



## **WiMAX**

# **The Technology & the Business Case**

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## **Introduction**

WiMAX is being hyped out of all proportion. Vested interests on the part of three primary players in the UK have resulted in enormous hyperbole designed to protect significant investment in spectrum by Intel in partnership with Freedom4 and PCCW (trading as UK Broadband Limited).

Intel has invested in the UK in order to protect its massive investment in WiMAX research and development that is to feature in their emerging chipsets. Interestingly, similar partnerships with Clearwire and Sprint Nextel in the United States have collapsed with the Network Operators realising a potentially poor return on investment.

Freedom4 is the more vocal of the two network operators in the UK and is increasingly promoting the use of WiMAX for a plethora of applications for which the technology is not ideally suited.

This paper is intended to illustrate why WiMAX should be compared to ADSL/SDSL cable services that are contended; but not with dedicated leased circuits. It also questions the commercial viability of WiMAX in the UK where there is a saturation of cable based services available through an established infrastructure.

## **The Evolution of the Standard**

WiMAX (World-wide Interoperability for Microwave Access) is based upon the IEEE 802.16 (Institute of Electrical and Electronic Engineers) standards for wireless metropolitan area networks. The IEEE standards (one for fixed links and a second for mobile connections) originally specified use of spectrum ranging from 2GHz to 60GHz; however, the WiMAX Forum (established to provide interoperability testing), realising the high cost of silicon that would be capable of operating at the higher end of the spectrum range opted to use spectrum between 2GHz and 11GHz.

The standard assumes exclusive use of the spectrum in which it is operating and, as such, cannot accommodate third party interference.

As neither the IEEE nor the WiMAX Forum has the ability to mandate which spectrum will be allocated in different countries and regions, there has inevitably been an extended delay between ratification of standards and commercial delivery of services.

Progress is now being made and there is now considerable hype surrounding the launch of commercial services in the UK, where two Companies own spectrum that is dedicated to WiMAX services.

- Freedom4 owns the 3.5GHz band
- PCCW (trading as UK Broadband Limited) owns the 3.4GHz band.

Inherent to WiMAX is the commercial need to over-subscribe the network, which is dictated by the high cost of base station equipment coupled with Operators' intention to deliver services at near ADSL prices.

Whilst International standards are invaluable in ameliorating the potential for IT Vendors to lock customers into proprietary technologies, this openness does come at a price. Standards invariably introduce compromise as competing vested interests of the technology contributors dilute systems performance.

WiMAX is no exception to this rule as brief examination of the standard reveals a plethora of protocols governing interoperability, network handshake negotiation, quality of service, etc. The net result has compromised the potential performance that would otherwise be possible.

## **Comparing Apples with Apples**

WiMAX should be pitched against ADSL over which it has the advantage of potentially being delivered as a symmetrical service, i.e. your uplink speed is the same as your download speed. Freedom4 for example is highlighting its intention to deliver data at up to 4Mbps each way.

Parallels will also be drawn with the more expensive SDSL services, which by definition are also symmetrical but as is explained later, SDSL is typically delivered as a contended service thereby making the quality of service non-deterministic.

It is worth noting that Freedom4's partner in Milton Keynes, MKConnect, advertises split data rates for Business users –

- 1Mbps Symmetric
- 2Mbps Symmetric
- 4/2Mbps Asymmetric

WiMAX proponents are not keen to advertise the principal attribute that its wireless technology shares with ADSL services: notably contention ratios that are predicted by industry observers to be in the region of 20:1. This means that any WiMAX user will be sharing bandwidth with others on an ad hoc basis which is bound to have a detrimental affect on the user experience. (Note that WiMAX Operators quote data rates 'up to' certain speeds.)

It is worth noting that SDSL resellers will claim that this service is not contended; however it is almost invariably the case that SDSL subscribers will contend for shared bandwidth from the point of entry into the network exchange. SDSL subscribers of <4Mbps services face additional problems as the bandwidth is split across different physical connections (one line per each 2Mbps of service) introducing a complex data management challenge if the full resource is to be utilised.

The authors of this paper recommend that any User contemplating the use of WiMAX for heavily used circuits must clarify how the service will be affected when stressed over extended periods of time.

Operating in a dedicated spectrum, WiMAX is not subject to interference from other radio sources; however, it will be open to interference from a growing installed base of WiMAX equipment (when Intel gets its way) that will increasingly negotiate with base stations for services to which the User may or may not have subscribed.

With regards business pricing, MKConnect publish prices on their website ranging from £60 per month to £160 per month, which represents a significant mark up over many ADSL services. Whether or not the modest increase in upload speeds will justify the premium remains to be seen.

### **Aligning WiMAX with Airfibre Services**

Airfibre operates managed wireless network services that are directly comparable to dedicated point-to-point leased-line services from legacy network operators.

#### Zero Contention

Airfibre circuits, delivered as dedicated un-contended services, ensure that no one customer can compromise the service of another. WiMAX, as cited above, operates in a contended environment and, as is the case with ADSL circuits, Users must expect differing levels of service in-line with others' usage.

A consistent level of service is important to a wide variety of applications that are sensitive to latency including VOIP, Video Streaming, Citrix, web hosting, etc. Commercial WiMAX services are not intended to support extended periods of high bandwidth utilisation; rather as is the case with ADSL, these services are designed to support bursts of high bandwidth usage.

#### True Symmetry

All Airfibre circuits are fully symmetrical operating at data rates extending from 1Mbps through to 1Gbps. Airfibre does not use clever words such as 'up to' in order to guard against the possibility that contended services will impact either upload or download data rates. Moreover, customers can migrate between data rates at short notice to accommodate varying requirements over time.

### No Usage Limitation

Consistent with an obvious need to constrain costs, MKConnect advertises a fair usage policy for its Freedom4 WiMAX circuits. No such constraint applies to Airfibre services.

### Service Level Agreement (SLA)

Positioning its services against dedicated leased line services, Airfibre conforms to and delivers against a 99.95% SLA. Once again, reference to MKConnect's FAQ page suggests that a help line is available (not 24 hours) and that the Company will aim to get back to Users experiencing problems inside 48 hours.

This is in stark contrast to Airfibre 'managed services'. The Company has invested heavily in automated network monitoring and management systems, operates a 24x7 help desk facility and proactively works to ensure that the network delivers against the SLA to which it is contractually committed.

### Proud to be Proprietary

Airfibre's use of carrier grade radio systems also involves use of proprietary technology for performance optimisation and increased security. Because services are dedicated to each customer there is no requirement to compromise quality of service with standards based technology. This also ensures that circuits cannot be compromised by third party users of Wi-Fi type systems.

As suggested earlier, standards are important in avoiding proprietary lock in. However, with regard to the provision of communications services, there is no need to be concerned about the radio technology employed, provided it is terminated using industry standard interfaces e.g. IP/Ethernet.

## **What is Driving WiMAX?**

In a nutshell – Intel!

In the developing world that lacks telephony infrastructure there is a clear case for WiMAX deployment. Once ratified, mobile WiMAX is likely to appeal to emergency services and others that require broadband connectivity to vehicles; however, the authors of this report suggest that 4G services will swamp this market as delivery of a successful commercial service will require a significant network of mobile services masts. In other words, this market will be dominated by Vodafone, O2, T-Mobile, etc.

In the UK the commercial case for WiMAX is not obvious for whilst it compares well with ADSL services there is no compelling commercial case for the majority of Users. It is highly unlikely that WiMAX will displace a significant number of existing ADSL circuits.

Intel's vision is 'always on' connectivity where computer users can log on to WiMAX networks wherever they roam. This might explain the Company's substantial investment in WiMAX research and development and the strategic importance of the technology to its next generation of chipsets. But one has to question the practicality of this vision given the relative failure of Wi-Fi hot spots to attract paying customers?

There is a danger that WiMAX will be another one of those technologies for which the true market fails to reach the aspirations of the technologists.

## Summary

Airfibre services will continue to appeal to its traditional customer base which includes: -

- organisations that have a strategic dependence upon Internet and point-to-point communications circuits;
- anyone that is frustrated by the varying performance levels associated with contended communications services;
- those frustrated with service level agreements associated with traditional wire-based ADSL, SDSL and leased-line services;
- public and private sector organisations that fail to understand why it should take so long to install leased line circuits; and
- organisations that cannot justify the cost of traditional leased-line communications services.

In essence, the Airfibre proposition occupies the middle ground between ADSL services that are inadequate for many organisations and dedicated leased-line circuits that are presumed to be of questionable value for most.

WiMAX offers a questionable alternative to wired ADSL/SDSL broadband services.