



# International Mobile Roaming Report: 2003



*Billed International Roaming, Inter-Country Mobile Traffic, Mobile Voice Revenue, Minutes of Use, MOU's per POP and per Subscriber Worldwide, 5 World Regions, 137 Countries*

*2002-2010*

## Contact Information

Terry Young  
Vice President & Principal Analyst  
[terry.young@telecompetition.com](mailto:terry.young@telecompetition.com)  
+1 925 543 5724

Eileen Healy  
President & CEO  
[eileen.healy@telecompetition.com](mailto:eileen.healy@telecompetition.com)  
+1 925 543 5702

## TABLE OF CONTENTS

<b>1. EXECUTIVE SUMMARY</b> .....	<b>16</b>
<b>2. KEY FORECAST VARIABLES</b> .....	<b>17</b>
2.1 INTERNATIONAL MOBILE ROAMING – DEFINITIONS.....	17
2.1.1 Billed International Roaming.....	17
Figure 2.1. Illustrative example: Billed International Roaming for Country A.....	18
Figure 2.2. Illustrative example #2: Billed International Roaming for Country A.....	18
2.1.2 Inter-Country Mobile Traffic.....	18
Figure 2.3 Illustrative example: Inter-country mobile traffic between Country A and Country B.....	19
Figure 2.4. Illustrative example #2: Inter-country mobile traffic between Country A and Country B.....	19
2.2 MAJOR FORECAST ASSUMPTIONS.....	19
2.2.1 International Roaming and Mobile Traffic Growth.....	20
2.2.2 Worldwide Average Revenue per User (ARPU).....	20
Figure 2.5. Worldwide average revenue per subscriber: 2002 – 2010.....	21
2.2.3 Worldwide Mobile Voice Penetration Rates.....	21
Table 2.6. Mobile Voice penetration assumptions: 2010.....	22
2.3 OTHER CONSIDERATIONS: COUNTRY DEMOGRAPHICS AND INDUSTRY TRENDS.....	22
<b>3. WORLDWIDE SUMMARY FORECASTS: 2002 - 2010</b> .....	<b>23</b>
Table 3.1 Summary of worldwide revenue and subscribers.....	24
Figure 3.2 Total mobile revenue: 2002 - 2010.....	25
Figure 3.3 Worldwide total mobile ARPU: 2002 – 2010.....	25
Figure 3.4 Total revenue by region: 2010.....	26
Figure 3.5 Worldwide revenue composition: 2010.....	26
3.1 MOBILE VOICE.....	27
Figure 3.6 Mobile Voice subscribers.....	27
Figure 3.7 Mobile Voice revenue.....	27
3.2 BILLED INTERNATIONAL ROAMING.....	28
Figure 3.8 Billed International Roaming minutes of use.....	28
Figure 3.9 Billed International Roaming revenue.....	28
3.3 MOBILE DATA.....	29
Figure 3.10 Mobile Data subscribers.....	29
Figure 3.11 Mobile Data revenue.....	29
<b>4. SERVICE FORECASTS BY REGION (2005 AND 2010)</b> .....	<b>30</b>
Table 4.1 Countries and administrative regions considered in mobility forecast.....	31
Table 4.2 Mobile Voice and Billed International Roaming by Region: 2005 and 2010.....	32
4.1 MOBILE VOICE.....	33
Figure 4.3 Mobile Voice subscribers by region.....	33
Figure 4.4 Mobile Voice subscribers.....	34
Figure 4.5 Mobile Voice revenues.....	34
4.2 BILLED INTERNATIONAL ROAMING.....	35
Figure 4.6. Billed International Roaming MOUs by region: 2002 – 2010.....	35
Figure 4.7 Billed International Roaming MOUs by region.....	36
Figure 4.8 International Roaming revenues by region.....	36
<b>5. REGIONAL FORECASTS BY SERVICE: 2002 - 2010</b> .....	<b>37</b>
5.1 ASIA PACIFIC.....	38
Table 5.1 Summary of Asia Pacific revenue, subscribers, and minutes of use.....	38
Figure 5.2 Mobile Voice subscribers.....	39
Figure 5.3 Mobile Voice revenue.....	39
Figure 5.4 Billed International Roaming MOUs.....	40
Figure 5.5 Billed International Roaming revenue.....	40
Figure 5.6 Revenue composition – 2005.....	41
Figure 5.7 Revenue composition – 2010.....	41
5.2 EUROPE.....	42

	Table 5.8 Summary of Europe revenue, subscribers, and minutes of use.....	42
	Figure 5.9 Mobile Voice subscribers.....	43
	Figure 5.10 Mobile Voice revenue.....	43
	Figure 5.11 Billed International Roaming MOUs.....	44
	Figure 5.12 Billed International Roaming revenue.....	44
	Figure 5.13 Revenue composition – 2005.....	45
	Figure 5.14 Revenue composition – 2010.....	45
5.3	NORTH AMERICA.....	46
	Table 5.15 Summary of North America revenue, subscribers, and minutes of use.....	47
	Figure 5.16 Mobile Voice subscribers.....	47
	Figure 5.17 Mobile Voice revenue.....	48
	Figure 5.18 International Roaming MOUs.....	48
	Figure 5.19 International Roaming revenue.....	49
	Figure 5.20 Revenue composition – 2005.....	49
	Figure 5.21 Revenue composition – 2010.....	50
5.4	REST OF WORLD.....	51
	Table 5.22 Summary of Rest of World revenue, minutes of use, and subscribers.....	52
	Figure 5.23 Mobile Voice subscribers.....	52
	Figure 5.24 Mobile Voice revenue.....	53
	Figure 5.25 International Roaming MOUs.....	53
	Figure 5.26 International Roaming revenue.....	54
	Figure 5.27 Revenue composition – 2005.....	54
	Figure 5.28 Revenue composition – 2010.....	55
5.5	LATIN AMERICA.....	56
	Table 5.29 Summary of Latin America revenue and subscribers.....	57
	Figure 5.30 Mobile Voice subscribers.....	57
	Figure 5.31 Mobile Voice revenue.....	58
	Figure 5.32 Billed International Roaming MOUs.....	58
	Figure 5.33 Billed International Roaming revenue.....	59
	Figure 5.34 Revenue composition – 2005.....	59
	Figure 5.35 Revenue composition – 2010.....	60
5.6	DEVELOPING AND EMERGING ECONOMIES.....	61
	Table 5.36 Summary of Developing and Emerging Economies revenue and subscribers.....	62
	Figure 5.37 Mobile Voice subscribers.....	62
	Figure 5.38 Mobile Voice revenue.....	63
	Figure 5.39 International Roaming MOUs.....	63
	Figure 5.40 Billed International Roaming revenue.....	64
	Figure 5.41 Revenue composition – 2005.....	64
	Figure 5.42 Revenue composition – 2010.....	65
<b>6.</b>	<b>COUNTRY-LEVEL FORECASTS: 2003, 2005 AND 2007.....</b>	<b>66</b>
6.1	ALBANIA.....	67
	Figure 6.1 Billed International Roaming MOUs.....	67
	Table 6.2 Average Annual Billed International Roaming MOUs.....	67
	Figure 6.3 Billed International Roaming Revenue.....	67
6.2	ALGERIA.....	68
	Figure 6.4 Billed International Roaming MOUs.....	68
	Table 6.5. Average annual Billed International Roaming MOUs.....	68
	Figure 6.6 Billed International Roaming revenue.....	68
6.3	ARGENTINA.....	69
	Figure 6.7 Billed International Roaming MOUs.....	69
	Table 6.8 Average annual Billed International Roaming MOUs.....	69
	Figure 6.9 Billed International Roaming Revenue.....	69
6.4	ARMENIA.....	70
	Figure 6.10 Billed International Roaming MOUs.....	70
	Table 6.11 Average annual Billed International Roaming MOUs.....	70
	Figure 6.12 Billed International Roaming revenue.....	70
6.5	AUSTRALIA.....	71
	Figure 6.13 Billed International Roaming MOUs.....	71
	Table 6.14 Average annual Billed International Roaming MOUs.....	71

	Figure 6.15 Billed International Roaming revenue.....	71
6.6	AUSTRIA.....	72
	Figure 6.16 Billed International Roaming MOUs.....	72
	Table 6.17 Average annual Billed International Roaming MOUs.....	72
	Figure 6.18 Billed International Roaming Revenue.....	72
6.7	AZERBAIJAN.....	73
	Figure 6.19 Billed International Roaming MOUs.....	73
	Table 6.20 Average annual Billed International Roaming MOUs.....	73
	Figure 6.21 Billed International Roaming revenue.....	73
6.8	BAHRAIN.....	74
	Figure 6.22 Billed International Roaming MOUs.....	74
	Table 6.23 Average annual Billed International Roaming MOUs.....	74
	Figure 6.24 Billed International Roaming Revenue.....	74
6.9	BANGLADESH.....	75
	Figure 6.25 Billed International Roaming MOUs.....	75
	Table 6.26 Average annual Billed International Roaming MOUs.....	75
	Figure 6.27 Billed International Roaming Revenue.....	75
6.10	BELARUS.....	76
	Figure 6.28 Billed International Roaming MOUs.....	76
	Table 6.29 Average annual Billed International Roaming MOUs.....	76
	Figure 6.30 Billed International Roaming Revenue.....	76
6.11	BELGIUM.....	77
	Figure 6.31 Billed International Roaming MOUs.....	77
	Table 6.32 Average annual Billed International Roaming MOUs.....	77
	Figure 6.33 Billed International Roaming Revenue.....	77
6.12	BENIN.....	78
	Figure 6.34 Billed International Roaming MOUs.....	78
	Table 6.35 Average annual Billed International Roaming MOUs.....	78
	Figure 6.36 Billed International Roaming Revenue.....	78
6.13	BOLIVIA.....	79
	Figure 6.37 Billed International Roaming MOUs.....	79
	Table 6.38 Average annual Billed International Roaming MOUs.....	79
	Figure 6.39 Billed International Roaming revenue.....	79
6.14	BOSNIA/HERZEGOVINA.....	80
	Figure 6.40 Billed International Roaming MOUs.....	80
	Table 6.41 Average annual Billed International Roaming MOUs.....	80
	Figure 6.42 Billed International Roaming revenue.....	80
6.15	BOTSWANA.....	81
	Figure 6.43 Billed International Roaming MOUs.....	81
	Table 6.44 Average annual Billed International Roaming MOUs.....	81
	Figure 6.45 Billed International Roaming revenue.....	81
6.16	BRAZIL.....	82
	Figure 6.46 Billed International Roaming MOUs.....	82
	Table 6.47 Average annual Billed International Roaming MOUs.....	82
	Figure 6.48 Billed International Roaming revenue.....	82
6.17	BRUNEI.....	83
	Figure 6.49 Billed International Roaming MOUs.....	83
	Table 6.50 Average annual Billed International Roaming MOUs.....	83
	Figure 6.51 Billed International Roaming revenue.....	83
6.18	BULGARIA.....	84
	Figure 6.52 Billed International Roaming MOUs.....	84
	Table 6.53 Average annual Billed International Roaming MOUs.....	84
	Figure 6.54 Billed International Roaming revenue.....	84
6.19	BURKINA FASO.....	85
	Figure 6.55 Billed International Roaming MOUs.....	85
	Table 6.56 Average annual Billed International Roaming MOUs.....	85
	Figure 6.57 Billed International Roaming revenue.....	85
6.20	BURUNDI.....	86
	Figure 6.58 Billed International Roaming MOUs.....	86
	Table 6.59 Average annual Billed International Roaming MOUs.....	86

	Figure 6.60 Billed International Roaming revenue.....	86
6.21	CAMBODIA.....	87
	Figure 6.61 Billed International Roaming MOUs.....	87
	Table 6.62 Average annual Billed International Roaming MOUs.....	87
	Figure 6.63 Billed International Roaming revenue.....	87
6.22	CAMEROON.....	88
	Figure 6.64 Billed International Roaming MOUs.....	88
	Table 6.65 Average annual Billed International Roaming MOUs.....	88
	Figure 6.66 Billed International Roaming revenue.....	88
6.23	CANADA.....	89
	Figure 6.67 Billed International Roaming MOUs.....	89
	Table 6.68 Average annual Billed International Roaming MOUs.....	89
	Figure 6.69 Billed International Roaming revenue.....	89
6.24	CAPE VERDE.....	90
	Figure 6.70 Billed International Roaming MOUs.....	90
	Table 6.71 Average annual Billed International Roaming MOUs.....	90
	Figure 6.72 Billed International Roaming revenue.....	90
6.25	CHAD.....	91
	Figure 6.73 Billed International Roaming MOUs.....	91
	Table 6.74 Average annual Billed International Roaming MOUs.....	91
	Figure 6.75 Billed International Roaming revenue.....	91
6.26	CHILE.....	92
	Figure 6.76 Billed International Roaming MOUs.....	92
	Table 6.77 Average annual Billed International Roaming MOUs.....	92
	Figure 6.78 Billed International Roaming revenue.....	92
6.27	CHINA.....	93
	Figure 6.79 Billed International Roaming MOUs.....	93
	Table 6.80 Average annual Billed International Roaming MOUs.....	93
	Figure 6.81 Billed International Roaming revenue.....	93
6.28	CHINA (TAIWAN).....	94
	Figure 6.82 Billed International Roaming MOUs.....	94
	Table 6.83 Average annual Billed International Roaming MOUs.....	94
	Figure 6.84 Billed International Roaming revenue.....	94
6.29	CROATIA.....	95
	Figure 6.85 Billed International Roaming MOUs.....	95
	Table 6.86 Average annual Billed International Roaming MOUs.....	95
	Figure 6.87 Billed International Roaming revenue.....	95
6.30	CUBA.....	96
	Figure 6.88 Billed International Roaming MOUs.....	96
	Table 6.89 Average annual Billed International Roaming MOUs.....	96
	Figure 6.90 Billed International Roaming revenue.....	96
6.31	CYPRUS.....	97
	Figure 6.91 Billed International Roaming MOUs.....	97
	Table 6.92 Average annual Billed International Roaming MOUs.....	97
	Figure 6.93 Billed International Roaming revenue.....	97
6.32	CZECH REPUBLIC.....	98
	Figure 6.94 Billed International Roaming MOUs.....	98
	Table 6.95 Average annual Billed International Roaming MOUs.....	98
	Figure 6.96 Billed International Roaming revenue.....	98
6.33	DENMARK.....	99
	Figure 6.97 Billed International Roaming MOUs.....	99
	Table 6.98 Average annual Billed International Roaming MOUs.....	99
	Figure 6.99 Billed International Roaming revenue.....	99
6.34	DOMINICAN REPUBLIC.....	100
	Figure 6.100 Billed International Roaming MOUs.....	100
	Table 6.101 Average annual Billed International Roaming MOUs.....	100
	Figure 6.102 Billed International Roaming revenue.....	100
6.35	EGYPT.....	101
	Figure 6.103 Billed International Roaming MOUs.....	101
	Table 6.104 Average annual Billed International Roaming MOUs.....	101

	Figure 6.105 Billed International Roaming revenue .....	101
6.36	EL SALVADOR .....	102
	Figure 6.106 Billed International Roaming MOUs .....	102
	Table 6.107 Average annual Billed International Roaming MOUs .....	102
	Figure 6.108 Billed International Roaming revenue .....	102
6.37	ESTONIA .....	103
	Figure 6.109 Billed International Roaming MOUs .....	103
	Table 6.110 Average annual Billed International Roaming MOUs .....	103
	Figure 6.111 Billed International Roaming revenue .....	103
6.38	FIJI 104	
	Figure 6.112 Billed International Roaming MOUs .....	104
	Table 6.113 Average annual Billed International Roaming MOUs .....	104
	Figure 6.114 Billed International Roaming revenue .....	104
6.39	FINLAND .....	105
	Figure 6.115 Billed International Roaming MOUs .....	105
	Table 6.116 Average annual Billed International Roaming MOUs .....	105
	Figure 6.117 Billed International Roaming revenue .....	105
6.40	FRANCE .....	106
	Figure 6.118 Billed International Roaming MOUs .....	106
	Table 6.119 Average annual Billed International Roaming MOUs .....	106
	Figure 6.120 Billed International Roaming revenue .....	106
6.41	GABON .....	107
	Figure 6.121 Billed International Roaming MOUs .....	107
	Table 6.122 Average annual Billed International Roaming MOUs .....	107
	Figure 6.123 Billed International Roaming revenue .....	107
6.42	GAMBIA, THE .....	108
	Figure 6.124 Billed International Roaming MOUs .....	108
	Table 6.125 Average annual Billed International Roaming MOUs .....	108
	Figure 6.126 Billed International Roaming revenue .....	108
6.43	GEORGIA .....	109
	Figure 6.127 Billed International Roaming MOUs .....	109
	Table 6.128 Average annual Billed International Roaming MOUs .....	109
	Figure 6.129 Billed International Roaming revenue .....	109
6.44	GERMANY .....	110
	Figure 6.130 Billed International Roaming MOUs .....	110
	Table 6.131 Average annual Billed International Roaming MOUs .....	110
	Figure 6.132 Billed International Roaming revenue .....	110
6.45	GHANA .....	111
	Figure 6.133 Billed International Roaming MOUs .....	111
	Table 6.134 Average annual Billed International Roaming MOUs .....	111
	Figure 6.135 Billed International Roaming revenue .....	111
6.46	GREECE .....	112
	Figure 6.136 Billed International Roaming MOUs .....	112
	Table 6.137 Average annual Billed International Roaming MOUs .....	112
	Figure 6.138 Billed International Roaming revenue .....	112
6.47	HONG KONG S.A.R. ....	113
	Figure 6.139 Billed International Roaming MOUs .....	113
	Table 6.140 Average annual Billed International Roaming MOUs .....	113
	Figure 6.141 Billed International Roaming revenue .....	113
6.48	HUNGARY .....	114
	Figure 6.142 Billed International Roaming MOUs .....	114
	Table 6.143 Average annual Billed International Roaming MOUs .....	114
	Figure 6.144 Billed International Roaming revenue .....	114
6.49	ICELAND .....	115
	Figure 6.145 Billed International Roaming MOUs .....	115
	Table 6.146 Average annual Billed International Roaming MOUs .....	115
	Figure 6.147 Billed International Roaming revenue .....	115
6.50	INDIA .....	116
	Figure 6.148 Billed International Roaming MOUs .....	116
	Table 6.149 Average annual Billed International Roaming MOUs .....	116

	Figure 6.150 Billed International Roaming revenue.....	116
6.51	INDONESIA.....	117
	Figure 6.151 Billed International Roaming MOUs.....	117
	Table 6.152 Average annual Billed International Roaming MOUs.....	117
	Figure 6.153 Billed International Roaming revenue.....	117
6.52	IRAN 118.....	
	Figure 6.154 Billed International Roaming MOUs.....	118
	Table 6.155 Average annual Billed International Roaming MOUs.....	118
	Figure 6.156 Billed International Roaming revenue.....	118
6.53	IRELAND.....	119
	Figure 6.157 Billed International Roaming MOUs.....	119
	Table 6.158 Average annual Billed International Roaming MOUs.....	119
	Figure 6.159 Billed International Roaming revenue.....	119
6.54	ISRAEL.....	120
	Figure 6.160 Billed International Roaming MOUs.....	120
	Table 6.161 Average annual Billed International Roaming MOUs.....	120
	Figure 6.162 Billed International Roaming revenue.....	120
6.55	ITALY.....	121
	Figure 6.163 Billed International Roaming MOUs.....	121
	Table 6.164 Average annual Billed International Roaming MOUs.....	121
	Figure 6.165 Billed International Roaming revenue.....	121
6.56	IVORY COAST.....	122
	Figure 6.166 Billed International Roaming MOUs.....	122
	Table 6.167 Average annual Billed International Roaming MOUs.....	122
	Figure 6.168 Billed International Roaming revenue.....	122
6.57	JAMAICA.....	123
	Figure 6.169 Billed International Roaming MOUs.....	123
	Table 6.170 Average annual Billed International Roaming MOUs.....	123
	Figure 6.171 Billed International Roaming revenue.....	123
6.58	JAPAN.....	124
	Figure 6.172 Billed International Roaming MOUs.....	124
	Table 6.173 Average annual Billed International Roaming MOUs.....	124
	Figure 6.174 Billed International Roaming revenue.....	124
6.59	JORDAN.....	125
	Figure 6.175 Billed International Roaming MOUs.....	125
	Table 6.176 Average annual Billed International Roaming MOUs.....	125
	Figure 6.177 Billed International Roaming revenue.....	125
6.60	KAZAKHSTAN.....	126
	Figure 6.178 Billed International Roaming MOUs.....	126
	Table 6.179 Average annual Billed International Roaming MOUs.....	126
	Figure 6.180 Billed International Roaming revenue.....	126
6.61	KENYA.....	127
	Figure 6.181 Billed International Roaming MOUs.....	127
	Table 6.182 Average annual Billed International Roaming MOUs.....	127
	Figure 6.183 Billed International Roaming revenue.....	127
6.62	KUWAIT.....	128
	Figure 6.184 Billed International Roaming MOUs.....	128
	Table 6.185 Average annual Billed International Roaming MOUs.....	128
	Figure 6.186 Billed International Roaming revenue.....	128
6.63	KYRGYZSTAN.....	129
	Figure 6.187 Billed International Roaming MOUs.....	129
	Table 6.188 Average annual Billed International Roaming MOUs.....	129
	Figure 6.189 Billed International Roaming revenue.....	129
6.64	LATVIA.....	130
	Figure 6.190 Billed International Roaming MOUs.....	130
	Table 6.191 Average annual Billed International Roaming MOUs.....	130
	Figure 6.192 Billed International Roaming revenue.....	130
6.65	LIBAN (LEBANON).....	131
	Figure 6.193 Billed International Roaming MOUs.....	131
	Table 6.194 Average annual Billed International Roaming MOUs.....	131

	Figure 6.195 Billed International Roaming revenue.....	131
6.66	LITHUANIA.....	132
	Figure 6.196 Billed International Roaming MOUs.....	132
	Table 6.197 Average annual Billed International Roaming MOUs.....	132
	Figure 6.198 Billed International Roaming revenue.....	132
6.67	LUXEMBOURG.....	133
	Figure 6.199 Billed International Roaming MOUs.....	133
	Table 6.200 Average annual Billed International Roaming MOUs.....	133
	Figure 6.201 Billed International Roaming revenue.....	133
6.68	MACAU.....	134
	Figure 6.202 Billed International Roaming MOUs.....	134
	Table 6.203 Average annual Billed International Roaming MOUs.....	134
	Figure 6.204 Billed International Roaming revenue.....	134
6.69	MACEDONIA.....	135
	Figure 6.205 Billed International Roaming MOUs.....	135
	Table 6.206 Average annual Billed International Roaming MOUs.....	135
	Figure 6.207 Billed International Roaming revenue.....	135
6.70	MADAGASCAR.....	136
	Figure 6.208 Billed International Roaming MOUs.....	136
	Table 6.209 Average annual Billed International Roaming MOUs.....	136
	Figure 6.210 Billed International Roaming revenue.....	136
6.71	MALAWI.....	137
	Figure 6.211 Billed International Roaming MOUs.....	137
	Table 6.212 Average annual Billed International Roaming MOUs.....	137
	Figure 6.213 Billed International Roaming revenue.....	137
6.72	MALAYSIA.....	138
	Figure 6.214 Billed International Roaming MOUs.....	138
	Table 6.215 Average annual Billed International Roaming MOUs.....	138
	Figure 6.216 Billed International Roaming revenue.....	138
6.73	MALDIVES.....	139
	Figure 6.217 Billed International Roaming MOUs.....	139
	Table 6.218 Average annual Billed International Roaming MOUs.....	139
	Figure 6.219 Billed International Roaming revenue.....	139
6.74	MALI.....	140
	Figure 6.220 Billed International Roaming MOUs.....	140
	Table 6.221 Average annual Billed International Roaming MOUs.....	140
	Figure 6.222 Billed International Roaming revenue.....	140
6.75	MALTA.....	141
	Figure 6.223 Billed International Roaming MOUs.....	141
	Table 6.224 Average annual Billed International Roaming MOUs.....	141
	Figure 6.225 Billed International Roaming revenue.....	141
6.76	MAURITANIA.....	142
	Figure 6.226 Billed International Roaming MOUs.....	142
	Table 6.227 Average annual Billed International Roaming MOUs.....	142
	Figure 6.228 Billed International Roaming revenue.....	142
6.77	MAURITIUS.....	143
	Figure 6.229 Billed International Roaming MOUs.....	143
	Table 6.230 Average annual Billed International Roaming MOUs.....	143
	Figure 6.231 Billed International Roaming revenue.....	143
6.78	MEXICO.....	144
	Figure 6.232 Billed International Roaming MOUs.....	144
	Table 6.233 Average annual Billed International Roaming MOUs.....	144
	Figure 6.234 Billed International Roaming revenue.....	144
6.79	MOLDOVA.....	145
	Figure 6.235 Billed International Roaming MOUs.....	145
	Table 6.236 Average annual Billed International Roaming MOUs.....	145
	Figure 6.237 Billed International Roaming revenue.....	145
6.80	MONGOLIA.....	146
	Figure 6.238 Billed International Roaming MOUs.....	146
	Table 6.239 Average annual Billed International Roaming MOUs.....	146

	Figure 6.240 Billed International Roaming revenue.....	146
6.81	MOROCCO.....	147
	Figure 6.241 Billed International Roaming MOUs.....	147
	Table 6.242 Average annual Billed International Roaming MOUs.....	147
	Figure 6.243 Billed International Roaming revenue.....	147
6.82	MOZAMBIQUE.....	148
	Figure 6.244 Billed International Roaming MOUs.....	148
	Table 6.245 Average annual Billed International Roaming MOUs.....	148
	Figure 6.246 Billed International Roaming revenue.....	148
6.83	NAMIBIA.....	149
	Figure 6.247 Billed International Roaming MOUs.....	149
	Table 6.248 Average annual Billed International Roaming MOUs.....	149
	Figure 6.249 Billed International Roaming revenue.....	149
6.84	NEPAL.....	150
	Figure 6.250 Billed International Roaming MOUs.....	150
	Table 6.251 Average annual Billed International Roaming MOUs.....	150
	Figure 6.252 Billed International Roaming revenue.....	150
6.85	NETHERLANDS.....	151
	Figure 6.253 Billed International Roaming MOUs.....	151
	Table 6.254 Average annual Billed International Roaming MOUs.....	151
	Figure 6.255 Billed International Roaming revenue.....	151
6.86	NEW ZEALAND.....	152
	Figure 6.256 Billed International Roaming MOUs.....	152
	Table 6.257 Average annual Billed International Roaming MOUs.....	152
	Figure 6.258 Billed International Roaming revenue.....	152
6.87	NIGERIA.....	153
	Figure 6.259 Billed International Roaming MOUs.....	153
	Table 6.260 Average annual Billed International Roaming MOUs.....	153
	Figure 6.261 Billed International Roaming revenue.....	153
6.88	NORWAY.....	154
	Figure 6.262 Billed International Roaming MOUs.....	154
	Table 6.263 Average annual Billed International Roaming MOUs.....	154
	Figure 6.264 Billed International Roaming revenue.....	154
6.89	OMAN.....	155
	Figure 6.265 Billed International Roaming MOUs.....	155
	Table 6.266 Average annual Billed International Roaming MOUs.....	155
	Figure 6.267 Billed International Roaming revenue.....	155
6.90	PAKISTAN.....	156
	Figure 6.268 Billed International Roaming MOUs.....	156
	Table 6.269 Average annual Billed International Roaming MOUs.....	156
	Figure 6.270 Billed International Roaming revenue.....	156
6.91	PANAMA.....	157
	Figure 6.271 Billed International Roaming MOUs.....	157
	Table 6.272 Average annual Billed International Roaming MOUs.....	157
	Figure 6.273 Billed International Roaming revenue.....	157
6.92	PAPUA NEW GUINEA.....	158
	Figure 6.274 Billed International Roaming MOUs.....	158
	Table 6.275 Average annual Billed International Roaming MOUs.....	158
	Figure 6.276 Billed International Roaming revenue.....	158
6.93	PARAGUAY.....	159
	Figure 6.277 Billed International Roaming MOUs.....	159
	Table 6.278 Average annual Billed International Roaming MOUs.....	159
	Figure 6.279 Billed International Roaming revenue.....	159
6.94	PERU.....	160
	Figure 6.280 Billed International Roaming MOUs.....	160
	Table 6.281 Average annual Billed International Roaming MOUs.....	160
	Figure 6.282 Billed International Roaming revenue.....	160
6.95	PHILIPPINES.....	161
	Figure 6.283 Billed International Roaming MOUs.....	161
	Table 6.284 Average annual Billed International Roaming MOUs.....	161

	Figure 6.285 Billed International Roaming revenue.....	161
6.96	POLAND.....	162
	Figure 6.286 Billed International Roaming MOUs.....	162
	Table 6.287 Average annual Billed International Roaming MOUs.....	162
	Figure 6.288 Billed International Roaming revenue.....	162
6.97	PORTUGAL.....	163
	Figure 6.289 Billed International Roaming MOUs.....	163
	Table 6.290 Average annual Billed International Roaming MOUs.....	163
	Figure 6.291 Billed International Roaming revenue.....	163
6.98	QATAR.....	164
	Figure 6.292 Billed International Roaming MOUs.....	164
	Table 6.293 Average annual Billed International Roaming MOUs.....	164
	Figure 6.294 Billed International Roaming revenue.....	164
6.99	REUNION.....	165
	Figure 6.295 Billed International Roaming MOUs.....	165
	Table 6.296 Average annual Billed International Roaming MOUs.....	165
	Figure 6.297 Billed International Roaming revenue.....	165
6.100	ROMANIA.....	166
	Figure 6.298 Billed International Roaming MOUs.....	166
	Table 6.299 Average annual Billed International Roaming MOUs.....	166
	Figure 6.300 Billed International Roaming revenue.....	166
6.101	RUSSIA.....	167
	Figure 6.301 Billed International Roaming MOUs.....	167
	Table 6.302 Average annual Billed International Roaming MOUs.....	167
	Figure 6.303 Billed International Roaming revenue.....	167
6.102	RWANDA.....	168
	Figure 6.304 Billed International Roaming MOUs.....	168
	Table 6.305 Average annual Billed International Roaming MOUs.....	168
	Figure 6.306 Billed International Roaming revenue.....	168
6.103	SAUDI ARABIA.....	169
	Figure 6.307 Billed International Roaming MOUs.....	169
	Table 6.308 Average annual Billed International Roaming MOUs.....	169
	Figure 6.309 Billed International Roaming revenue.....	169
6.104	SENEGAL.....	170
	Figure 6.310 Billed International Roaming MOUs.....	170
	Table 6.311 Average annual Billed International Roaming MOUs.....	170
	Figure 6.312 Billed International Roaming revenue.....	170
6.105	SINGAPORE.....	171
	Figure 6.313 Billed International Roaming MOUs.....	171
	Table 6.314 Average annual Billed International Roaming MOUs.....	171
	Figure 6.315 Billed International Roaming revenue.....	171
6.106	SLOVAKIA.....	172
	Figure 6.316 Billed International Roaming MOUs.....	172
	Table 6.317 Average annual Billed International Roaming MOUs.....	172
	Figure 6.318 Billed International Roaming revenue.....	172
6.107	SLOVENIA.....	173
	Figure 6.319 Billed International Roaming MOUs.....	173
	Table 6.320 Average annual Billed International Roaming MOUs.....	173
	Figure 6.321 Billed International Roaming revenue.....	173
6.108	SOUTH AFRICA.....	174
	Figure 6.322 Billed International Roaming MOUs.....	174
	Table 6.323 Average annual Billed International Roaming MOUs.....	174
	Figure 6.324 Billed International Roaming revenue.....	174
6.109	SOUTH KOREA.....	175
	Figure 6.325 Billed International Roaming MOUs.....	175
	Table 6.326 Average annual Billed International Roaming MOUs.....	175
	Figure 6.327 Billed International Roaming revenue.....	175
6.110	SPAIN.....	176
	Figure 6.328 Billed International Roaming MOUs.....	176
	Table 6.329 Average annual Billed International Roaming MOUs.....	176

	<i>Figure 6.330 Billed International Roaming revenue</i> .....	176
6.111 SRI LANKA .....		177
	<i>Figure 6.331 Billed International Roaming MOUs</i> .....	177
	<i>Table 6.332 Average annual Billed International Roaming MOUs</i> .....	177
	<i>Figure 6.333 Billed International Roaming revenue</i> .....	177
6.112 SUDAN .....		178
	<i>Figure 6.334 Billed International Roaming MOUs</i> .....	178
	<i>Table 6.335 Average annual Billed International Roaming MOUs</i> .....	178
	<i>Figure 6.336 Billed International Roaming revenue</i> .....	178
6.113 SURINAM .....		179
	<i>Figure 6.337 Billed International Roaming MOUs</i> .....	179
	<i>Table 6.338 Average annual Billed International Roaming MOUs</i> .....	179
	<i>Figure 6.339 Billed International Roaming revenue</i> .....	179
6.114 SWAZILAND .....		180
	<i>Figure 6.340 Billed International Roaming MOUs</i> .....	180
	<i>Table 6.341 Average annual Billed International Roaming MOUs</i> .....	180
	<i>Figure 6.342 Billed International Roaming revenue</i> .....	180
6.115 SWEDEN .....		181
	<i>Figure 6.343 Billed International Roaming MOUs</i> .....	181
	<i>Table 6.344 Average annual Billed International Roaming MOUs</i> .....	181
	<i>Figure 6.345 Billed International Roaming revenue</i> .....	181
6.116 SWITZERLAND .....		182
	<i>Figure 6.346 Billed International Roaming MOUs</i> .....	182
	<i>Table 6.347 Average annual Billed International Roaming MOUs</i> .....	182
	<i>Figure 6.348 Billed International Roaming revenue</i> .....	182
6.117 SYRIA .....		183
	<i>Figure 6.349 Billed International Roaming MOUs</i> .....	183
	<i>Table 6.350 Average annual Billed International Roaming MOUs</i> .....	183
	<i>Figure 6.351 Billed International Roaming revenue</i> .....	183
6.118 TAJIKISTAN .....		184
	<i>Figure 6.352 Billed International Roaming MOUs</i> .....	184
	<i>Table 6.353 Average annual Billed International Roaming MOUs</i> .....	184
	<i>Figure 6.354 Billed International Roaming revenue</i> .....	184
6.119 TANZANIA .....		185
	<i>Figure 6.355 Billed International Roaming MOUs</i> .....	185
	<i>Table 6.356 Average annual Billed International Roaming MOUs</i> .....	185
	<i>Figure 6.357 Billed International Roaming revenue</i> .....	185
6.120 THAILAND .....		186
	<i>Figure 6.358 Billed International Roaming MOUs</i> .....	186
	<i>Table 6.359 Average annual Billed International Roaming MOUs</i> .....	186
	<i>Figure 6.360 Billed International Roaming revenue</i> .....	186
6.121 TOGO .....		187
	<i>Figure 6.361 Billed International Roaming MOUs</i> .....	187
	<i>Table 6.362 Average annual Billed International Roaming MOUs</i> .....	187
	<i>Figure 6.363 Billed International Roaming revenue</i> .....	187
6.122 TRINIDAD/TOBAGO .....		188
	<i>Figure 6.364 Billed International Roaming MOUs</i> .....	188
	<i>Table 6.365 Average annual Billed International Roaming MOUs</i> .....	188
	<i>Figure 6.366 Billed International Roaming revenue</i> .....	188
6.123 TUNISIA .....		189
	<i>Figure 6.367 Billed International Roaming MOUs</i> .....	189
	<i>Table 6.368 Average annual Billed International Roaming MOUs</i> .....	189
	<i>Figure 6.369 Billed International Roaming revenue</i> .....	189
6.124 TURKEY .....		190
	<i>Figure 6.370 Billed International Roaming MOUs</i> .....	190
	<i>Table 6.371 Average annual Billed International Roaming MOUs</i> .....	190
	<i>Figure 6.372 Billed International Roaming revenue</i> .....	190
6.125 TURKMENISTAN .....		191
	<i>Figure 6.373 Billed International Roaming MOUs</i> .....	191
	<i>Table 6.374 Average annual Billed International Roaming MOUs</i> .....	191

Figure 6.375 Billed International Roaming revenue.....	191
6.126 UGANDA.....	192
Figure 6.376 Billed International Roaming MOUs.....	192
Table 6.377 Average annual Billed International Roaming MOUs.....	192
Figure 6.378 Billed International Roaming revenue.....	192
6.127 UKRAINE.....	193
Figure 6.379 Billed International Roaming MOUs.....	193
Table 6.380 Average annual Billed International Roaming MOUs.....	193
Figure 6.381 Billed International Roaming revenue.....	193
6.128 UNITED ARAB EMIRATES.....	194
Figure 6.382 Billed International Roaming MOUs.....	194
Table 6.383 Average annual Billed International Roaming MOUs.....	194
Figure 6.384 Billed International Roaming revenue.....	194
6.129 UNITED KINGDOM.....	195
Figure 6.385 Billed International Roaming MOUs.....	195
Table 6.386 Average annual Billed International Roaming MOUs.....	195
Figure 6.387 Billed International Roaming revenue.....	195
6.130 UNITED STATES.....	196
Figure 6.388 Billed International Roaming MOUs.....	196
Table 6.389 Average annual Billed International Roaming MOUs.....	196
Figure 6.390 Billed International Roaming revenue.....	196
6.131 UZBEKISTAN.....	197
Figure 6.391 Billed International Roaming MOUs.....	197
Table 6.392 Average annual Billed International Roaming MOUs.....	197
Figure 6.393 Billed International Roaming revenue.....	197
6.132 VENEZUELA.....	198
Figure 6.394 Billed International Roaming MOUs.....	198
Table 6.395 Average annual Billed International Roaming MOUs.....	198
Figure 6.396 Billed International Roaming revenue.....	198
6.133 VIETNAM.....	199
Figure 6.397 Billed International Roaming MOUs.....	199
Table 6.398 Average annual Billed International Roaming MOUs.....	199
Figure 6.399 Billed International Roaming revenue.....	199
6.134 YEMEN.....	200
Figure 6.400 Billed International Roaming MOUs.....	200
Table 6.401 Average annual Billed International Roaming MOUs.....	200
Figure 6.402 Billed International Roaming revenue.....	200
6.135 YUGOSLAVIA.....	201
Figure 6.403 Billed International Roaming MOUs.....	201
Table 6.404 Average annual Billed International Roaming MOUs.....	201
Figure 6.405 Billed International Roaming revenue.....	201
6.136 ZAMBIA.....	202
Figure 6.406 Billed International Roaming MOUs.....	202
Table 6.407 Average annual Billed International Roaming MOUs.....	202
Figure 6.408 Billed International Roaming revenue.....	202
6.137 ZIMBABWE.....	203
Figure 6.409 Billed International Roaming MOUs.....	203
Table 6.410 Average annual Billed International Roaming MOUs.....	203
Figure 6.411 Billed International Roaming revenue.....	203
6.138 COUNTRIES NOT FORECASTED.....	204
<b>7. TOP 50 COUNTRIES – BILLED INTERNATIONAL ROAMING FORECASTS.....</b>	<b>205</b>
Table 7.1 Top 50 countries sorted by 2003 MOUs per Sub.....	205
Table 7.2 Top 50 countries sorted by 2007 Billed International Roaming MOUs per sub.....	207
Table 7.3 Top 50 countries sorted by 2003 Billed International Roaming MOUs.....	209
Table 7.4 Top 50 countries sorted by 2007 Billed International Roaming MOUs.....	211
Table 7.5 Top 50 countries sorted by 2003 Billed International Roaming revenue.....	213
Table 7.6 Top 50 countries sorted by 2007 Billed International Roaming revenue.....	215
<b>8. INTER-COUNTRY MOBILE TRAFFIC.....</b>	<b>218</b>

Table 8.1 International Mobile Traffic - top 500 country pairs by minutes of use ..... 218

**9. METHODOLOGY .....233**

9.1 TELECOMPETITION, INC. AND ATIVA RESEARCH TOOLS® ..... 233

9.2 ABOUT THE INTERNATIONAL MOBILE ROAMING REPORT 2003 ..... 234

*Figure 9.1 Telecompetition service groups framework*..... 234

9.3 PENETRATION RATES, SUBSCRIBERS, AND SUBSCRIPTIONS ..... 234

**10. ABOUT TELECOMPETITION, INC.....236**

## 1. Executive Summary

The Worldwide International Roaming Report 2003 is the mobile industry's pre-eminent desktop reference tool for international mobile roaming forecasts. This report provides a comprehensive source of revenue and unit forecasts for most countries in the world, based on Telecompetition's® rigorous methodology and patented forecasting tools.

The analysis and forecast output in this report are consistent with previous Telecompetition's reports on worldwide mobile market opportunities. Based on our analysis, Telecompetition concludes the following:

- Total revenue contribution from international mobile roaming calls is expected to decline by over 50% by the end of this decade despite a more than two-fold increase in traffic volume.
- International mobile roaming currently only contributes about 5% of total mobile revenues. However, it contributes a much higher percentage of profit for many operators. The financial impact on these operators will be significant.
- In developed countries, increased competition, regulatory pressure and an increasing end-user expectation that mobile services emulate wireline communications will force price per minute down considerably. For example, in response to increased competition, US mobile operators typically offer subscribers free long distance and no roaming charges within a large geographic area. We expect this competitive strategy to be adopted by more operators worldwide.
- International roaming volume increases are driven by additions to roaming agreements operator solutions to increase network interoperability, and end-user expectation to use mobile services wherever and whenever desired.
- In developing and emerging economies, international mobile roaming traffic volume will steadily increase as penetration rates for mobile services increase. Operators in these countries will see similar price pressure due to subscribers' ability to purchase local mobile services from other operators when traveling.
- Mobile voice subscriber growth in many developed countries has all but evaporated, with most countries in Western Europe growing voice subscribers by less than 5% in 2003 and some countries at less than 1%. The US will see growth rates averaging 10% for just a few more years.

This 2003 report incorporates some important changes in forecast assumptions from the international roaming forecasts in our Worldwide Mobility Report 2002:

- International roaming prices remained stable in 2003. However, we expect that market pressures will create a 20% annual decline, beginning in 2004.
- Country level forecast assumptions have been adjusted to reflect new roaming agreements and increased interoperability between CDMA and GSM networks.

In conclusion, we see the expected signs of a maturing industry: increased competition, price erosion for high margin services, commoditization of core services, expansion to include markets formerly considered less attractive (e.g., developing countries) and an increased need for operators to develop new revenue sources and to reduce churn. In the near future, International roaming capability will increase in importance, as mobile subscribers will expect international roaming access to also include email and other forms of mobile data. Mobile operators that have succeeded in providing seamless and cost effective voice roaming will find themselves in a stronger position for these new mobile data services. Demand for mobile services remains strong and users continue to show interest in new mobile service possibilities. We believe there is ample opportunity for those operators that can navigate the transition to a competitive environment and customer-focused market strategies.