# WiMAX, THE BREAKTHROUGH TECHNOLOGY TO IMPLEMENT WIRELESS AND MOBILE TELEMEDICINE SERVICES

*C. A. Szabo*
*Budapest University of Technology and Economics, Hungary and*
*CREATE-NET Research Consortium, Italy*
szabo@hit.bme.hu, cszabo@create-net.org

Wireless/mobile telecommunication solutions play a key role in providing telemedicine services, due to their flexibility in installation, portability and mobility, among other advantages. Existing systems are mostly based on WLAN – wireless local area network - (a.k.a. WiFi) and WPAN – wireless personal area network (e.g. Bluetooth) technologies, in indoor applications, and on 2.5-generation cellular mobile services (mostly GPRS), in wide area applications.

These technologies possess serious limitations as far as area coverage, data rate or both are concerned. Mobile operators claim that third generation systems (3G mobile) represent a significant improvement. While it may be true technology-wise, most of the regions in the world are far from being covered by 3G, and it is not likely that operators will expand their network coverage to rural and developing areas.

WiMAX is a new paradigm for broadband wireless access. This novel technology offers orders of magnitude improvement in data rate and coverage area compared with WLAN, while preserving almost the same simplicity and flexibility in deployment and operation.
Standards are available for fixed, nomadic, portable and mobile applications since 2004 ("fixed WiMAX") and since end of 2005 ("mobile WiMAX), while the first certified products have been/will be available since 2005/in 2007, respectively.

WiMAX is an excellent possibility to cope with "digital divide" which is a major obstacle when implementing telemedicine services in many areas worldwide. Main barriers are both economical and technological and include deployment costs, regulatory issues, need to cover large territories, cost effectiveness. WiMAX solves most of theses problems due to ease of installation, wide coverage (up to 50 km in line-of-sight and up to 15 km in NLOS conditions!), flexibility of spectrum allocation, worldwide standardization, support of multimedia communications. That's why local governments, planning to build regional open communication infrastructures (also known as "community networks"), are seriously considering WiMAX as an effective means to implement society-related applications such as e-health and telemedicine.

The paper first summarizes the benefits of this novel technology for telemedicine applications and reports on some test results obtained recently in Budapest, Hungary and Trento, Italy. Then the community network business model is outlined and illustrated with a case study of the Province of Trento, North Italy. This small area, although situated in one of the most developed regions of Europe, has similarities to many areas in developing countries: it is sparsely populated, consists mostly of small villages located in mountains, and the digital divide is a real issue. Finally a model of this CN is described which is a real life testbed implemented in Trento using WiMAX technology. Planned telemedicine applications will also be outlined.

Keywords: broadband wireless access, WiMAX, wireless and mobile e-health, telemedicine