SIGNAL PROCESSING AND SIMULATION OF 802.16E WIMAX SYSTEMS

Project Code: VL3b-07

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WiMAX is a telecommunication technology aimed at providing wireless data over long distances in a variety of ways, from point-to-point links to full mobile cellular type access. It is a certification mark used for products based on the IEEE 802.16 family of standards, which specifies a wireless metropolitan-area network technology. 802.16e is an amendment to 802.16, which uses OFDMA and provides both fixed and mobility services.

Objectives

- Design a WiMAX 802.16e system in MATLAB Simulink
- Simulate the system using MATLAB Simulink
- Look for options for better system performance
Transmitter transmits the original data using OFDMA symbols
Receiver performs estimation and recovers the original data from the received OFDMA symbols
Channel simulates different cases such as direct input, AWGN, and frequency-selective fading

**Detailed Design**

**Transmitter**
The process of the transmitter is straightforward. The Source Generator will first generate data, and then go through the source coding blocks, after that, an inverse FFT will be used to achieve a time-domain signal that can be transmitted over the channel.

**Receiver**
The baseband receiver can be partitioned into frontend and backend. The baseband frontend is defined as the subsystems that involve parameter estimation. The baseband backend is defined as the subsystems that involve signal detection.
We have simulated the 802.16e WiMAX system successfully. Some further developments of this project could be the use of Multiple Input and Multiple Output (MIMO) technology and adaptive modulation to enhance the system performance.