Mobile Wireless Broadband

Skeeve Stevens writes about the hottest new Wireless technology and describes his excitement in discovering Mobile Wireless Broadband

Wireless, 802.11, Hotspot, a, b, g, Access Point, WLAN, WiFi, blah blah blah — Wireless ad nausium. *Hotspot* was the catch phrase of 2003 with the big Telcos like Telstra and Optus getting involved either by purchasing existing infrastructure or doing their own roll outs in areas such as Airports and McDonalds restaurants. Wireless technology became commonplace in the home and was accepted as a valid addition to the office LAN.

Entering 2004 has delivered us something new, *Mobile Wireless Broadband*. "What?" You say, "Wireless already is mobile!". You may think that wandering around the office, house or in the back yard is being "mobile", but it is not the same "mobile" I'm referring to here. I'm talking about true mobility — much more than being able to wander close to where your base station is located. Driving along a motorway, sitting on a boat or ferry, or travelling to work on the train are some of the scenarios that come to mind when I think of true mobility. 802.11 wireless is now passé. Even my mother has 802.11a throughout her house. It is like what my niece is constantly saying to me: "Uncle, that is just so *last week*".

In 2003, providers like PBA (iBurst), Unwired, BigAir, and manufactures like Intel all started to make noises as they cranked up their spin machines. Now comes 2004 and they are ready to start yelling at the press: "Our technology is the next big thing". The hype war is on and who knows what to believe considering that almost none of the technology has had time to prove itself. Just when Joe Public was beginning to understand what WiFi and 802.11 was all about, now there is a whole new range of acronyms.

Due to the iBurst service by PBA being the only commercially released product/technology in this area, this article will focus mainly on it, but I will also discuss the other competing technologies that are similar in purpose and design.

The Technology

For the technically minded, what I have provided here are some details about the significant players in this new wireless world and how they came to be.

iBurst

This is a proprietary wireless technology developed by ArrayComm in the US. It makes use of licensed 1.9 GHz spectrum which has been built around ArrayComm's IntelliCell adaptive smart antenna (spatial processing) technology. Broadband speeds of up to 1 Mbit/s download and 345 Kbit/s upload (simultaneously) are attainable, with the average download speed being 600 Kbit/s. The range of the iBurst technology is around 13-14 km from a base station, with the further you get away, the slower the speed gets. *iBurstII* and *iBurstIII* are currently on the drawing board and will offer speeds of 4 Mbit/s and 8 Mbit/s respectively. Range will also be extended in the new versions. It will be about 18 months untill iBurstII and a further 18 months after that for iBurstIII.

The iBurst technology has been very specifically designed for mobile users. It has excellent base station to base station hand over when moving (as well as standing still). iBurst is one of several technologies being proposed for the IEEE's 802.20 standard, but the only one that has a commercial implementation. PBA obtained its spectrum in the 2001 auctions when they snuck under the radar of the other Telcos and purchased a 5 MHz slice of the spectrum in all capital cities. It obtained the spectrum for only $10 million — under the name CKW Wireless.

While "iBurst" is the technology, the company behind it in Australia is *Personal Broadband Australia*. PBA is owned by ArrayComm, Kyocera, Mitsubishi and some personal holdings.

Unwired

This technology is currently only a *portable* technology. This is to say that the modem can be moved by a customer between computers at different locations within the network coverage area and be able to use their broadband service at those locations. But it won't actually work while moving. Unwired recently selected Airspan's 802.16a products to form the initial rollout of its core network in Sydney. Airspan is a founding member of the WiMAX forum and is evolving its technology toward the proposed 802.16d IEEE standard. The Unwired service can run at speeds of up to 1 Mbit/s with ranges over 10 km from the base station.

Unwired purchased its spectrum in the 2001 auctions using the name "AKAL". Unwired later acquired Austar's share of the spectrum and now owns close to the entire available 3.4 GHz spectrum (a 100 MHz slice), which covers approximately 95% of the Australian population. Unwired's success was due to the ACCC which made a ruling stating that Telstra was not allowed to bid for any metropolitan 3.4 GHz spectrum. Unwired spent over $95 Million in the auction themselves and whatever was later required to obtain Austar's share of the spectrum.

BigAir

 I do not understand these guys. BigAir is deploying a wide scale wireless network based on 802.11b technology — the old gear that even hardware vendors have been discounting and offloading for the past 6 months. 'g' is supposedly the new thing and these guys are doing it with 'b'.

I include BigAir here because unlike Hotspot providers such as Azure and Alphalink, these guys are providing Fixed Access Wireless to homes and offices as alternatives to other broadband connections like DSL and cable. Their initial marketing will be directed at those in Multi-Dwelling Units (MDUs) in areas where getting cable or DSL is not possible.

BigAir say they are using "proprietary RF design techniques" and I have on good authority that it doesn't really mean anything other than perhaps external antennas. It is assumed that the technology used will be mostly an *off-the-shelf* kit with standard 802.11b limitations of distance, security, signal quality and channels.

My last comment regarding BigAir is that they perhaps shouldn't be underestimated. They have some serious talent including **Jason Ashton**, formerly of Magnadata/NTT, **Patrick Choi** formerly a director of PowerTel and **Rob Gillan** formerly of Alcatel and

C&W Optus. These guys bring some amazing talent, but the 802.11 kit worries me a bit.

WiMAX

The WiMAX forum consists of members such as Intel, Nokia, Airspan, Siemens Mobile, Fujitsu, AT&T, Proxim, Unwired and many more. Over 65 heavy hitters at last count. They have working groups that are concentrating on developing and publicising the "IEEE 802.16 Air Interface Standard".

Intel, famous for its new found love with wireless (Centrino), wants to increase its semiconductor business and see the WiMAX standard as a vehicle to make that aim a reality. Intel has said that it intends to make WiMAX-friendly chips (whatever *friendly* means) available by the end of 2004.

The 802.16d standard is expected to be completed and approved any time now but the forum themselves say that they probably won't certify any equipment till the start of 2005 after defining and carrying out a testing system.

Whatever happens with WiMAX, it will not be around for a while yet and won't be proven for a period after that. There is no actual standard yet and any products that do purport to be WiMAX are akin to the "V.Fast and V.FC" modems of days of old when 56k was still being defined. At the time manufacturers just couldn't wait for a standard to be ratified, so they launch their products early in the hope of gaining market share, and brand acceptance. Will they do it again? Probably yes.

Two very important companies, Cisco and Motorola have so far resisted joining the WiMAX forum as they sit back and see which standard comes to fruition.

Which ever technology wins, the next few years in wireless are certainly go-

ing to be interesting. There will be several stages in the process of each new technology:

The Hype

This is when the different competitors say that their products are better than the others and make promises about what their products will be able to do.

The Hardware

Initially, device pricing will be high, as they will be made by only one or two manufacturers. (WiMAX may be the exception here)

The Cost

Monthly plans will be different depending on the target market, but suffice to say that your ordinary user won't be able to afford it until there is widespread adoption of the said technology.

The Reality

All the technologies will work, they wouldn't have got this far if they didn't; but with sketchy coverage at first while the carrier's battle to extend their coverage as fast as fiscally possible. This would be the current stage that Orange is in with their "3" network using 3G technology.

What Does It Mean For the Real User?

Our Experience

As a wholesale Internet provider my company looks at all the different technologies as they emerge. We don't rush into anything but we taste everything.

I had heard about the iBurst service trials throughout last year in the IT News, but it didn't really register with me. It was just before Christmas that I read that PBA launched their iBurst services with limited coverage of the Sydney CBD and outlying CBD areas (Parramatta, Chatswood, etc). This got my interest and I started to investi-

gate more about it and became more interested, so much so that we soon had a meeting with PBA and borrowed a couple of iBurst cards to test.

My life changed in an instant. I remember a couple of years ago logging onto one of my UNIX servers from my Nokia 9210 while parked by the side of the road in the Blue Mountains. That was a momentous day for me, telneting at 9600 bps, paying close to $1 per minute. But the Nokia experience was nothing in comparison to the iBurst service. This technology that came from nowhere had suddenly shaken my world (actually they've been around for a while; I must have been asleep not to see them arrive).

Here is what did it for me. The day after we received our cards, my boss was driving along while I had the laptop and I was connected to thebasement.com.au and receiving a live feed of a 400 kb/s video stream of Doug Mulray live on air. There was almost no jitter as we drove at speeds in excess at 60 kph. We could not believe it. I proceeded to log onto several UNIX servers using SSH, I POP'd my e-mail, loaded one Web page after another, used Terminal Services to the office and even started downloading a RedHat CD image off a local mirror. Speeds were variable, but downloads were steady at 70 kB/s which is excellent and exceeds a 512k/128k DSL service. We didn't know what else to do, so for the next hour we just loaded Web cams, Web sites, pinging and traceroutes and chatting to people on Messenger, ICQ and IRC. Then while my boss visited a customer, I sat in the car park and did changes to some Web sites.

It was like we had found gold. We then decided to go for a long drive from Parramatta to the City, over the bridge, up to Chatswood then over through Lane Cove and up the M2 back to Seven Hills. The coverage between Parramatta and the City wasn't great, with dropouts, reconnects and so on. Once we got closer to the city there were only a few problems, with

the occasional large office tower causing a blind spot. Continuing over the Harbour Bridge and on to Chatswood, things were quite smooth. Heading back to Seven Hills we were hanging off the Chatswood base station so the further we got away the weaker the signal became. But this entire time, we were driving at varying speeds, over bridges, up and down hills, into valleys and for the most part, the iBurst service performed amazingly well.

Over the next week the immediate novelty wore off, so we gave the iBurst cards to a field technician and a sales guy. This was our second stage of amazement as the guys chatted to us over Instant Messenger, accessed the office network for documents, used the Web for support and drivers and generally impressed the hell out of the clients they were visiting.

Then we had best demonstration to date of this new technology. One of our sales guys was a couple of kilometres south of the Sydney CBD and with his laptop he logged into our office network using the Cisco VPN client. He then loaded up the Cisco soft phone and connected to our office VoIP network. Once connected, he drove from the south of the city, over the Harbour Bridge to Crows Nest, talking to us in the office all the way. There were times when he became faint and echoed a little just like mobile phones today, but there he was, driving along making a VoIP call. This was mobile wireless broadband at its best.

Over the past couple of months the guys have been all over Sydney, used nearly every protocol and network application possible on the iBurst service. After all the hype has gone and the *toy* becomes the *tool* you really start to understand how mobile wireless broadband is going to have a big affect on our lives.

The customers I envisage to be large scale adopters of the iBurst technology will be the commercial world. Lawyers in court and paralegals on the

run; Architects and Engineers on building sites; travelling executives coming into town; hotels freeing guests from their rooms; Council workers reading meters; couriers collecting signatures; Law Enforcement officers logging reports; Journalists and Photographers out reporting stories; people living on boats; workers travelling to work on ferries/jet cats, trains, buses and even carpooling; Sales people not needing to return to the office to do whatever one has to return to the office for; and the list is endless.

On Wednesday night 16 March 2004 on Sydney Harbour, the iBurst service of PBA was launched on an unsuspecting public. There were the typical suits and politicians and even **Dr Karl Kruszelnicki** gave a high speed talk. The iBurst service was demonstrated in absolutely amazing fashion where they had a laptop with a Digital Video Camera plugged into it, streaming to another iBurst powered laptop which then projected the broadcast onto a big screen using a data projector. Amazing stuff! Even more so was hearing **Marty Cooper** speak, CEO and Founder of ArrayComm and the man to make the first ever mobile call on 3 April 1973 when he worked at Motorola.

Today and the Future

Today, PBA has only PCMCIA cards available for iBurst. This works well in PC laptops, Macintosh laptops and Linux drivers are available for some versions of the card. We are currently waiting for the WinCE drivers so that with a caddy, we can have our iPAQ and other PDAs that can support full sized PCMCIA cards, using the iBurst network to do things like: pick up e-mail; use the Web; instant messaging and other apps that will surely be written to fully exploit this technology. In the not too distant future we will see the introduction of iBurst technology in SD or Compact Flash cards, enabling a new generation of devices with wireless.

In the next couple of months PBA will

be releasing the desktop version of their iBurst service with a USB/Ethernet bridge. The desktop service will essentially be a product like the Unwired and BigAir offerings. The uses for FWA are also endless, for example: Emergency broadband (when something happens to your current connection); conferences; boating; vehicles such as Taxis and Limousines; Remote monitoring of devices such as Vending Machines; and the list goes on.

iBurst vs. the Others

The iBurst service has some distinct advantages over the other technologies which right now, and in the long term, make it a more suitable and stable option in which to invest.

Availability

It's here. You can actually buy it today. It is not a dream. Everything else is either fantasy or still in testing mode. *Nothing else gives a product a boost like actually being able to buy it.*

Base Station Hand Over

This is when your connection is seamlessly transferred from one base station to another when the signal gets weak or the load gets high.

Your average mobile phone changes base stations every few minutes, being transferred to where the signal is strongest at that moment and where a base station usage is lowest. Imagine the network switching that your mobile phone has to go through when you are driving along. This is what the iBurst service has been designed to do, but doing so while delivering greater bandwidth than does a mobile phone.

The iBurst service has this hand over feature designed into their technology so whether you are mobile, or using FWA, the product will be able to swap between base stations to handle capacity spikes and network issues as they arise.

Unwired's technology does not currently support base station hand over and this will cause issues as customers connect to a particular base station for service. If that base station goes down for any reason, it will be much harder to reconnect to the network. That said, with the number of base stations these guys are planning (70 in Sydney alone) this issue should be solved by the planned 802.16e specification which should be a relatively simple upgrade to from the 802.16d technology. At the moment, all that is theory with specification not finished and no technology even existing, indeed the standard should be finished just about the time products are being certified for 802.16d, so we have a year or two before it is a reality.

Base Station Backhaul

Each iBurst base station is able to handle approximately 20 Mbit/s of traffic capacity. This means that at any one time, hundreds of users will be able to get an excellent signal and throughput. Other technologies do not have backhaul anywhere near this such as Orange's "3" network which has about 2-3 Mbit/s per base station and Unwired, which has around 10 Mbit/s per base station. This means that fewer iBurst towers are required to achieve the same coverage as other providers.

Adoption

When PBA started trailing the iBurst service in Australia two of the partners involved were *OzEmail* and *Vodafone*. OzEmail has just announced it will be joining as a Channel Partner, but Vodafone is yet to figure out how to bundle the service. With partners like OzEmail along with UnitedIP, Fujitsu, SecureTel, Mobile Broadband, Veritel and Techex, the iBurst service will no doubt be a familiar brand on the broadband landscape by the end of this year.

Regional Access

At present there is no possibility of iBurst access in regional areas. When the ACA held its auctions in 2001 it released only the 1.9 GHz range in the capital cities, not the regional areas. No one owns the TDD 1900-1920 spectrums in places like Bathurst, Orange, Bendigo, Ballarat or Geelong, because the ACA hasn't decided to release that spectrum yet. One problem I think the iBurst service is going to have, is that due to their success so far, once the ACA does release the spectrum, the big Telcos like Telstra and Optus will go all out to buy as much as they can to stop the iBurst service getting outside the capital cities. The ACA does have the ability to decide who can bid on the spectrum, which is influenced by the ACCC, which has happened in the past.

This is one area that Unwired does come out on top, having purchased national coverage with their spectrum; they are able to reach almost 95% of the population. Unwired's only issue here is the cost of rolling out the network.

The State of Affairs in Victoria

Although relatively unpublicised, Victoria is currently in a state of confusion over network rollouts.

The ACA has a section of the Telecommunications Act called the Telecommunications (Low-Impact Facility) Determination 1997. The purpose of this determination is that Carriers are able to go about installing *low impact* facilities to extend their networks without having to deal with the arduous planning laws of local councils. The problem with this determination is that it is a little vague in exactly what is classified as "low impact".

Recently, Hutchison 3G, aka "3", pushed the envelope of what could be determined as low impact and several councils objected. Monash City Council objected to Hutchison 3G wanting to put a mobile array on a

concrete light pole in Glen Waverley, and took them to the Victorian Civil and Administrative Tribunal. In a separate but similar case involving Hutchison 3G, the Victorian Supreme Court made a determination that while antennas are described in the low impact determination, that none of the other equipment required for a telecommunications facility, such as fit-out room, cabling, poles and so on, constitute a low impact facility in terms of the legislation.

What does that all mean? Well, it means that due to this decision, no carrier is about to rollout any more facilities in Victoria. This means a stop to any more Telstra, Optus, Vodafone towers; no more 3G rollout for Hutchison; no more antenna arrays for Hotspot providers such as Azure, Alphalink and others. It means a complete dead halt, a moratorium as such, on all Telecommunications Infrastructure rollout in Victoria. This also includes underground cabling.

When will this situation be fixed? No one knows at this point in time. The Federal Government has not yet become involved, but clearly in the interests of being sensible, something has to happen soon.

What Does this all Mean For Melbourne?

Assuming that something happens with the planning laws, or new rules are put in place for the low impact determination, then Melbourne is a strategic location for PBA.

Melbourne, being predominately flat, will mean coverage can be rolled out a lot quicker than in other locations. three to four base stations are immediately planned for the CBD which will see coverage extending to the City; North, South, East and West Melbourne; Fitzroy; Newmarket; Carlton; Kensington; Richmond; and some areas of St. Kilda, all with reasonably good coverage. A base station is also planned for the airport which gives good coverage around the area of Tullamarine.

Sometime next year an executive visiting from another city should be able to fly into Melbourne, pick up a card from the airport, or bring his own, and then immediately get onto the Internet or company network to make use of that normally wasted 30 to 40 minute trip to the city and play catch-up for lost time on the plane.

Brisbane will be rolled out at the same time as Melbourne, and there are plans also in place for Canberra by the end of the year with other capitals being looked at in the future depending on demand.

Conclusion

This new wave of mobile wireless broadband will revolutionise our lives. In a couple of years from now, there will be no requirement to deal with Telstra or its monopolistic infrastructure and costs. The arguments in today's media about Telstra BigPond and their Anti Competitive actions will be long gone.

The new generation of wireless technology will help make broadband cheaper and bring broadband to those who currently cannot get it. Coverage will always be an issue for those in far regional areas, but hopefully new technologies will be developed which will give these areas true broadband access.

Links

http://www.iburst.com.au
http://www.arraycom.com.au
http://www.wimaxforum.org/tech/
http://www.unwired.com.au
http://www.bigair.com.au
http://www.aca.gov.au
http://www.austlii.edu.au

About the Author

Skeeve Stevens, skeeve@skeeve.org, is General Manager of a wholesale ISP based in Sydney. He freelance writes on topics such as Hacking, Security, Broadband and ISP related issues. ❑