

Contents

Abstract	i
Acknowledgments	iii
List of Figures	ix
List of Tables	x
1 Introduction	1
1.1 Motivation and Method	1
1.2 Summary of Contribution	3
1.3 Dissertation Outline	4
2 Preliminaries	6
2.1 Review of Wireless Communication Basis	6
2.1.1 Digital Wireless Communication System Model . .	6
2.1.2 Wireless Channel Models	7
2.1.3 AWGN Channel Capacity	8
2.1.4 Outage Probability	9
2.2 Turbo Codes	10
2.3 BICM-ID Principles	12
2.4 Cooperative Communications	14
2.5 Distributed Source Coding	17
2.6 Summary	17
3 DACC-Assisted Relay System with BICM-ID Allowing Intra-link Errors	19
3.1 System Model	20
3.2 Decoding Schemes	21
3.2.1 Doped Accumulator	23
3.2.2 BICM-ID Demapper	24

3.2.3	LLR Updating Function	26
3.3	EXIT Chart and Convergence Analysis	27
3.4	Simulation Results	31
3.5	Relationship to ARQ Technique	38
3.6	Summary	39
4	Theoretical Outage Probability Analysis of Slepian-Wolf Relay System	42
4.1	Slepian-Wolf Theorem	43
4.2	Case 1: Slepian-Wolf Relay with Parameterized Intra-link	44
4.2.1	System Model	44
4.2.2	Outage Probability Definition	45
4.2.3	Outage Calculation	47
4.2.4	Asymptotic Tendency Analyses	50
4.2.5	Numerical Results	53
4.3	Case 2: Slepian-Wolf Relay with Rate Distortion Function	61
4.3.1	System Model	61
4.3.2	Outage Probability Definition	61
4.3.3	Outage Probability Calculation	63
4.3.4	Numerical Results	65
4.4	Summary	67
5	Optimal Power allocation	71
5.1	Problem Setup	72
5.2	Case 1: Slepian-Wolf Relay with Bit-flipping Intra-link Error Model	72
5.2.1	Closed-form Expression of Outage Probability	72
5.2.2	Optimal Power Allocation	73
5.3	Case 2: Slepian-Wolf Relay with Rayleigh-Fading Intra-link	80
5.3.1	Total Transmit Power Fixed	80
5.3.2	Outage Requirement Fixed	83
5.4	Summary	84
6	Conclusions and Future Work	88
6.1	Conclusions	88
6.2	Future Work	90
Appendix A		91
Appendix B		93

Bibliography	94
Publications	99