

Smart machine in a smart world

Clive Akass looks at the ultimate mobile: the universal interface

Nobody knows what the personal computer of the future is going to look like – indeed, whether it will exist as a separate entity at all, or disappear completely into the network. A fair bet is that it will be something like a writing pad, descended from the mobile computers of today.

The designs of these, particularly of the way they are used, are distorted by the fact that IT advances are driven almost exclusively by markets. Developers look less at what is possible than at what can possibly make money. Imagine building a road system on that basis: many roads would not exist because, though they enable profitable commerce, they are not in themselves profitable.

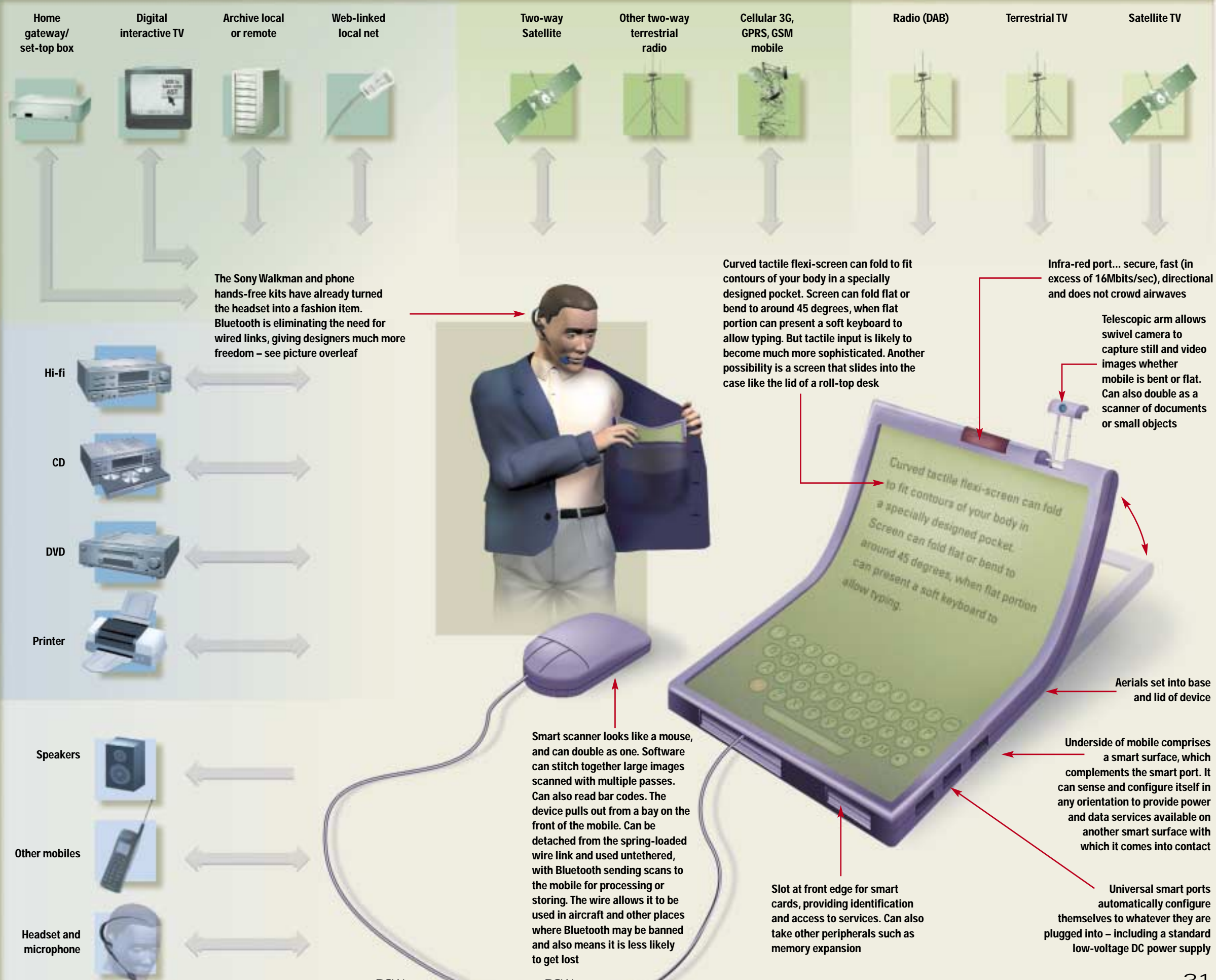
Something of this sort is happening with data transport, as I discussed last month (*PCW* May, page 34). You get a different perspective by ignoring business models and looking at the possibilities of communication systems as an integrated whole. The diagram (right) extends this holistic view to the mobile. It shows a concept model surrounded by all its possible data channels. The mobile, in effect, is a universal interface.

The design, a set of ideas rather than a prediction, is based on what is possible now or is likely to be so soon. It assumes intelligence in both the mobile and its environment, and the end of a glaring oddity of today: that, at a time when a 28Kbits/sec cellular link is considered a cause for congratulation, mobiles are bathed every second in gigabytes of wireless data that they simply ignore.

The mobile uses a touch-sensitive organic light-emitting diode (OLED) screen of a type being developed by Cambridge Display Technology, among others. This has two advantages: it is flexible, and it draws less battery power than an LCD (see pages 17 & 32).

The mobile can be flattened and used in the style of a writing pad, stood on its side to act as a display, or be bent in the centre to present both a writing area and viewing screen. In this last mode it can offer a soft keyboard, but use of tactile screens is likely to become at least as various and subtle as paper.

The mechanics of the screen bending, plus the odd spring and flap and the pull-out camera, constitute the only moving parts. The guts of the machine consist almost entirely of processors, aeriels, tuning circuits, and as much RAM and ROM as space and budgets permit – gigabytes of it. A flexible battery is moulded to any space left, allowing for some



The Sony Walkman and phone hands-free kits have already turned the headset into a fashion item. Bluetooth is eliminating the need for wired links, giving designers much more freedom – see picture overleaf

Curved tactile flexi-screen can fold to fit contours of your body in a specially designed pocket. Screen can fold flat or bend to around 45 degrees, when flat portion can present a soft keyboard to allow typing. But tactile input is likely to become much more sophisticated. Another possibility is a screen that slides into the case like the lid of a roll-top desk

Infra-red port... secure, fast (in excess of 16Mbits/sec), directional and does not crowd airwaves

Telescopic arm allows swivel camera to capture still and video images whether mobile is bent or flat. Can also double as a scanner of documents or small objects

Smart scanner looks like a mouse, and can double as one. Software can stitch together large images scanned with multiple passes. Can also read bar codes. The device pulls out from a bay on the front of the mobile. Can be detached from the spring-loaded wire link and used untethered, with Bluetooth sending scans to the mobile for processing or storing. The wire allows it to be used in aircraft and other places where Bluetooth may be banned and also means it is less likely to get lost

Slot at front edge for smart cards, providing identification and access to services. Can also take other peripherals such as memory expansion

Underside of mobile comprises a smart surface, which complements the smart port. It can sense and configure itself in any orientation to provide power and data services available on another smart surface with which it comes into contact

Universal smart ports automatically configure themselves to whatever they are plugged into – including a standard low-voltage DC power supply

IT'S BACK TO THE SCROLL AND BOOK

Two other flexi-screen formats could give a Palm-sized device a screen at least twice its size. The screen could be rolled up into a scroll or it could slide out like a roll-top desk, with a hinged lid flipping back to act as backing plate. Also seriously being considered is a hinged screen on a device that opens out like a book.

ventilation. The flexi-screen allows the mobile to fit snugly in a coat pocket designed for the purpose. This is fitting clothes to the computer rather than the other way round, an idea that is gaining ground (see below right).

The tactile display is only one of four smart surfaces (in the sense of an intelligent physical interface). The other three are:

Smart Rodent This is the paper interface, basically a scanner that can double as a mouse – though it is an open question whether either function will survive in a mainstream device as use of the tactile screen matures. The base springs in and out to allow it to fit into its tiny bay. Its ability to stitch together partial rough scans is already available on HP's over-bulky but underrated CapShare portable scanner.

Smart Base Researchers in Cambridge have been playing with this idea. Contacts on the base talk to similar ones on smart desktops and configure themselves for power and data whatever the orientation of the device. Crucial here is the idea of a ubiquitous low-voltage DC power supply: the mobile simply announces what it wants. This ready availability of power reduces battery drain and eliminates heavy mains adaptors. (We have the makings of a universal DC supply in the USB port, but it is inflexible and underpowered).

Smart Plugs These are functionally the same as the smart base but provide a more robust connection, allowing the passage of more power and higher bit rates.

You might also count the infra-red port and the webcam as smart surfaces. I include infra-red to make the point that we should not kill it off just when it has got useful. It can hit beyond 16Mbits/sec and its short range and line-of-sight operation can be seen as advantages.

Two PC Card bays are included tentatively. If they are needed at all it will be for smart cards, authorising the use of services, rather than for the kind of card peripherals in use today. To this mobile, the world is its peripheral.

Intelligent environment

I have been deliberately vague about details such as dimensions to present as broad a picture as possible. But you might wonder, from the diagram on the previous page, if it is possible for something that size to cope with data from all those sources: processing one digital signal is much like processing another, but you still have to capture it and tune your device to it.

Digital Audio Broadcasting (DAB), which is set to replace analog radio in Britain, is actually designed for mobile use. But the mobile doesn't have to pick up all the data directly if it is surrounded by devices that can. This is a world in which machines pass data to each other.

TV, in particular, is used in a very narrow context today: large, rich organisations push programmes to couch potatoes. Many programmes, especially on obscure channels, are dross with tiny audiences. Yet there are video gems by the thousand sitting unwatched in archives. It's

like being in a library and being allowed only to read Mills and Boon. Small wonder that the take-up of digital TV is low, with people declaring that they cannot see the point of all the extra channels.

Still more channels could be delivered using the same bandwidth to small-format mobiles. But much of the content would be pre-ordered by people who want to see it. In an integrated communications system, as opposed to today's segregated one, you could call up anything. You might have to wait a while, or pay more to get it immediately, but you could get it in one way or a hundred. And not just archive material.

Satellite broadcasting is cheap: you could probably make money from a few score people paying to watch the screening of a small-town gig. The current structure cuts out a whole layer of economic activity.

Your mobile would need to transmit only as far as the nearest building to put the world literally at your fingertips. Ubiquitous home gateways, packing wireless networking and sitting on multi-megabit always-on web links, could act as relay stations.

Why would householders allow you to do this? You might as well ask why they would allow you to use the street outside their door. Data-transport systems are every bit as much public infrastructure as roads. Only transient commercial pressures prevent them from being treated as such. We need the business models of today to build the network of the future, but they will change radically as the e-economy matures.

Home or office gateways provide

the link between the local and wide area network and what, with the rise of Bluetooth, is coming to be called the personal area network. Here the relationship between human and machines, and other humans with machines, will become very complex indeed.

The principle is the same as with the wider network. If you want to hear music, you ask your hi-fi to play it. You want a video, you call the DVD. You want to store data, you call up your archive. The TV will lose its distinct identity to become simply an alternative, big screen viewing mode. You might have a family browsing different content on their private mobiles while half watching a programme on the big screen. TV recording, which can be ludicrously complex today, will be a matter of clicking a listing.

All this will change lives as much as TV did. We seem to be moving from a text-based literacy to a tactile-audio-visual one with its own grammar. If you could see someone using a computer a century hence, you might be hard put to understand what they were doing. IT will make people better informed – even, arguably, more intelligent. But not all changes will be to the good. That camera eye may do wonders as a videophone but, even more than mobile phones, it could become very intrusive.



Custom jewellery... throat mic and earphones in the form of a necklace, pendant and earrings. The ring (centre) flashes to alert you to email. All are experimental IBM designs, as is the PDA-watch (left) which reflects a growing interest in wearable computers. Its battery-friendly OLED screen has full VGA resolution and uses Kodak's emissive polymer (see page 17). Flexible OLED screens are still some way off.