

# Readme

## Note:

Functions for time-domain plots and spectrum analysis are only in first task file, they might be used also for task 2-3

## Task 1

### Overview

This task involves the analysis of OFDM signals in both time and frequency domains, with a focus on WiMAX signals. The provided MATLAB script (Task1\_WiMAX\_Analysis.m) performs various analyses on the WiMAX signal, including time-domain plots, spectrum analysis, and computation of the signal's peak factor.

### Instructions

1. Run the script `Task1_WiMAX_Analysis.m` in MATLAB.
2. Ensure the file `sig_wimax.mat` is in the same directory.
3. Follow the prompts and observe the generated plots.
4. Verify the presence of OFDM symbols, preambles, and guard intervals.

## Task 2

### Overview

This task deals with the analysis of a WiFi signal. The MATLAB script (Task2\_WiFi\_Analysis.m) reads a binary file containing in-phase and quadrature components, combines them into a complex signal, and performs similar analyses as in Task 1.

### Instructions

1. Run the script `Task2_WiFi_Analysis.m` in MATLAB.
2. Ensure the file `sig_wifi.pcm` is in the same directory.
3. Follow the prompts and examine the generated plots.
4. Confirm the presence of OFDM symbols and guard intervals.

## Task 3

### Overview

Task 3 involves generating a custom OFDM signal in MATLAB. The script (Task3\_Custom\_OFDM\_Generation.m) creates an OFDM signal with specified parameters and performs analyses similar to Tasks 1 and 2.

### Instructions

1. Run the script `Task3_Custom_OFDM_Generation.m` in MATLAB.
2. Observe the generated OFDM signal with the provided parameters.
3. Analyze the time-domain, frequency-domain, and constellation plots.
4. Verify the presence of guard intervals and subcarriers.

## Task 4

### Overview

The final task focuses on the analysis of signal constellations. The MATLAB script (Task4\_Constellation\_Analysis.m) implements transformations on OFDM signals and plots their constellations using the scatterplot function.

### Instructions

1. Run the script `Task4_Constellation_Analysis.m` in MATLAB.
2. Follow the prompts and observe the generated constellation plots.
3. Confirm the presence of central, pilot, and information subcarriers.
4. Analyze the impact of transformations on the signal constellation.

### Additional files

- Matched filter
- Sinus sound with different freqs
- Sinus impact to signal constellation