Will the Real "Mobile WiMAX" Please Stand Up!

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Abstract

There has been a lot of noise in recent months about the role of "Mobile WiMAX" (IEEE 802.16e or officially IEEE 802.16-2005) in 3G/4G networks, especially since the very significant SPRINT-Nextel multi billion dollar deployment plan announcement. There have also been questions on whether "Mobile WiMAX" would be used for fixed or mobile broadband wireless networks, or both. We are now starting to see a trickle of "Mobile WiMAX" product announcements along with interoperability testing.[1] We therefore conclude that the 802.16e technology is real. *But we wonder if the market is real?* We take a hard look at these and other related issues in this article.

Discussion

In a telebriefing on September 20, 2006 Carolyn Gabriel, Research Director of Rethink Research (UK), addressed an important question: **Is mobility really WiMAX'S key weapon?** In her opinion, it is not –at least not yet. Carolyn asserts that there are other valid reasons operators may choose to deploy IEEE 802.16e (officially 802.16-2005, but AKA "Mobile WiMAX'). On

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[1] **On September 27, 2006, Beceem Communications announced that it is showing a live Mobile WiMAX demo at the Intel Developer Forum.** The demonstration is based on a PC card from Beceem that incorporates Beceem's MS120 Mobile WiMAX chipset, which is based on the IEEE 802.16e-2005 Mobile WiMAX standard.

21 members of the equipment development and operator communities participated in an interoperability test for Mobile WiMAX. Please see:

WiMAX Forum PlugFest Showcases Interoperability Among Mobile WiMAX Products

http://sev.prnewswire.com/computer-electronics/20060926/DATU04026092006-1.html

Insights from this first WiMAX Forum™ ***PlugFest*** demonstrating interoperability of mobile products will be discussed at WCA's ***Carrier & Enterprise Leadership Briefing*** on Oct. 4, 2006 in Reston, VA. The title of the talk is, **"WiMAX Forum Interoperability Testing At Bechtel Labs: Summary and Path Forward"** by Bechtel Principal Vice President & CTO J.S. (Jake) MacLeod and Intel Mobility Group Director of Technology Standards Kamran Etemad. http://www.wcai.com/event/06/b_agenda.htm

one slide Carolyn asks the opposite question: "Is mobility its Achilles' Heel? Or should WiMAX do something different?"

Ms Gabriel believes that network operators are initially interested in applications other than those involving mobility. In particular: personal broadband, service convergence on one network (that works both indoors and outdoors), along with fixed-mobile convergence are much more important then mobility to operators and cellcos considering "Mobile WiMAX" deployments. Indeed, Figure 1 - **"The First WiMAX Wave" -**shows that **actual WiMAX mobility will not have any significant market share till 2009!** Until then, we can expect almost all "Mobile WiMAX" deployments to be a combination of fixed and nomadic users.

In other words, early deployments of "Mobile WiMAX" will not serve mobile users or "people on the move." Will fixed and nomadic deployments justify the initial expense of putting in a "Mobile WiMAX" infrastructure? We're not quite sure. Here's why:

In an earlier article by this author, Manish Gupta of **Aperto Networks**[2] made a very key point: most of the world's available spectrum for fixed wireless access and backhaul applications is in the 3.5GHz band, which is much better served by using IEEE 802.16-2004 "**Fixed WiMAX**." Conversely, "Mobile WiMAX" is optimized for the 2.4GHz band. Yet, for fixed or nomadic wireless network deployment in the unlicensed 2.4GHz band, "Mobile WiMAX" will face stiff competition from **mesh WiFi** - the broadband wireless network technology of choice for municipal wireless networks.

Nonetheless, Rethink Research claims that there is high telco/converged interest for infilling (wire-line broadband locations), mobility (later), and new territories (or green fields). Network operators said to be interested in "Mobile WiMAX" include: DT, NTT, KT, and BT.

There is also growing cellco interest for: off loading of traffic, indoor penetration, and new markets. Interested Cellco's include: T-Mobile, Sprint, KDDI. Interestingly, Rethink found that 50% of cellcos surveyed do not believe HSDPA will achieve good indoor penetration till 2008. Also, the Cellcos are looking for fixed wireless network options e.g. Vodafone/Arcor, and O2. Rethink says that 60% of Cellcos are considering WiMAX, but did not say which version (IEEE 802.16-2004 or 2005).

Concluding, Carolyn thinks that "Mobile WiMAX" will be bidding for a role in **4G** networks (unfortunately, there is no accepted definition of what 4G network will provide, other then higher speeds then 3G- see NY Times article referenced below). Ms Gabriel states that "Mobile WiMAX" must be fully mobile, but it can offer more (presumably, personal broadband, a network that will work indoors and outdoors, and services that will run on any combination of fixed/ nomadic/ mobile networks- all built with the same "Mobile WiMAX"/ IEEE 802.16-2005 technology).

Will "Mobile WiMAX" be a competitive mobile broadband/4G network? SPRINT seems to think so, but we don't know. That vision depends on "Mobile WiMAX" providing very good coverage, high quality, high bandwidth, and mobility by no later then 2009. We see several potential advantages of "Mobile WiMAX:"

–Superior spectral efficiency (this implies fewer base stations required and hence lower cost)

[2] **A Real Market Exists for Fixed WiMAX**
http://www.viodi.com/weissberger/060801article.pdf

–WiMAX as a metro network combined with premises or enterprise WiFi is quite appealing

–IP based – it can overlay 3G/4G networks for data and video applications/ services (the SPRINT-Nextel view)

-Will support VoIP in native mode (for smart phones and PDAs of the future)

–Less Royalty Payments (capping the royalties at about 2 to 3 percent of the price of the equipment sold, according to Intel)

–SPRINT-Nextel and Clearwire deployments may give "Mobile WiMAX" some much needed market momentum

At the **July 18, 2006 WCA** meeting in San Jose, **CA**, Monica Paolini of SENZA FILI CONSULTING offered the following conclusions about WiMAX and 3G technologies:

- 3G and WiMAX will compete, but also have to coexist
- The technology roadmap for cellular and WiMAX is converging fast towards OFDMA, IP core, IMS (IP Multimedia System)
    - Will we be able to keep cellular and WiMAX apart?
- 3G and WiMAX differ in their approach to wireless data:
    - 3G is a voice technology moving towards data
    - WiMAX is a data technology moving towards mobility
- Both 3G and WiMAX meet the requirements for wireless broadband
- Performance differences will not decide which technology is adopted and where
- The challenge for service providers is to understand which technology is better suited to their needs

→ So the message here is that both technologies will coexist and live happily together. Again, we are not so sure.

The **New York Times** explored the 4G conundrums in a September 26, 2006 article:

Wireless Networking May Soon Get Faster. Will Anyone Care?
http://www.nytimes.com/2006/09/26/business/26wireless.html?_r=2&oref=slogin&oref=slogin

"Many in the industry seem split over whether the technology, known as fourth-generation wireless, or 4G, will usher in a new era of instant Internet availability or become a multibillion-dollar flop. Skeptics, many of them on Wall Street, point to a string of previous failures to turn wireless, still predominantly used for speaking on cell phones, into a challenger in the market for Internet access services.

Skeptics say the biggest danger is that the new system, while an engineering marvel, is **not something that consumers will actually use. They** say the sort of nationwide wireless networks being envisioned will be expensive to build and that the cost will probably get passed down to users in high fees. **Fixed-line access like fiber optics and cable modems, they say, will continue to be cheaper, faster and more reliable.**

"Four-G is just much ado about nothing," said Edward F. Snyder, an analyst at Charter Equity Research. **"There's no business model here, just a lot of marketing and hot air."**

Even proponents are having a hard time defining exactly what they mean by 4G. About the only thing most agree on is speed: to be considered 4G, a network must be able to transmit **a gigabit, or 1 billion bits of data, every second**. That is fast enough to download an entire movie in less than six seconds."

Conclusions:

We are left with a lot of uncertainty as to whether Fixed or Mobile WiMAX will capture significant market share in the next three or four years. While we are all holding our breaths for truly mobile broadband data/video and 4G, industry participants must make sure that "real world" scenarios are addressed. Otherwise, 4G and related technologies will be dead on arrival or fizzle out like the ESPN mobile phone service.

Finally, there is one small problem with the "Mobile WiMAX" for mobility scenario: By 2009 - the time Rethink believes "Mobile WiMAX" will actively support mobility- all the 3G+ data technologies (EVDO, HSPDA, Flash OFDM, etc) will be well advanced to the point that they might equal or exceed its capabilities. That is a great unknown and only time will decide whether the Cellcos will adopt "Mobile WiMAX" in any big way.

Figure 1. First WiMAX wave

Source: Operator spending on WiMAX 2006-9, ***Rethink Research Associates***

- **Interest in mobility limited even with 802.16e**