

SUDAN UNIVERSITY OF SCIENCE

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ADAPTIVE MODULATION AND CODING
FOR FUTURE WIRELESS NETWORKS

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Abstract

Rapid variation of signal power (fading) at the receiver of the mobile radio terminal is the core problem in the line to develop and design high spectrally efficient system which can effectively handle the future wireless traffic trends. One way to solve this problem is to use equalization which can efficiently mitigate a part of the problem (small scale fading) another solution is to use spread spectrum modulation which is also used to solve the problem partially. A third method to solve this problem is to use adaptive modulation and coding, in this method, modulation and error control coding schemes are changed in accordance to the channel variation, for example when the channel condition is good, low rate coding and large modulation constellations and when the channel condition is bad, large coding rate and low value constellation modulation techniques is used. in this thesis firstly, the performance gain of adaptive modulation system is investigated, the simulation results showed that the SNR range can be compensated by this system is not enough, then Adaptive coding system performance results showed that it can improve the performance of adaptive modulation, and finally the two techniques are applied together in one system and the performance result showed better results than using both adaptive modulation only and adaptive coding only.

Table of Contents

Contents

PAGE

ACKNOWLEDGMENT.....	
ABSTRACT.....	II
ABSTRACT IN ARABIC.....	III
TABLE OF CONTENTS	IV
LIST OF FIGURES	V
LIST OF TABLES.....	IX
GLOSSARY	
1 Introduction.....	X
1.1 Statement of the problem.....	XI
1.2 Objective of the study.....	1
1.3 Thesis outline.....	1
2 THE MAIN CONCEPT OF ADAPTIVE MODULATION	2
AND CODING	2
2.1 Introduction.....	
2.2 History of adaptive modulation and coding	4
2.3 Adaptive modulation and coding is usage	4
2.4 Adaptive modulation and coding system model.....	5
2.4.1 System Assumptions.....	5
2.4.2 Power adaptation.....	5
2.4.3 Adaptive data rate.....	6
2.4.4 Adaptive coding and /or coding parameters.....	7
2.4.5 System Requirements.....	9
2.5 Diversity Various Adaptation Techniques.....	9
2.6 Key factors determine the performance of adaptive modulation	

and coding Schemes.....	
3 WIRELESS CHANNEL MODELS AND CHANNEL ESTIMATION.....	
3.1 Introduction.....	11
3.2 Radio channel	12
3.3 Path loss.....	12
3.3.1 Free space propagation model	12
3.3.2 Two ray model	12
3.3.3 Empirical and semi-empirical model.....	14
3.3.4 The Okumara-Hata model	14
3.3.5 Lee model	15
3.3.6 Cost – 231- Hata model.....	17
3.4 Shadowing.....	18
3.5 Channel Fading.....	18
3.5.1 Mathematical model of Fading.....	19
3.5.2 Fading characterization in time and frequency	20
3.6 Channel Fading rate and duration.....	20
3.6.1 Channel Fading Rate	22
3.6.2-Channel Fading duration	23
3.7 Channel estimation	23
3.7.1 Pilot Symbol Assisted Modulation	25
3.7.2 Empirical Transfer Function Estimate.....	26
3.7.3 The least squares method.....	28
3.8 Channel Prediction.....	29
3.8.1-The FIR– predictor.....	29
	30

4-DIGITAL MODULATION AND CODING TECHNIQUES FOR

WIRELESS COMMUNICATIONS.....	
4.1 Introduction.....	
4.2 Coding techniques.....	
4.2.1 Convolutional codes	35
4.2.2 Interleaving	35
4.2.3 Concatenated codes.....	36
4.2.4 Hybrid ARQ (HARQ)	36
4.3 Digital modulation.....	40
4.6.1 The main considerations in choosing particular digital modulation?	42
4.6.2 Passband modulation principles.....	45
4.6.3 Amplitude and phase modulation.....	50
4.6.4 M-array amplitude modulation (MPAM).....	51
4.6.5 Phase shift keying (MPSK).....	52
4.6.6 Quadrature Amplitude modulation.....	
5-APPLICATION OF ADAPTIVE MODULATION AND CODING.....	53
5.1 Introduction	53
5.2 Threshold method.....	54
5.3 Adaptive modulation.....	54
5.3.1 Modulation parameter selection.....	56
5.3.2 Adaptive modulation only drawbacks.....	56
5.4 Adaptive error control	56
5.4.1 Adaptive FEC.....	56
5.4.2 Adaptive ARQ and Hybrid ARQ.....	58
5.4.3 Adaptive modulation and coding system (AMC).....	58
	59

6-CONCLUSIONS AND RECOMMENDATIONS.....	67
6.1 Future research directions.....	68
REFERENCES.....	68
APPENDIX.....	69
	71

List of figures

Figure	Page
2.1 Adaptive modulation and coding system model.....	6
3.1 Radio channel effect.....	13
3.2 Two ray model.....	16
3.3 Multipath signal propagation.....	21
3.4 Illustration of a level crossing at a threshold of X.....	26
3.5 The insertion of pilot data within the traffic.....	29
3.6 The FIR filter predictor.....	34
4.1 Convolutional encoder.....	37
4.2 Rate $\frac{1}{2}$ convolutional encoder.....	38
4.3 Tree diagram for the rate $\frac{1}{2}$ convolutional encoder.....	40
4.4 Block interleaver example.....	41
4.5 Block diagram of concatenated encoding and decoding.....	42
4.6 Block diagram of turbo code encoder.....	43
4.7 Turbo code decoder.....	44
4.8 Flow chart diagram of HARQ type II.....	48
4.9 Flow diagram of an HARQ type III	49
5.1 Show the relation between MCS and the average received SNR partitions.....	57

5.2 The modulation switching algorithm diagram.....	59
5.3 Various PSK modulation over AWGN channel.....	60
5.4 Various PSK modulation over Rayleigh fading channel.....	61
5.5 Rate $\frac{1}{2}$ convolutional code.....	63
5.6 Rate $\frac{1}{3}$ convolutional code.....	63
5.7 Rate $\frac{1}{2}$ and $\frac{1}{3}$ convolutional coding over 16PSK modulation and AWGN channel.....	64
5.8 8PSK and PSK with rate $\frac{1}{2}$ and $\frac{1}{3}$ convolutional code.....	66

LIST OF TABLES

Table	page
3.1 fading rate for various frequency and different Receiver velocities.....	27
3.2 fading duration for various frequency and different Receiver velocities.....	28

GLOSSARY

AGC	Automatic gain control
AMC	Adaptive modulation and coding
AWGN	Additive white Gaussian Noise
ARQ	Automatic Repeat Request
BER	Bit Error Rate
CSI	Channel State Information
ETFE	Empirical Transfer function Estimate
FEC	Forward Error Correction
FIR	Finite Impulse Response
HARQ	Hybrid Automatic Repeat request
LOS	Line Of Sight
MC-CDMA	Multicarrier Code Division Multiple Access
MCS	Modulation and Coding Schemes
MPSK	M array phase Shift keying
MQAM	M array Quadrature amplitude modulation

OFDMA	Orthogonal frequency Division Multiple Access
PSAM	Pilot symbol assisted modulation
SNR	Signal to Noise Ratio.
QPSK	Quadrature Phase Shift Keying