

## Future Implications of the WiMAX vs. LTE Debate

by Jen Olomon

Commercials for Clear's WiMAX service have blanketed the Waco market for months, promising a "fast mobile internet" experience. There is a definite appeal to having internet access at better-than-broadband speeds from any local area; current WiFi options tether a user to access points that stretch no farther than a few hundred feet. In this era of smartphones, we have had a taste of what perks might await us with mobile internet access, but until now the relatively slow speeds provided with 3G networks have proven to be more frustrating than freeing<sup>(1)</sup>. The newest iteration of network technology has now introduced two 4G options in the forms of WiMAX (Worldwide Interoperability for Microwave Access) and LTE (Long Term Evolution). At this point in time, the similarities and differences between the two show no clear winner, or if there will even be a true winner-take-all situation in the first place, but examining the two technologies can hint at what we may generally expect to see in the future.

As voice and data communication began to blend together, two approaches to the field emerged. The development of LTE was born from advancements in voice transmission that first led to the 3G network (essentially, a voice medium that could also convey data). WiMAX, on the other hand, began as a data network that just happened to also carry voice (with applications like VOIP)<sup>(2)</sup>. Although Godfrey Chua, the research manager in the wireless and mobile infrastructure group at IDC, said that LTE "was designed with mobility in mind from the get-go, while 802.16 evolved from standards based on fixed wireless networking," even he admitted that the two technologies were more alike than different. In fact, the similarities between WiMAX and LTE led another expert to estimate that the two were "80% to 85% the same"<sup>(3)</sup>. Apart from the basic concept of high-speed mobile internet access and all the

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conveniences that entails, there are some striking parallels in the bigger picture; however, differing opinions about the finer details remind us of their separate origins.

Both technologies support roaming between existing 2G and 3G networks by using dual mode devices, which seems to be their definition of “backwards compatible”<sup>(4; 5)</sup>. In the strictest sense, it does not appear as though either LTE or WiMAX could directly interface with these older networks, although some sources claim that LTE’s architecture design allows for a smooth handover between 3G and LTE, whereas WiMAX has a hard enough time being backwards compatible between 802.16m and previous standards iterations<sup>(6)</sup>.

In terms of performance, there is again a vast array of opinions. The overwhelming majority of sources indicate that LTE *should* be the leader, with top download speeds estimated at 100Mbps whereas top download speeds for WiMAX are estimated at 40Mbps (though in practice these rates would be much lower depending on mobile vs. fixed implementations, interference, etc.). However, since LTE has yet to be deployed in any area, there is no data on its real world speeds<sup>(1)</sup>. Some believe that because both technologies use Orthogonal Frequency Division Multiplexing (OFDM), the implementation of multiple antennas at the receiver and transmitter sites (MIMO), an “all IP-based” design, and a “flattened” architecture, the difference in speeds should ultimately be negligible<sup>(7)</sup>. It is likely that only time and the final LTE implementation will answer this question.

The eventual coverage for each technology will largely depend on the coverage of existing cell sites, since most carriers will re-use their existing infrastructures to deploy their 4G networks. Although Clear has a 2-year head start, with current coverage in 9 states and plans for expansion and LTE has no current coverage areas at all, LTE is still estimated to end up with more than 4 times the users of WiMAX.<sup>(3; 8)</sup>

This is in part due to the fact that 80% of cellular service in use today uses GSM, so the conversion of existing cell sites should favor a GSM-related technology such as LTE. As one expert said, “Whenever

two technologies perform the same function, the one with the larger installed base wins. But, you say, LTE has no installed base. Yes, but its parents do.”<sup>(9)</sup> Since it is estimated that WiMAX’s appeal as a DSL substitute gives it an estimated base of 1 billion, while LTE may grow from GSM’s base of 4.6 billion, the greater coverage for LTE may be a deciding factor in its success.<sup>(3)</sup>

Another similar claim between WiMAX and LTE is the promise of more security-conscience transmissions than previous technologies. WiMAX has learned from the evolution of WiFi, and its adopted standards have reaped the benefits of having been tested in the marketplace<sup>(10)</sup>. Although LTE standards are still being debated, an eye has been kept on security from the start and there is strong support at the physical layer for mature protocols as well as at higher levels<sup>(11; 12)</sup>.

The issue of standards is just one large difference between WiMAX and LTE. WiMAX’s current standard version is 802.16-2009; however, ongoing discussion about a newer and faster 802.16m are under way<sup>(13)</sup>. On the other hand, LTE’s standards are not yet ratified and details are still being hammered out<sup>(3)</sup>. Regarding the belief that WiMAX’s standards were created in a more open environment than LTE, one author stated, “If WiMAX is the hippie, grass-roots parents on ‘Family Ties,’ LTE is closer to Alex P. Keaton.”<sup>(14)</sup> It is also interesting to note that neither technology’s standards can be called 4G yet in the technical sense, since they lack the required minimum of 100 Mbps mobile and 1 Gbit/s fixed (in the future, WiMAX’s 802.16m and LTE’s revision 10 should bring them both within this range)<sup>(3)</sup>.

Pricing is another area where the experts disagree: would WiMAX or LTE be cheaper once both are available on the open market? Some argue that because WiMAX has been developed openly as its standards were formed, that this should lead to equipment that meets the requirements at a cheaper price point than proprietary hardware.<sup>(14)</sup> However, if LTE does indeed have lower associated costs with the necessary network upgrades at the same time as more manufacturers provide LTE compatible

handsets in the market, it is possible that LTE could eventually become the more affordable choice overall.<sup>(4)</sup>

Ultimately, the availability of the services and equipment may play a large part in which technology becomes popular. Clear first rolled out its services in September 2008, giving it an estimated 2 year head start on LTE.<sup>(1)</sup> Clear also has the backing of some powerful investors, such as Comcast, Google, Intel, Sprint, and Time Warner Cable, which definitely helps when it comes to raising the investment capital and interest needed to blanket the market.<sup>(1)</sup> Although LTE may not become available until at least 2010, it's garnering support from some of the major industry players, such as AT&T, Verizon, and T-Mobile.<sup>(9)</sup> Equipment manufacturers such as Ericsson, Nokia, and Motorola have decided to back LTE as well, which will provide the lion's share of available devices and will in turn fuel public opinion to favor LTE.<sup>(3; 4)</sup>

While some people in the industry have likened the WiMAX vs. LTE debate to Betamax vs. VHS (with WiMAX being the eventual obsolete technology) this may be a gross oversimplification, and there may not even be a case of winner-take-all.<sup>(14; 15)</sup> Because the similarities between each network provide many of the same benefits, they may be able to coexist by servicing different areas (WiMAX is seen as more a more likely winner in rural regions, for instance) instead of fighting for overlapping markets<sup>(1)</sup>. Otherwise, LTE seems to have more overall potential in terms of technology, coverage, and availability of devices, despite WiMAX's 2 year lead time.

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