

Contents

Acknowledgements	ix
Introduction	xi
1 Charging in communication networks	1
1.1 Multiservice networks	1
1.2 Internet	5
1.3 ATM	12
1.4 Requirements for charging schemes	16
1.5 The CA\$hMAN Project	19
2 The <i>abc</i> scheme	23
2.1 Introduction	23
2.2 Models for charging schemes	24
2.3 A general mechanism for usage-sensitive charging	26
2.4 A numerical example	29
2.5 Charging policies	32
2.6 Implementation and user issues	34
3 Design and Implementation Concepts	37
3.1 Overview	37
3.2 Business model	39
3.3 Accounting management service	42
3.4 Service provision and charging - the common framework	48
3.5 Interfaces and information flow	55

3.6 User and network intelligent agents 60

3.7 Performance considerations 65

4 The CA\$hMAN charging and accounting system 71

4.1 Overview 71

4.2 Motivation and objectives of the system 73

4.3 Service provision and accounting management 76

4.4 Architectural framework 79

4.5 The CA\$hMAN charging unit 88

4.6 Integration and deployment of the system 95

4.7 User interface design 98

4.8 Operational scenario 101

4.9 Conclusion 105

5 Agents 109

5.1 A user agent for ABR connections 110

5.2 Experiments with the ABR agent 125

5.3 Automated tariff renegotiation 133

5.4 Automated traffic contract renegotiation 137

6 Open issues 149

6.1 Service-level charging 150

6.2 Interconnect charging 152

6.3 Relative prices of services 157

6.4 Standards activities 160

6.5 IP charging 161

A Pricing for guaranteed services 167

A.1 Overview 167

A.2 Effective bandwidth 168

A.3 A simple charging mechanism 175

A.4 Charges that are linear in general measurements 177

A.5 Accuracy and fairness	183
A.6 Charging and acceptance control	188
B Pricing for elastic services	193
B.1 Overview	193
B.2 Proportionally fair pricing	195
B.3 Dynamic pricing for ABR services	201
B.4 Sharing effective usage	206
C CA\$hMAN participants	211
Glossary	213
Bibliography	217
Index	226