Experimental characterisation of WiMAX propagation in different environments

The aim of this work is to continue the cooperation on Fixed WiMAX experimental propagation characterization between Instituto de Telecomunicações – DEM of University of Beira Interior, Portugal, Fondazione Ugo Bordoni and the Department of Electronics and Information Systems of the University of Bologna, both from Italy. The field trials addressed different environments, i.e., suburban and open areas in a hilly terrain for the study of the propagation characteristics of WiMAX systems. The IEEE 802.16–2004 equipment operates at 3.5 GHz with a bandwidth of 3.5 MHz. Different antenna heights are considered. The measurements have been performed in outdoor, indoor and mixed environments, with omnidirectional and 120° sectored antennas. A comparison with the output from the ray tracing tool from FUB is envisaged. In the outdoor environment, results show an adequacy between the trend-curve for the experimental results with the modified Friis equation with propagation exponent 2.71.

Transmitter characteristics
Alvarion BreezeMAX 3000 µBS (3.5 GHz):
• ODU: $P_{\text{TX}}=2 \text{ dBW}$;
• 10 dBi omnidirectional antenna;
• 15.3 dBi 120° sectored antenna.

The measurements have been performed in outdoor, indoor and mixed environments, with omnidirectional and 120° sectored antennas.

Measurement
equipment characteristics
Rohe&Schwarz FSH8 spectrum analyser:
• Frequency range: [9 kHz, 8 GHz];
• Sensitivity: < -163 dBm (1 Hz);
• Sweep time: 200 µs to 100 s;
• 10 dBi omni antenna;
• Laptop;
• GPS receiver.

CONCLUSIONS
• The collected data will allow a comprehensive characterisation of WiMAX propagation at 3.5 GHz and will be used to fine-tune and improve existing propagation models and software tools, better suited to WiMAX planning and deployment than the today's existing ones;
• A comparison with the output from the ray tracing tool from FUB is envisaged in the near-future;
• In the outdoor environment, results show an adequacy between the trend-curve for the experimental results with the modified Friis equation with propagation exponent 2.71.