

ANALYSIS

The economics of broadband wireless

Adapting the capabilities of mobile WiMAX to a market's particular characteristics can help improve network economics.

By J. Randolph Luening, Signals Research Group, LLC

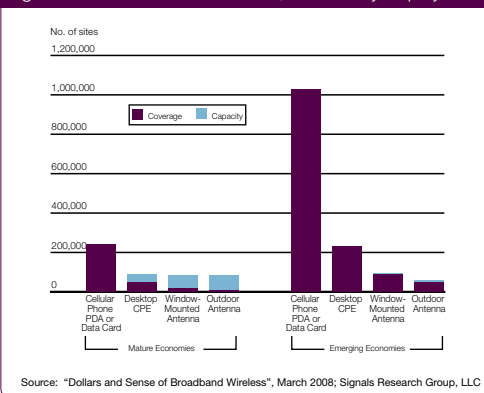


J. Randolph Luening

It would be nice to imagine that a mobile WiMAX strategy that is effective in one country could easily be replicated in others. While this may work in some instances, there are many factors that cause the economics of wireless infrastructure deployments to vary widely with geography.

As an example, mature economies, on average, have ten times the traffic per POP of emerging economies. There are also vast differences in demographics, morphologies, and in the underlying adoption of telecommunication services (voice and data) that cause network economics to differ widely by country.

Fig 1. Mobile WiMAX at 2500MHz, 65 Country Deployment



Source: "Dollars and Sense of Broadband Wireless", March 2008; Signals Research Group, LLC

With a global database of geocoded demographic/morphology data and a set of country-level telecom demand drivers, it is possible to quantify the impact of geography, adoption, and usage on network economics.

One engineering metric, which greatly influences the economics of a wireless network deployment, is the number of required coverage and capacity sites. The radio access network (radio infrastructure, cell sites, and

transmission) typically represents most of the cost of operating a wireless network.

Figure 1 shows the number of cell sites (coverage + capacity) required to cover 65 countries around the world with mobile WiMAX at 2500MHz. This hypothetical rollout includes 25 mature economies (US, Europe, and developed Asia) and 40 emerging economies (low GDP per capita countries), assuming 70 per cent population coverage in each country.

One quickly sees that the number of sites required for coverage and capacity is a function of service concept (depth of coverage, devices supported, and actual services offered), frequency band, and other factors.

In Figure 1 we show the following voice and data service concept/device combinations: fully mobile (cell phones, PDAs, and data cards), nomadic (desktop CPE), semi-fixed (window-mounted antenna), and fixed (outdoor antenna).

For each country, we have separately quantified the demand, in minutes and megabytes, associated with mobile devices and the demand associated with fixed devices (telephones, DSL modems, and cable modems).

We attribute mobile demand to service concepts focused on mobile devices and we attribute fixed demand to service concepts focused on nomadic or fixed devices. Finally, we attribute a 20 per cent share of today's telecommunications demand (mobile voice, mobile data, fixed voice, and cable/DSL data) to each mobile WiMAX network, including only those categories of traffic appropriate to the service concept.

We envision next-generation wireless operators competing with fixed (phone and cable) and wireless operators for a share of the total telecommunications pie.

One can easily observe several things: In a given geographic area, the number of cell sites required for coverage is highly

dependent upon the service concept. In a mature market, a network designed for full mobility/deep in-building coverage requires 4.6 times more coverage sites than a network designed to support desktop CPE (nomadic) and 23 times more coverage sites than a network designed to provide voice and data connectivity via an outdoor antenna (fixed). Similar ratios exist in emerging markets.

Broadband wireless networks achieve their greatest efficiency and their lowest unit costs when they are fully utilized. Operators who design for full mobility and deep in-building coverage (cell phones, PDAs, and laptop data cards) will spend far more money on coverage than operators who design for limited mobility (desktop CPE, window antennas, and outdoor antennas). The latter will have a smaller portfolio of service offerings but will deliver those services very cost-effectively.

Finally, there is a great disparity between mature and emerging markets. In emerging markets network operators frequently struggle to achieve reasonable levels of network utilization, especially with high-mobility offerings. Poorly utilized networks result in high unit costs. Operators in many developing markets, therefore, should favour limited-mobility service concepts, which they can deliver cost-effectively.

Mobile WiMAX operators will need to carefully evaluate their own market in order to identify the service concept/network deployment strategy that is most suited to the demographic/demand characteristics of that market. □

J. Randolph Luening is the Vice President of Economics at Signals Research Group, LLC (randy@signalsresearch.com) and co-author of "The Dollars and Sense of Broadband Wireless - from 700MHz in America to 3500MHz in Vietnam".