

MATLAB tool box for channel simulation and estimation

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¹Author of the tool box dose not claim it to be a complete source of tools for the intended kind of work. This toolbox is still under construction, many feature will be added soon.

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Chapter 1

Introduction

Day by day, more and more people are getting into the research on wireless communication. The application are very demanding. The transferred object vary from application to application, sometime data, sometime human voice but the principle of communication remains the same. Two most important as well as popular methods of wireless communication are OFDM and CDMA. Most of the data transfer in wireless communication are done using these two techniques, whether the transfer of data is within wireless LAN of some office or from base-station to our handy mobile phone.

This tool box is designed, keeping in mind to help current researcher as well as new researcher who come along the way. Detail description with example are given on how to use each function. A brief introduction to the methods CDMA and OFDM are given for reference. It is assumed that users of this tool box have a theoretical background of OFDM and CDMA communication system. There are other toolboxes available with same kind of name. Still author thought of writing one more because of two reasons. He is going to make this tool box more dedicated towards CDMA and OFDM techniques, with different simulation and estimation techniques. There will be many options to transmit pilots for estimating the channel matrix and other features like that. Second, this will be a freeware. Communication engineers doing research in the field of mathematics of communication or a mathematician with such an interest are the targeted user. But author encourage any kind of professional to use this tool box and send their comments. A OCTAVE compatible version of this tool box will can be expected soon.

The contents of this manual is arranged in the following way. First and introduction to the communication techniques OFDM and CDMA. In this introductory chapter one can get a very brief idea and the terminology that is used through out the manual and in the comments of the MATLAB codes. Next comes one chapter on how to use the tool box. This chapter is higly recomended as this will make the use of this tool box more easy. Then comes a chapter where all the functions are listed with their usage and examples. Finally a chapter with examples describing the usage of the tool box. For further help on this tool box, users are encouraged to contact the author at the given e-mail address.

Finally author will like to thank all without whose help this tool box woluld not be possible. Author like to give special thank to Prof. Hans G. Feichtinger, who gave him the oportunity to work and learn such subjects at NuHAG, University of Vienna. The funding for this work are from the projects IK and MOHAWI.

Chapter 2

OFDM - A brief introduction

Orthogonal Frequency Division Multiplexing (OFDM) - is a digital multi-carrier modulation scheme, which uses closely spaced orthogonal subcarrier. Each sub carrier is modulated with a conventional modulation scheme. A diagrammatic view of the data flow from transmitter end to receiver end is shown in figure.

OFDM is used in ADSL and DSL broad band access in wired system. Wi-Fi (IEEE 802.11) for wireless LAN s. IEEE 802.16 (WiMAX), IEEE 802.20 (MBWA) and in many other popular standards.

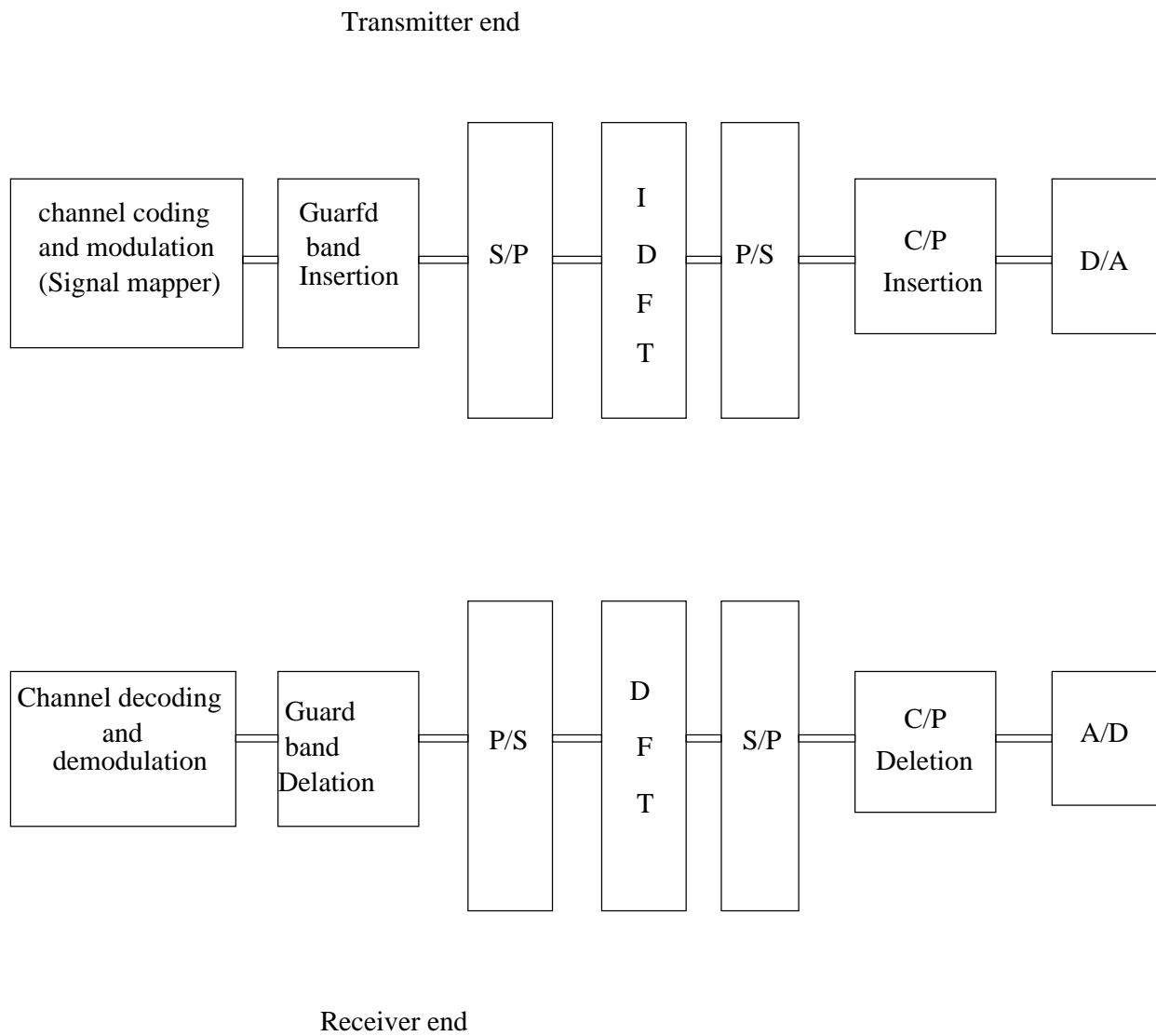


Figure 2.1: demmonstrating flow of data in OFDM system

Chapter 3

CDMA - A brief introduction

Chapter 4

How to use the tool box

Chapter 5

List of Functions

Chapter 6

Usage and examples

Chapter 7

To do

This section contains a list of work that are still to be done to take this tool box forward. Author will try his best to complete those gap. Other interested person will to add more to this tool box is very much welcome.

Chapter 8

Bibliography