

# Contents

Abstract . . . . .	i
中文摘要 . . . . .	ii
<b>1 Introduction</b>	<b>1</b>
<b>2 A Network Optimization Model</b>	<b>4</b>
2.1 Utility Functions . . . . .	4
2.2 A Network Optimization Model . . . . .	5
2.3 Network Constraints . . . . .	7
<b>3 Two Models with Weighted Utility Functions</b>	<b>10</b>
3.1 Model I . . . . .	10
3.2 Model II . . . . .	11
<b>4 An Illustrative Example and Numerical Results</b>	<b>14</b>
4.1 An Illustrative Example . . . . .	14
4.2 Numerical Results of Model I . . . . .	16
4.3 Numerical Results of Model II . . . . .	22

<b>5 Conclusions</b>	<b>29</b>
<b>References</b>	<b>30</b>
<b>Appendix A : A Listing File of Model I</b>	<b>33</b>
<b>Appendix B : A Listing File of Model II</b>	<b>46</b>

# List of Tables

4.1	Characteristics of Each Link . . . . .	15
4.2	Characteristics of Each QoS Class . . . . .	16
4.3	Change in the Number of Connections in Class 1 ( $J_1$ ) for Model I . . .	16
4.4	Change in the Number of Connections in Class 2 ( $J_2$ )for Model I . . .	17
4.5	Change in the Number of Connections in Class 3 ( $J_3$ ) for Model I . . .	17
4.6	Change in the Total Budget ( $B$ ) for Model I . . . . .	18
4.7	Change in the Aspiration Level in Class 1 for Model I . . . . .	19
4.8	Change in the Aspiration Level in Class 2 for Model I . . . . .	20
4.9	Change in the Aspiration Level in Class 3 for Model I . . . . .	20
4.10	Change in the Reservation Level in Class 1 for Model I . . . . .	20
4.11	Change in the Reservation Level in Class 2 for Model I . . . . .	21
4.12	Change in the Reservation Level in Class 3 for Model I . . . . .	21
4.13	Change in the Number of Connections in Class 1 ( $J_1$ ) for Model II . . .	22
4.14	Change in the Number of Connections in Class 2 ( $J_2$ ) for Model II . . .	23
4.15	Change in the Number of Connections in Class 3 ( $J_3$ ) for Model II . . .	23

4.16	Change in the Total Budget ( $B$ ) for Model II . . . . .	25
4.17	Change in the Aspiration Level in Class 1 for Model II . . . . .	26
4.18	Change in the Aspiration Level in Class 2 for Model II . . . . .	26
4.19	Change in the Aspiration Level in Class 3 for Model II . . . . .	27
4.20	Change in the Reservation Level in Class 1 for Model II . . . . .	27
4.21	Change in the Reservation Level in Class 2 for Model II . . . . .	27
4.22	Change in the Reservation Level in Class 3 for Model II . . . . .	28

# List of Figures

1.1	Network Topology for an Illustrative Example . . . . .	2
2.1	The Graph of an Utility Function $f_i(q_i)$ . . . . .	5
4.1	Change in the Number of Connections in Class 1 ( $J_1$ ) for Model I . .	18
4.2	Change in the Number of Connections in Class 2 ( $J_2$ )for Model I . . .	18
4.3	Change in the Number of Connections in Class 3 ( $J_3$ ) for Model I . .	18
4.4	Change in the Total Budget ( $B$ ) for Model I . . . . .	18
4.5	Change in the Number of Connections in Class 1 ( $J_1$ ) for Model II . .	24
4.6	Change in the Number of Connections in Class 2 ( $J_2$ ) for Model II . .	24
4.7	Change in the Number of Connections in Class 3 ( $J_3$ ) for Model II . .	24
4.8	Change in the Total Budget ( $B$ ) for Model II . . . . .	24