

Contents

Abstract (in Chinese)	i
Abstract	ii
Acknowledgment	iii
Structure of this Work	iv
List of Figures	viii
List of Tables	ix
1 Introduction	1
2 QoS on All-IP Networks	6
2.1 Quality of Service	6
2.2 Resource Allocation & Routing with QoS Guarantees	8
3 Achievement Function	11

3.1	Construction	11
3.2	Implication	12
4	Formulation of the Bandwidth Allocation Model with Proportional Fairness	16
4.1	Notations	16
4.2	Objective Functions	18
4.3	Constraints	22
4.4	A Mathematical Model	24
4.5	Modifications of Nonlinear Parts	25
4.5.1	Objectives	25
4.5.2	Constraints	26
4.5.3	A Mixed-Integer Programming Model	31
4.6	Pareto Optimal Solutions	32
4.7	A Routing Scheme with End-to-End QoS Guarantees	34
4.7.1	QoS Guarantees in Deterministic Case	34
4.7.2	Optimization of the Path Selection	35
5	A Numerical Example	37
5.1	Problem Statements	37
5.2	A Mathematical Programming	40

5.3	Numerical Experiments with ILOG	41
5.3.1	Modifications of the Objective Functions	41
5.3.2	Modifications of the Constraints	47
5.3.3	A Mixed-Integer Programming Model	50
6	Conclusions and Future Studies	53
6.1	Conclusions	53
6.2	Future Studies	54
	Bibliography	55