



Wireless Futurist Marty Cooper

A Contrarian's View on Broadband Wireless

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PHOTOS BY REMY HAYNES

People are inherently, naturally mobile! They don't want to be chained to their desks and constrained to their offices and homes. Yet, the broadband connectivity woven into the fabric of our enterprise existence does just that. Whether we're plugged into an RJ45 connection or logged on to a wireless LAN, we are forced to sit at our desks or stay within two or three walls of an access point.

We can always use a cellular broadband connection like EDGE or 1xEVDO. Unfortunately, the speed on these connections is rarely better than a few hundred kilobits per second, and the cost of such connections relegates them to Blackberry and Pocket PC applications and occasional Web browsing. Wi-Fi and cellular connections have given us a taste of REAL wireless broadband but neither one fulfills the dream of complete personal telecommunications freedom. Only ubiquitous, low-cost, un-tethered broadband will do that.

We're addicted to broadband; we can't get along without it. But we're no better off in the way we use broadband today than the way we made voice calls 25 years ago before cellular telephony.

I know what you're thinking. Your productivity is far greater with the combination of broadband

connectivity in the office and your Blackberry or Pocket PC on the road. You really don't need any more than that. Surely, I must be exaggerating when I talk about the need for low-cost wireless broadband ubiquity.

That's exactly what people told me thirty years ago when I talked about the need for ubiquitous wireless voice connections, and yet your lives and your behavior have been notably changed by the availability of low-cost cellular service. Wireless voice is not just a step forward from landline calling. When you call someone on his or her cellular phone, you expect a person to answer; you're not just calling a place. What a huge and profound difference! Cellular technology has changed the way most people conduct their business and personal lives; it has improved productivity and enhanced their safety and convenience and made them truly mobile.

This ubiquitous capability did not happen instantly. From the introduction of commercial cellular technology in 1983, it took ten years before there were a few million subscribers in the United States. It took almost 23 years to achieve penetration to two-thirds of our population.

Wireless connectivity today is where cellular radio technology was 20 years ago. That's going to change and here's how:

- New technology will reduce the cost and increase the bandwidth of ubiquitous communications by orders of magnitude.
- Regulators will make spectrum available in which this new technology will be deployed.
- Only then will new applications arise that will change our personal and business lives.

Who will Support Our Broadband Addiction?

The wireless broadband technology revolution is well underway. Multi Antenna Signal-processing (MAS), the modern version of what was once called "smart antennas," will pervade every existing and future wireless system. MAS systems already in operation today have dramatically changed the economics of wireless communications. OFDM (Orthogonal Frequency Division

Multiplex) will reduce multi-path interference and increase speed. Software defined radios will bring down the compatibility barriers, and cognitive radio using all of the previous technologies will, ultimately, eradicate the myth of spectrum scarcity.

All of this will take time. There are precursor wireless systems in operation now, like iBurst and Ripwave, that use MAS as do many Wi-Fi access points. The WiMAX standard is now real and mobile WiMAX will be in the market by next year. Led by industry giants like Intel, Samsung, Motorola, Alcatel and others, WiMAX has the potential to be the next generation of broadband wireless connectivity. Inherent in WiMAX is the use of MAS and OFDM. MAS has already provided orders of magnitude improvement in spectral efficiency in iBurst systems that are deployed in more than a half dozen countries. This high spectral efficiency allows many more people to be served in a given amount of radio spectrum with much fewer base stations. The result – far lower costs to serve each user! Furthermore, because MAS is still in its infancy and because the power of MAS is achieved by upgradeable software, there is the potential to continue improving the economics and the spectral efficiency indefinitely.

And WiMAX will not be the only new wireless system. Qualcomm and Kyocera are standardizing their versions of broadband wireless in a separate process from WiMAX. Their systems will offer unique advantages in addition to incorporating MAS and other modern technologies.

The vision is clear. There is no reason why broadband wireless cannot be totally ubiquitous, as speedy as an RJ45 connection, and lower in cost than wired broadband. It will take some time for this to happen, but our natural mobility, and the competitive marketplace, will make it happen.

Regulator Roles Will Change...and Soon

The need for, and availability of, low-cost un-tethered communications will force spectrum regulators to recognize the evolution of technology. Among their challenges: