SUDAN UNIVERSITYOF SCIENCE

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ADAPTIVE MODULATION AND CODING FOR FUTURE WIRELESS NETWORKS

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Prepared by:

Eng. ELSADIG SAEID GEBREEL

Supervisor:

Dr . JACQUELINE. J. GEORGE

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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.

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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	Emprical Transfier function Estimate
FEC	Forward Error Correction
FIR	Finite Impulse Response
HARQ	Hybrid Automatic Repeate 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