

WiMAX: Where is the Industry Heading in 2010?

With spectrum more widely available, a well established ecosystem of vendors and products in place, and operators beginning to ramp subscribers, could 2010 finally be the break-out year for WiMAX?

Wireless Broadband Perspectives - WiMAX.com Weekly Series

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For the next several months, WiMAX.com and Cisco will be featuring weekly topics and perspectives from the WiMAX & wireless broadband industries. For the first in the series, we are taking a glimpse at where the industry is heading in 2010.

As we look forward to 2010, it is helpful to first review where the WiMAX industry is today. Just over 4 years after the mobile WiMAX 802.16e profile was finalized in late 2005, there are now over 519 WiMAX networks in 146 countries and over 300 WiMAX products (including base stations and end user devices) according to the WiMAX Forum™. Intel has also launched notebooks with embedded Wi-Fi/WiMAX in 80 notebook and netbook models from a dozen of the world's leading PC manufactures.

According to Infonetics Research, the number of global WiMAX subscribers is expected to grow from 4M by the end of 2009 to 130M subscribers by 2013. While some may debate the exact numbers, there is no doubt substantial momentum and growth opportunities for the industry. High profile WiMAX operators such as Yota in Russia added 250K subscribers, while Packet One in Malaysia reached over 130K subscribers in their first year. In the US, Clearwire has reached more than 555,000 subscribers and its network now covers more than 30 million consumers in 34 markets.

While an impressive start, what are some of the driving factors for WiMAX growth in 2010 and what else can we expect to see in the industry?

India & Indonesia Take Focus

To understand the enormous potential of WiMAX you need look no farther than India and Indonesia, two of the top 3 most populated countries in the world (after China) as well as two with the lowest broadband penetration rates (less than 1%). In each of these countries, governments are targeting to add an astonishing 100M broadband users in the next 4-5 years.

Recognizing the importance of the Indonesian market, the WiMAX Forum™ recently established a regional chapter in Indonesia to promote the benefits of WiMAX to government officials, regulators, operators and customers. Last July, the Indonesian government awarded 2.3 GHz spectrum to 8 operators to facilitate the build-out a nation-wide network.

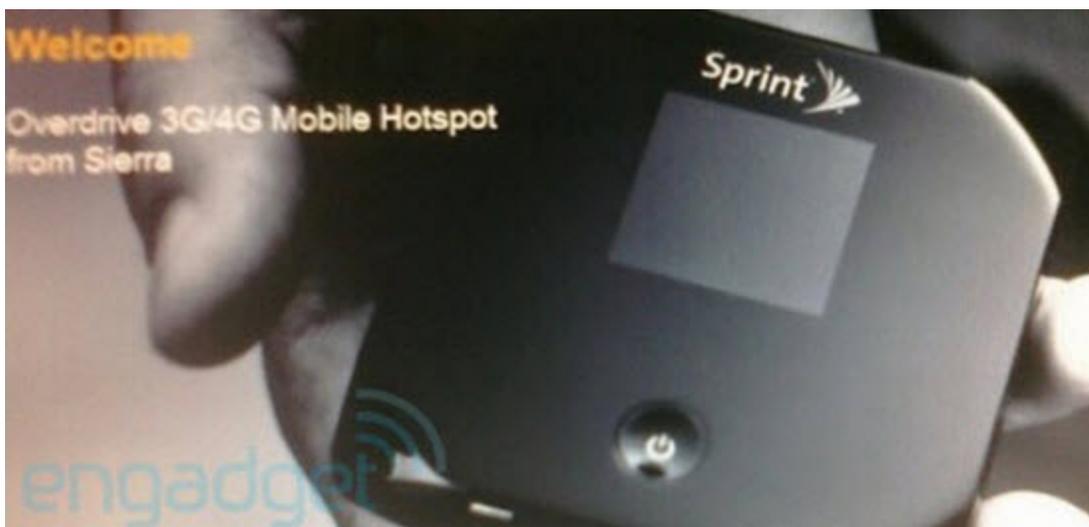
While WiMAX spectrum policy in Indonesia has been encouraging, the situation is vastly different in India where the auction of 3G & WiMAX spectrum has been repeatedly delayed. At last check, auctions are scheduled to take place on February 12th with spectrum available for deployments by mid-year 2010.

Not impacted by the spectrum delays, state-owned Indian-operated BSNL was awarded 2.5GHz spectrum outside of the auction process in 2008 and last month began deploying the first mobile WiMAX network in India at Ajmer, Rajasthan in north-western India. Although BSNL initially received the spectrum for free, it must pay for it once the auctions are held in February.

BSNL has also received support from Intel which recently announced a series of initiatives along with Indian hardware manufacture HCL Infosystems to develop low-cost atom based 'nettops' for the local market. Once complete, BSNL's network will consist of a nation-wide network over 7,000 base stations making it the largest mobile WiMAX network in the world.

More WiMAX & Dual-Mode Devices

With a mature vendor ecosystem and networks beginning to ramp, we should expect to see a variety of WiMAX enabled devices in 2010. Sprint is widely expected to announce its much anticipated dual mode EVDO/WiMAX mobile hotspot device at the Consumer Electronic Show (CES) this week in Las Vegas. The new device from Sierra Wireless dubbed "Overdrive" offers 100 feet of Wi-Fi connectivity would be similar to other "MiFi" type devices, but would be able to switch between Sprint's 4G and 3G networks depending on coverage. As in the past, we would expect to see similar branded products from Clearwire and its cable partners in the near future.



Sprint dual-mode EVDO/WiMAX mobile hotspot, courtesy Engadget

Also this week at CES, Intel is launching their new set of core processors with WiMAX support, and PC manufacturer Lenovo has announced their new lineup of WiMAX enabled ThinkPad Edge notebooks. In 2010 we can expect to see more notebooks and netbooks with multiple types of connectivity including Wi-Fi, WiMAX & 3G.

With the increase of WiMAX subscribers and larger orders to vendors from operators, we should also begin to see further declines in WiMAX CPE devices. "When ordered in significant volumes (i.e. millions of units), we should expect to see WiMAX USB dongles in the \$35-\$50 USD range," says XJ Wang, Marketing Director for the WiMAX Forum™. Lower priced WiMAX handsets are expected as well in 2010. In Russia, Yota was the first WiMAX operator to offer a dual-mode GSM/WiMAX handset from HTC priced around \$1,000 USD, but plans to offer a more reasonably priced mid-tier WiMAX handset from Samsung later this year.

WiMAX Base Stations & Advanced Antenna Systems

On the infrastructure side, another area of expected change is the increased use of beamforming compliment MIMO in WiMAX basestations to reduce total network cost and increase performance. One of the common misconceptions in the industry is that a "WiMAX certified base station" is essentially the same in cost effectiveness as any other "WiMAX certified base station", which leads to a race for the lowest price per base station unit. While two base stations may operate on the same frequency, have gone through the same interoperability testing and achieved WiMAX Forum™ certification according to the 802.16e WiMAX profile, how they compare based on performance can be entirely different.

Beamforming is a signal processing technique used in multiple antenna radio systems to increase coverage and capacity compared to more traditional radio systems. In a beamforming system, using multiple antennas, the base station is able to better tune-in to distant CPE devices by blocking out interference and directing a signal back based on the location of the receiver. Based on these improvements, fewer base stations are needed and more capacity can be delivered compared to traditional WiMAX networks.

Until recently, the traditional thinking was that WiMAX base stations using beamforming was too expensive. While it is true that a beamforming base stations can add 50% or more to the cost of equipment, beamforming can double the coverage area for a given frequency and increase throughput by 50%. The unfortunate consequence is that many WiMAX operators are tempted by the lower per unit base station costs, only to end up spending more to deploy an entire network.

According to a [recent study by British research firm Analysys Mason](#), WiMAX networks that utilize 8-antenna beamforming systems can cut their total cost of ownership (TCO) by up to 63% compared to 2-antenna systems with no beamforming capabilities. Since opex accounts for 60-70% of the total costs associated with each site, a reduction in the number of sites can have a huge impact on the total cost of ownership. Beamforming networks also have other advantages

as well including less dead zones, fewer dropped calls and better quality and throughput at the cell boundaries.

"Using smart beamforming, we have 3.5GHz WiMAX operators that are using roughly the same number of cell sites as 2.5 GHz operators," says Paul Sergeant, WiMAX Marketing for Cisco. "Beamforming doubles the coverage area and increases the spectral efficiency by 50%, so you can achieve 50% more traffic or optimize the network to perform 50% faster. We have effectively leveled the playing field for higher frequency operators, and made 3.5 GHz spectrum into valuable beachfront property."

While support for beamforming is included in the mobile WiMAX 802.16e profile, only a handful of vendors so far are offering beamforming-enabled equipment based on 4 and 8 antenna array systems, although more vendors have plans to do so on their upcoming roadmaps.

US Broadband Stimulus - Show Me the Money!

Finally, with WiMAX technology representing 25% of the last mile broadband stimulus applications, the eventual release of broadband stimulus funds should be an added boost to WiMAX vendors in 2010. Although the Obama administration has pledged to release more of the funds in the coming months, by the end of 2009 only about a 2% or 183M out of the \$7.2B in broadband stimulus funds have been released so far.

Interestingly, most of the first round of disbursements went towards funding "middle mile" projects that provide broadband connectivity just outside of the largest metro areas, rather than "last mile" service provider rural areas. While these improvements are encouraging, more work needs to be done to ensure that broadband services are delivered directly to the consumers and end users that need them the most.

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