickr.com/>

The search engine is being increasingly seen as one part of an online portal rather than a discrete function in itself. In the future it is likely is that online services will become more important than a computer's operating system and whether users access the internet through a Microsoft PC, a Mozilla browser, a phone or internet kiosk they will use a portal to manage their information discovery (search engine), information sharing (eg email) and information application (eg word processor).

To this end Microsoft is developing integrated portal services like Windows Live, Yahoo has introduced more personalisation to its site and Google has launched an online spreadsheet service and continued to acquire online service providers such as the Writely word processor.

<http://www.live.com/>

<http://www.writely.com/>

<http://uk.yahoo.com/preview>

In UK Education there are two broad approaches to searching for the purpose of resource discovery. It is widely accepted that resources with appropriate and complete metadata are the easiest and most effective to search. However, metatagging of resources is expensive and complicated to deliver on any kind of scale and is seen as a barrier to teachers uploading their own resources to repositories. This has led to two parallel types of service. Metadata based resource discovery has proponents and some important online applications such as Curriculum Online. Some RBCs and Local Authorities take a different view and have implemented more traditional search approaches. Birmingham Grid for Learning uses a Google application server to index its site and East Midlands Broadband Consortium (EMBC) is leading a cross-RBC pilot using a nationally hosted Google service to index sites connected to the National Education Network (NEN).

<http://www.curriculumonline.gov.uk/>

<http://www.embc.org.uk/>

Search engines are massively important in influencing how users find and access content on the World Wide Web. They are big business for countries as well as companies and a change in search ranking can seriously impact on a company's success or failure. Modern search engines and operating systems are being refined and extended to the extent that the boundaries between desktop and online content are blurring. Education users in the UK have, to date, been caught in a middle ground between relatively small, well arranged and described content stores; and large public database of undifferentiated and non-quality controlled content. The only constants in this area are that the three major players (Google, Microsoft and Yahoo!) will continue to fight for dominance and bring new features to end users at little or no cost.

## **Software and internet news**

### **Free ebooks**

Project Gutenberg and the World eBook Library Consortia have organised an online Book Fair which will run from July 4th to August 4th 2006. This online event is designed to encourage people to look at eBooks and will offer some 300,000 books for free download during this period. Project Gutenberg contains 18000 free books from a number of authors and in different languages for download. The

World eBook Library Consortia normally charges an annual fee for access to its content. eBooks can be downloaded and viewed on a range of devices ranging from the personal computer to PDAs and mobile phones. They use different formats from plain ASCII text to binary formats that include DRM and graphics. This event is hoped to raise the profile of eBooks and stimulate the market and demand.

<http://www.worldbookfair.com/>

<http://worldlibrary.net/>

<http://www.gutenberg.org/>

### **Office file formats**

The OASIS Open Document Format for Office Applications (ODF) has had a draft approved as ISO/IEC 26300. This approval from an international standards body should further promote the approach of using open standards so organisations prevent being locked in to a particular vendor's product and encourage wider vendor support. The ODF is supported by a growing number of companies and products. A current list is maintained at

<http://opendocumentfellowship.org/Applications/HomePage>. <http://www.oasis-open.org/news/oasis-news-2006-05-08.php>

Microsoft has submitted its Office Open XML (Extensible Markup Language) document format technology to Ecma International, the standards organisation. This format will form the basis of Office 12 files and Microsoft hopes that it will eventually be ratified as a formal international standard with a degree of openness that will encourage compatibility with other software.

<http://www.microsoft.com/presspass/press/2005/nov05/11-21EcmaPR.msp>

### **Online testing moves forward**

The first online exams in Scotland have taken place with over a hundred students at ten centres taking part. Pilots in previous years have led to this real-life implementation which involves secure links being used between centres and then Scottish Qualifications Authority.

<http://www.computeractive.co.uk/computeractive/news/2155217/scotland-first-online-exams>

In England KS3 tests in ICT will be delivered onscreen from 2008 though pilots have been running since 2004 to investigate the challenges of varied school networks. QCA has contracted with RM to provide the software and secure reporting.

<http://www.qca.org.uk/7280.html>

<http://www.rm.com/qca/default.asp>

It is expected that onscreen testing will increase in popularity over time to decrease the burden on markers, adapt to the needs of students and encourage a more efficient marking and results process.

### **Analysts expect further Vista delay**

Analysts at Gartner have suggested that Microsoft Windows Vista, the next generation of the Windows operating system, might not actually be delivered until the second quarter of 2007. The official launch date is currently January 2007. By judging the amount of change to the core system and comparing the timetable of this operating system to previous releases Gartner suggest that the significant changes will take some time to be debugged.

Windows XP took only 5 months to go from Beta 2 to final release but was seen as a "light touch" release rather than a major rewrite. In contrast Windows 2000 took 16 months for the same part of the development lifecycle. The Vista Beta 2 was released at Microsoft WinHEC conference in May 2006.

<http://www.internetnews.com/dev-news/article.php/3603626>

### **OSS update**

Linux is widely considered to be an effective operating system for servers but has yet to make significant inroads into the desktop computer market, where Windows remains the dominant choice. Some analysts suggest that lack of compatibility across the different systems and the lack of a dominant desktop standard confuse users. The Free Standards Group hopes to define standards across different open source software and has announced the Linux Standard Base (LSB) 3.1. This is the latest version of a standard that allows application developers to deliver software that will install on a range of systems. New to this release is support for portable Linux desktop applications.

<http://www.freestandards.org/>

### **Child protection online**

The UK government has launched CEOP – the Child Exploitation and Online Protection centre. This unit, affiliated to the Serious Organised Crime Agency (SOCA), is designed to bring together various agencies to improve the prevention and detection of child sex abuse. The centre intends to work with charities, local authorities and local police forces to make the internet a safer place for children.

More information on the work of the unit is available online at

[http://www.ceop.gov.uk/what\\_we\\_do.asp](http://www.ceop.gov.uk/what_we_do.asp)

### **Virtualisation update**

One of the themes of Microsoft's recent WinHEC forward-looking conference was virtualisation and hypervisors. These technologies are focussed around delivering multiple instances of operating systems on the same physical hardware (see TechNews May 2006)

<http://www.microsoft.com/whdc/winhec/default.mspx>

There are a number of different approaches to virtualisation that broadly differ on how virtual machines interact with the actual hardware. True virtualisation, where the host operating system and software give virtual machines access only to generic emulated components, often suffer from a performance hit. There has been a great deal of interest recently in hybrid systems, such as the open source Xen, that use a slightly modified version of the operating system on the virtual machines. This is to work around some of the problems virtualising x86 architecture that still exist even though AMD and Intel are designing chips with this in mind.

<http://www.cl.cam.ac.uk/Research/SRG/netos/xen/>

### **UK regional digital habits**

A recent Ofcom survey has investigated the differences between use of the internet and telecommunications services across the regions of the UK. The survey highlights a number of variables as important in the take up of digital services including socio-economic, rural/urban age, location and attitude, but also finds wide regional variations.

Take-up of digital TV stood at 65% at the end of Q3 2005 but was highest in Wales and lowest in Northern Ireland. As of June 2006 this had risen further to 72.5%. This interesting insight into the different media services across the country can be downloaded from the internet at:

[http://www.ofcom.org.uk/research/cm/nations/nations\\_regions/nations\\_regions.pdf](http://www.ofcom.org.uk/research/cm/nations/nations_regions/nations_regions.pdf)

### **Internet security flaws**

The internet system of name servers (DNS) has created a complicated hierarchy where an individual address (such as [www.becta.org.uk](http://www.becta.org.uk)) might be relying on a number of servers outside of that organisation's control to translate between the name and an IP address. Researchers in the US have investigated a sample of 593160 websites and looked at how they are served. Problems occur because a single weak point in the chain, such as a server running a version of the software that has known security holes, can compromise every server below it. For example researchers discovered that a computer two levels above the fbi.gov server was vulnerable and attacks on this could redirect or disrupt access to the FBI's servers relatively trivially.

The article highlights the importance of DNS and makes interesting reading for those interested in how the internet is constructed and managed.

<http://www.cs.cornell.edu/people/egs/beeive/dnssurvey.html>

### **Census data online**

Online genealogists can have access to new data with the announcement that the company [www.ancestry.co.uk](http://www.ancestry.co.uk) and the National Archive have collaborated to make the 1841 census available online. This means that dates from 1901 to 1841 are now available.

<http://www.nationalarchives.gov.uk/census/>

Researchers in Scotland have also recently gained access to their 1841 census.

<http://www.scotlandspople.gov.uk/>

The National Archives have also begun preparing for the publication of the 1911 census which will be released in 2012 under the 100 year rule that preserves personal information for 100 years after it has been collected.

<http://www.nationalarchives.gov.uk/news/stories/110.htm>

Genealogy is one of the most popular hobbies on the internet and is an excellent demonstrator of online, remote access to searchable databases. Census data from 1901 launched in 2002 crashed the servers of the Public Record Office and caused some embarrassment.

<http://news.bbc.co.uk/1/hi/uk/2136572.stm>

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