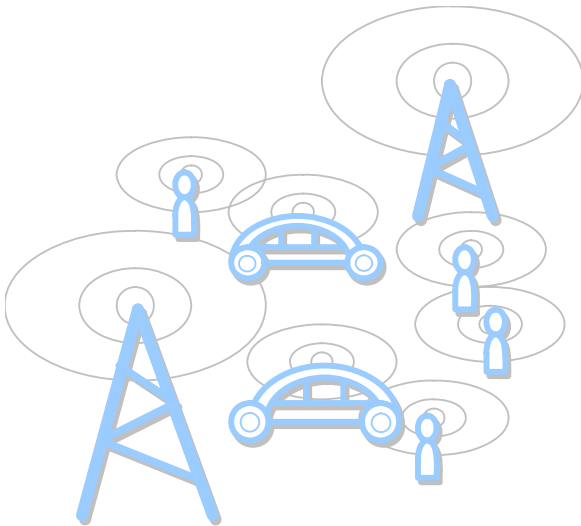


# WiMAX 802.16e PHY Test Bench



Cambridge Consultants Ltd has developed a Mobile WiMAX 802.16e PHY test bench / reference design. This comprehensive design incorporates a number of advanced features for high performance OFDMA transmission and reception.

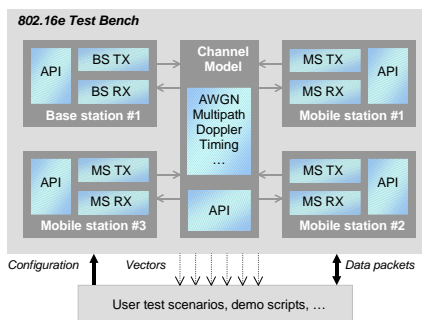
Written in MATLAB, the Test Bench has a multitude of uses for developers involved with WiMAX, including:

- Verification of WiMAX designs
- Generation/analysis of test vectors
- Evaluating the performance gains offered by WiMAX options like space-time coding.

## A Flexible and Modular approach

The 802.16e Test Bench consists of a number of subsystems that together fully model 802.16e PHY transmitters and receivers. Each subsystem has a clean and well-documented API, and can be run independently or in combination with other subsystems.

The figure below shows an example Test Bench configuration where 3 Mobile Stations are communicating with a single base station. This would allow the impact on Bit Error Rate for MS1 to be measured if MS2 and MS3 are transmitting off-frequency.



Example Test Bench configuration (1x BS, 3x MS)

Other examples of how the Test Bench can be used include:

- Running just the BS TX burst encoder subsystem to produce test vectors
- Using the MS RX FEC subsystem to analyse vectors from an ASIC implementation.
- Testing performance of MS acquisition in a non-stationary channel.
- Comparing the performance of different burst shapes in a strong multipath environment.
- Unlimited number of BS and MS supported in the same simulation
- FFT sizes 128, 512, 1024, 2048
- Mandatory PUSC and further PUSC zones
- Single antenna and STC2
- Acquisition, ranging, timing and frequency compensation
- Channel model supporting AWGN, multipath, clock mismatch simulation, Doppler errors.

## Easy to Use

- Demo scripts range from a simple Base station transmitter, through to multi-BS & multi-MS scenarios.
- Detailed HTML help pages
- Built in plotting functions for zones, waveforms, etc.
- C-based MEX libraries to speed up FEC and channel estimation calculations
- Compatible with Windows, Linux and Solaris

Future enhancements will include:

- FUSC & AMC zones, AAS, MIMO

## Test bench Specifications

The WiMAX test bench is being continuously upgraded to support new features. Features supported at the time of print include:

- Full path from bit level (bursts) through to time domain waveform in both transmitters and receivers

## Licensing the Test Bench

The 802.16e test bench is available in a number of packages:

- Full MATLAB source code
- Precompiled binaries
- Base station only (for supporting MS development)

## Wireless DSP at Cambridge Consultants

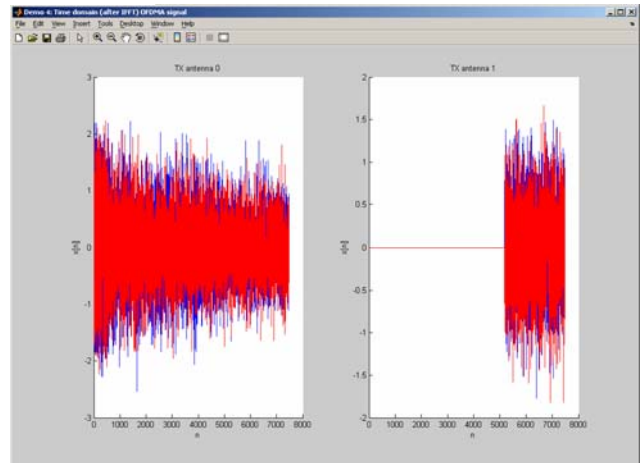
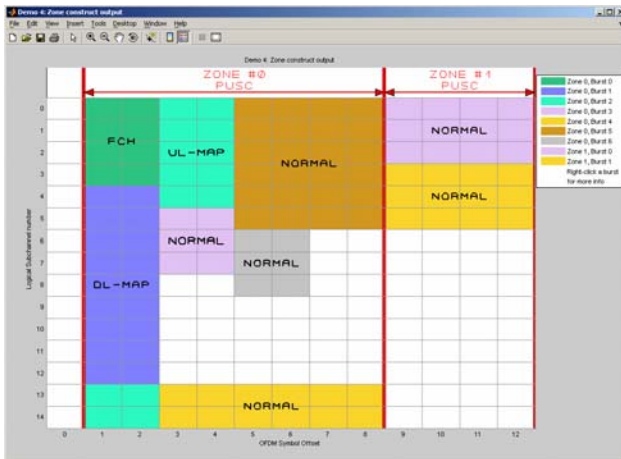
We offer a range of services and intellectual property in many wireless DSP-related areas including:

- Flexible DSP cores

- Error Correction (Turbo, Viterbi, LDPC, RS, etc.) and soft demodulators
- Complete software radio architectures
- System modelling

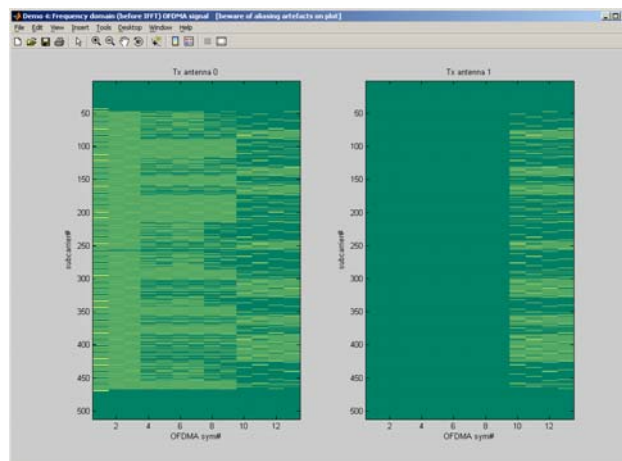
- DSP operating systems, embedded and application software
- ASIC and FPGA design
- Fault tolerant video transmission
- Reverse engineering of DSP

Plots produced by a test bench script:



Logical zone configuration

Time domain output waveforms



Spectrogram of output waveforms

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