WiMAX Technical Review and Industry Glimpse

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Abstract

WiMAX is expected to enable true broadband speeds over wireless networks at a cost point to enable mass-market adoption. There are two main applications of WiMAX today: fixed WiMAX applications are point-to-multipoint enabling broadband access to homes and businesses, whereas mobile WiMAX offers the full mobility of cellular networks at true broadband speeds.

Mobile WiMAX is based on OFDMA (Orthogonal Frequency Division Multiple Access) technology, which offers good resistance to multipath, and allows WiMAX to operate in NLOS conditions. Many wireless technologies may evolve towards OFDMA and all IP-based networks as an ideal for delivering cost-effective wireless data services. WiMAX is capable of supporting very high peak data rates. Typically, using a 10MHz spectrum operating under TDD scheme with a 3:1 downlink-to-uplink ratio, the peak physical layer data rate with the support of 2x2 MIMO is about 46Mbps and 4Mbps for the downlink and the uplink, respectively. WiMAX has a scalable physical-layer architecture that allows the data rate to scale easily with available channel bandwidth. A WiMAX system may use 128, 512, or 1,048-bit FFTs based on whether the channel bandwidth is 1.2MHz, 5MHz, or 10MHz, respectively.

The WiMAX Forum has defined a reference network architecture that is based on an all-IP platform. Reliance on IP allows WiMAX to take advantage of declining cost of IP processing, facilitate easy convergence with other networks, and exploit the rich ecosystem for application development that exists for IP.

While the involvement of the traditional cellular vendors in the WiMAX world is encouraging for WiMAX, these vendors are often unclear about how WiMAX and the future cellular technologies are likely to co-exist. HSDPA will likely offer more in terms of mobility while WiMAX ought to offer faster throughputs. Both WiMAX and HSPA proponents touted their technology provide higher performance according to the simulation results. Although the WiMAX has advantages in technology in theory, the real-life performance figures for both HSPA and WiMAX systems have not been reported, and uncertainty exists how efficient the systems will be in different environments and applications.