WiMAX briefing

Background

WiMAX (Worldwide Interoperability for Microwave Access) is an acronym developed by industry group the WiMAX Forum [1] to promote the wireless data standards developed by the 802.16 IEEE working groups [2]. In its fixed variant, 802.16d [3], applications include last mile wireless broadband access as an alternative to cable and DSL, wireless backhaul for metropolitan 802.11-based WLANs, and other point-to-point applications. The mobile version, 802.16e [4], supports roaming between base stations and therefore extends broadband service to mobile clients such as phones, laptops, navigation and gaming devices. Mobile WiMAX in its Wave 2 revision offers large coverage cell size (on the order of 1-2 kilometres in an urban environment), high download speed (around 1Mbit/s at the cell edge; up to 70Mbit/s under ideal conditions) and predictable quality of service. This standard is expected to be ratified in mid 2008. (*"Certification testing will be performed in multiple releases and waves […] to test products as they evolve over time with new features/specifications. For each release, the procedure will test all new features as well as all previously tested features. […] For each release, there will also be different waves of testing"*. See http://www.wimaxforum.org/technology/downloads/Certification_FAQ_final.pdf [5].)

802.16 can theoretically be adapted to any frequency below 66GHz, but in practice is limited to specific 'spectrum profiles' promoted by the WiMAX forum to reduce interoperability costs. These focus on 'centimetre' wavelengths, which are well suited for point-to-multipoint and last-mile distribution. These fall at around 2.3GHz, 2.5GHz and 3.5GHz. WiMAX has recently been recognised as a permissible International Mobile Telecommunications-2000 standard [6] (IMT-2000 standardises 3G technologies for the International Telecommunication Union), competing with other 3G standards. The next generation under development, 802.16m [7] (due 2009), is set to compete against the forthcoming 4G technologies UMB [8] (Ultra Mobile Broadband) and LTE [9] (Long Term Evolution, the Third Generation Partnership Project's competing proposal).

The UK Market

The nascent UK WiMAX market place is complex. Some licenses have been issued by Ofcom:

- UK Broadband [10] ISP holds 15 regional licenses for 3.4GHz WiMAX, but to date has deployed only in the Thames Valley (trading as 'Now'). At the time, these licenses were restricted to fixed and nomadic use, but following the recent decision at the World Radio Conference designating 3.5GHz as permissible IMT 'mobile' spectrum, Ofcom has extended these licenses to permit mobile use (the first regulatory body in Europe to do so).
- Pipex Wireless (a Pipex/Intel joint venture) has conducted a programme of small scale market trials, operating as FREEDOM4 [11]. They hold a national licence for use of 3.6-

4.2GHz spectrum plus three metropolitan 28GHz licences covering London, the Midlands and the Northwest. They are currently planning to offer coverage in Manchester as the first phase of the rollout of a national network covering the top 50 population centres.
- Urban WiMAX [12] ISP offers a service covering central London.

However, the key WiMAX licenses target the 2.5GHz spectrum selected by the ITU for global provision of mobile data services, and these are yet to be released by Ofcom. When this portion of the spectrum is released, it will most likely be in the context of a bidding process for national licenses to operate on the bands required, and it is expected that, much as with 3G mobile data technologies previously, those licenses will require significant investment to obtain. It is therefore likely that the viable business case around WiMAX in the UK will see the rollout of one or two national networks, and again as with 3G networks, the initial deployment will focus on areas of high population density and the corridors connecting them.

It is expected that the UK will auction off licenses in the 2.5–2.69 GHz WiMAX band in the first half of 2008. The beginnings of a national infrastructure and first generation client hardware should be available soon afterwards. Intel's 'Baxter Peak' and 'Montevina' chipsets, which support both Wi-Fi and WiMAX connectivity, will begin to appear in handhelds and laptops respectively in 2008/9 (see http://www.intel.com/pressroom/archive/releases/20070919corp_a.htm [13]).

WiMAX and the Education Sector

We frequently hear reference to WiMAX as a forthcoming solution to mobile data connectivity in a campus environment in terms that suggest it is considered to be simply a larger, faster equivalent of a WiFi access point. This perception may have come about through publicity materials that focus on the technical capabilities of the standard rather than the regulatory environment within which it will operate. Unfortunately, it is inaccurate.

Rather than a technology that an educational organisation will deploy, manage and connect directly to their IP infrastructure (like license-exempt 802.11-based access points), WiMAX should be seen as a data service obtained on a commercial basis from a third party supplier (like a mobile phone data plan or laptop 3G card). The economics of this are likely to dictate that rather than forming the solution to local mobility on and around campus for the staff and student body en masse, this service will be appropriate initially for a smaller number of highly mobile staff who require connectivity nationwide and have access to the high-end first generation hardware with native WiMAX support. The only potential for organisations to operate their own WiMAX hardware may arise where incumbent license holders do not plan to deploy coverage (for example in low population/rural areas) and are willing to sub-lease the required spectrum.

Janet will monitor developments in this area. We hope to enter discussions with the winning license holders once the spectrum is released with a view to the exploring ways in which this technology can be used effectively by our community.

Links
[1] http://www.wimaxforum.org/home/
[2] http://www.ieee802.org/16/

[3] http://www.ieee802.org/16/tgd/
[4] http://www.ieee802.org/16/tge/
[5] http://www.wimaxforum.org/technology/downloads/Certification_FAQ_final.pdf
[6] http://en.wikipedia.org/wiki/IMT-2000
[7] http://www.ieee802.org/16/tgm/
[8] http://cdg.org/news/press/2007/Sep24_07.asp
[9] http://www.3gpp.org/LTE
[10] http://www.ukbroadband.co.uk/
[11] http://www.freedom4.com/pg.asp?p=home
[12] http://www.urbanwimax.co.uk/
[13] http://www.intel.com/pressroom/archive/releases/20070919corp_a.htm