Ultra Mobile Computing

Buyers Guide 2008
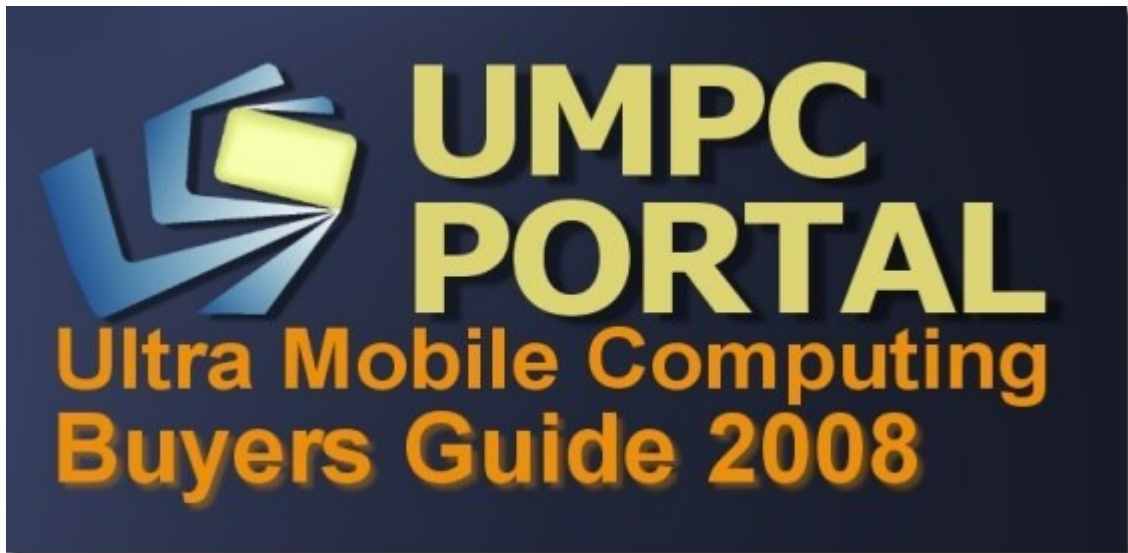
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Table of Contents

Foreword

Ultra Mobile computing is starting to come-of-age and the reason is that the technology and design is catching up, not with laptops, but with the way people *use* their laptops. The processing power wars finished a few years ago and its now about design, usability and at last, the 'personal' in personal computing. Mobile computing is true to that 'personal' computing aim.

It was almost exactly three years ago when I started analysing the segment to see if I could find a device that satisfied my needs and as I went along I wrote notes on pieces of paper and stuck them on my office divider. Moving these notes into electronic format was the natural thing to do and the result was a blog that within 1 year, grew into a reference portal and attracted so many viewers that I was able to leave my job and focus on it full time. Its amazing to think that there were maybe 6 devices in the segment then and now there are well over 200 in number of sub segments. Its amazing to think that companies are investing billions and that the segment offers Linux distributors the best chance they've ever had to reach the end user. The most amazing thing though is that it's just starting. In the next 5 years we'll see some amazing developments as PCs come down to meet smartphones but this document focuses on today. There are some great solutions out there and hopefully this document gives you enough guidance and information to allow you to make your decision.

I hope you enjoy it and find it useful.

Introduction

This document is split into a number of sections. In the first part of the report we give you a history of Ultra Mobile computing, show you how the devices break down into segments and show you what each segment is capable of.

The second section goes into detail about all aspects of an Ultra Mobile Computer. From form factor through to details about the choices of CPU and graphics. Keyboard, screens, battery and weight are also covered in detail.

In the last third section we cover some of the less commonly found features on Ultra Mobile computers and finally, in the last section you'll find a detailed overview of the resources available on UMPCPortal including the up-to-date database, the RSS feeds and the forums. We also give you a list of external websites to check-out.

What is Ultra Mobile Computing?

A Short History of Ultra Mobile Computing

Mobile computing is not new. For many years there have been small and portable personal computers. Early portable computers in the late 70's and early 80's were big, clumsy and expensive but during the 90's, as technology advanced, the notebook or 'laptop' computer became a very successful mobile form factor. During the time that notebooks were becoming successful though, there were many attempts to make computers truly portable by shrinking them to handheld and pocketable sizes. Early attempts were nothing much more than programmable calculators but by the early 90's these had evolved into personal organisers with loadable software, touch screens and pocketable sizes. The Apple Newton and Psion Organisers were early, popular examples. During this period, Microsoft also started one of its first handheld computing projects, the 'Winpad' project. Various iterations of similar project during the mid 90's resulted in what is now known as the PocketPC platform which is now the basis of most Windows-Mobile smartphones.

While these projects and products were successful handheld computing devices and platforms, the branch of computing we are concerned with here, UMPCs, is a sub category of the PC; the x86-based platform that nearly all desk, office and notebook PCs are built on. Simply put, Ultra Mobile PC's are notebook computers in extremely small, handheld proportions while still offering elements of productivity, connectivity and entertainment. Its all about computing on-the-move rather than between home and office desks. Toshiba were the first to make a successful product in this category in 1996 when they released the Libretto. Since then, the genre has been developing.

In 2006, the available technology allowed for the first time, ultra-mobile computers to be built running off-the-shelf PC components with desktop operating system and a flexible applications suite at a consumer level cost. Microsoft had been running a project called 'Origami' which had been looking again into alternative form factors, input methods and marketing to consumers. When the team announced the project, and the results of the project, at CeBIT in March 2006, the market received a healthy boost as OEM's started to produce devices in line with the Microsoft Origami concept. Either because of bad marketing, bad design, or bad timing, the Origami devices never reached mass market acceptance and remained, as had previous mobile PC's, in the geek, pro-mobile and business markets. The lack of battery technology advances, poor transfer of the desktop interface to touch and keyboard-driven interfaces and the introduction of a new, much more heavyweight operating system in Windows Vista have also prevented OEM's from producing successful, low-cost alternatives

The concept, however, of a mobile computer has not gone away. During 2006 and 2007 Intel were developing high-efficiency processors capable of meeting design and user requirements head-on. At the

same time VIA had been marketing their existing low-cost, low-power computing platforms that could enable OEM's to make small computing devices and eventually, in 2007, Intel and Asustek managed to create a mini storm in the mobile computer market. First, Intel announced their dedicated silicon developments. Menlow was the platform name and it was targeted squarely at the mobile consumer and slated for launch in 2008. Later in the year (2007) Asustek took a risk and decided to launch a simple, small notebook using the same components as the Origami devices that came before it. For the first time a mobile version of a familiar mobile device came with an extremely low price. The success has surprised many and today, there are many tens of similar devices all within the 900gm to 1500gm range, all with consumer-focused pricing.

Today, in 2008, we are left with 3 main categories of ultra mobile computer.

Today's Mobile Computing Categories

1 - The **Pro-Mobile** focused device based loosely on Microsoft's original Origami specifications and often called a 'UMPC.' has business-targeted builds, full operating systems, 6-7" screens, pro-mobile features and pro level pricing. Mostly modular, slate or slider devices in the 300-800gm range using leading-edge technology.

2 - The mobile notebook. Notebook-style devices targeted at 1) the low-cost consumer, education and developing countries. Known as **Netbooks**. 2) The mobile productivity market.

3 - The **Mobile Internet Device** (MID). The device category defined by Intel as consumer focused, handheld, low cost and capable of full Internet, navigation and entertainment usage models. These devices are largely Linux-based. Other OEMs including Microsoft, ARM and Qualcomm are also starting to use this term but it appears to be converging on the consumer usage model with some targeting at the high-end smartphone market.

There is no strict definition of these terms and you will find them used for all three of those product categories. Even Smartphones are starting to move into the mobile Internet device territory now as technology and software advances and the term 'UMPC (Ultra Mobile Personal Computer) is often used as a synonym for the pro-mobile and Origami devices. The following diagram shows the common terms in use in four product categories.
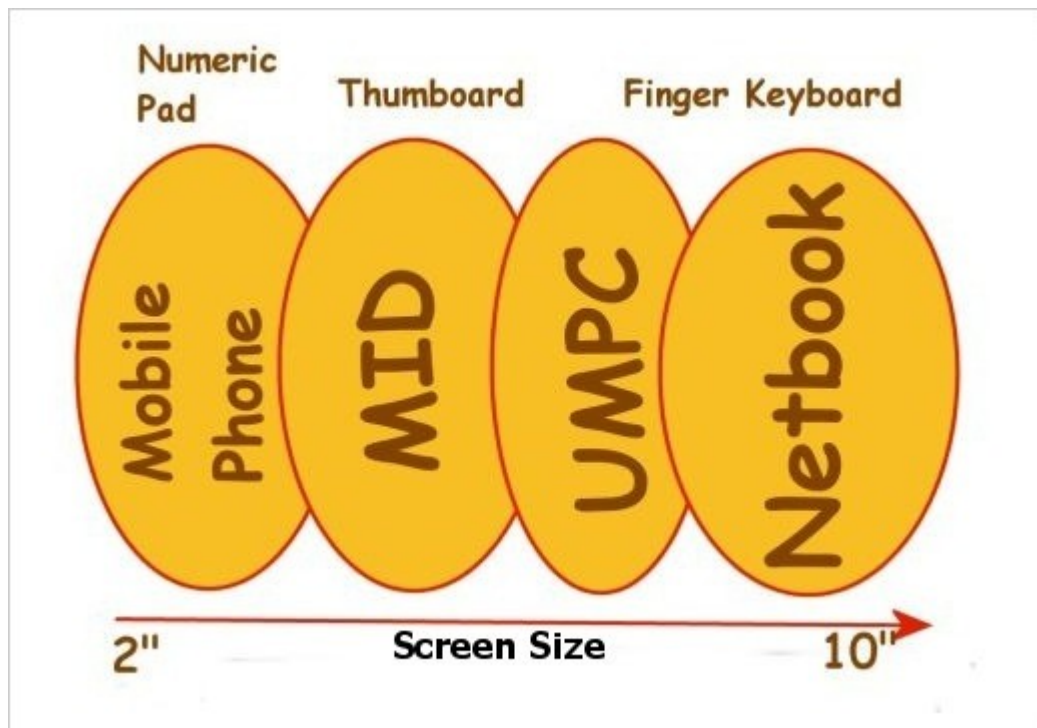
Common categories for various mobile computing devices.

Here's our definition of an Ultra Mobile Computer from 2006.

> *A highly portable hand-held computing device with 4-10" screen, wired and wireless connectivity that is able to load and run common Internet, office, media and information applications operated through a graphical user interface.*

As you can see, the three common categories of MID, pro-mobile/UMPC and netbook defined above, fit into this, definition. This report continues with that 3-category definition but takes into account the emerging high-end smartphone market where some devices are using high-end screens and high-end processors.

Mobile computing Device capabilities

The following diagram (click to download a PDF version) summarises the four main categories of mobile computing device shown in the above diagram and shows the capabilities of devices in the categories. The diagram was created in 2006 and so the label names have changed (at that point we were calling the 4-5" segment a 'Pocket PC' and the 6-7" segment a 'Carrypad' but the content remains valid.) Of course, a few devices don't fit well into these categories but for the purposes of understanding requirements, and understanding the different types of mobile devices, this is a good starting point. More details on UMPC market segments and definitions in the diagram can be found in the 2006 report here. We don't expect this diagram to change for the next 3-5 years until foldable/rollable screens become mass market.

Lowest device categories for portable functions.

Feb 2006. V1.1.
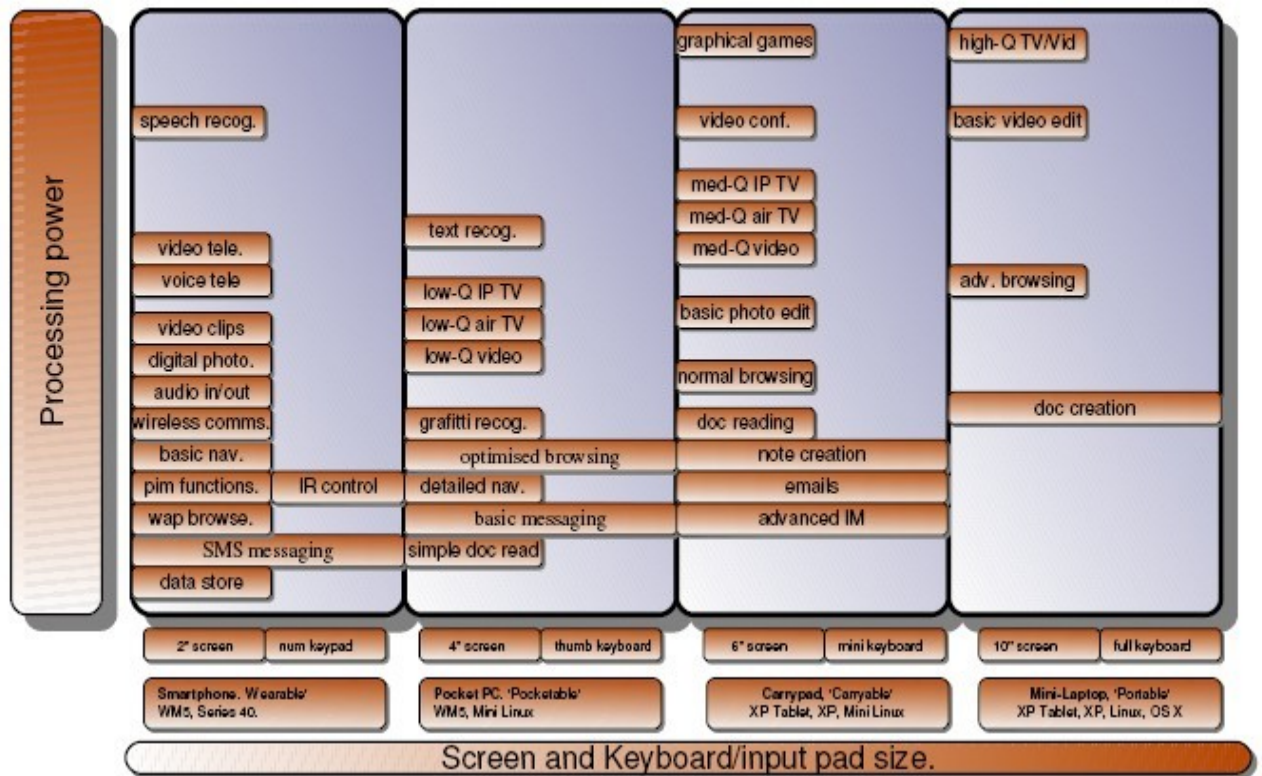
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In the diagram you can see the four categories of mobile computing. The 'wearable' smartphone is identified by its very small screen and minimal input mechanism. The 'pocketable' Pocket PC identified by its slightly bigger screen and more input options, the 'carryable' device with a medium sized screen, more processing power and optional input mechanisms and finally the 'portable' notebook PC with its full-sized keyboard and screen and much h

igher processing power and weight. In each category we've identified the common functions that can only be performed by this category (and the more powerful categories of devices to the right.) For example, you can perform most PIM (address book, calendar etc.) functions on a smartphone but if you want to watch high-quality videos, you have to use a UMPC or better.

What device(s) do you need?

This is obviously a difficult question to answer and one that will be asked many times by people looking at these relatively new product segments. There is never a 'best' or 'one device fits all' solution so the only way to find your ideal device is to analyse your current and near-future requirements. In all three of the categories, MID, UMPC and Netbook, there are varying levels of mobility and a different list of scenarios where you may use the device and a different list of how you might carry the device. There's also a huge range of prices, styles, form factors, features and brands.

If you are new to mobile computing, there's one rule you should know about: **The more mobility you have, the more places you will find to use your device.** The speed of use may be less but often, been able to use a device slowly but successfully is better than not be able to do it at all. For some people, this capability translates directly into productivity. If you are able to watch a time-shifted training video on the bus, standing up, you will save yourself time. If you are able to lie in bed and read emails before you get to work, again, you will have saved time. For other people, this mobility just translates to more fun and flexibility. Think about having a web browser at your side on the sofa. The ability to check emails, weather, traffic info and news even before you get out of bed. Being able to check on recipe details in the kitchen. Having a lightweight, handheld Internet access device in the cafe, waiting room, train, bus, car etc, etc, etc. There are scenarios that you wont even think of until you have your Mobile Computing Device.

As was mentioned earlier though, there are compromises to be made. A mobile device is smaller than a normal notebook PC. The screen space is limited and the keyboards are always smaller than a normal desktop PC. The processing power inside a UMPC is often less in order to get the required life from the smaller batteries and to keep the heat down in the small casings .There are cost considerations too as the market is still new and the components require more detailed design and in some cases, more expensive components.

In order to decide whether you need a UMPC you simply have to **decide if the improvement in mobility (and resulting increase in productivity or fun) is worth the compromises**.

As the price comes down, the designs get refined and the Internet access capabilities improve, the compromises become less and less and more and more people are seeing the positive side of the equation. Eventually its possible that the prices will get so low that you might be able to justify buying a device for one usage scenario. We look forward to that day!

Details and Choices

Device designs within the Ultra Mobile PC segment
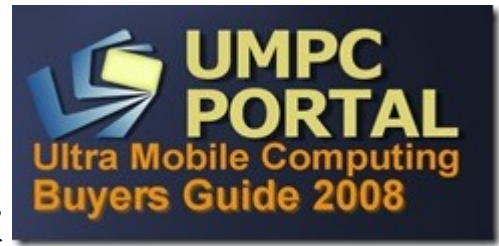
As we mentioned before, there are many variations in devices within the segment. Every manufacturer is looking for their own spot in the marketplace and is designing with certain target users in mind. The options range from low-powered Linux-based mini tablets, right up to high-powered laptop formats running Microsoft Windows Vista. The price bracket also ranges from under $400 to well over $2000. Take a look at this page which shows all the currently known (200+) devices including MIDs and Netbooks. You'll see a huge range of sizes and the first thing to note is that some have keyboards, some don't!

> **Click here to view a pictorial overview of all UMPCs from the 'MID' to the Pro-Mobile notebook.**

Tablet format Ultra Mobile PCs (without Keyboard)

These devices generally use some form of touch or pen input to control the device. They may also support handwriting recognition and speech input. Many of the original "Origami' UMPCs were in this category but in 2008 most devices are being produced with some form of keyboard input mechanism. This trend is expected to continue, especially for devices aimed productivity. Tablet devices have the advantage that they are generally smaller and lighter or have the space for larger batteries. It's possible to connect a normal USB or Bluetooth keyboard so they offer a level of flexibility, modularity and choice that you don't find in the all-in-one' device. In some cases, the devices are as powerful as a low-end desktop and can be considered a 'desktop with a screen.' In other cases, the devices are designed as low-power as possible and due to dedicated or closed software, can only perform fixed functions.

Ultra Mobile PCs with keyboards or thumbboards

Finding greater popularity and responding to previous customer disappointment are devices with

keyboards in various forms. This segment actually comprises two sub-segments. Devices with normal keyboards for a familiar desktop typing experience (netbooks or mini notebooks,) and thumbboard layouts. The desktop format keyboards appear mostly in the larger 7-10" screened devices. Some of these notebook-style devices offer a convertible, swivel screen format where the device can be turned into a tablet. Thumbboards are being experimented with in many differing formats. From hidden, slide-out keyboards to split keyboards. Many more variants on this them are sure to appear. The convertible designs are aimed towards the higher end of the market but some convertible designs are now starting to filter down into the sub $1000 segment and are targeting consumers. A keyboard is an important element of the ultra mobile PC and should be considered carefully. Read reviews and look at statistics (some stats on the relative speeds of keyboards here) but ultimately, try and get hands on.

For a more detailed look at keyboard types and how to choose between them, see the UMPCPortal article: Detailed tips for choosing a mobile computing keyboard

For most people, the keyboard (or lack of it) will be the first decision to be made and the answer will depend on how you intend to use your UMPC. (Sofa, Car, Bed, Office, Train, Plane, Coffee Shop, Customer premises) and how much you intend to input into the device. Will you use natural handwriting for brief but ultra lightweight operation or will you need a full keyboard for reports, emails or blogging. You may also be considering one as part of a multi-device line-up with a mobile phone and laptop. Thumbboards will naturally appeal to the younger customer but must not be ignored as a quick input method that, in two-handed operation can be a good balance between input speed and input volume.

When making your form factor choice for the first time, don't underestimate the amount of time you might use (or learn to use) the device for web consumption in a social setting. Once you feel comfortable using a device on the sofa, bed, bus or coffee shop you might be surprised at how often you find yourself using the UMPC in these settings where having the lightest and longest battery life becomes very important and the keyboard, less so.

Operating system choices

Choices on operating system in 2006 were limited to Windows XP and a couple of devices running Linux. In 2008 however, we have Windows Vista in the mix, a number of Linux distributions and some dedicated software stacks. If you already have a desktop PC and you run Windows, you might find it easier to get used to a Windows-based UMPC but bear in mind that in the long-run, it doesn't always mean that it will be the most efficient choice. If you pair a Windows XP operating system with a 4.8", high-resolution touchscreen device for example, the result might not be very satisfying. Generally, users are happier when they don't have to change their known user interface or when they are confident that a new user interface has already reached general market acceptance. For productivity most users will be looking for a familiar desktop environment based on Windows.

The choice between Vista and XP depends on the hardware. The recommendation today is that for productivity, XP is generally better than Vista on **currently available hardware** due to the maturity of the driver software and smaller memory, disk and CPU requirements. There are a few devices being marketed now with Windows Vista pre-installed and as we move towards the point where Windows XP may not be available any more (estimated end of 2009), Vista or even Windows 7 may be the only choice. Vista is widely acknowledged as having a much better touch/handwriting support so if you are considering a slate type device, Vista would be a good option.

Apple OSX is not currently available on a mobile productivity devices but Apple have created a core system, based on OS X and some of the applications, that runs on their iPhone and iPod platform. Both of these devices can be considered for mobile Internet operations in the 'MID' segment.

Windows CE and Windows Mobile devices are available but as time goes on, the limitations of the applications and browser software are becoming more and more apparent. As a 'thin client' type of device that might use remote desktop or remote PC software to access and control a remote device over an IP network they can make cheap and very efficient devices but as standalone devices, limitations will become apparent with advanced web browsing (Flash, flash video, dynamic html, Ajax code) and with some media playback. Windows Mobile 6.5 and 7 is planned and we expect to see this in 2009 with a much improved user interface, browser and application suite.

During the later part of 2007 Ubuntu and RedFlag released early versions of their Linux distributions that included optimised interfaces and good support for Intel hardware. Even now though, in late 2008, these distributions are only suitable for further development by OEMS and only one or two examples of the distributions can be found in the market in the pocketable MID segment. The expectation is that these Linux-based operating systems will develop quickly into consumer-focused suites and become well supported but that may not happen until well into 2009.

Since the launch of the small 'netbooks' there have been efforts by many Linux operating system vendors such as Xandros, Linpus, SuSE and Canonical to produce more generic distributions and these can now be found on netbooks purchased online or in shops. While the quality, look and feel may not be as good as with XP or Vista, the cost is lower and the core set of applications is always available to the user. As netbooks gain in popularity with many millions of sales forecast, expect these distributions to evolve and develop into more polished options.

Screen

Screen sizes range from about 4 inches to 10" and resolutions vary wildly from the small 480x320 of the iPod touch to 1280x768 and beyond. Perhaps a more useful figure to use is the PPI. (Pixels per Inch, also known as DPI - Dots per inch) For example, a 1024x600 resolution on a 4.8" screen results in a DPI of around 250. Given standard font sizes on Windows operating systems, this can be extremely hard to read and only really possible when holding the device at about 15-20cm from the eyes. At the other end of the scale, 10" devices with the same resolution result in a comfortable tablet-top readable figure of 120. Here are some tips for choosing screen sizes.

- For tabletop operation, 1024x600 at 9 or 10" is generally acceptable without any adjustment of font sizes. a 7" device at 1024x600 will require some adjustment of font sizes (to about 125%) for it to be comfortable.
- For handheld use, a 5.6 or 7" device at 1024x600 provides acceptable reading quality.
- For touchscreen devices, a PPI of 150 or less can help with accessing standard font-size links and menu items with a finger.
- A device or application with a *fast* zoom can help in many scenarios.
- In most operating systems, the font size can be adjusted up to make typing and reading more comfortable but this reduces the amount of useable space on the screen.
- The design of 7" screen devices can be too small to fit in a high quality touch-typing keyboard.

...and here are some comments based on screen sizes:

- 4.8" Smallest for comfortable 800×480 hand-held work. Poor typing speed on most keyboards at this size but comfortable thumbing experience on sliders. Ideal for pocketable MIDs.
- 5.6" Good handheld size for 1024×600 screen. Also works as an emergency table-top device. Thumbing still comfortable in most cases.

- 7" Still small enough for handheld use but also usable for up to an hour on a tabletop. A tablet device allows you to go handheld when needed and then add a BT or USB keyboard for more comfort on the table. Probably the size limit for extended one-handed use with a touch-screen until components shrink to allow bigger screens for the same, circa 700gm, weight.
- 8.9" Starting to get comfortable on a table for extended periods. 1hr + is easy. At this size, weights are usually about 1KG which makes single handed use or even /two-handed use difficult over longer periods.
- 10" Very comfortable tabletop experience. Arguably the best size for travel and productivity work on a tabletop. 1.3-1.5KG is common though so its not a device you'll be using in one or two hands which severely limits usage in some scenarios.
- Adjustable screens and foldable screens have been seen in a few designs but are not expected to be mainstream with fast refresh, colour and touch for another 3 years or more.

PPI figures can be found on the comparison pages of the product portal for nearly all devices. E.g. This comparison page here.

Screen brightness is another area to consider. The best screens now (and this is common on nearly all devices now) are using LED back-lighting and offer a brightness of around 300 nits which is usable in a brightly lit room or bright bur shaded outdoor area. Some points to note here:

- Glossy screens may give too many reflections for outdoor use but are generally sharper and offer better contrast for use indoors.
- Touchscreen layers can significantly reduce the brightness of a screen.
- Older CCFL-backlit screens are to be avoided for mobile use as they are less-bright and consume significantly more battery than LED backlit screens.
- There are some specialist screens that use filters and transflective layers to improve the outdoor viewing experience.
- The higher the brightness, the more battery drain (usually about 10-15% less battery life on high screen brightness.)
- The bigger the screen, the higher the battery drain.

Touch and Pen input

For those interested in using finger or stylus to drive an Ultra Mobile PC, consideration should be given to the varying types of touchscreen available.

The most commonly found tech technology is 'resistive digitiser' touch which uses a two-layer sensor mounted over the screen. Its cheap and easy to deploy but has disadvantages for those wishing to do natural input work as anything touching the screen, from stylus to finger to palm, will be registered. Handwriting input is possible but requires the user to adopt a palm-lifted approach to handwriting which isnt at all natural. Attempts are made to reduce this effect by making the touch layer less flexible and thus requiring a heavier per-mm press. This can work well in some cases if implemented well. Its known as 'heavy' touch. The weight needed to register on a touchscreen is often quoted in gm/mm2 where 80 would be a light touch (good for finger) and 120 would be a heavy (good for stylus) figure.

Active digitisers don't register physical touch. They register the proximity of a special pen which must always be used on the device. These devices can support proximity sensitivity and work extremely well for those wishing to use natural handwriting on operating systems like XP (Tablet Edition) or certain versions of Vista.

Capacitive touchscreens are an alternative to light touch resistive digitisers and work extremely well in

detecting finger contact without requiring a lot of pressure.

Multi-touch screens are a relatively new possibility and use the capacative method to register multiple touch points on a screen. Software can then convert this touches and movements into events such as scrolling, zooming and page-related events.

If you are looking to use natural handwriting input, our recommendation is to look for the active digitisers or for the heavy touch resistive digitisers that are often referred to as having 'palm rejection' capabilities.

Disks and storage

Consider your disk-space requirements. Some people find 30GB to be restrictive. Others, that don't need to take a video library with them, will find 30GB to be more than enough for storage requirements. There are speed and ruggedness issues to be considered too. The current range of disks can be broken down as follows.

Traditional 2.5" laptop disks. Fast, cheap, good storage. They are however relatively big, sometimes noisy and consume a lot of power. These wont be found in the 4-7" segment but can be found in the larger netbooks and notebook devices. For storage capacities over 80GB, these are one of the few options. Look for 5400 RPM drives and test results that indicate 40MB/s or more read speed.

1.8" drives. Originally designed for use in MP3 players, these devices have found popularity now in the mid-range UMPCs. Capacities range from 20-80Gb and power and size requirements are low. They are more expensive per GB than the larger 2.5" drives but offer a good compromise for the mid-range devices. Some cheaper, low-speed models can have a noticeable impact on the speed of the operating system but in general are acceptable for common operations. Highest speeds will be in the order of 30MB/s maximum read speed.

SSD devices. Solid state disks based on flash memory technology have no moving parts. They are lighter, consume less power generate less heat and are more rugged than the rotating drives. There are two types to watch out for. Low-cost MLC drives which offer good capacities and the high-speed SLC drives that offer higher read and write speeds but can cost a lot more.

MLC drives can range in speed from extremely slow to mid-range transfer rates (as fast as a 1.8" rotating drive) although in general, are able to get to data more quickly for multiple small-size data operations. Unfortunately there is no way to tell from a devices specifications how fast the device is and the only recommendation here is to search for a device review that includes these disk test results. MLC drives are commonly used in the cheaper 'netbook' PCs and come in the 4-20GB size range which offer little opportunity to store media. For many operations though, very little storage is required and with external media cards such as SD and CF reaching 16 and 32GB capacities, this can be suitable for many people.

SLC drives are more tailored for the high-end of the market and can offer exceptional speeds that even exceed the bandwidth of the connecting bus. Only a small number of high-end devices are shipped with these drives (often as options) but there is a growing number of after-market options that can be used to boost the speed of a low-end device by a noticeable amount. Prices are currently in the range $80-500 for these devices and can be hard to find. Upgrading a device will often invalidate the warranty and can be difficult to achieve. Do your research before you take this path.

All SSD technologies are advancing very quickly and prices are dropping rapidly. We expect SSD storage solutions to overtake Hard Drive solutions in terms of popularity during 2009.

Online storage is an option gaining in popularity and can be useful for people that are always able to connect to the Internet via a Wifi or 3G connection. Access speeds are extremely slow compared to local drives but for small documents, can be useful as a user moves from device to device. An additional feature of some storage solutions is that you are able to edit some files while they are on remote servers through web-based applications. Google Docs is one example. Look for generic solutions that can be accessed as a virtual drive and take note of syncronisation solutions that can help with offline work.

Connectivity options

The options here are numerous. Here are some considerations and tips.
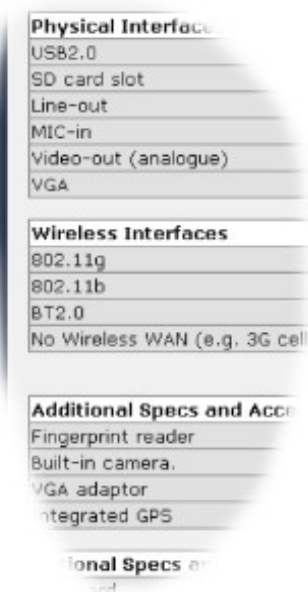
USB2.0 The most flexible and widely used interface is USB2.0. Through the USB connector you'll be able to attach external disk drives, printers, DVD writers, wireless LAN modules, Bluetooth modules and many other devices. Fortunately, all UMPC's have USB ports. For mid-range and netbook devices a minimum of two USB ports is recommended.

TIP: For tabletop operation and quasi-desktop setups, 3 USB ports is recommended. Some external devices also require two USB ports within close proximity of each other.

TIP: Some USB ports on mobile devices are not able to deliver high enough currents to drive some external disk drives or CDROMs.

FireWire is a similar style of connectivity to USB but not common at all so if you expect to download data using this method (often used with video cameras) you'll need to look carefully at the specifications.

VGA outputs (to external monitors) are common on netbook devices but not always on the 4-10" devices. DVI-out is only found on a few devices at the moment as is HDMI. Nearly all devices with VGA ports can be operated in 'extended desktop' modes which can greatly increase productivity levels. The exception here are some older devices based on the AMD Geode LX800 and LX900 CPU.

SD card slots are common on notebook-style devices but there are some smaller devices that use the smaller Mini-SD or Micro-SD standard. Some are not able to support the higher capacity SDHC cards (4GB+) so watch out for this. Transfer speeds can vary so make sure you test this if you plan to transfer large files using this method.

Headphone outputs are found on most devices but Mic inputs are sometimes left off in favor of a built-in mic. Some headphone ports are actually 'headset' ports that provide the headphone and mic ports in one socket.

PCMCIA is a standard that many used for expansion cards on laptops. This is found on some mobile devices but it has been largely phased out in favor of the **ExpressCard** slot. The slots are smaller but still only found on the bigger, more pro-mobile devices. These ports can be useful for 3G cards, SSD drives and some external 3D graphics adaptors. In general, most of these features are available through USB ports so unless you have specific requirements, it may not be a key feature for you.

Other ports to consider:

- SPDIF-out (digital audio) Rarely found but if required, can be implemented through a USB solution.
- Ethernet 10/100/1000, Many pro-mobile devices and note-book style devices include an Ethernet port. Gigabit Ethernet is sometimes found although some of the slower disks may be the bottleneck here.
- Docking connector. Often found on pro-mobile tablet devices and can be very useful in implementing a 'dock and go' style desktop.
- Video-out (analogue.) Rarely found on mobile devices.
- RJ-11 (Modem) Rarely found.
- Compact Flash slot. Rare
- Memory Stick slot. Sometimes integrated into a multi-card reader.
- Mobile SIM-card slot. See details on cellular Internet connectivity below.

Wireless connectivity

The most important connection on your UMPC is likely to be the connection to the Internet and this is generally achieved through the use of a wireless data connection. For wireless connectivity in the home, in hotels, coffee shops and airports, **WiFi** is a must-have. WiFi types 802.11b (11mbps) and 802.11g (54mbps) are common. Support for 802.11a is not available on all devices but 802.11n, the latest standard, is starting to appear. Reception and power drain must be considered for Wifi and in general, a better antenna reduces the power requirements. Some older and often internal USB-module based Wifi solutions can be very heavy on battery usage. Again, this is something to look out for in detailed reviews.

Cellular Internet access, as provided by many mobile phone operators is rapidly gaining in popularity, speed and value and can be use for on-the-go Internet access in most populated areas either via a mobile phone (see below) or via a built-in cellular data modem that you can find on some ultra mobile devices today. The connection method, speed, type and cost of access will vary from area-to-area, country-to-country, provider to provider and even month-by-month! It's a minefield just choosing a service let alone getting connected but when everything is working with a good provider the experience can be a step up from WiFi access when on the move. For users in some parts of the world, WiMax is starting to be offered. The early market in the US shows some signs of promise but in Europe, 3.5G and its successor, LTS, has too much market share and investment involved to allow a switch to WiMax. Look out for more detailed information on this topic in the 2009 edition of the buyers guide.

One of the common ways to access the Internet if a device has no built in cellular data module and there is

no Wifi hotspot available is via a cellphone. Most cellphones have built in data modems that can be used via USB connection (often through provider-specific software) or by using a Bluetooth wireless connection which brings us to the third important wireless connectivity method. Bluetooth is often left out on cheaper devices so if you need to connect a cellphone (Note that contracts do not allow this 'tethering' process) or if you need to use one of the many other Bluetooth connectivity methods (known as profiles) in order to use a wireless headset, wireless speakers, to transfer images or to connect a wireless keyboard, make sure BT2.0 (or the newer BT2.1) is included. BT1.2 is not recommended due to its lower security standards, reduced range and reduced profile set. BT2.1 offers better security, a 'near field' paring option and improved power efficiency but is only just starting to become available. BT2.1 is backwards compatible with BT2.0 devices.
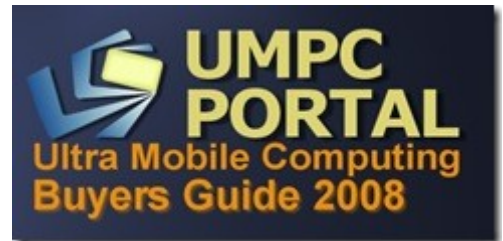
One 'workaround' solution to accessing a cellular Internet connection is to use a 3G/WiFi adaptor. These are usually battery-power routers that include a 3G modem and a WiFi modem and act as a bridge between the two. Were a 3G connection needs to be shared, the 3G routers can be a perfect and easy to use solution.

Processor (CPU)

There are a number of CPU's that are being used in ultra mobile devices and each has its own advantages and disadvantages. CPUs range in capability from the simple low-power devices found in smartphones, through to powerful dual-core options that are found in laptops. Your CPU requirement depends on what you expect to do with the device. Below is an explanation of the current CPU options followed by a summary. (Updated from the article originally published in Jan 2008.)

Intel

With the old Pentium-M and Celeron M now gone from the production lines, the Intel Atom processor range lives on as the low-cost Ghz-class processor option. Intel have different ranges of the Atom processor but the two most likely to be found in UMPCs are the Atom Diamondville and Silverthorne processors. Diamondville is a low-cost, low-power processor normally found in single-core, 1.6 Ghz hyperthreading-capable versions. Processing power is roughly equivalent to the old Pentium-M at 1Ghz and it is capable of running common Windows XP and Linux applications at speeds acceptable to most people. In fact, coupled with a fast disk drive, the performance can be impressive and even good enough for Windows Vista. The Diamondville processor is found in most current Intel-based 'netbooks.'

The other Atom processor found in UMPCs is the Silverthorne CPU. Based on the same core architecture as Diamondville, it is focused at very small-size and low power operation and comes in variants without hyperthreading (800Mhz, 1.1Ghz) and with hyperthreading all the way up to 1.8Ghz. Silverthorne is paired with a specific chipset known as Poulsbo (or SCH) which contains a new GPU and video decoding hardware (see below.)

Some older UMPCs are still being sold with the Intel 'McCaslin' platform which comprises a slightly modified Pentium-style CPU at 800Mhz. This has already been phased out but is capable of decent

performance and efficiency in some well-engineered UMPCs. Intel's A110 (800Mhz) and A100 (600Mhz) are the labels to look out for here.

Intel don't have a high-end platform for UMPCs but we are seeing some high-end engineering that is enabling laptop processors to be squeezed into UMPC form factors. Sony have always used the laptop processors in their UX range and currently offer a Core 2 Solo processor with GMA950 GPU. Samsung also use a Core processor, the Core Solo at 1.3Ghz, in their Q1 Ultra Premium. It should be no suprise that devices using these processors tend to be expensive.

VIA

VIA continue to offer their C7M ULV processor and VX700/VX800 integrated GPU/chipset but have made two announcements about products that will extend their range and confirm their focus in the low-power and mobile computing market. Firstly and presumably as a spin-off of their dead 'John' Core-Fusion project, they have developed a single board computer using a small-die C7 ULV processor and VX700 chipset. The board is known as Mobile-ITX and is planned for launch at some point during 2009 (delayed from 2008). Mobile-ITX focuses on providing a standard motherboard a very small size that will enable designers to skip the board design stage and thus save time and money. The complete board covers about the same area as a credit card and has the potential to enable Ghz-class x86 computing in smartphone form factors. No details are available at the moment so this is simply one to watch for 2009.

More importantly, VIA have announced a brand new architecture known as Isaiah that will be used in a new CPU range known as Nano. This architecture, developed by their daughter company Centaur, is said to provide 2-4 times the processing power of the C7-M, with advanced sleep and thermal modes in a pin-compatible CPU module in the same power envelope as the C7-M. In addition, VIA have announced a VX800 integrated chipset that incorporates the VN896 DX-9 capable GPU. Unfortunately for UMPC fans, the 'CN' CPU looks like it will initially target notebook, thin, and green computing devices with part availability planned for end of Q2 and devices available at the end of 2008. It must also be noted that the standard C7 range continues so some repositioning can be expected in the coming years. The C7-M will probably drop in price and become the budget CPU that can be coupled with the VX700 or, hopefully, the VX800 depending on the graphics requirements. The 'Nano' is likely to become the premium part and could enable gaming UMPCs, desktop replacement UMPCs and even low-end video processing UMPCs. Currently though, VIA are in an in-between stage with the C7-M not really being able to compete with the Atom Diamondville CPU.

AMD

AMD have only once or twice talked publicly about ultra mobile devices and their efforts to address that market. So far, no-one has seen or heard of any real hardware or plans but there are rumors that 'Bobcat' is the keyword to watch. Other reports indicate that AMD's 'fusion' concept will integrate the CPU and GPU onto a single die.

Meanwhile, products based on the LX800 and LX900 Geode processor and chipset are still going out of the door although these really aren't competitive in the current market. Recently we have seen a low-end Turion Dual-Core offering being used in a Raon Digital 'Note' UMPC and this has proven to be one of the most powerful CPUs seen yet in a UMPC. No other manufacturers have yet announced AMD devices so the AMD strategy is really looking like a 'one-off' strategy at the moment.

ARM

ARM is the company that designs the architecture for the billions of processors used in mobile devices such as smartphones and arguably the strongest microprocessor design company in the handheld mobile computing space. The current single-core ARM11 offerings aren't really up to the job of a quality Internet and multimedia experience but there are new cores coming through that could change this. Cortex A8 and Cortex A9 are the next-in-line offerings and promise to offer 3x the processing power (Cortex A8) in the same power envelope as ARM11 cores. Considering the current cores run with power requirements under 500mw and that the Cortex A8 could be as powerful as a low-end Silverthorne there could be some interesting possibilities and competition in the space. Add the fact that the ARM ecosystem is huge, mature and well-experienced at producing mobile devices and add the fact that Open Handset Alliance is developing an advanced, open, web-centric operating system for these types of devices (Android) and that Symbian is already working with these products and its easy to see where the big competition between ARM and X86 will start. Devices supporting Cortex A8 (watch out for Ti OMAP 3430) expected in late 2008. Devices supporting the multi-core Cortex A9 are expected in 2010. Early examples of devices are the Archos 5 and OpenPandora devices.

CPU summary

At the time of writing, there really is only one player in the ultra mobile market. Intel. ARM and VIA are ready with new products though and these could be important in 2009. Nano from VIA and Cortex from ARM are the two key products to consider.

The UMPCPortal product pages contain processor information for all UMPCs.
Sorting and filtering is available to allow you to quickly choose or eliminate groups of UMPCs.

Graphics processors (GPU)

Ultra Mobile computers are generally not built to support graphics-intensive applications such as games and video post-processing and if you need a device that will run the latest windows games, you will need to look for a high-end notebook PC. Mid-market UMPCs and netbooks do include 2D/3D graphics acceleration support and are powerful enough to run most types of video playback and even some low-end games.

In netbooks with the Diamondville (Intel Atom 1.6Ghz processor) you'll find an Intel GMA950 GPU core. This is good enough for most desktop 3D effects and basic 3D application requirements such as those found in the iTunes software or in Google Earth. Gaming with 2002-2004 games is also possible. Some high-end netbooks are starting to use third party processors from Nvidia or ATI. Assess these on a case-by-case basis but expect performance 2 to 3 times better than the standard offerings.

The Intel Silverthorne CPU (Again an Atom core) is coupled with a chipset known as Poulsbo or SCH. This combined chipset includes a Power VR 3D core from Imagination technologies. In high-end versions of the chipset it also includes dedicated video decoding hardware for WMV, H.264, MPEG4 and MPEG2 compression standards. At the time of writing, the drivers for these devices don't appear to be fully developed and many applications wont use the capabilities so some performance limitations should be expected. As more OEM's start to use the devices then we should see faster development of drivers and applications for Vista, XP and Linux variants. Intel have committed to producing drivers for Linux and will make XP and Vista drivers available as OEM's require them.

VIA C7-M based devices are still using VX700 chipsets with older DX7-capable hardware and some video decoding acceleration. The newer VX800 chipset is largely untested at this stage but, like the Intel SCH, will require mature drivers before the capability is fully exposed. It includes a new graphics engine and hardware decoding support for common video encoding standards.

Note that video content relies purely on the CPU to do the decoding unless specific hardware is available in the chipset. (VX700, VX800 and SCH) AND if the drivers or application are built to use it. YouTube

and other flash-based video content is always reliant on a relatively fast processor for good quality playback.

Memory

Memory required is largely dependant on the operating system you want to run. Devices based on Windows CE use very little memory. Windows XP-based devices generally require 512Mb to be efficient with 1GB recommended for multitasking. Vista devices require a minimum of 1GB (2GB recommended) and Linux-based devices can run in as little as 256MB but again, if used as full desktop PCs, will require 1GB or more depending on applications. Be aware that memory is not often a user-unreadable item so an extra $100 to double the memory at purchase-time could be a wise move. Extra memory can positively affect the speed and battery life of a device and is highly recommended in a UMPC.

Battery

We would all like to have 8 hour battery life on our mobile PC's. Unfortunately, this is not available in 2008. The balance that the manufacturers have made between hardware design, weight and battery life results in 2-3hrs run-time for 7-10" devices that use batteries in the 25-35Wh capacity range. Extended batteries will obviously improve this it at the expense of weight and cost. For the smaller devices using the latest technology, drain rates drop down but battery sizes drop too. Smaller devices with batteries in the 10Wh to 20Wh range are also providing between 2 and 3hrs run time.

Our predictions on battery life over the 5 years from 2006 are as follows:

Real-use battery life predictions. (30wh battery, wireless network connected, 50% screen brightness, web usage, 7" screen)

- 2006 - Average UMPC life 2.5 hours
- 2007 - Average UMPC life 3 hours
- 2008 - Average UMPC life 3.6 hours
- 2009 - Average UMPC life 4.3 hours
- 2010 - Average UMPC life 5 hours.

Maximum battery predictions (idle device, often used in marketing)

- 2006 - Average UMPC life 4 hours
- 2007 - Average UMPC life 4.8 hours
- 2008 - Average UMPC life 5.75 hours
- 2009 - Average UMPC life 6.9 hours
- 2010 - Average UMPC life 8.3 hours.

Most users look for over 3 hours in-use battery life for mobile scenarios and currently, only the best devices with the highest density batteries can achieve this.

Be aware of manufacturers claims as industry figures are generally 30% more than what might be achieved under normal use conditions. WiFi, 3G and screen brightness have a huge effect on battery life and so if you expect to use the device outside, connected to a 3G network, you should expect a battery life at the low end of the scale.

Be aware that even smartphones only return 2-4hrs of Internet-use battery life due to radio considerations

and the extremely small batteries used in them.

Cost

With the introduction of the netbook category which is largely focused on driving 2nd and 3rd consumer PC sales, the average prices in this category have nosedived. The netbook category is starting at around $250 and ranges up to $600. This has also impacted the prices of the pro-mobile devices too. Where $1200-$1500 was common, device prices seem to have dropped to an average of under $1000 with prices starting at $500. The pricing of the MID segment is still being tested by manufacturers but a few examples are being seen with 3G included at around $600-$700. The prediction is that the MID pricing will drop quickly during 2009, netbook prices will stay in the same range (with more features being added) and that pro-mobile devices with 5-9" touchscreens will remain fairly stable between the $800 and $1200 range.

The complete ultra mobile PC segment is a fast changing one though and devices are being replaced by newer models at 12-18 month intervals. Prices for older models drop sharply towards the end of their life and bargains are easy to find if you're prepared to use the previous-generation technology.

Weight

How heavy is heavy?

Netbooks are ranging from 2.2lbs (1KG) up to about 3.3lb (1.5kg) and represent a weight that can be carried around all day and used on tabletops. The lightest of netbooks can be used in one hand for short times.

UMPCs with 5-7" screens appear in the 1lb to 2lb range (500-900gm) and in this weight category, its possible to hold the devices for longer periods on one hand opening up possibilities for touchscreens, thumb keyboards and use while standing up. The smallest of these devices are pocketable for short times in big pockets!

MIDs with 4"-5" screens are aiming at the pocket and as such, are mostly under 1lb with the lightest being around 0.5lb. They are still not as small and light as most smartphones, but provide a comfortable one-handed experience and aren't too heavy for a pocket.

Be aware that extended batteries will add weight. Expect 100-150gm per 30Wh of battery.

Additional Information

Docking stations

One feature that UMPCPortal considers very important for mobility is the docking station. Some of the higher-end tablet UMPCs are capable enough to be used as desktop PCs and having tested this set-up a number of times now, it's clear that it's a valid usage scenario for UMPCs of the future. The problem is that most UMPCs are manufactured by people that also make desktop PC's so you will rarely see this usage model promoted!

The docking station should support docking through a dedicated docking connector or through a PCI-Express connector so as to support direct connectivity and control of a monitor (for dual monitor operation.) Avoid cheaper USB docking solutions if you want to use a UMPC in this kind of set-up.

Currently very few UMPCs come with docking stations. Hopefully this will change in the future.

Other features

As time goes on and competition in the market increases you will see more and more features being added to the wide-range of UMPCs on the market. Some will be generally useful and others useful only to a niche type of customer, other features will be purely marketing-related. The list is long but here are the most common features to consider:

- DVB-T/H and DMB (Digital TV over terrestrial transmissions to be picked up using an aerial.) Is country dependant. Some UMPCs offer these facilities but only in countries and cities where the service is available.
- Built-in GPS. Can be very useful for in-car usage but as more and more smartphones include GPS, its arguable that for most consumers, the build-in GPS on no longer needed. For some applications using vehicle tracking though, this could be a requirement.
- Fingerprint reader. Combined with a good software suite can limit the amount of username and password entry need. Also simplifies the login process. Can also increase security of data when combined with disk encryption.
- Stereo speakers. Generally, speakers on UMPCs are quite low quality due to the size. If its important to you (Kitchen film watching, background music while surfing, video conferencing) then make sure you check out the quality.
- Rugged builds. In general, mid range and low-end UMPCs do not offer any level of ruggedness but some specialist devices are available. We don't cover specialist rugged-build devices but there are some consumer devices that are able to withstand the knocks and bumps that a device might experience in a home.
- Extended battery options. For all-day operation extended battery options are available with some UMPCs. They add weight and size. One tip here is to ignore the mAh figure until you know the voltage of the battery. Capacity is expressed in watt-hours (Wh) so make sure you find out this figure before buying a battery. As a rule of thumb, 10wh will bring about 1 hour of computing time on the average 7-10" UMPC under average usage conditions. For the newer, smaller devices, you can expect up to 1.5hours per 10wh of battery capacity. On average, each 10wh will add about

2.5oz (75 grams) to the devices overall weight.
- Active digitisers. Regarded as the best option for pen input (handwriting, sketching, annotating) but do not permit finger touch response unless the are combined with a second, resistive layer. Only some specialist devices are available with this combination.
- High brightness screens. For outdoor use, high brightness screens are essential. Look for brightness figures over 280 nits for outdoor, under shade and in-car usage. Some mid-range UMPC devices are available with 300 or 350 nit screens. Specialist devices can offer more. Operation in direct sunlight is generally not possible with normal UMPCs.
- Built in cameras. For web conferencing or video calling, a built in 1.3MP camera can be useful. It is important to check on the sensitivity if you are looking to work indoors under normal home lighting. Some devices also come with forward facing cameras. At this time, there are no UMPCs that offer digital photography class cameras. (Glass lenses, manual focus, optical zoom etc.)
- Small PSU units. If mobility is your aim, make sure you check on the size of the power supply unit. Some can be big and heavy!

Other aspects to consider

Style and customer service are the main considerations that you won't find detailed on reseller pages. Style plays an important part in the UMPC market. These devices are very personal, a new breed, go out of the house a lot and for many people the style is a very important characteristic. Its personal choice here. I'm afraid we can't help you!!! Customer service is not something we track on UMPCPortal either so make sure you do a little research. Generally a search for "[company name] problem (blog OR forum)" brings up interesting results but don't take them out of perspective. Google usually shows you exactly what you were searching for.

The near future

The UMPC market is a fast-moving one so waiting for the next device to come is always going to be an option. As this is being written there are devices based on 2007 technology that have been announced and still haven't reached the consumers while some CPU manufacturers have already demonstrated next years technology. The overlap is big! As the UMPC marketplace becomes more competitive, so more effort will be going into design and unique features and within months of buying a device, a new model will be announced that will have better features and a better price. This will affect residual prices of devices and you have to be aware that reselling the device to fund a new model won't be an option unless you're the type of person that buys for a three month span and then sells the device while it's still current.

The pro-mobile market is fairly slow moving as the competition here is relatively low and many solutions are made as one-off designs. We expect the Intel Atom processor to filter into this segment during 2009 along with 3G options. Prices will remain relatively high.

The netbook market is at the other end of the scale. Here, products are being announced every week. Prices drop as models leave the market and in some cases, certain models are announced before the previous model becomes available. We don't expect technology to change much during 2009 with Intel Atom devices making up the biggest percentage. VIA's C7-M based devices will continue to find a home in Asian and developing markets although the new Nano processor should appear in devices before the end of 2008.

The MID market is just starting and we're expecting this to gain momentum during 2009. Prices will drop rapidly and buying a device from this sector will take a lot of research as software updates on the Linux-based systems can change features and usability overnight. We expect MIDs to appear through carriers in

Europe during the first half of the year with US-based carriers starting to offer the devices later in the year. The reseller network will be initially very small and it could be difficult to get hands-on. We don't expect any new silicon platforms in this segment during 2009 so the Intel Menlow platform and ARM Cortex-based platforms will be the two main choices.

Our suggestion is to do what we said before. Be honest! If you're honest with yourself about what you need and there is a device that matches your requirements then there is **no need to wait**. You will only be waiting to buy something that does more than you needed in the first place. Your requirements are likely to mature after you've bought the device but over time, you can re-consider your requirements and keep them in mind for your next purchase.

Summary

The UMPC market is developing well now and because of the introduction of the low cost Netbooks and the increasing availability of cellular Internet services at consumer prices, millions of people are being introduced to the idea of taking a personal computer with them all the time. While the netbook segment highlights a good balance between portability, features and price, its still a moving market and the constant increase in the numbers of devices prove time and time again that everyone's ideal device is different. Make you choice by doing the following things.

1) Ask yourself WHY you want a mobile computing device. What do you want to do with it?

2) Look for devices that match your criteria and do some research.

3) Try and get hands-on. If you have never used a device in a mobile scenario before, try-before-you-buy. The easiest way to do this is to buy a second-hand device, use it for a few months and then feed that experience into your choice.

4) Don't wait! There is ALWAYS a device coming up that will be better but if you've already found a device that meets your criteria, don't waste time in buying it and starting to enjoy it.

Further Reading

Further reading and information available on UMPCPortal

What started as a little blog in Feb '06 has, mainly through the good feedback of readers, matured very quickly into a rich portal that we hope is helping users learn and make decisions about UMPCs of all types. From the iPod touch to the Flybook V5. During the last 2.5 years, we've produced a number of reports. Some you may find helpful are listed below:

Using UMPCs as Mobile thin-client solutions

UMPCPortal sales predictions for netbooks

Our definition of the Full Internet Experience (FIE)

UMPC Battery life expectations

UMPCPortal is split into a number of areas so here's a run-down of the content we've got that might help you on your UMPC journey.

Home page.

The home page is where you'll find all the latest news, detailed reports, reviews and research as they are published. You'll also see a microblog on the right hand column which is updated regularly by the authors on the site.

Product pages (database)

If you're looking for more details on specific UMPC products, we have a set of product pages that contain as many specifications as we can find (and more that we've found out through reviews) on all the UMPCs we have in the database. In the product pages we also have a detailed comparison engine that will allow you to line-up a short-list of UMPCs for finer comparison. You'll are able to leave comments, read the latest news-links, view related products and even check on a devices popularity. UMPC Product database.

The product database also gets syndicated and shared out to other websites. Partner websites also contribute to the database. Current partners are JKKMobile, Liliputing and Pocketables. If you would like to use the shared version of the database on your blog or website, please contact us.

River of Links

We also include a constantly updating hand-reviewed list of links (River of Links) to important news and reviews for each product. If you want to track important info about product reviews and sites this is a good way to keep updated.

Gallery

When we review a product we take a lot of pictures that don't make it into the review itself. You can view all our UMPC photography here in the Gallery. Over 2000 images are available.

Forums

An active forum is available to ask questions and exchange info about all aspects of the UMPC

Reviews

All UMPC reviews are listed on this page .

Podcasts

Our regular, approx .one-per-month podcasts are always listed here.

UMPCPortal Live. Chat and live video sessions

The unwritten rule is that when a new device arrives, we go live that evening with video and a chat session where you can see a presentation of the device and ask questions. The live video and chat area is always open for you to talk live with other UMPC fans.

Videos on YouTube and Blip.tv

All of our video presentations can be found on Blip.tv and YouTube.

Site authors

The UMPCPortal writing team currently consists of Steve Paine (Aka Chippy), Ben Lang and Kornel Tomasiak.

Friendfeed

All UMPC-related content here so it's the #1 place to keep up with news and activity on UMPCPortal. **View the feed and follow Chippy here**.

RSS feeds

A feed for every UMPC hunger!

- **Recommended!** Main feed. . This includes all the news items passing through the front page of UMPCPortal.com

- UMPCPortal forums . Track new posts in the forums.
- River of product links . Hand-picked product related links and brief info. Mostly external.
- Gallery . Before we report on anything we're testing or reviewing or even live-blogging, you'll often find that we post the images into the gallery. Stay a few minutes ahead of the curve here!

Product specific RSS feeds

As an extension to the River Of Links feeds, you can now track a single product and catch all the hand-picked product news for a single product. These feeds are updated regularly by UMPCPortal and partner websites. The product specific RSS feeds can be found on the product pages.

More background information about the portal is available on this page.

Other useful websites

Here's a list of recommended reading for current news and editorial on ultra mobile computing.

- GottaBeMobile.com
- jkOnTheRun
- Liliputing
- JKKMobile
- Asus Eee PC News
- Mobility Site
- All About Symbian - News
- Pocketables.net
- LinuxDevices.com
- SolSie.com / The Lighter Side of Mobile Technology
- Small Laptops and Notebooks
- WindowsForDevices.com
- Mobile2day.de
- Web Worker Daily
- Mobile Momentum
- The Mobile Gadgeteer
- The Solar UMPC Blog
- Atmospheric Endeavors
- The Tablet Blog
- Staying Connected
- Rodfather Mobile
- Ogra's blog (Ubuntu-UMPC)
- Wireless Moves
- Internet Tablet Talk
- LaptopMag

Corrections

If you have any questions or corrections for report, please don't hesitate to <u>contact us</u>. The next buyers guide will be produced in 2009.

Donations

If you feel this guide has been useful to you, please consider a donation that will help us improve the content and coverage in the future. Thanks

<u>http://www.umpcportal.com/donations</u>

Thanks

Many thanks to the many people that sent in donations for the IDF event in August. With special thanks to...

<u>Fortune Fountain</u>
<u>Mobilx</u>
<u>GrowVC</u>
M&I Argitek
<u>Direct From Japan</u>
<u>Tegatech</u>
<u>Geek.com</u>

About the Author

Steve 'Chippy' Paine has been working with Internet technologies since 1986. He was part of the team that implemented the first ever British Telecom (BT) Internet product and went on to manage support for that product. In 1998, Steve left BT to become a consultant for Internet network architecture and internet security architecture working for clients such as AT&T, Colt Telecom and Unity Media. In early 2006 he started writing the blog 'Carrypad' which focused on ultra mobile devices and went full-time on this in Summer of that year. Two years later, the blog has evolved into the UMPCPortal news and reports site and a product database that extends across multiple websites and multiple partners with over 1 million page hits per month from over 250000 unique visitors.