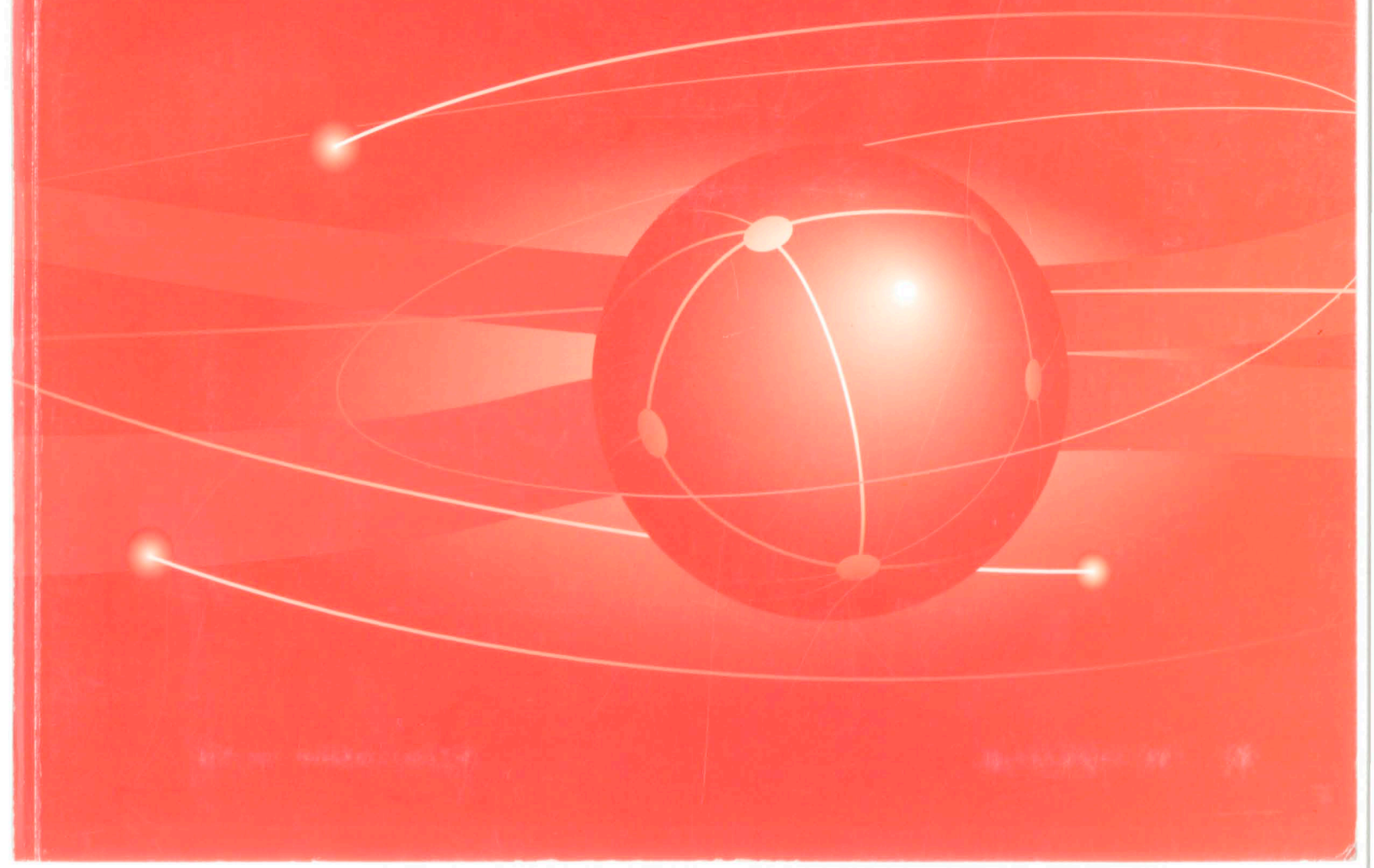
A TELEGEOGRAPHY GUIDE

TeleGeography 2003

GLOBAL TRAFFIC STATISTICS & COMMENTARY



TeleGeography 2003

Global Telecommunications Traffic Statistics and Commentary

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TeleGeography, Inc. • 1909 K Street, NW • Suite 380 • Washington, DC 20006 USA
Tel. +1 202 741 0020 • Fax +1 202 741 0021 • E-mail: info@telegeography.com
www.telegeography.com

TeleGeography, Inc.

This report was prepared by TeleGeography, Inc., the Washington, D.C.-based research and publishing group of Band-X Ltd.

The *TeleGeography 2003* research and production team included:

Stephan Beckert . . . . . .Director of Traffic Research
J. Patrick Christian . . . . . .Senior Traffic Analyst
Anupama Dokeniya . . . . . .Senior Research Analyst
Alan Mauldin . . . . . .Senior Research Analyst
Paul Melton . . . . . .Senior Research Analyst
Abiola Ogunyemi . . . . . .Research Analyst
Markus Krisetya . . . . . .Director of Systems & Design
Michael Gorski . . . . . .Systems Administrator
Tim Stronge . . . . . .EVP of Research, TeleGeography, Inc.
Jason Kowal . . . . . .President, TeleGeography, Inc.

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For all inquiries, please contact:

TeleGeography, Inc.
1909 K Street, NW
Suite 380
Washington, DC 20006 USA
Tel. +1 202 741 0020
Fax +1 202 741 0021
E-mail: info@telegeography.com

For more information, please visit www.telegeography.com.

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Preface

Now more than ever!

At WorldCom, that's how we feel about this year's *TeleGeography 2003* report...and our longtime sponsorship of the authoritative *TeleGeography* series.

During turbulent times, there truly is no substitute for dependable data. The report you hold in your hands offers the most informative, comprehensive, reliable information—and the most incisive analysis—available on the state of the international telephone market.

There's no question that the telecommunications industry faces a number of difficult challenges. Certain disturbing trends—such as the loss of half a million jobs and $2 trillion in U.S. market value—cannot be blithely ignored or wished away. Nor can we ignore certain long-term challenges that plague the industry—like excess network capacity and continued downward price pressure, especially in the U.S and Europe.

Yet, for all of its woes, the global telecom industry shows hopeful signs of recovery. In the last two years, over a dozen new markets have opened and over 700 new carriers have entered the global telecommunications market. In addition, while international PSTN traffic flows grew just eight percent in 2001, Voice-over-IP call volumes almost doubled to 10 billion minutes. Indeed, the twin forces of technological advances and increased competition will continue to drive consumer demand for innovative communications services around the world.

As the industry manages, consolidates, and transforms its way out of its current doldrums, this *TeleGeography 2003* report will prove invaluable. New to this year's edition is an expanded look at mobile traffic, as well as the evolution of inter-carrier relationships and traffic routing. You'll also find re-instated "Almanac" features in this report, including overviews of global Internet backbones and the underlying fiber-optic systems.

On behalf of WorldCom, I'm delighted that our sponsorship of *TeleGeography* continues to make this indispensable resource available. Now more than ever, I heartily recommend this year's report to your attention.

Robert K. Lacy
Vice President
WorldCom, Inc.

Acknowledgements

We wish to thank the numerous carriers, government departments, regulators, and international organizations from around the world who responded to our requests for information. This report would not exist without the help of the dedicated people at these organizations who took the time to ensure that the data reported here are as current and accurate as possible.

We also owe a debt of gratitude to the Band-X switched minutes trading team, whose industry expertise and historical pricing statistics contributed substantially to the depth and accuracy of this report.

We would also like to thank the many people who generously contributed their time and expertise to our research efforts, and those who helped to review early and final drafts of this book. They include: Silvia Agudo, Linda Blake, Teddy Chu, Simon Dodsworth, Cathy Hsu, Tim Kelly, Bill Marmon, Michael Minges, Paul Newnes, Rebecca Rohtbart, Heather Tinsley, Peter Toen, Laura Viana, and Monica Wells.

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The Editors

Executive Summary

Executive Summary

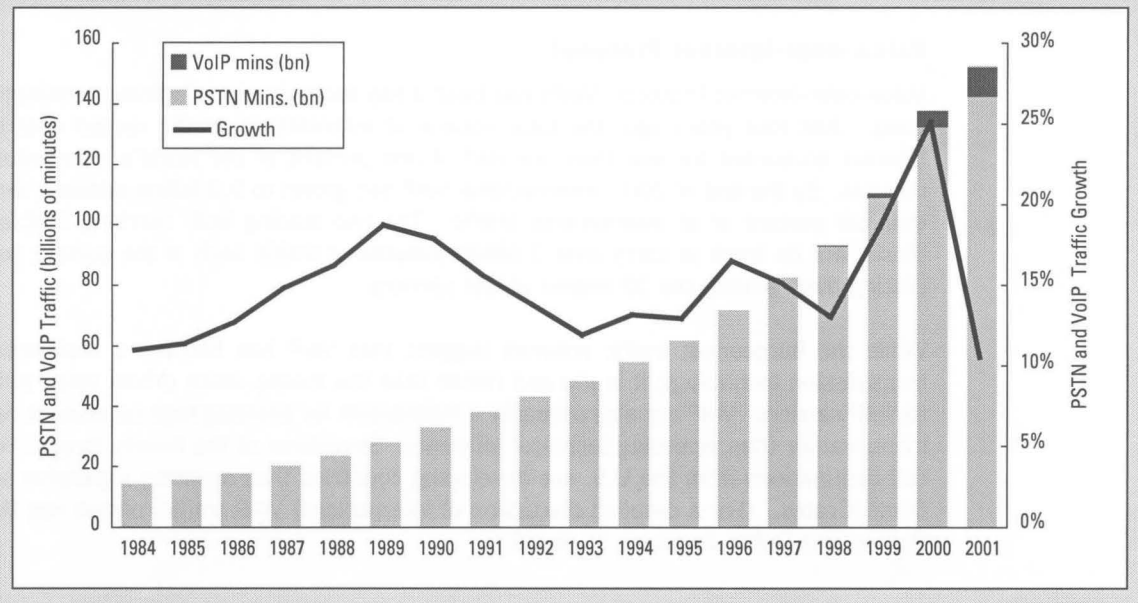
"The WTO Basic Telecommunications Agreement will prove to be the greatest influencing event on the industry for at least the next ten years..."
—Alex Arena, Special Advisor to the Hong Kong SAR, writing in TeleGeography 1997/98

The international telecom sector is so ferociously competitive today that it's difficult to remember how sheltered the industry was five years ago. In 1997, only fifteen countries permitted competition in international telephone services. By 2001, the number of countries allowing competition had tripled and more than 4,000 new international carriers emerged to challenge the former monopoly incumbents. Cross-border traffic flows also grew at unprecedented rates between 1997 and 2001, from 82 to 144 billion minutes annually.

Traffic

Global call volumes expanded as a result of a combination of factors: worldwide economic growth, telephone subscribership increases, and, in particular, plunging call prices. Beginning in 1998, plummeting retail prices, along with the rapid growth of mobile subscribers, spurred international traffic growth and call volumes to unprecedented of levels, with annual growth rates peaking at 23 percent in 2000.

Figure 1. Call Volumes and Growth Rates, 1984-2001



Source: TeleGeography research

In many respects, 2001 marked the end of the post-liberalization boom. By 2001, price cuts seemed to have lost their effectiveness as international PSTN traffic grew by only 8 percent, the slowest pace on record (see Figure 1. Call Volumes and Growth Rates, 1984-2001). Furthermore, new market entrants' assault on established carriers stalled in 2001, leaving the new carriers' (companies established after 1989) year-end market shares at 31 percent, the same level as in 2000. Slowing growth has had a devastating impact on these upstart carriers: seven of the ten largest U.S. carriers in 1999 have since filed for bankruptcy. (For a detailed discussion of international traffic trends, see the "Traffic Analysis" articles on pages 61 to 98.)

Prices and Revenues

Slowing growth is not the only problem facing the carrier market: international call revenues have effectively been flat since 1994 (see Figure 2. Global Revenues Gone Flat). Between 1992 and 2001, call volume increases barely exceeded price declines, resulting in net revenue growth of only 2.8 percent annually. The market for international voice communications peaked in 2000, when global revenues exceeded $70 billion. Sharply reduced calling rates drove revenues down to $60.6 billion in 2001, resulting in the largest absolute decline ever.

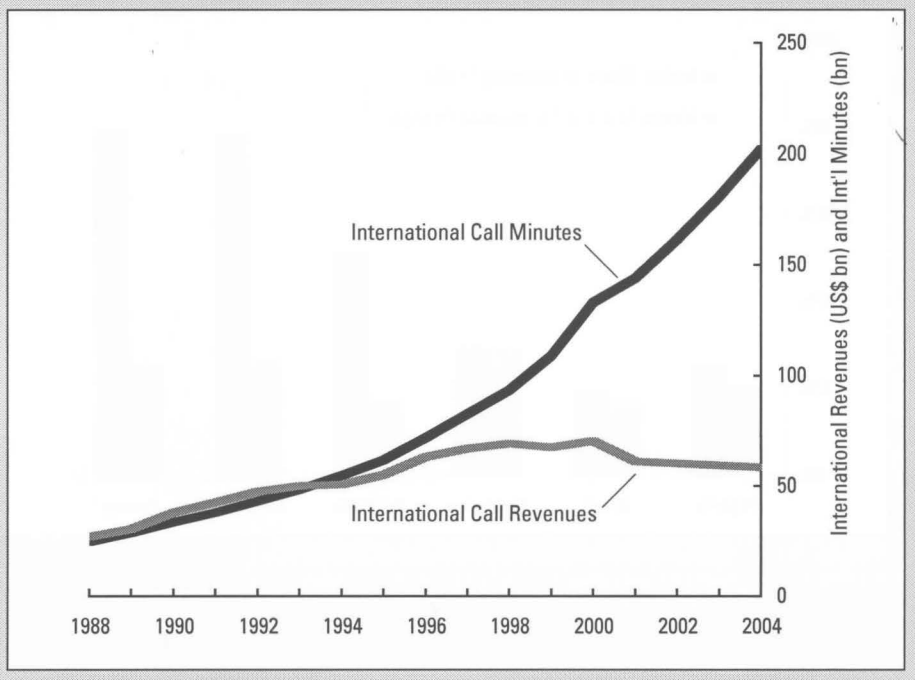
Market liberalization forced carriers to shift from revenue-optimized tariffs to more competitive, cost-based prices. Technological advances and plunging fiber-optic capacity prices have sharply lowered the cost of transporting a call to its destination country. Settlement payments and other termination charges—the per-minute fees a carrier must pay to connect each call to its final destination—account for the largest cost element in completing an international call. As with capacity costs, termination payments have plummeted in recent years. Political and economic pressure, combined with technological change, have helped drive average U.S. carrier termination costs from $0.79 per minute in 1991 to only $0.15 per minute in 2001. (For more on the factors behind stagnant international revenues, please see the "Price & Revenue" section on pages 31 to 60.)

Voice-over-Internet Protocol

Voice-over-Internet Protocol (VoIP) has been a key factor behind declining termination costs. Just four years ago, the total volume of international traffic routed over the Internet accounted for less than one-half of one percent of the world's international minutes. By the end of 2001, international VoIP had grown to 9.9 billion minutes, more than six percent of all international traffic. The two leading VoIP carriers, ITXC and iBasis, are on track to carry over 2 billion minutes of traffic each in the current year, placing them among the 20 largest global carriers.

While the burgeoning traffic volumes suggest that VoIP has become a mainstream transmission technology, it is the end rather than the means which drives voice traffic to VoIP carriers. VoIP remains primarily a mechanism for avoiding high settlement payments rather than achieving technical efficiency. Seventeen of the twenty largest VoIP call destinations from the U.S. are developing countries that maintain expensive settlement rates. (For a detailed discussion of international VoIP traffic, please see VoIP Routes and Traffic on pages 75 to 86.)

Figure 2. Global Revenues Gone Flat



Note: International call minutes and revenues reflect global totals for all countries to all international destinations. Data for 2002 to 2004 are projections based on the assumptions of 12 percent annual traffic growth and 12 percent annual price declines.

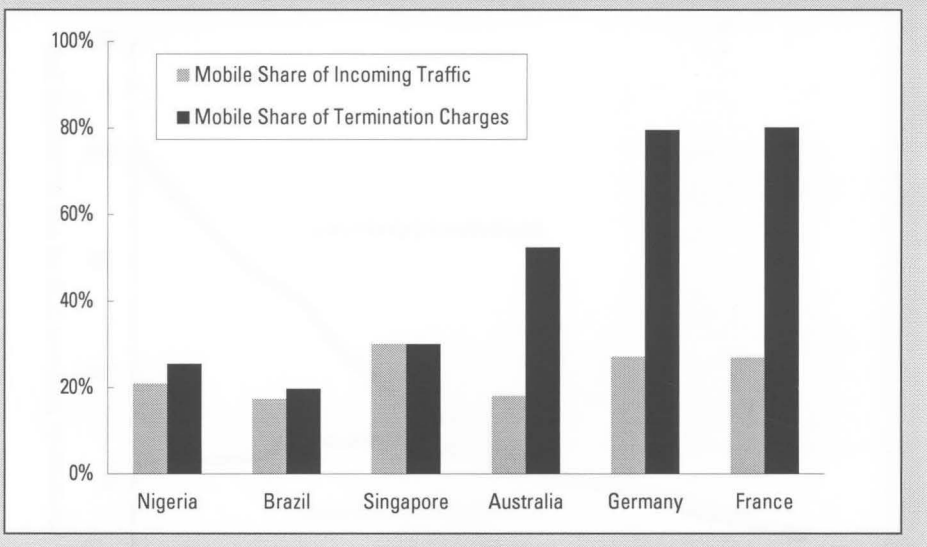
Source: TeleGeography research

Mobile Networks

The rapid adoption of mobile phones around the world has added greatly to the number of calling opportunities, and, by extension, traffic volumes. In 2001, mobile subscribers accounted for approximately 15.7 percent of outgoing international calls—up from eight percent in 1998. Since few mobile carriers maintain any international networks of their own, mobile-originated call volumes have proven to be a valuable source of traffic for wholesale-oriented carriers seeking to carry the international calls of other service providers.

While calls *from* mobiles have proven a useful revenue stream for some international carriers, international calls *to* mobiles represent a major cost to others. Regulators in many countries historically have tolerated much higher termination rates to mobile networks than to fixed-line networks. In much of Europe, the cost of mobile termination is ten to fifteen times higher than the fixed-line termination rate. Consequently, international calls made to mobile phones account for a disproportionate share of termination payments (see Figure 3. Incoming Mobile Traffic versus Termination Costs). For Europe, where the disparities between mobile and fixed–line termination costs are greatest, TeleGeography estimates that mobile terminated calls account for approximately 30 percent of incoming international traffic but 67 percent of the total cost for terminating international traffic. (For a detailed discussion of mobile telephony's impact on the international long-distance sector, please see "International Traffic to and from Mobile Phones" on pages 87 to 98.)

Figure 3. Incoming Mobile Traffic versus Termination Costs



Note: Incoming traffic includes both traffic reported to TeleGeography and estimates. Fixed and mobile termination costs are derived from wholesale rates available from the Band-X London switch as of August 2001, multiplied by the volume of total international minutes to fixed and mobile phones in each country.

Source: Band-X, Inc. and TeleGeography research

The Road Ahead

The challenges facing the international long-distance industry have never been more complex: carriers must adapt to rapid technological and regulatory changes while contending with slowing traffic growth and declining revenues. Although these challenges are daunting, it's clear that this $60 billion industry is unlikely to wither away.

This year's edition of *TeleGeography*—the eleventh in our annual series—offers a comprehensive picture of an industry in flux. The report's call volume data set of 3,490 international routes in 123 countries represents the principal tool for gauging change. In addition, *TeleGeography 2003* presents detailed analysis on traffic, prices, revenues, and technology trends for the international long-distance sector. To place this analysis in context of the industry at large, the report also incorporates over 30 pages of charts and tables from TeleGeography's original research on long-haul terrestrial networks, undersea cables, and international Internet backbones.

Carriers

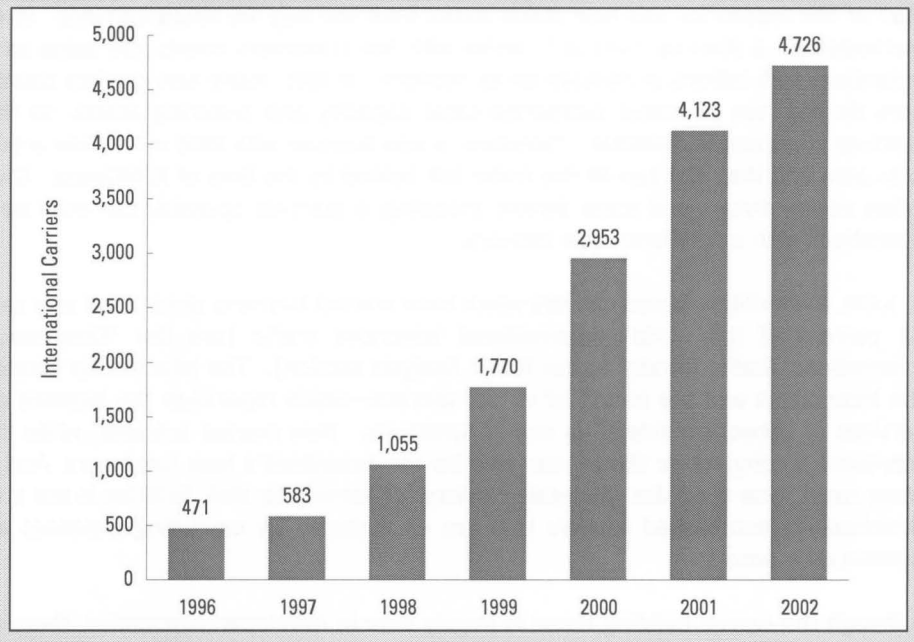
The Growth of International Carrier Competition

New Entrants Outpace Dropouts

In the last year, more than 1,000 new carriers entered the international voice services market. Unfortunately, at least half that many older carriers dropped out over the same period. This shift brings the world's international carrier count to just over 4,700—15 percent more than the year before, and 4,000 more than existed five years ago (see Figure 1. Global Growth of International Carriers, July 1996-July 2002).

From where have all the new carriers come? Despite scarce access to private and public investment capital, many companies have seen opportunity in the wake of failures. In the U.S., for example, over 700 companies became authorized to build international networks between July 2001 and July 2002. Simultaneously, previous market entrants dropped out rapidly—only half of the top ten U.S. international carriers from 1999 are still in business today. In most of Western Europe a similar pattern has formed, leading to little change in absolute carrier counts (see Figure 2. Regional Growth of Licensed International Carriers, 1997-2002).

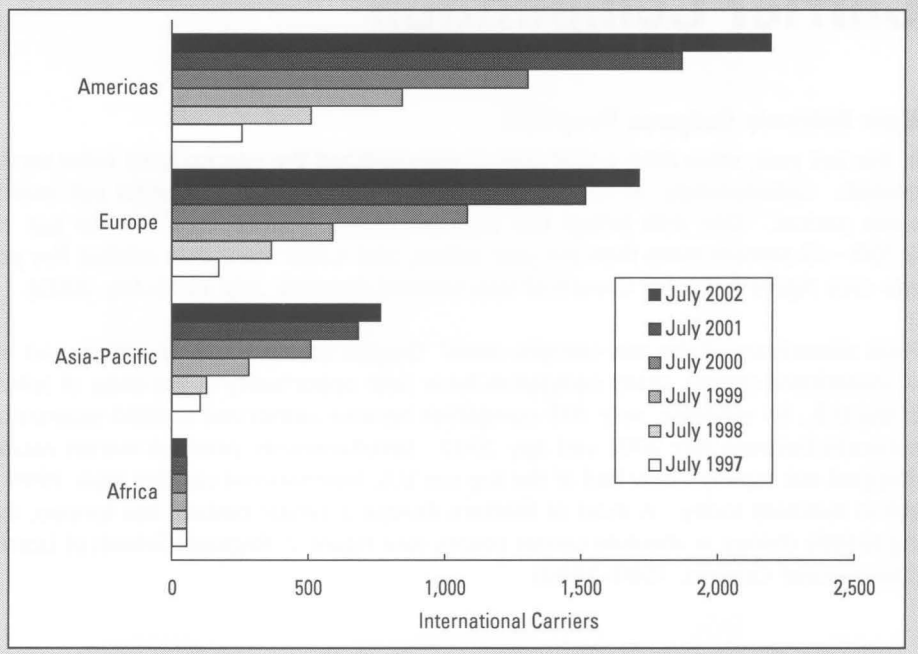
Figure 1. Global Growth of International Carriers, July 1996-July 2002



Notes: Figures include all carriers authorized to provide international facilities-based service or international simple resale (ISR).

Source: TeleGeography research

Figure 2. Regional Growth of Licensed International Carriers, 1997-2002



Notes: Figures include all carriers authorized to provide international facilities-based service or international simple resale (ISR).

Source: TeleGeography research

Part of the reason for this new stasis stems from the way we count carriers. In our methodology, a start-up "virtual" carrier with few customers counts the same as an incumbent with billions of minutes on its network. In fact, many new carriers counted here do not own extensive submarine cable capacity and switching assets, so their start-up costs can be minimal. Therefore, a new licensee with little more than a business plan and Web site can fill the crater left behind by the likes of KPNQwest. Given a few million dollars and some shrewd shopping, a start-up operator can even begin operations with a fully functional network.

In total, the facilities-based carriers which have started business since 1989 now carry 31 percent of the world's international telephone traffic (see the "Overview of International Traffic Trends" in the Traffic Analysis section). The relationship between the incumbents and the swarm of virtual carriers—which repackage the facilities and services of network builders—is one of symbiosis. New market entrants, while they represent a competitive threat, can also be the incumbent's best customers. And, in some cases, new specialist wholesale carriers are serving up their facilities in the other direction—to established carriers that are encumbered by marketing expenses and bureaucratic processes.

Although the carrier building boom is largely over in developed economies, there are still many places where competition is nascent. In the last two years, over a dozen countries have introduced full-scale international carrier competition (e.g., Argentina, Singapore, and Taiwan), and others that are about to explode (e.g., Brazil, China, India,

Figure 3. Countries with International Telephone Service Competition

Rank	Country	July 2002	July 2001	July 2000	July 1999	July 1998	July 1997
		Number of Competing International Carriers—Americas					
1.	United States	1,800	1,600	1,100	679	393	175
2.	Canada	96	90	75	49	21	21
3.	Argentina	66	25	4	2	1	1
4.	Peru	48	28	22	18	11	1
5.	Chile	34	33	30	23	18	9
6.	El Salvador	29	10	10	10	10	1
7.	Mexico	21	19	16	16	15	9
8.	Guatemala	15	9	2	2	1	1
9.	Uruguay	13	1	1	1	1	1
10.	Venezuela	10	5	1	1	1	1
11.	Netherlands Antilles	8	6	2	1	1	1
12.	Bolivia	7	1	1	1	1	1
13.	Dominican Republic	5	5	4	4	3	3
14.	Brazil	4	2	2	2	1	1
15.	Colombia	3	3	3	3	3	1
-	Ecuador	3	3	3	3	3	3
-	Grenada	3	1	1	1	1	1
-	Haiti	3	3	3	3	1	1
19.	Bermuda	2	2	2	2	2	2
-	Dominica	2	2	2	2	1	1
-	Saint Kitts & Nevis	2	1	1	1	1	1
-	Suriname	2	2	2	2	1	1
		Number of Competing International Carriers—Asia-Pacific					
1.	Hong Kong	235	225	150	80	4	1
2.	Japan	150	140	115	50	13	3
3.	Singapore	93	87	60	1	1	1
4.	Australia	75	65	40	27	14	10
5.	Korea, Rep.	60	50	40	24	3	2
6.	New Zealand	30	27	21	19	11	9
7.	Taiwan	29	4	4	1	1	1
8.	Malaysia	16	10	5	5	5	5
9.	Philippines	11	12	12	12	12	9
10.	India	4	1	1	1	1	1
11.	China	3	2	2	2	2	2
-	Israel	3	3	3	3	3	3
-	Kazakhstan	3	3	3	3	3	1
14.	Brunei	2	2	2	2	2	2
-	Georgia	2	2	2	2	2	2

Notes: Figures include all carriers licensed to provide facilities-based international service or International Simple Resale as of July 1 for each year.

Source: TeleGeography research

and most of Eastern Europe). So, while the pool of established carriers continues to shrink, the effect on our global count will continue to be offset by new entrants from developing markets for the foreseeable future. As a result, we expect the growth of competition to remain stable for next year.

Figure 3. Countries with International Telephone Service Competition (continued)

		Number of Competing International Carriers—Europe					
Rank	Country	July 2002	July 2001	July 2000	July 1999	July 1998	July 1997
1.	United Kingdom	500	410	306	215	144	100
2.	Germany	135	130	90	40	32	1
3.	France	130	125	89	50	29	1
4.	Italy	120	115	90	15	9	1
-	Sweden	120	100	60	20	13	11
6.	Netherlands	95	85	60	30	23	3
7.	Spain	85	75	40	16	9	1
8.	Norway	70	57	35	14	7	1
9.	Austria	65	54	40	17	13	1
10.	Switzerland	60	60	50	40	21	1
11.	Belgium	50	45	30	18	11	1
12.	Ireland	45	50	40	25	5	3
-	Denmark	45	50	45	18	11	9
14.	Finland	32	36	20	8	8	8
-	Portugal	32	21	15	1	1	1
16.	Russia*	30	30	30	30	1	1
17.	Iceland	20	14	8	3	1	1
18.	Greece	15	2	1	1	1	1
-	Czech Republic	15	10	1	1	1	1
-	Estonia	15	10	1	1	1	1
21.	Luxembourg	11	15	10	4	1	1
22.	Ukraine*	2	2	2	2	2	2

* Estimates include Russian and Ukrainian carriers authorized to provide service only in certain municipalities.

Notes: Figures include all carriers licensed to provide facilities-based international service or International Simple Resale as of July 1 for each year.

Source: TeleGeography research

Market Shares of International Carriers

Country/Carrier	Percentage of Outgoing Minutes												
	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Argentina													
Telefónica Larga Distancia de Argentina												54.5	54.1
Telecom International												45.5	45.9
Australia													
Telstra			100.0	98.0	87.0	76.3	73.4	62.0	55.0	49.0	49.5	38.9	39.2
Optus				2.0	13.0	21.9	23.4	27.0	26.0	22.0	21.9	21.7	18.2
AAPT									11.0	13.4	13.6	12.7	13.1
WorldCom												6.0	10.0
Primus									3.0	4.0	5.0	13.2	6.4
Teleglobe										4.4	4.4	5.4	5.9
Cable & Wireless													5.3
Others						1.8	3.2	11.0	5.0	7.2	5.6	2.2	1.9
Austria													
Telekom Austria									100.0	95.0	65.3	51.3	45.9
UTA Telekom										1.5	6.1	13.8	9.4
WorldCom											1.4	2.6	7.2
Tele2											5.0	7.1	6.8
Cable & Wireless											3.8	3.5	4.3
eTel													3.9
COLT													3.7
Teleglobe													2.0
Others										3.5	18.4	21.6	17.0
Belgium													
Belgacom									100.0	87.0	81.0	69.6	63.7
WorldCom												9.8	14.4
COLT													6.4
Cable & Wireless													5.9
BT Ignite													2.1
Others										13.0	19.0	20.5	7.5
Brazil													
EMBRATEL											100.0	90.7	86.8
Intelig												9.3	13.2

Notes: Data based on outgoing international traffic for the public switched network and International Simple Resale (ISR) covering the full calendar or fiscal year. Some data aggregated in "others" rows include market shares for carriers shown individually in later years. Market shares may not total to 100 percent due to rounding.

Source: TeleGeography research

Market Shares of International Carriers

Country/Carrier	Percentage of Outgoing Minutes												
	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Canada*													
Bell Canada											27.4	26.3	25.3
AT&T Canada					1.0	5.0	8.0	9.0	10.0	14.0	19.4	21.0	21.6
Teleglobe Canada	29.0	30.0	30.0	31.0	29.0	33.0	30.0	23.0	26.0	24.0	16.9	16.3	17.4
Sprint Canada							15.0	21.0	17.0	18.0	19.5	14.1	13.9
Primus											8.8	9.0	8.2
Telus											5.8	8.0	7.6
Cable & Wireless													1.3
Stentor	71.0	70.0	70.0	69.0	66.0	54.0	44.0	44.0	41.0	40.0			
Others					4.0	8.0	3.0	3.0	6.0	4.0	2.6	5.1	4.7
Chile													
ENTEL Chile			100.0	80.0	57.5	40.0	40.6	37.3	34.1	33.2	34.8	34.2	32.5
CTC Mundo				<1.0	17.5	31.2	31.0	22.2	22.8	25.5	26.4	30.6	32.1
Chile Sat				20.0	25.0	19.7	19.4	15.2	17.9	13.9	12.8	13.0	13.0
BellSouth Chile						6.6	6.8	10.0	11.1	10.7	10.0	10.1	9.8
Globus								9.3	6.8	7.0	7.2	3.4	3.2
TransAm						<1.0	<1.0	2.8	3.1	3.2	3.0	3.1	2.8
AT&T Latin America - Chile						1.2	<1.0	2.8	3.1	3.0	2.7	2.0	2.0
Telefónica del Sur Carrier												0.2	1.8
Others						<1.0	<1.0	0.4	1.0	3.2	3.0	3.4	2.8
Colombia													
Telecom Colombia									100.0	88.0	70.5	55.7	47.6
Orbitel										7.0	15.7	24.3	28.2
ETB										5.0	13.8	20.1	24.2
Czech Republic													
SPT Telecom												100.0	77.7
Cable & Wireless													4.6
eTel													3.3
Others													14.1
Denmark													
Tele Danmark (TDC)							100.0	92.5	84.4	67.5	55.3	47.2	42.7
Tele2 Denmark								4.0	6.6	12.4	13.2	13.3	12.1
Teleglobe											3.1	5.8	8.4
Primus													7.8
Cable & Wireless												4.7	7.2
Telia Denmark								3.5	6.3	9.9	10.7	9.1	7.1
Others									2.7	10.3	18.0	19.9	14.6

Notes: See page 21.

*Canada: The Stentor alliance, which was dissolved in 1999, included Bell Canada, Telus, MTS, SaskTell, and Aliant. BCE, the parent company of Bell Canada, announced the purchase of Teleglobe in February 2000. Until October 1998, Teleglobe held a monopoly on all non-U.S. routes. Sprint Canada market shares include Fonorola, which merged with Sprint Canada in 1998. AT&T market shares include ACC traffic prior to 1999 merger. Primus acquired the consumer division of AT&T Canada in May 1999.

Source: TeleGeography research

Country/Carrier	Percentage of Outgoing Minutes												
	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Dominican Republic													
CODETEL				100.0	90.0	85.8	83.0	77.0	73.8	72.2	78.1	77.4	77.8
Tricom						6.7	7.5	12.8	12.9	15.5	14.2	15.5	14.6
Centennial						7.5	9.5	10.2	13.3	12.3	7.7	7.1	7.6
Finland*													
Sonera					100.0	90.0	72.8	66.0	58.9	54.7	54.0	49.3	47.9
Finnet International						5.0	19.1	24.2	28.2	28.0	25.7	26.9	26.0
Song Networks						3.0	7.7	8.8	9.3	12.0	8.6	8.5	6.7
Cable & Wireless													2.7
Telia													1.8
Teleglobe													1.5
Others						2.0	0.4	0.9	3.5	5.2	11.6	15.2	13.3
France													
France Telecom									100.0	93.0	85.0	67.6	60.4
Telecom Developpement										1.9	8.4	13.3	13.4
Cable & Wireless												3.0	5.6
Siris												4.8	5.3
WorldCom												4.0	4.8
Teleglobe										3.6	4.4	4.6	3.2
9 Telecom													2.4
COLT													2.2
Primus													2.0
Others										1.0	2.2	2.8	0.7
Germany													
Deutsche Telekom									100.0	80.3	58.0	47.3	48.7
WorldCom										1.8	6.4	10.1	11.7
COLT											3.3	5.2	5.2
Arcor										7.2	1.8	2.9	4.9
Cable & Wireless											2.6	4.1	4.8
Primus											3.7	5.9	4.5
Viag Interkom										1.4	3.0	4.7	4.3
Teleglobe										1.8	2.1	3.5	3.8
Telia											1.4	2.0	2.8
Others										7.5	17.7	14.1	9.2
Greece													
OTE												100.0	80.9
Cable & Wireless													14.5
Others													4.4

Notes: See page 21.

*Finland: Song Networks acquired Telia's fixed-line business in Finland in June 2001.

Source: TeleGeography research

Market Shares of International Carriers

Country/Carrier	Percentage of Outgoing Minutes												
	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Hong Kong													
PCCW Hong Kong Telecom									100.0	90.0	61.3	39.0	36.4
City Telecom												16.9	20.1
New World Telephone										2.0	14.3	14.6	14.9
New T&T Hong Kong										2.0	9.6	9.1	8.6
WorldCom												5.8	8.4
China Netcom													6.3
Teleglobe											5.1	5.4	3.2
Cable & Wireless													1.3
Others										6.0	9.7	9.2	1.0
Indonesia													
PT Indosat					100.0	99.5	95.4	88.5	84.8	88.3	86.5	89.2	89.7
PT Satelindo						0.5	4.6	11.5	15.2	11.7	13.5	10.8	10.3
Ireland													
Eircom								100.0	91.0	78.0	73.8	75.0	63.4
WorldCom									3.0	3.0	6.5	10.6	12.2
Esat Telecommunications									5.0	8.0	9.9	8.3	9.8
Cable & Wireless													9.3
Teleglobe											2.0	2.1	2.2
Others									1.0	11.0	7.8	4.0	3.1
Israel													
Bezeq								100.0	72.5	51.4	45.9	44.2	41.1
Barak ITC									15.0	24.8	29.9	31.3	33.0
Golden Lines									12.5	23.7	24.3	24.5	25.9
Italy*													
Telecom Italia									100.0	88.6	73.5	65.0	63.3
Infostrada										4.5	9.2	10.8	10.4
Cable & Wireless												6.1	8.0
Albacom										1.0	6.2	8.0	7.2
Teleglobe										3.8	4.0	5.4	7.0
WorldCom												1.8	2.5
Others										2.0	6.8	2.4	1.6
Japan*													
KDDI	93.3	88.0	73.3	69.7	66.9	66.3	66.2	63.9	62.7	58.0	51.1	36.9	34.5
C&W IDC	3.7	6.5	13.3	15.3	16.9	17.3	17.3	18.7	18.4	18.2	17.5	19.3	23.8
NTT Communications Corp.											1.2	17.5	18.2
Japan Telecom	3.0	5.5	13.4	15.0	16.2	16.4	16.5	17.5	19.0	18.3	17.4	14.1	13.2
WorldCom											4.9	7.8	6.2
Teleglobe											3.2	2.8	2.3
Others										5.5	4.7	1.6	1.8

Notes: See page 21.

*Italy: Wind and Infostrada were merged in 2001.

*Japan: Japan Telecom market shares include ITJ prior to 1997 merger.

Source: TeleGeography research

Country/Carrier	Percentage of Outgoing Minutes												
	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Korea, Rep.													
Korea Telecom			100.0	79.9	74.5	68.7	72.6	73.5	69.0	66.6	59.5	51.9	49.4
DACOM Corporation				20.1	25.5	31.3	27.4	26.5	27.0	21.9	24.7	23.6	26.7
Onse Telecom									4.0	11.5	15.8	15.3	15.2
Others												9.2	8.9
Malaysia													
Telekom Malaysia							100.0	90.0	80.0	77.0	58.5	61.1	54.7
Maxis Communications										7.6	11.2	15.9	18.1
Celcom								8.0	11.0	10.0	14.5	9.0	11.5
TIME Telekom										5.0	8.7	8.9	8.3
Digi Telecommunications											7.2	5.5	7.4
Others								2.0	9.0	1.0	1.0	1.0	
Mexico													
Telmex								100.0	83.0	78.0	68.0	64.7	66.6
Avantel									7.5	8.5	10.0	15.1	14.4
Alestra									8.5	10.5	13.1	13.1	12.2
Others									1.0	3.0	8.9	7.1	6.7
Netherlands													
PTT Telecom Netherlands (KPN)								100.0	95.0	84.9	68.3	57.8	52.6
Telfort											16.8	19.4	15.8
WorldCom											5.4	10.8	9.8
COLT													7.4
Cable & Wireless												2.2	6.9
Teleglobe											1.4	2.1	3.8
Others									5.0	15.3	8.1	7.7	3.9
New Zealand													
Telecom New Zealand	100.0	92.0	82.0	80.0	78.4	74.8	78.0	78.2	74.6	77.5	72.5	71.8	71.4
CLEAR Communications		8.0	18.0	20.0	21.6	25.2	22.0	19.8	20.2	12.3	17.9	15.3	15.0
Teleglobe										6.9	6.2	6.6	3.6
Cable & Wireless													2.3
Others								2.0	5.2	3.3	3.4	5.8	7.8
Norway													
Telenor									100.0	92.6	73.2	75.0	72.6
Tele2 Norge											7.0	7.3	6.9
Cable & Wireless												3.2	6.4
Teleglobe													2.6
Telia										5.0	5.0	5.3	
World Access											6.0	6.2	
Others										2.4	8.8	2.8	11.4

Notes: See page 21.

Source: Telegeography research

Market Shares of International Carriers

Country/Carrier	Percentage of Outgoing Minutes												
	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Philippines*													
PLDT			100.0	91.6	84.2	69.0	68.0	79.0	73.0	69.0	65.4	51.8	49.9
Globe Telecom								2.0	7.0	8.6	16.0	30.6	36.7
Digitel								2.0	3.0	4.3	4.9	5.0	4.5
Eastern Telecommunications						7.0	6.0	5.0	7.0	6.4	3.4	4.6	3.8
Bayan Tel							<1.0	4.0	5.0	5.7	4.6	3.5	2.6
Capitol Wireless						<1.0	<1.0	1.0	1.0	3.5	4.1	3.1	1.5
Philippine Global Communications				8.4	15.8	23.0	23.0	6.0	3.0	1.1	1.3	1.2	0.9
Others						1.0	3.0	1.0	1.0	1.0	1.0	1.0	1.0
Portugal													
Marconi											100.0	83.3	79.9
Cable & Wireless												8.6	13.1
Jazztel												2.0	1.8
Others												6.1	5.6
Singapore													
Singapore Telecom													83.7
StarHub													10.4
WorldCom													2.4
Teleglobe													2.3
Others													1.1
Spain													
Telefónica									100.0	90.5	82.7	82.6	72.2
Cable & Wireless												3.3	8.6
Retevisión										4.5	4.3	3.7	3.5
WorldCom													2.4
BT Ignite												1.4	2.3
Teleglobe											2.2	2.6	2.9
Lince											2.1	2.4	3.3
COLT													2.1
Others										5.0	8.7	3.7	2.9
Sweden													
Telia				100.0	92.0	87.0	76.0	69.0	66.0	62.0	53.0	47.1	43.4
WorldCom											4.0	13.8	17.0
Tele2					8.0	13.0	21.0	22.0	22.0	24.0	18.0	14.5	13.2
Cable & Wireless												100.0	6.2
Telenordia											7.0	4.8	4.4
Teleglobe											2.0	2.9	2.8
COLT													2.0
Others							3.0	9.0	12.0	14.0	16.0	16.5	11.0

Notes: See page 21.

*Philippines: PLDT market shares include Smart Communications traffic prior to 1999 acquisition. Globe Telecom market shares include Islacom traffic prior to 2001 merger.

Source: Telegeography research

Country/Carrier	Percentage of Outgoing Minutes												
	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Switzerland*													
Swisscom									100.0	93.5	77.6	58.7	54.4
Sunrise										3.7	6.6	25.3	21.8
Cable & Wireless												5.3	6.4
WorldCom												7.4	5.7
Teleglobe											1.4	1.1	4.8
COLT													4.3
Telia													1.1
Others										2.8	14.4	2.2	1.4
Taiwan													
Chunghwa Telecom											100.0	91.2	80.6
Others												8.8	19.4
United Kingdom*													
BT	91.0	86.0	81.0	76.8	74.2	68.6	67.7	60.0	54.9	51.6	39.7	37.2	33.3
Cable & Wireless	9.0	14.0	19.0	23.2	24.0	28.1	25.8	26.8	30.3	32.2	31.3	28.5	24.5
WorldCom								6.6	5.1	5.1	10.0	11.8	13.7
Primus												3.5	5.5
Teleglobe										4.2	4.8	5.6	4.5
COLT													4.1
Energis Carrier Services												4.2	3.9
Telia												2.1	2.7
Others					1.8	3.3	6.5	6.6	9.7	6.9	14.2	7.3	7.9
United States*													
AT&T Corp.	83.3	78.4	74.8	70.3	62.2	60.1	54.3	50.2	44.7	39.6	36.5	25.7	32.2
WorldCom	10.2	14.6	17.8	21.2	25.4	28.6	32.0	32.9	31.2	28.8	28.0	33.0	30.7
Sprint	5.8	6.4	6.3	7.3	10.3	11.1	11.3	13.2	12.0	11.7	12.5	10.4	14.4
Teleglobe USA									1.3	3.3	4.8	4.0	3.9
Cable & Wireless													2.4
World Access									2.9	5.1	3.9	4.8	2.3
Primus									0.3	0.5	2.9	2.9	2.2
Others	0.7	0.7	1.1	1.2	2.1	0.2	2.4	3.7	7.6	11.0	11.4	19.2	11.8

Notes: See page 21.

* Switzerland: Sunrise shares include diAx traffic prior to November 2000 merger.

* United Kingdom: Figures for Cable & Wireless reflect data for Mercury prior to its April 1997 merger with Bell Cablemedia, Videotron, and NYNEX CableComms.

* United States: Market shares for U.S. carriers prior to 1993 exclude traffic to Canada and Mexico. WorldCom market shares prior to 1998 merger aggregate MCI and WorldCom traffic. World Access filed for bankruptcy and ceased operations in the first half of 2001.

Source: Telegeography research

Top 40 International Carriers

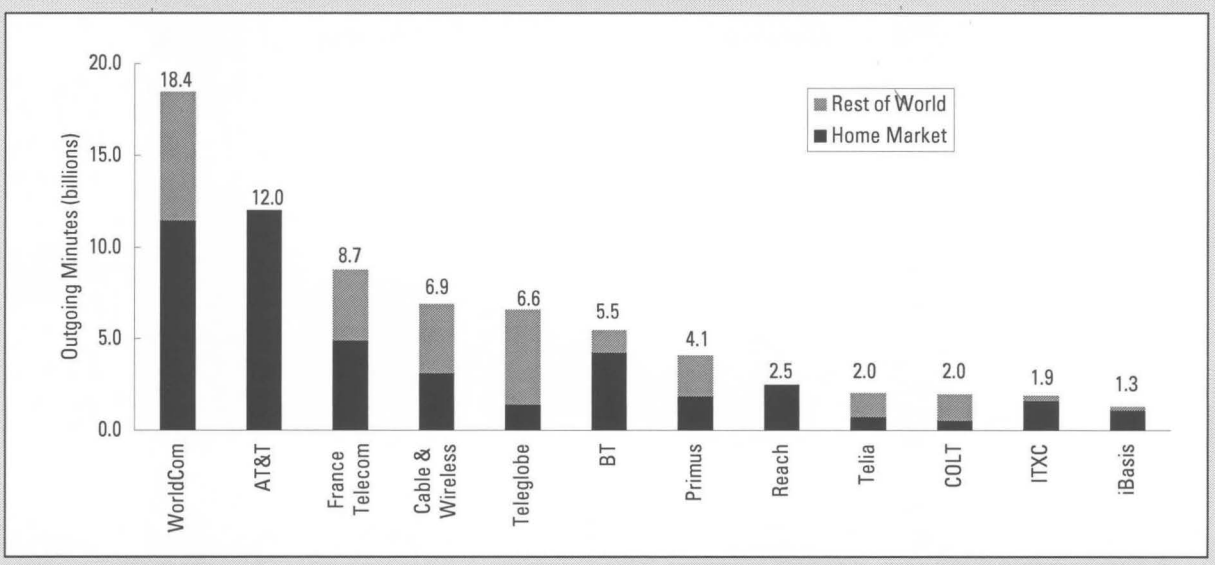
Rank	Company	Origin Country	Outgoing Traffic (millions of minutes) 2001	2000	Change '00-'01	2001 Revenue (US$ billions) Total	Int'l Service
1.	AT&T Corp.	United States	12,006.8	9,680.1	24.0%	52.6	4.6
2.	WorldCom	United States	11,454.7	12,399.5	-7.6%	35.2	1.7
3.	Sprint	United States	5,384.4	3,922.8	37.3%	26.1	0.8
4.	Deutsche Telekom	Germany	5,025.1	4,525.0	11.1%	43.3	0.7
5.	France Telecom	France	4,592.0	4,393.0	4.5%	38.6	1.0
6.	BT*	United Kingdom	4,233.5	4,559.3	-7.1%	26.6	n.a.
7.	Cable & Wireless	United Kingdom	3,113.8	3,487.6	-10.7%	3.1	n.a.
8.	Telefónica	Spain	3,084.8	2,656.9	16.1%	27.6	2.8
9.	Telecom Italia	Italy	3,042.0	2,706.0	12.4%	28.0	n.a.
10.	China Telecom	China	2,600.0	2,240.0	16.1%	14.5	n.a.
11.	Bell Canada	Canada	2,000.0	1,900.0	5.3%	17.3	n.a.
12.	Swisscom	Switzerland	1,757.0	1,633.0	7.6%	3.1	0.1
13.	WorldCom	United Kingdom	1,747.4	1,447.3	20.7%	35.2	n.a.
14.	AT&T Canada	Canada	1,711.4	1,524.8	12.2%	1.0	n.a.
15.	PTT Telecom (KPN)	Netherlands	1,695.0	1,636.0	3.6%	11.5	1.3
16.	Singapore Telecom*	Singapore	1,565.0	1,440.0	8.7%	4.1	0.7
17.	Saudi Telecom	Saudi Arabia	1,516.6	1,194.9	26.9%	n.a.	n.a.
18.	Teleglobe USA	United States	1,458.1	1,517.7	-3.9%	2.1	<0.1
19.	Etisalat	United Arab Emirates	1,395.9	1,123.6	24.2%	0.7	n.a.
20.	Telmex	Mexico	1,386.4	1,281.3	8.2%	11.9	1.0
21.	Teleglobe Canada	Canada	1,376.7	1,180.9	16.6%	2.1	n.a.
22.	Belgacom	Belgium	1,372.2	1,277.6	7.4%	4.8	0.4
23.	PCCW Hong Kong Telecom	Hong Kong	1,270.0	1,200.0	5.8%	2.8	0.7
24.	Chunghwa Telecom	Taiwan	1,227.2	1,058.4	15.9%	5.4	n.a.
25.	WorldCom	Germany	1,209.1	964.7	25.3%	35.2	n.a.
26.	Telstra	Australia	1,188.0	1,030.0	15.3%	9.9	0.2
27.	Rostelecom	Russia	1,081.6	944.0	14.6%	0.8	0.1
28.	Telecom Developpement	France	1,021.5	867.2	17.8%	1.0	n.a.
29.	Eircom	Ireland	973.3	936.9	3.9%	1.6	<0.1
30.	KDDI	Japan	950.0	950.0	0.0%	14.9	n.a.
31.	Cable & Wireless, Inc.	United States	910.1	332.6	173.6%	1.0	n.a.
32.	Primus Telecommunications	United States	832.0	1,082.5	-23.1%	1.0	n.a.
33.	OTE	Greece	825.1	793.2	4.0%	3.6	0.3
34.	Telia	Sweden	741.6	730.0	1.6%	5.5	0.3
35.	TPSA	Poland	729.9	675.8	8.0%	4.2	n.a.
36.	Marconi	Portugal	719.0	599.5	19.9%	n.a.	n.a.
37.	Sunrise	Switzerland	704.6	702.0	0.4%	0.9	n.a.
38.	Telecom New Zealand*	New Zealand	689.2	682.5	1.0%	2.3	0.1
39.	Telekom Austria	Austria	680.0	724.0	-6.1%	3.5	n.a.
40.	Türk Telekomünikayson	Turkey	675.0	731.8	-7.8%	n.a.	n.a.

Notes: Traffic figures are for public switched telephone network (PSTN) circuits and International Simple Resale only (service resale is excluded). Carrier rankings based on originating country minutes only; when based on the aggregated traffic of all subsidiaries, the top multinational carriers include: AT&T, BT, WorldCom, Cable & Wireless, Teleglobe, and Primus. International service revenues generally reflect net of PSTN service revenues after adding or subtracting for settlement payments but may also include some private line revenue. All revenue figures converted from original currency at conversion rate current to year end reported.

* Data are for the fiscal year ending March 31, 2002. Telecom New Zealand's fiscal year ends June 30, 2002.

Source: TeleGeography research, FCC, and company reports.

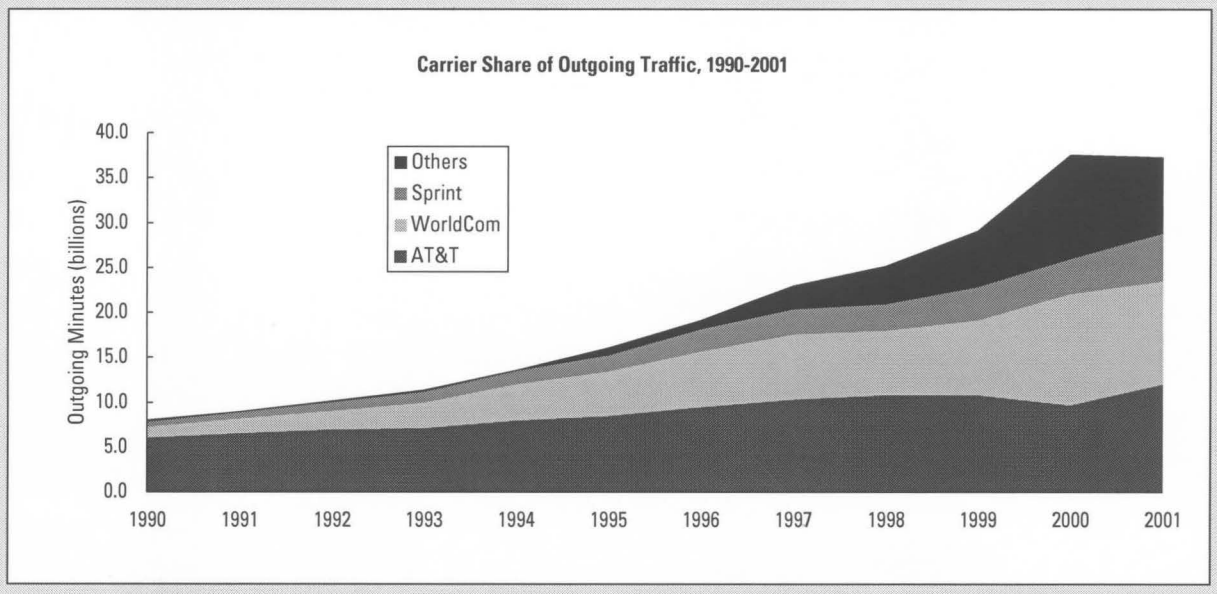
Traffic Base of Selected Multinational Carriers



Notes: Figures represent total outbound international traffic, including some refile and transit traffic. Reach, a joint venture of Telstra and PCCW, has two "home" countries, Hong Kong and Australia. AT&T traffic represents U.S.-originated traffic only; traffic from overseas subsidiaries not available. ITXC and iBasis are primarily VoIP-based carriers.

Source: TeleGeography research

Market Shares of U.S. International Carriers



Notes: Traffic figures are for public switched network circuits based on billing point of call, not originating point. International Simple Resale (ISR) is included in facilities-based totals.

Source: TeleGeography research and FCC carrier filings

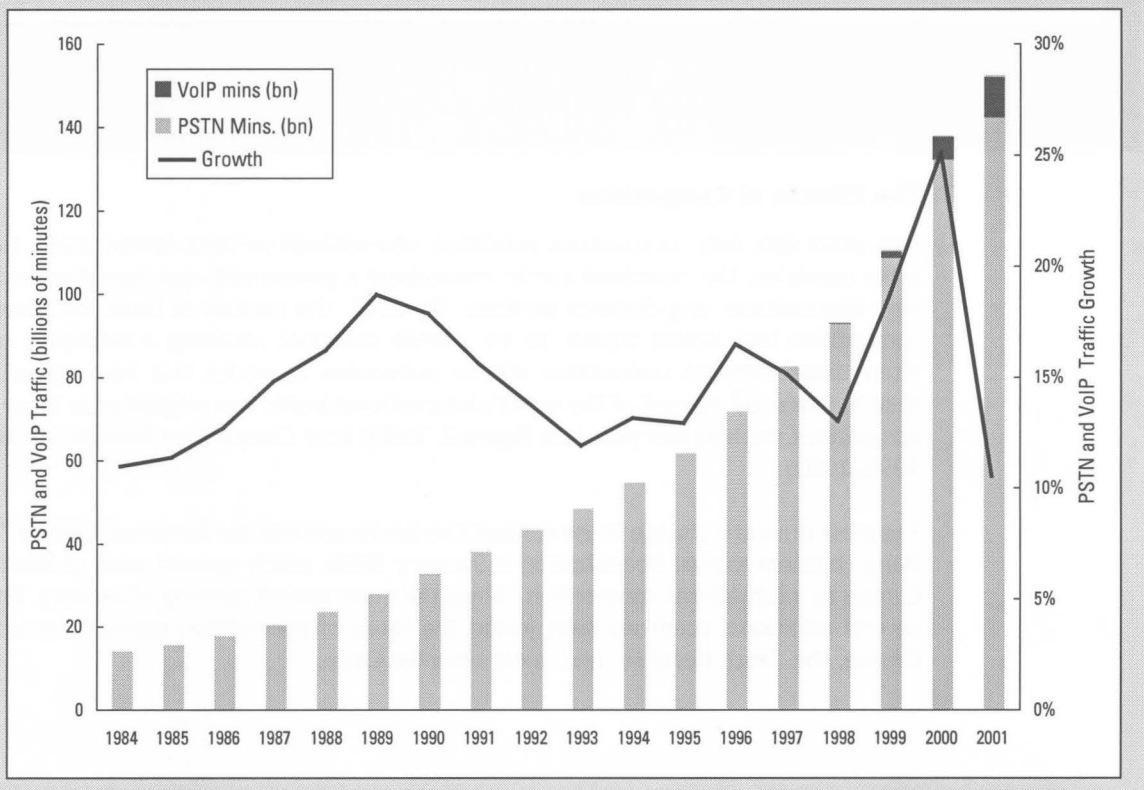
Traffic Analysis

Overview of International Traffic Trends

The latest data compiled by TeleGeography suggest that 2001 may have represented the end of an era of rapid traffic growth. After three consecutive years of torrid growth, capped by a 23 percent surge in 2000, worldwide switched traffic grew by only 8 percent, to 142 million minutes in 2001—the slowest pace on record. If voice-over-IP traffic (VoIP) is included, aggregate growth came to approximately 10 percent (see Figure 1. Call Volumes and Growth Rates, 1984-2001), still the lowest pace since the mid-1980s.

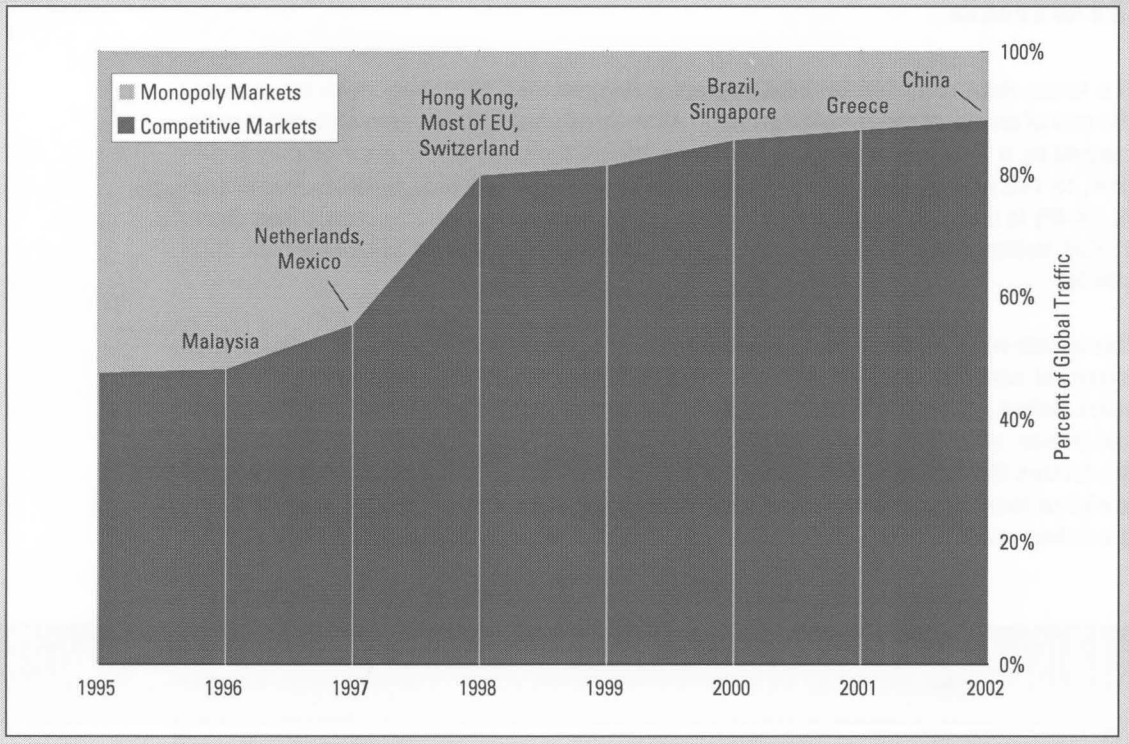
This article will review the past year's worldwide telecom traffic growth patterns in their historical context. The groundwork for the 2001 market slowdown was laid several years before. In fact, the apparent slowdown may simply represent a return to historical trends, after several anomalous years of rapid growth. Instead of examining only the factors that conspired to restrain traffic growth last year, it may therefore be more useful to look back at the factors that drove growth to unprecedented heights in the preceding years.

Figure 1. Call Volumes and Growth Rates, 1984-2001



Source: TeleGeography research

Figure 2. Traffic From Competitive Telecom Markets, 1995-2002



Notes: Country labels reflect the timeline of market liberalization for select countries. Between 1996 and 2002 a total of 35 countries opened their international telecommunications markets to competition.

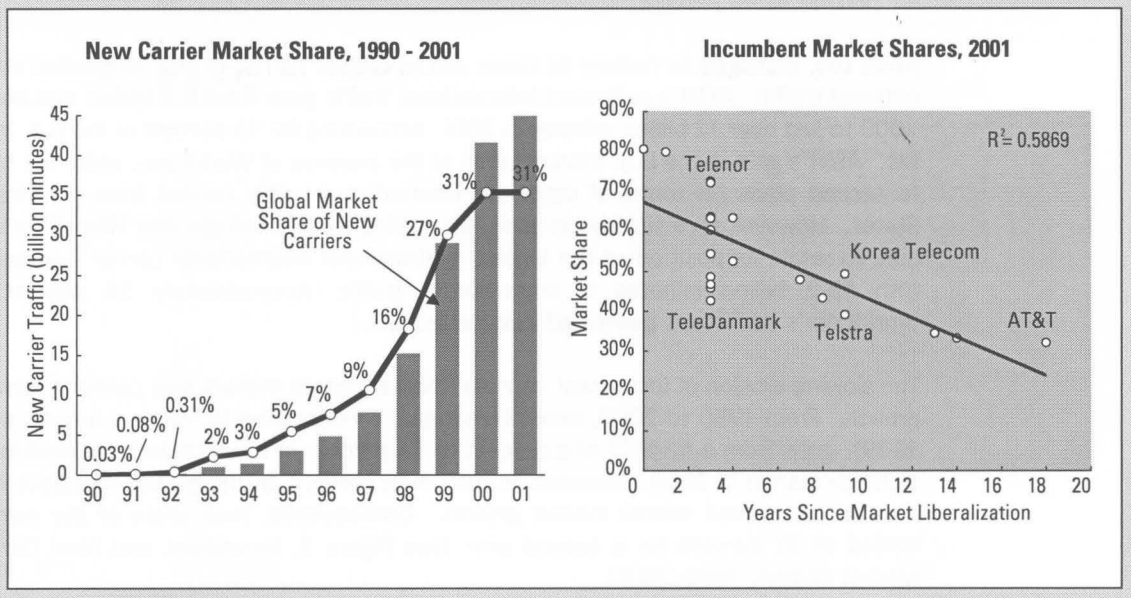
Source: TeleGeography research

The Effects of Competition

Five years ago, only 15 countries permitted international services competition. In all other countries, the incumbent carrier maintained a government-sanctioned monopoly over international long-distance services. By 2001, the number of countries allowing competition had almost tripled, to 44. While countries retaining a monopoly over international services competition still far outnumber countries that have liberalized their markets, 87 percent of the world's international traffic was originated in those 44 competitive markets last year (see Figure 2. Traffic from Competitive Telecom Markets, 1995-2002).

The most dramatic change in the competitive landscape was the European Union's "Big Bang" telecom market liberalization in January 1998, which opened most of Western Europe to international competition. Since the mass market opening of January 1998, several additional countries have joined the ranks of competitive markets, including Greece, the Czech Republic, and, most recently, China.

Figure 3. Incumbent and New Carrier Market Shares, 1990-2001



Note: New carrier figure includes only carriers that began facilities-based operation after 1989.

Source: TeleGeography research

Pricing

New market entrants used low prices to pry customers away from the former monopoly incumbent carriers. Since new carriers had little or no established customer base themselves, new market entrants priced their services far more aggressively than their entrenched rivals. Moreover, given that international call prices had traditionally been set far above carriers' underlying costs, there was plenty of room for price reductions.

Low prices proved an effective lure. To cite just one example, within the first year of market liberalization, competitive carriers had captured 20 percent of the German market and were making comparable inroads in neighboring countries. (A complete list of carriers' market shares by country can be found on pages 21 to 27.) Faced with the dramatic erosion of their customer base, incumbents had no choice but to match their rivals' price cuts, leading to an unprecedented price war. Deutsche Telekom's prices on many routes have fallen by more than 90 percent since the introduction of competition. The unprecedented ferocity of the price war in Germany is reflected in the fact that Deutsche Telekom now offers calls to Canada for only 4.5 Euro cents per minute—less than AT&T normally charges for a call from the U.S. to Canada. Despite these drastic price cuts, the most aggressive rivals still underprice Deutsche Telekom by 40 to 50 percent on many routes.

Market Shares

Such savage price cuts have finally helped to slow the erosion of incumbents' market share. Last year, for example, Deutsche Telekom's outbound international traffic experienced net growth for the first time since the opening of the German long-distance market in January 1998. In fact, Deutsche Telekom was one of a small number of for-

mer incumbent carriers that managed to claw back a bit of their lost share of the international long-distance market: in 2001, Deutsche Telekom's share rose slightly, from 47 percent to 49 percent.

AT&T, too, managed to reclaim its crown as the largest carrier of U.S.-originated international traffic. AT&T's outbound international traffic grew from 9.6 billion minutes in 2000 to just over 12 billion minutes in 2001, accounting for 32 percent of the U.S. market. AT&T's gain in the U.S. market came at the expense of WorldCom, which fell back to second place in terms of outbound international traffic carried from the United States. However, on a worldwide basis, all available data indicate that WorldCom was able to retain its position as the largest multinational international carrier worldwide, with 18.2 billion minutes of cross-border traffic. Approximately 38 percent of WorldCom's traffic was generated outside the U.S.

The slowing erosion of incumbent carriers' market shares mirrors new carriers' slowing growth. From 1990 to 2000, new international carriers (that is, carriers formed after 1989), grew from a fraction of a percent to 31 percent of the total international long-distance market in 2000. However, in 2001, new carriers' traffic growth kept pace with but did not exceed overall market growth. Consequently, their share of the market stalled at 31 percent for a second year (see Figure 3. Incumbent and New Carrier Market Shares, 1990-2001).

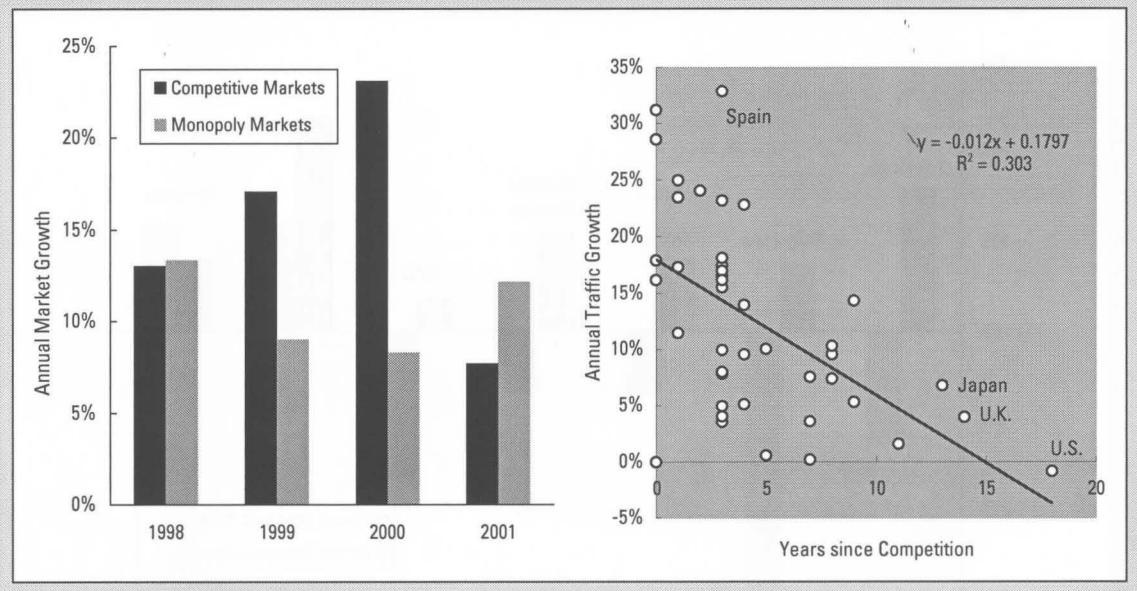
Although incumbent carriers were able to slow the tide last year, historical precedent suggests that most former monopoly carriers' market shares will continue to decline over the long term, albeit at a more gradual rate. Typically, in markets that have been liberalized for more than a decade, the incumbent's market share has gradually declined to approximately one-third.

Market Maturation

In 1998, at the outset of the European liberalization process, traffic growth in competitive and monopoly markets was comparable, at approximately 13 percent annually. Between 1998 and 2000, international traffic from liberalized markets grew twice as quickly as traffic from monopoly markets. The price wars between incumbents and competitive carriers have driven down international call prices in many European countries by more than 70 percent since 1998. These deep price reductions have spurred traffic growth in countries that were widely regarded as relatively mature telecom markets to levels that were well above historical averages.

However, by 2001, price cuts seem to have lost their effectiveness, and growth slowed in many markets. The scatter plot diagram in Figure 4 (Traffic Growth in Competitive and Non-Competitive Telecom Markets) illustrates the trend behind this slowdown. Traffic growth rates in newly liberalized telecom markets (the circles closest to the Y axis) are typically high, reflecting consumers' demand for lower-priced international services. Over the course of several years, growth rates tend to slow, as the market reaches a new equilibrium. The linear regression equation describes the relationship as $y = -0.012x + 0.1797$, where y is traffic growth and x represents the number of years since a country has introduced competition. In other words, on average, countries experience 17.97 percent traffic growth in the first year of competition, but that growth decelerates by 1.2 percentage points every year thereafter.

Figure 4. Traffic Growth in Competitive and Non-Competitive Telecom Markets



Note: Data reflect PSTN traffic only and exclude VoIP traffic volumes.
Source: TeleGeography research

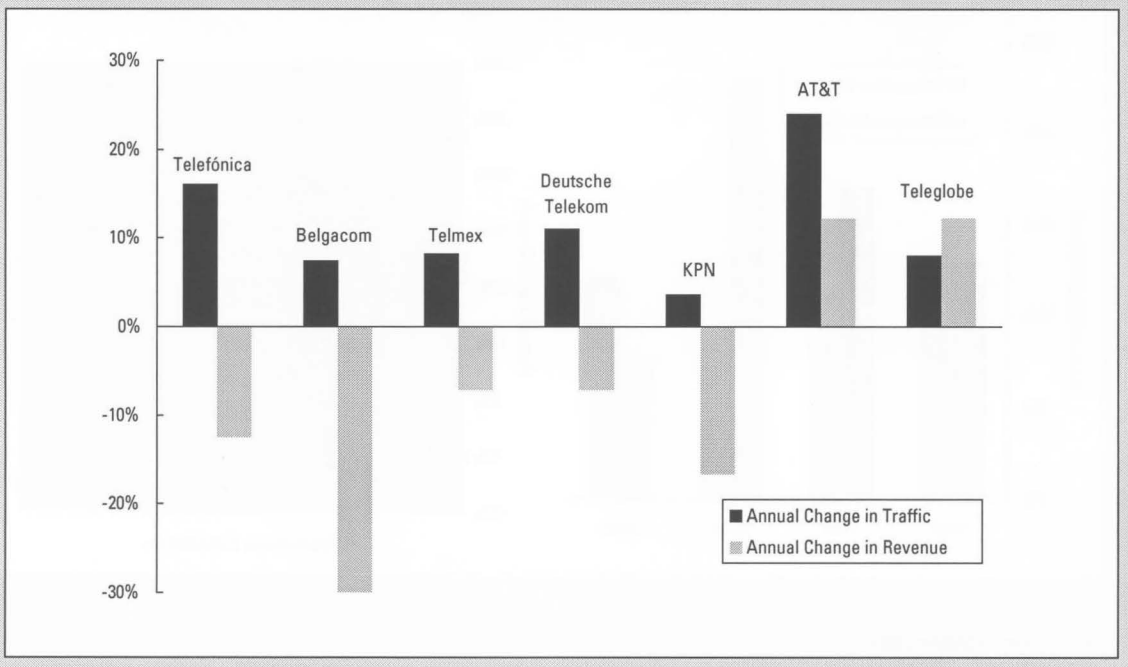
This linear regression is hardly a perfect fit. Numerous examples buck the trend. For instance, Spain experienced above-average growth in 2001, three years after opening its market to competition. On the whole, however, the downward trend does mesh with common sense. Both the quantitative effects of liberalization (e.g., price decreases) and the qualitative effects (e.g., the novelty of low prices) are strongest in the first few years of competition. These quantitative effects weaken over time, as carriers have less scope to cut prices. Similarly, the qualitative effects are less apparent in the years after market liberalization as carriers have already adjusted their practices to competition.

The introduction of competition should be viewed as a one-time boost to call volumes that tends to fade over time. After the initial surge in call volumes, traditional reasons for traffic growth, including economic growth, international trade and travel, and increases in telephone subscribership, resurface as the principal drivers for growth. From this perspective, the global slowdown in international minutes growth simply reflects the maturation of the national telecom markets opened to competition in the 1990s.

Revenues

While sharp price cuts have helped to spur call volumes to new heights, revenues have not grown apace. In 2001, the global average price for making international calls fell by 20 percent while call volumes on the international PSTN increased by only 8 percent (for a detailed analysis of pricing and revenues, see pages 33-60). This mismatch indicates that the price elasticity of demand for international telephone services was less than unitary (that is, call volumes will not increase rapidly enough to offset the decline in prices). Moreover, each competitive country's international telephone traffic was no

Figure 5. Revenue and Call Volume Changes for Major Carriers, 2000-2001



Source: TeleGeography research

longer carried by one monopoly telco but was divided between a dozen or more carriers. Consequently, incumbents' revenues from international telephone services continued to suffer. For example, Spain's Telefónica saw traffic volume rise by 16 percent, yet revenues fell by 13 percent (see Figure 5. Revenue and Call Volume Changes for Major Carriers, 2000-2001).

Declining revenues from international traffic have forced incumbent carriers to rationalize their businesses, leading to sharp staff reductions at many formerly stable telcos. However, the impact of competition and meager revenues has been even more devastating for many new carriers. Seven of the ten largest U.S. carriers in 1999 have since filed for bankruptcy. While some of these companies, such as WorldCom and Startec are still operating under Chapter 11 bankruptcy protection, others, such as Star Telecommunications and Pacific Gateway Exchange, have been liquidated. Many European carriers, such as Carrier1, Storm, Atlantic Telecom, and Germany's TelDaFax, have met a similar fate.

A small number of carriers, such as AT&T, were able to buck the trend last year and increase their international traffic enough to offset price declines. Others, like Teleglobe, experienced a decline in gross revenues from voice traffic, but improved their net revenues due to tighter cost controls and declining termination costs. Unfortunately, Teleglobe's improved voice margins were not enough to offset the losses incurred in the company's ambitious data unit, which ultimately dragged this company, too, into bankruptcy court.

Mobile Telephony

Mobile telephony contributed strongly to the surge in international call volumes of the past two years. At the most basic level, mobile subscriber growth has stimulated international traffic simply by providing more calling opportunities. Moreover, unlike fixed-line phones, mobile phones can travel across borders with their subscribers. In regions such as Europe, where countries are small and borders are porous, mobile roaming has served as an additional stimulus to international traffic.

However, mobile telephony has not been immune to the overall slowdown in growth. As the mobile market has matured, subscriber growth has slowed, from over 60 percent in 2000 to approximately 22 percent in 2001. Mobile-originated international traffic followed suit: after surging by 63.7 percent in 2000, international calls from mobile phones grew by just under 18 percent in 2001, to 22.6 billion minutes, accounting for approximately 16 percent of the world's international traffic.

Routing and Settlement Arrangements

Until just a few years ago, sending and terminating calls abroad was simple and expensive. International telecommunication companies (typically, incumbent monopolies) shared the cost and revenue for nearly every cross-border public switched call in accordance with the decades-old accounting rate regime. To send a call abroad, a carrier would route the signal onto its own international "half circuit", then transfer the call onto the matching network of its foreign counterpart for final termination. For this service, the originating carrier would pay the foreign telco a hefty settlement fee, usually equal to one-half the accounting rate negotiated by the two carriers.

The accounting rate regime worked well enough to withstand decades of change. As long as carriers were predominately national monopolies, and traffic on routes remained roughly in balance, there was little reason to question the economics of the accounting rate regime. But times have changed: in 2001, 87 percent of the world's traffic was originated in countries that allowed international services competition, and traffic imbalances on some large routes, such as the U.S. to Mexico, can amount to hundreds of millions of minutes annually.

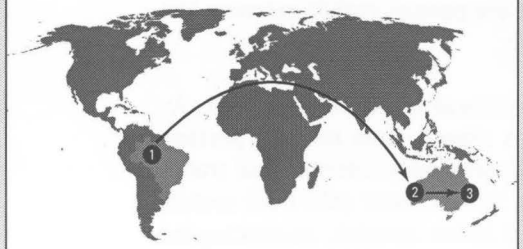
As competition began to intensify, many carriers sought ways of reducing or avoiding high settlement costs by "bypassing" the international accounting rate system. Technological advances, such as voice-over-IP, have combined with the gradual deregulation of telecom markets to offer carriers a host of ways to send and terminate their international traffic. Not all of them are entirely legal—but almost all are cheaper than the accounting rate regime.

Direct Interconnection / International Simple Resale

The most widely used alternative to the settlement rate system is "International Simple Resale" (ISR). This bureaucratic name is something of a misnomer, in that ISR is not really voice resale. ISR involves the provision of switched voice services over leased or owned private lines that are interconnected directly to the public switched network (PSTN) in the origin and destination countries. Sometimes called "direct interconnection," this alternative allows international carriers to bypass the international gateway operator, and to negotiate a termination rate directly with the local exchange carrier in the destination country. Most competitive telecom markets, including the European

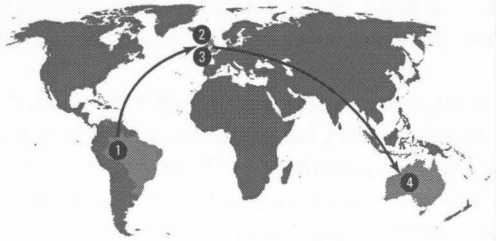
Figure 6. Call Delivery Methods

Standard Public Switched Call



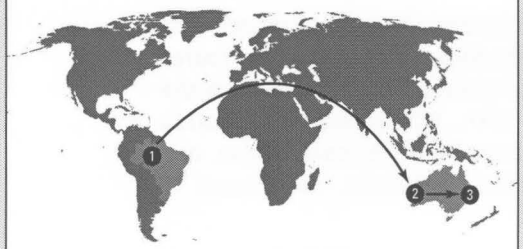
1. Customer dials international number.
2. Call is sent over the Public Switched Telephone Network (PSTN) by originating carrier, which pays settlement charge to terminating carrier in destination country.
3. Call is delivered to its final destination by terminating carrier.

Refile



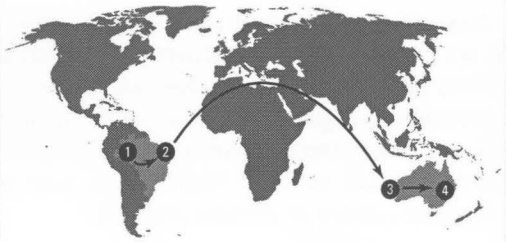
1. Customer dials international number.
2. Originating carrier sends call to hub country via PSTN or over international private line.
3. Refile carrier re-originates call over PSTN.
4. Call is delivered to final destination via refile carrier, which pays settlement charge to terminating carrier.

International Simple Resale (ISR)



1. Customer dials international number.
2. Call is routed over international private line to switch in destination country but outside network incumbent telco (e.g., to closed user group or mobile operator).
3. Call is re-rerouted to incumbent telco's network and completed as a local call on PSTN. No international settlements are paid by the originating carrier.

VoIP



1. Customer dials international number. Call is routed over PSTN to gateway computer.
2. Call is converted from analog voice to Internet Protocol (IP) format and sent over the Internet to a gateway in terminating country.
3. Call is converted back to analog format.
4. Call is completed as a local call on PSTN. No international settlements are paid by the originating carrier.

Source: TeleGeography research

Union, the U.S., Canada, and Japan, now allow direct interconnection. The FCC estimates that 18.8 billion minutes of U.S.-originated international traffic, approximately 50 percent of total U.S. traffic, were sent via ISR in 2001.

The advantage of direct interconnection is that the termination rates charged by local exchange carriers are typically far lower than the official international settlement rate (see pages 50 to 55 for a comparison of U.S. settlement rates and direct interconnection charges). Despite the apparent cost advantage of ISR, many carriers—particularly incumbents—still send a substantial proportion of their international traffic via the settlement rate regime. An informal survey of international carriers conducted by TeleGeography indicated that even in some highly competitive markets in Europe, many incumbent carriers still send most of their traffic via international settlements.

The seemingly archaic settlement system may hold some advantages for incumbent carriers. Incumbent carriers control most of the domestic-fixed line networks in their home countries, and thus terminate the lion's share of inbound international traffic. Since settlement payments are symmetrical, the effective termination rate paid by the sending carrier can be zero if traffic on a bilateral route is in balance.

By contrast, new market entrants, which tend to send far more traffic than they terminate on their own networks, generally find it to their advantage to send as much traffic as possible via direct interconnection. Several new market entrants reported that they sent more than 90 percent of their traffic via direct interconnection in 2001.

For carriers sending traffic between countries where direct network interconnection is permitted, the term "bypass" has become somewhat archaic. The term suggests that there is an obstacle that must be overcome, when in fact, this is no longer the case. Instead, the settlement rate system has simply evolved into one of a number of options a carrier may choose for terminating international traffic.

Illicit Bypass

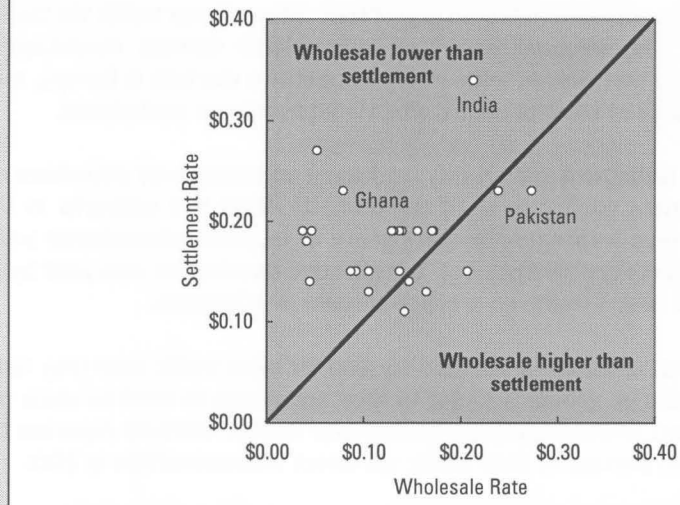
The issue of bypass traffic is far more significant in the approximately 200 countries where direct interconnection with the domestic network is not permitted. As Telmex noted in its annual report, "Bypass is technically difficult to prevent or to measure but we believe that bypass was primarily responsible for the decline in the number of minutes of international long distance traffic..."

While difficult to measure, it is not difficult to document the existence of bypass traffic. A comparison of wholesale prices charged by carriers on minutes exchanges with official settlement rates suggests that many carriers have found ways to beat the system. Figure 7 compares wholesale country rates available from Last Mile Connections (formerly Band-X New York) in November 2002 with the prevailing U.S. settlement rates for that particular country. Each dot in the chart compares the settlement rate with the wholesale price charged for carrying a minute of traffic to that country. Thus, for example, one wholesaler was offering to carry traffic from New York to Moldova at a rate of $0.086 per minute, 92 percent less than the prevailing settlement rate of $1.04 per minute. Since ISR is not permitted in Moldova, it seems certain that this traffic is bypassing the settlement rate illicitly.

Voice over IP

The volume of traffic carried over IP links in 2001 was impressive: 9.9 billion minutes, equivalent to more than six percent of the world's international traffic. While the traffic volumes suggest that VoIP has become a mainstream technology, the primary destinations of VoIP traffic suggest that it is, as yet, primarily used for settlement rate

Figure 7. Comparison of Wholesale and Settlement Rates, 2002



Note: Wholesale rates reflect least-cost-routing rates available on Last Mile Connections during November 2002.
Source: Last Mile Connections, Inc., FCC, and TeleGeography research

arbitrage. Seventeen of the twenty largest VoIP call destinations from the U.S. are developing countries that prohibit direct interconnection and still maintain high settlement rates.

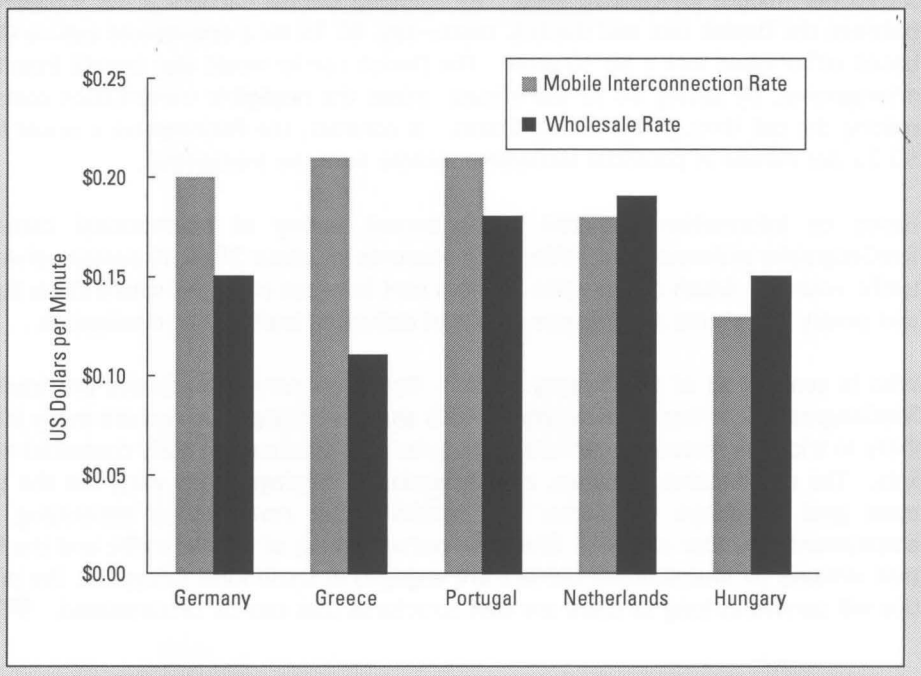
Given the stunning volume of traffic now passing through international VoIP links, it is clear that VoIP has emerged as the most successful means of bypassing the settlement rate regime to date. However, its very success as an arbitrage tool may be helping VoIP move into the mainstream. Faced with the rapid erosion of incoming termination traffic, a growing number of incumbent carriers in developing countries have concluded agreements with leading VoIP carriers to terminate their traffic.

Refile

Refile represents a third form of alternatively routed traffic. Instead of avoiding accounting rates altogether, carriers employing refile bend the rules of the international settlement regime to their advantage. Refile occurs when a carrier re-routes an outgoing international call through a third country, frequently in order to take advantage of the intermediate country's lower settlement rate with the final destination.

Although the legal status of refile is more debatable than that of many other forms of bypass, the practice is certainly illicit. With the intent of disguising the true origin of traffic, the refile carrier in the intermediate country strips the numbering code, which identifies the originating country, replacing it with its own country code. This ruse makes economic sense in cases where settlement rate disparity exists between originating countries.

Figure 8. Comparison of Wholesale and Mobile Termination Rates, 2002



Bypass operators' ideal targets combine three qualities: high volumes of traffic, high prices, and a significant price or cost imbalance. Traditionally, developing countries with high settlement rates have been the most attractive targets. However, in recent years margins have eroded as settlement rates have declined. Moreover, the occasionally draconian penalties levied on "economic crimes" in some developing countries can serve as an effective deterrent to all but the well connected.

As luck would have it, a new refile target has emerged: European mobile networks. In Europe, approximately 30 percent of incoming international calls are terminated on mobile telephones. However, TeleGeography estimates that, due to the very high cost of mobile termination, calls to mobile phones account for 67 percent of the total cost for terminating international traffic in Western Europe.

Mobile termination costs are high enough that most carriers have chosen to pass them on to their subscribers. For example, many consumer calling plans in the U.S. now charge different rates for international calls placed to European fixed and mobile subscribers. However, some service providers offer calling plans for high-volume corporate customers that feature "blended" international prices. These plans provide callers a fixed country rate, irrespective of whether the call is terminated on a fixed or mobile network. In some cases, this blended price is lower than the termination rate alone.

This pricing imbalance has prompted arbitrageurs to open high-volume retail accounts with such a carrier and then resell this retail service to other wholesale buyers. There is ample evidence that arbitrageurs have found inexpensive ways of transporting calls to European mobile networks. Wholesale rates offered on telecom exchanges to many European mobile destinations on telecom exchanges are frequently lower than the cost of mobile termination, alone. While it's impossible to determine the precise volume of this traffic, there's no question that it runs into the million of minutes on an annual basis.

Notes: Wholesale rates reflect least-cost-routing rates available on Last Mile Connections during November 2002.
Source: Last Mile Connections, Inc., and TeleGeography research

For example, in mid-year 2001, the official settlement rate for traffic from Denmark to Peru was approximately $0.47 per minute, while U.S. carriers paid a settlement rate of $0.25 per minute for calls to Peru. By charging Danish carriers a fee somewhere between the Danish rate and the U.S. rates—say, $0.35 for a one-minute call—a U.S.-based refiler could turn a $0.10 profit. The Danish carrier would also benefit from this arrangement, by saving $0.12 per minute, minus the negligible transmission costs of routing the call through the United States. In contrast, the Peruvian telco would lose $0.22 per minute in potential settlement income from the transaction.

Based on information gathered in its annual survey of international carriers, TeleGeography estimates that refile traffic accounts for about 25 to 30 percent of world traffic volumes. Much of this refile traffic is sent between countries where ISR is legal, and simply represents an alternate means of delivering traffic to its destination.

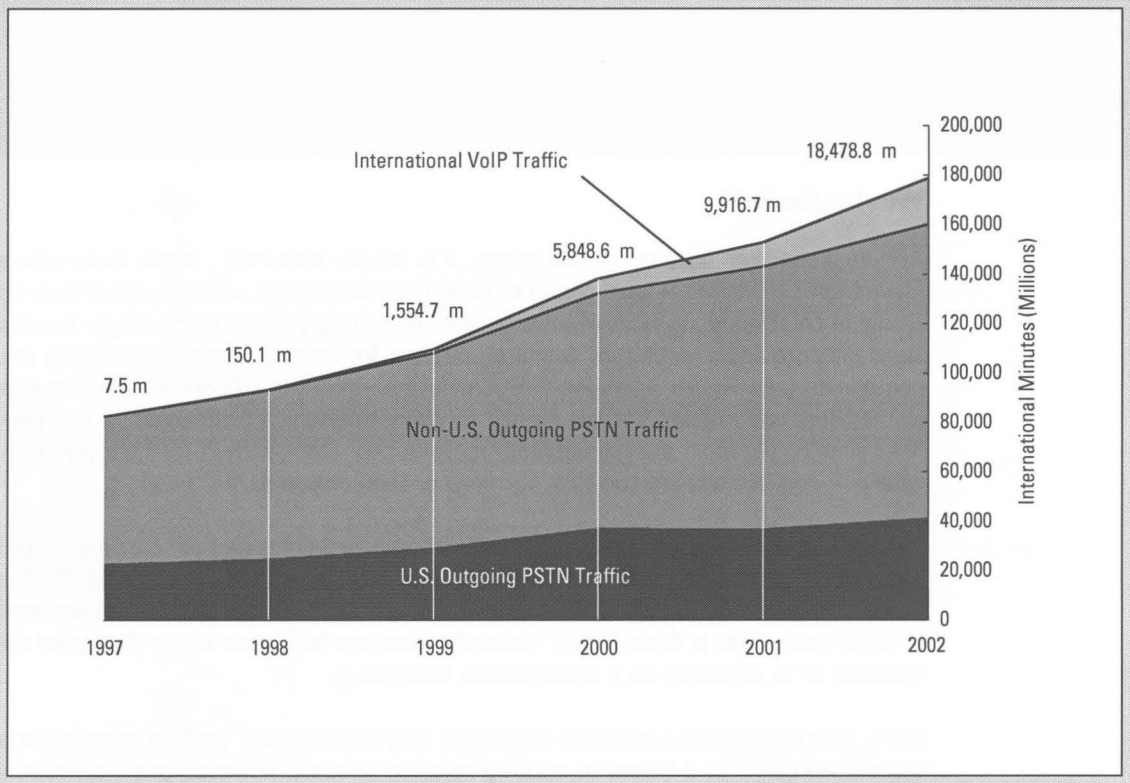
Who is sending all of this bypass traffic? Based on survey responses provided to TeleGeography, carriers in monopoly markets and developing countries are every bit as likely to trick the system as carriers battling for their existence in hotly contested markets. The destinations, volumes, and technologies employed may vary, but the ultimate goal is always the same: to maximize net revenues by minimizing net outpayments to other carriers. Given the pervasiveness of bypass traffic and the fact that virtually all international carriers are engaged in some form of bypass, the practice will survive as long as there are cost structures that can be circumvented.

VoIP Routes & Traffic

Overview

Just four years ago, the combined traffic of all companies routing international calls over Internet Protocol (IP) networks accounted for less than one-half of one percent of the world's international minutes. By the end of 2001, international Voice-over-IP (VoIP) traffic had grown to 9.9 billion minutes, more than six percent of all international traffic. Based on TeleGeography's half-year survey results, the total market may reach 18 billion minutes for the calendar year 2002, constituting more than 10 percent of the world's forecasted international traffic (see Figure 1. International VoIP and PSTN Traffic Summary, 1997-2002). Although VoIP has only recently left its infancy as a carrier-grade transport technology, it can no longer be considered an experiment. Based solely on traditional circuit-switched traffic flows, global cross-border calling grew just eight percent in 2001—the slowest rate of growth since traffic indicators were first collected almost 30 years ago. Add international VoIP minutes to the 2001 total, however, and global traffic grew over 10 percent—still anemic but not unprecedented.

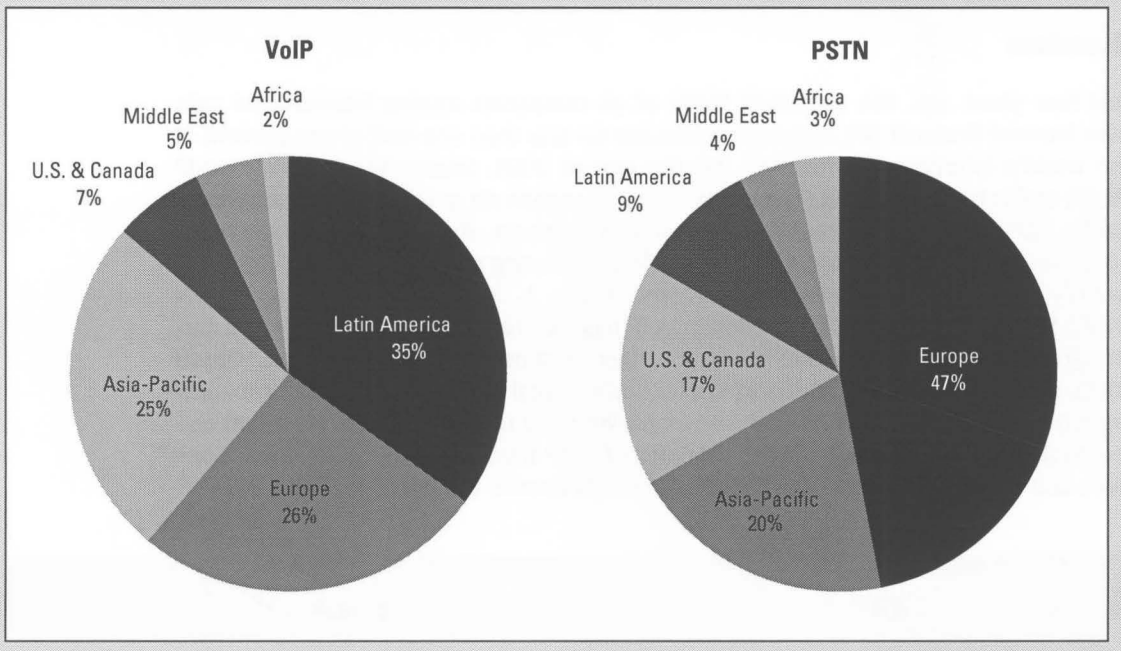
Figure 1. International VoIP and PSTN Traffic Summary, 1997-2002



Notes: Voice-over-IP (VoIP) traffic includes all cross-border voice calls carried on IP networks but terminated on public switched telephone networks; PC-to-PC communications and private network traffic are excluded. PSTN traffic includes circuit-switched voice and fax traffic carried on traditional international facilities as well as international simple resale (ISR) facilities. Figures for 2002 are estimated.

Source: TeleGeography research

Figure 2. International VoIP and PSTN Traffic Destination Summary, 2001



Notes: Voice-over-IP (VoIP) traffic includes all cross-border voice calls carried on IP networks but terminated on public switched telephone networks; PC-to-PC communications and private network traffic are excluded. PSTN traffic includes circuit-switched voice and fax traffic carried on traditional international facilities as well as international simple resale (ISR) facilities.

Source: TeleGeography research

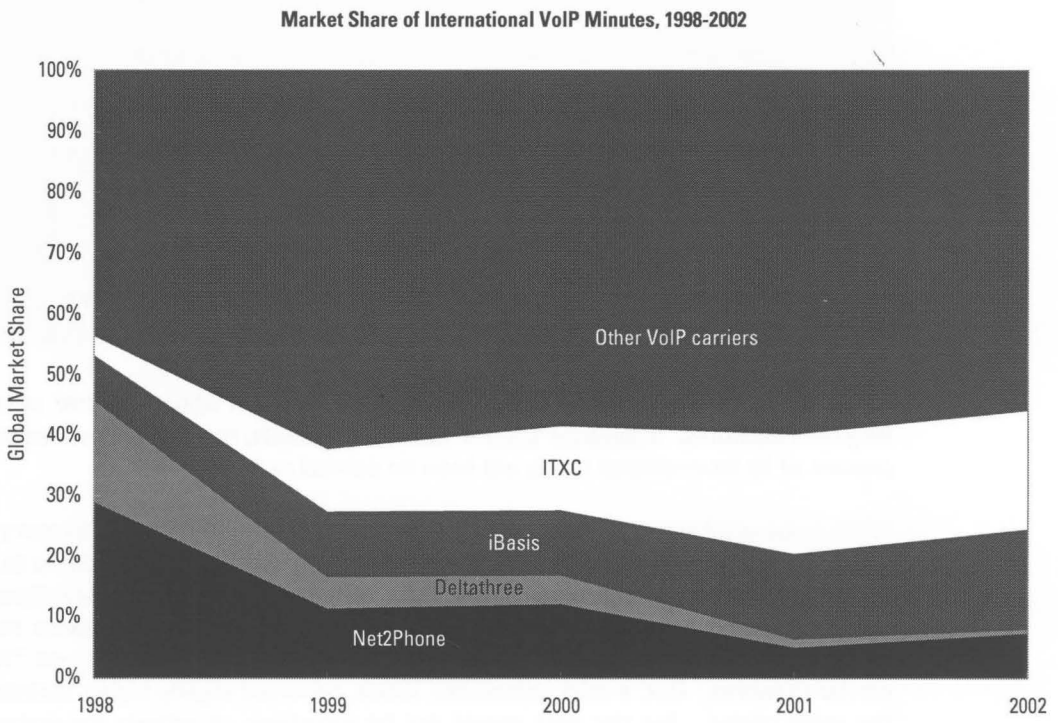
Wholesale VoIP

Although the VoIP industry is still young, it is rapidly maturing. While many new and incumbent carriers alike have begun to build IP networks that will carry all of their voice traffic in coming years, most wholesale VoIP traffic today is still carried by a handful of specialist providers acting as carriers' carriers for established and emerging phone companies (see Figure 3. Major VoIP Carriers and Traffic). Some of these specialist wholesalers use regular Internet transit to carry their voice traffic; others use private lines running IP. Most use a combination of the two, along with PSTN "failover" circuits where IP connections are too thin, too few, or too congested.

Although their network architectures may differ, most wholesale VoIP carriers share the same goal: arbitrage. They take advantage of differences between official PSTN settlement fees and de facto termination rates by using IP to transport their voice traffic. In some cases, this is done illicitly. Notably, there are few cases where IP is used solely because of its efficiency as a transmission technology.

Many well-established telephone companies may still consider VoIP an experiment and sometimes see it as a threat to existing revenue streams; however, this view seems to be changing. Established PSTN carriers are increasingly using VoIP technology and adding VoIP services to their list of offerings. While a large portion of VoIP traffic carried by established carriers is bundled into enterprise services on private networks,

Figure 3. Major VoIP Carriers and Traffic



Company	2001 (Jan.-Dec.) Traffic (min)	2001 (Jan.-Dec.) Revenues	2002 (Jan.-June) Traffic (min)	2002 (Jan.-June) Revenues	Market Capitalization Oct., 2001	Market Capitalization Oct., 2002
Deltathree (NASD: DDDC)	129 m	$15.6 m	61 m	$6.5 m	$19 m	$17 m
iBasis (NASD: IBAS)	1,147 m	$133.8 m	1,174 m	$83.6 m	$29 m	$17 m
ITXC (NASD: ITXC)	1,881 m	$173.2 m	1,390 m	$123.7 m	$119 m	$113 m
Net2Phone (NASD: NTOP)	478 m	$165.4 m	515 m	$57.1 m	$190 m	$146 m

Notes: Traffic statistics include only wholesale international VoIP minutes; revenue figures include services, software, and equipment in addition to per minute charges for PSTN and IP voice and fax services. Traffic statistics may include some PSTN failover. Net2Phone's fiscal year ends July 31.

Source: TeleGeography research and company reports

Figure 4. If You Can't Beat Them...

Cloaked in the "gray area" of international telecom regulation, VoIP has posed new threats to established revenue streams, especially in protected single carrier markets. However, some of the world's aging international carrier monopolies have taken the decision to embrace, rather than fight, VoIP. These incumbents are partnering with VoIP carriers to terminate—and increasingly, originate—traffic to augment revenue rather than lose it. Incumbents in Colombia, Zimbabwe, Vietnam, and many other economies have formed partnerships with wholesale VoIP carriers. The incumbents must balance cannibalization of traditional revenue streams while capturing a portion of the traffic they are losing to illicit bypass. More information about how carriers and regulatory organizations are dealing with the introduction of VoIP in their markets can be found in a series of case studies published by the ITU (http://www.itu.int/ osg/spu/casestudies/index.html#iptel).

Source: TeleGeography research

some carriers are beginning to carry significant volumes of wholesale VoIP over their long-haul networks. Incumbent Telecom Italia, for example, recently announced that 50 percent of its international traffic will soon be carried as VoIP.

While some established PSTN carriers are utilizing their own IP networks to carry voice traffic, most are outsourcing to VoIP middle men. VoIP wholesaler ITXC claims to carry traffic for most major carriers in the U.S., including the Regional Bell Operating Companies, who have only recently begun to compete in the long distance market. ITXC reported in June 2002 that over 60 percent of its traffic originates on "Tier-1" carrier networks. ITXC's chief competitor, iBasis, reported slightly higher statistics for the same period. But this data should not be surprising. It reflects the maturity of VoIP as a routing option and matches the reality of the international telephone business—that top carriers originate most of the traffic.

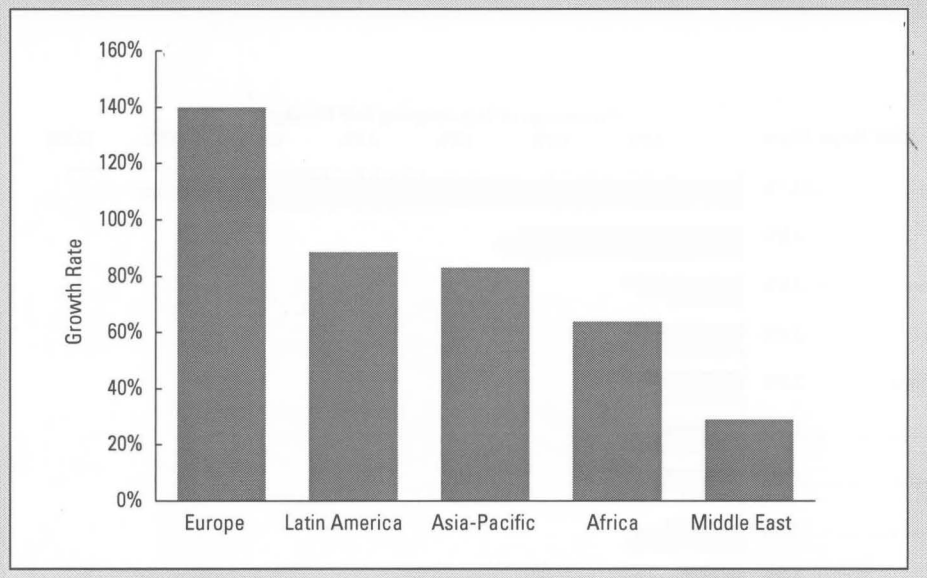
As incumbents become more comfortable with VoIP and as the underlying technology matures, more and more voice traffic is likely to transit IP networks. How much? The answer will largely depend—in the short term—on how many arbitrage opportunities exist. In the long term, the answer will depend on how deeply into the home and office IP-enabled devices penetrate and how willing existing carriers are to mothball billions of dollars of PSTN switching equipment ahead of their expected depreciation cycle.

End Users & Technology

In addition to their wholesale businesses, many VoIP specialists are also taking a direct path to the consumer by way of PC-to-PC, PC-to-phone, and phone card calling plans. (In fact, PC-to-phone calls predate phone-to-phone over IP.) Last year, companies such as Net2Phone, deltathree, and Callserve reported significant volumes of PC-to-phone traffic. Most retail VoIP carriers also offer wholesale services; however, similar to their switched counterparts, some are focusing more on the end user as wholesale margins evaporate.

The capabilities of a VoIP network—that is, what can be delivered to the consumer—are largely determined by the standards implemented. To date, the mostly widely deployed standard for handling VoIP traffic has been H.323, a protocol developed

Figure 5. International VoIP Traffic Growth by Region, 2000-2001



Notes: Voice-over-IP (VoIP) traffic includes all cross-border voice calls carried on IP networks but terminated on public switched telephone networks; PC-to-PC communications and private network traffic are excluded.

Source: TeleGeography research

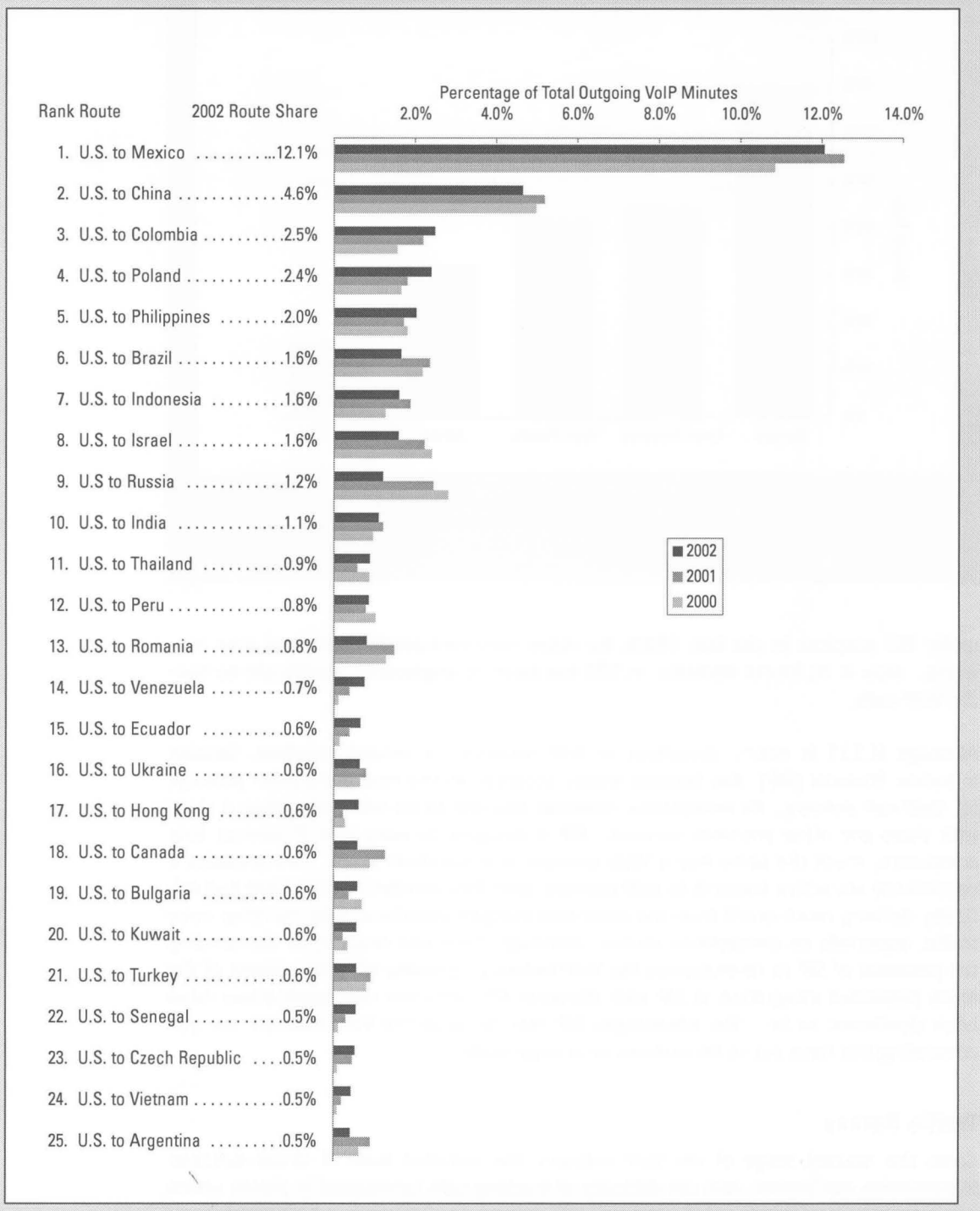
under ITU auspices in the late 1990s for video communications over local area networks. Now in its fourth iteration, H.323 has been re-engineered specifically to handle VoIP calls.

Although H.323 is nearly ubiquitous in VoIP networks, a second standard, Session Initiation Protocol (SIP), has become widely accepted as the next generation protocol for VoIP call delivery. Its acceptance, however, has less to do with voice than it does with video and other premium services. SIP is designed to work with IP devices (like computers) much the same way a Web browser or email client does. This provides a particularly attractive scenario to VoIP carriers (and their vendors), which have had difficulty deriving much profit from the razor-thin margins associated with carrying voice traffic, especially on competitive routes. Although there was much hype surrounding the potential of SIP to revolutionize the VoIP industry—peaking with the release of the much publicized integration of SIP with Windows XP—very few new applications have been developed so far. The advantages SIP may bring to the VoIP industry are still compelling but have yet to be realized on a large scale.

Traffic Survey

Given the nascent stage of the VoIP industry, the installed base of circuit-switched transmission equipment, and the difficulty of tracking calls terminated in places where you may not want to advertise your success, making predictions is a hazardous business. Therefore, our research focused on acquiring real traffic statistics from real VoIP carriers. The statistics and analysis presented on these pages are based on TeleGeography's third annual VoIP routes survey, concluded in October 2002.

Figure 6. Top 25 U.S.-Originated VoIP Routes, 2000-2002



Notes: Route rankings are based on actual traffic reports by major wholesale and retail VoIP carriers. Figures do not include all VoIP carriers and routes, however, so some omissions may have occurred. Year 2002 rankings are based on statistics supplied for the first six months of 2002. In 2002, routes omitted from this table may have accounted for almost 30 percent of U.S.-originated VoIP traffic.

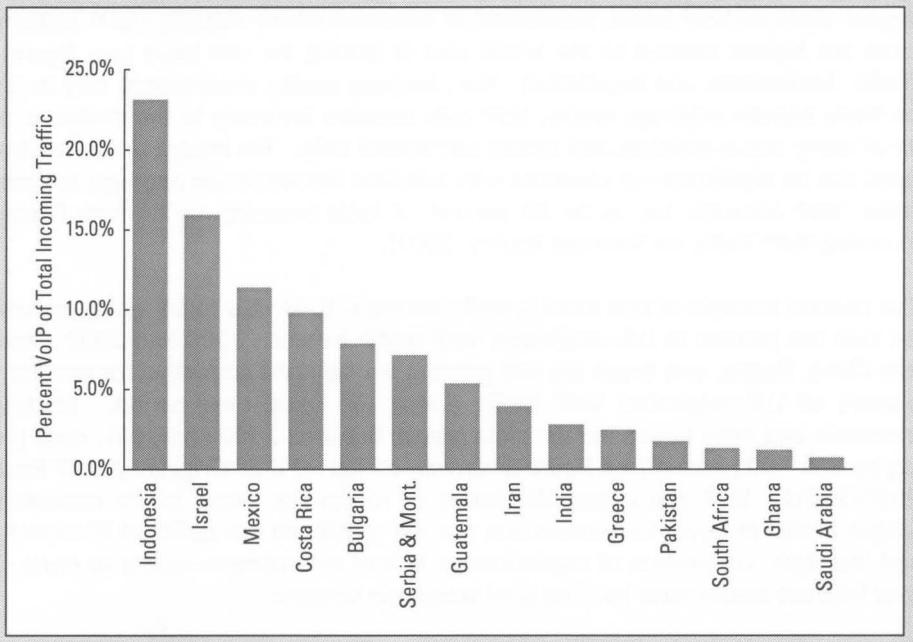
Source: TeleGeography research

The goal of our survey was twofold: first, to measure how much VoIP traffic transits international networks; and second, to establish where it is going. The data presented here include international phone calls that transit public or private IP networks at some point but are ultimately terminated on traditional fixed or mobile networks. PC-to-PC communications and private corporate network traffic are excluded because neither are directly comparable to PSTN traffic flows. Also, because our survey is based on the reports of most—but not all—companies carrying VoIP traffic, some routes may be under-reported. Finally, the true point of origin for most wholesale VoIP traffic is difficult to ascertain. Many carriers track only where the traffic enters their network, usually at a centrally-located hub in the U.S. or the U.K.

The Results

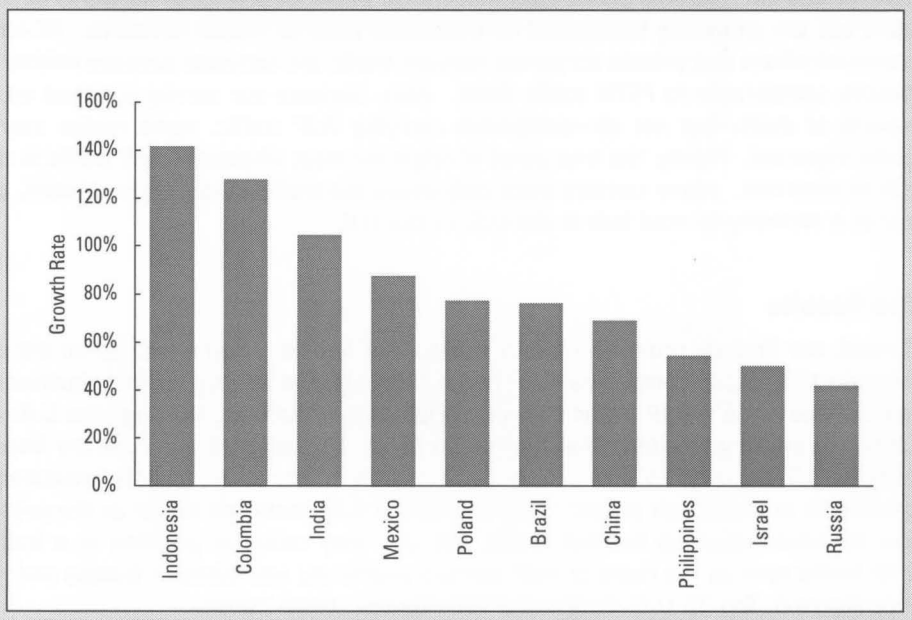
Overall, our findings prove an obvious point—that VoIP is a new means to an old end. Because U.S.-based companies have had a head start in setting up their businesses, most of the world's VoIP traffic currently originates in the U.S., although the U.K. and China are growing as alternative origination hubs. Furthermore, because the Internet remains U.S.-centric, U.S.-based VoIP carriers have access to the most international IP bandwidth at the lowest prices. And, just as the U.S. continues to act as the primary hub for intercontinental Internet traffic, the U.S. may retain its position as a hub for VoIP traffic even as the ranks of VoIP carriers proliferate into Western Europe and Asia (see Figure 6. Top 25 U.S.-Originated VoIP Routes, 2000-2002).

Figure 7. Incoming VoIP Traffic on Selected Routes, 2001



Notes: Traffic data based on carrier reported traffic for 2001.
Source: TeleGeography research

Figure 8. Growth on Top 10 U.S.-Originated VoIP Routes, 2000-2001



Notes: Voice-over-IP (VoIP) traffic includes all cross-border voice calls carried on IP networks but terminated on public switched telephone networks; PC-to-PC communications and private network traffic are excluded.

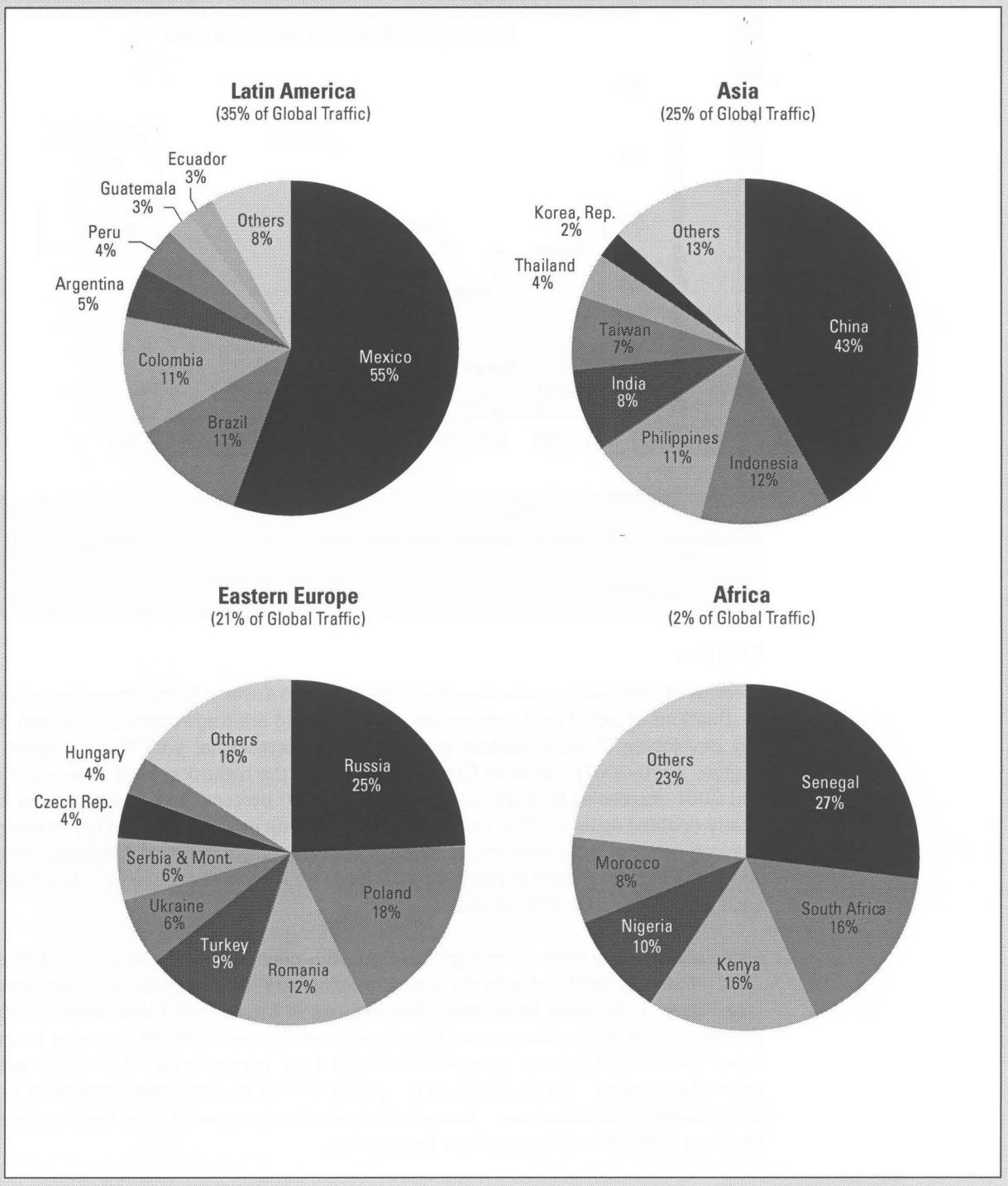
Source: TeleGeography research

Routes

Although VoIP calling patterns run roughly parallel to established PSTN demand, the largest share of VoIP traffic terminated in countries where existing PSTN settlement rates are highest relative to the actual cost of getting the call there (see Figure 10. Traffic, Settlements, and Regulation). Also, because quality expectations may be lower on many popular arbitrage routes, VoIP calls compare favorably to the mediocre quality of many circuit-switched and mobile terminated calls. The impact on overall traffic flows can be significant—in countries with sufficient infrastructure and high settlement rates, VoIP accounts for up to 20 percent of total incoming traffic (see Figure 7. Incoming VoIP Traffic on Selected Routes, 2001).

The clearest example of this trend is traffic on the U.S.-Mexico route, which accounted for over ten percent of U.S.-originated VoIP traffic between 2000 and 2002. Routes into China, Russia, and Brazil are still growing strongly and accounted for another ten percent of U.S.-originated VoIP traffic during the same time period. Routes to Indonesia and India have seen the most growth between 2000 and 2001, each growing by over 100 percent (see Figure 8. Growth on Top 10 U.S.-Originated VoIP Routes, 2000-2001). VoIP is a logical alternative on routes like these, where International Simple Resale or direct interconnection are still prohibited but sufficient IP capacity—and the right combination of regulations or lack of enforcement—exists to route calls over Internet connections into the local telephone network.

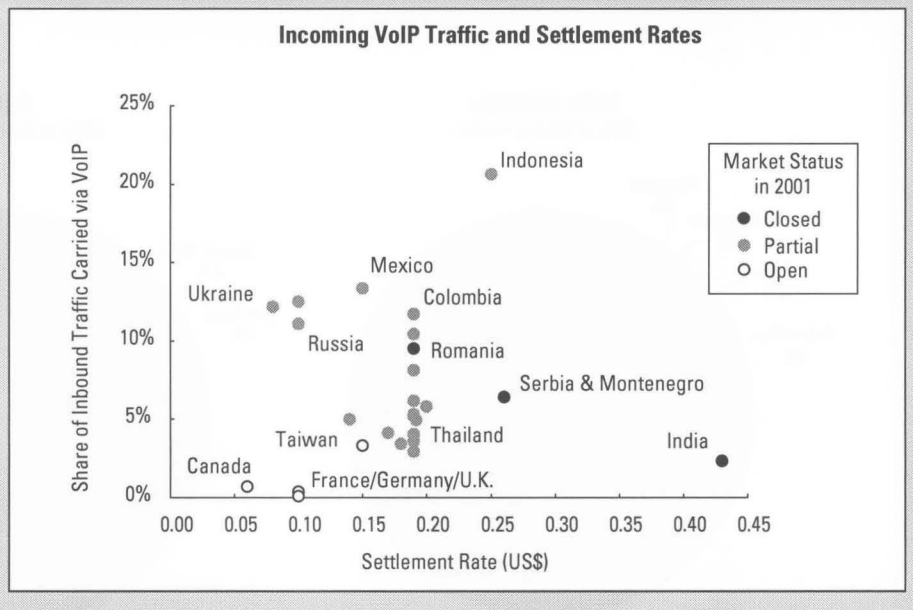
Figure 9. Regional Termination Destinations of International VoIP Traffic, 2001



Notes: Voice-over-IP (VoIP) traffic includes all cross-border voice calls carried on IP networks but terminated on public switched telephone networks; PC-to-PC communications and private network traffic are excluded.

Source: TeleGeography research

Figure 10. Traffic, Settlements, and Regulation



Notes: Traffic data based on actual and estimated totals for 2001. Settlement rates based on FCC reported averages for calendar year 2001. Regulatory comparison based on the number of carriers authorized to own international transmission facilities at year end 2001.

Source: TeleGeography research and FCC

Regions

In terms of total traffic, Latin America, East Asia, and Eastern Europe were the primary destinations of global VoIP termination in 2001 due to arbitrage opportunities and rapidly developing IP infrastructure (see Figure 5. International VoIP Traffic Growth by Region, 2000-2001). Eastern Europe experienced the highest growth between 2000 and 2001, increasing its traffic volume by nearly 140 percent. Latin America and Asia nearly doubled again in 2001 and may grow faster still in 2002 with the full opening of the international voice markets of Brazil and India. Colombia and Argentina experienced the highest growth in incoming VoIP for Latin America between 2000 and 2001, each growing by over 120 percent.

Africa continues to experience significant growth—over 60 percent between 2000 and 2001—however, total traffic to the region remains very low compared to other regions. (see Figure 9. Regional Termination Destinations of International VoIP Traffic, 2001). Senegal, South Africa, Kenya, and Nigeria account for two-thirds of incoming international VoIP in Africa. In all parts of the Middle East, except Israel, VoIP is not taking much of a foothold. The environment is right for VoIP to flourish—high settlement rates and growing IP infrastructure—however, the incumbents seem to have been successful so far on keeping illicit bypass from burgeoning.

Conclusion

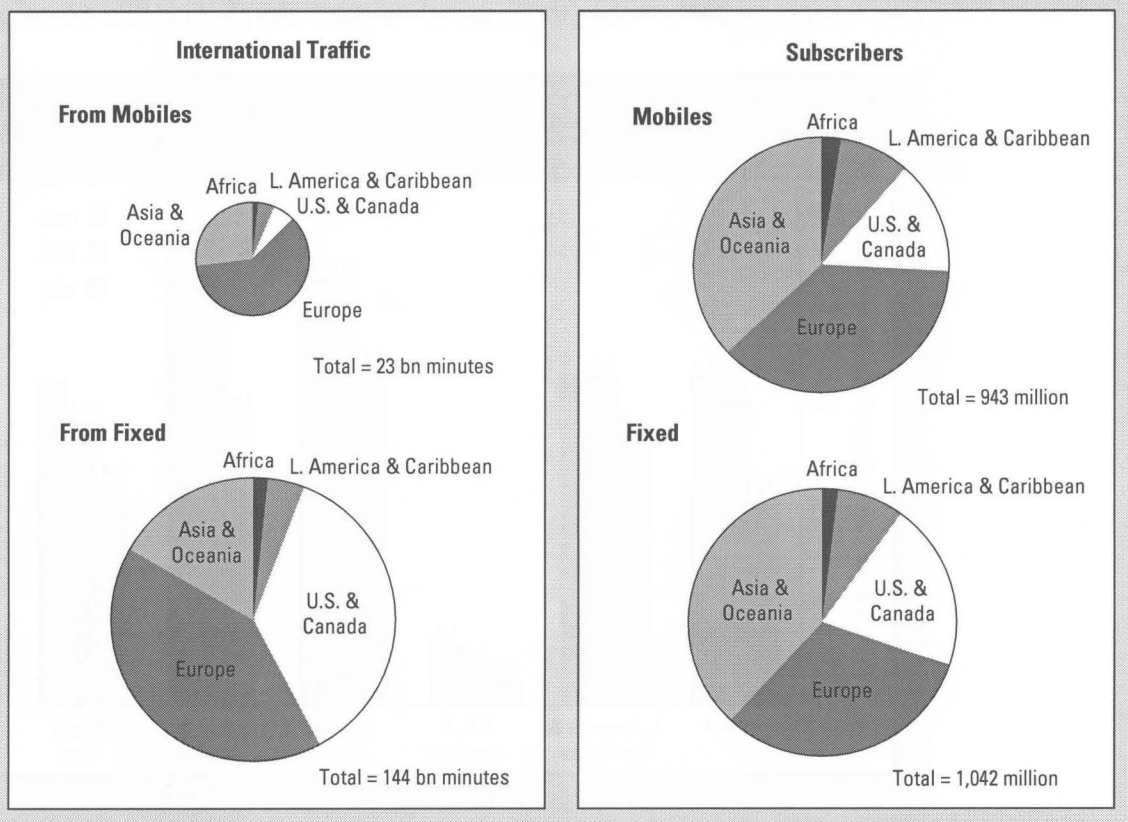
Since TeleGeography began tracking international phone calls more than a decade ago, market forces and technological innovation have driven down prices and increased traffic flows across the globe. The Internet has no doubt played a significant role in accelerating this process in the last few years, and forecasting the effect on actual traffic flows remains an extremely difficult endeavor. Moreover, as new IP communications services and devices become available, they may stimulate new demand and increase VoIP traffic flows beyond the growth rates characteristic of the traditional voice telephony market. We will be watching—and reporting—these developments as they occur.

International Traffic to and from Mobile Phones

After several years of explosive growth and feverish expansion, mobile telephony has become a fixture of international telecommunications. Recently, however, the frenzied optimism which accompanied the mobile industry in its infancy has given way to greater investor skepticism and scrutiny. Third-generation (3G) licenses were auctioned off at unprecedented premiums only a few years ago, but, during the last year, major operators have reneged on plans to offer such services, eliciting favorable responses from financial markets. As the industry matures, mobile operators are shifting their focus from sheer subscriber growth to increasing the average revenue per user (ARPU), to which international traffic contributes considerably.

For international carriers, mobile traffic is increasingly important. As mobile-originated international traffic grows, mobile operators become more valuable buyers of wholesale services. Conversely, the more international traffic is terminated to mobile handsets, the greater the payments international carriers must make to mobile operators. Given the significant differential between fixed- and mobile-termination prices, even a

Figure 1. Mobile versus Fixed International Traffic and Subscribers by Region, 2001



Source: TeleGeography research and ITU

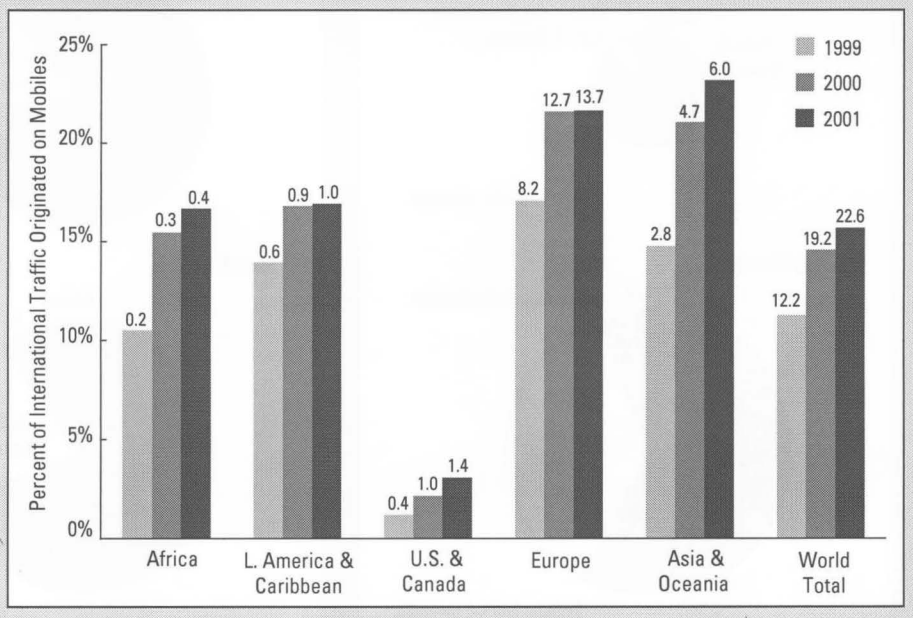
small increase in mobile-terminated traffic can result in a significant increase in total termination costs. Over the past year, mobile-originated traffic grew from 14.5 percent of total international traffic to 15.7 percent while mobile-terminated traffic rose from just over 18 percent to 21 percent. As that proportion grows, mobile traffic will become an even greater consideration for long-distance carriers.

Mobile Traffic

Over the past several years, international mobile traffic has grown much faster than total international traffic, boosted largely by the explosion in mobile subscriptions. From 1995 to 2001, the number of mobile subscribers worldwide increased ten-fold, from 90 million to almost 1 billion—roughly equal to the number of fixed-line subscribers in the world. During the past three years, however, global subscriber growth, while still strong, has slowed consistently, reflecting the maturation of many mobile markets. In fact, the subscriber growth rate between 2000 and 2001—29 percent—was the slowest annual growth since mobile phones entered the market in the early 1980s. In more developed economies (with higher international traffic volumes), the decline in growth has been more dramatic. Europe, for example, watched its subscriber growth fall from 61 percent in 2000 to 22 percent in 2001.

As a result, international mobile traffic (particularly mobile-originated traffic) has also registered declining growth rates. From 2000 to 2001, the volume of international traffic originated on mobile phones grew from 19.2 billion minutes to 22.6 billion minutes, an increase of almost 18 percent. While nearly double the growth rate of total global traffic in 2001, mobile traffic growth is down sharply from the 64 percent

Figure 2. Percent of Mobile-Originated International Traffic, 1999-2001



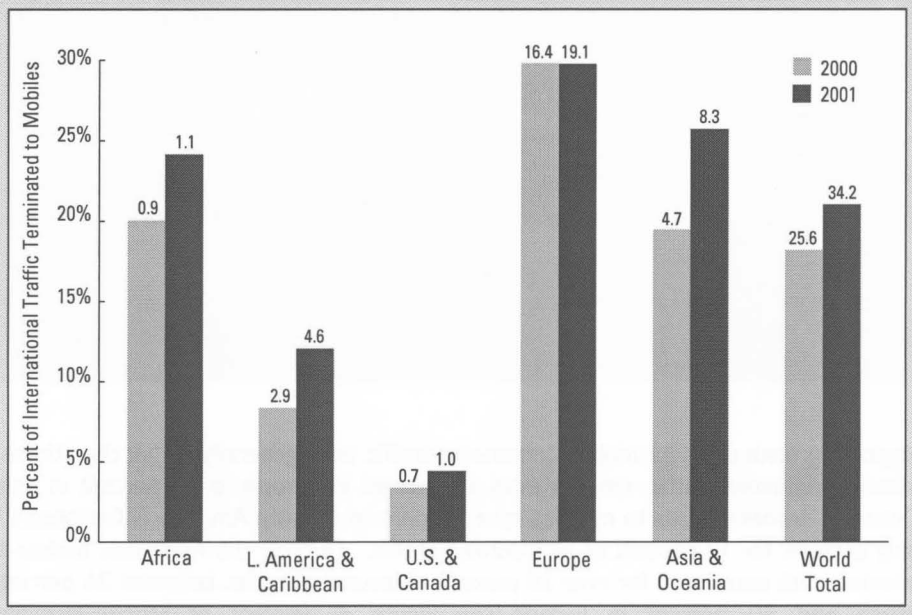
Notes: Numbers show total mobile-originated traffic minutes in billions.
Source: TeleGeography research

increase realized between 1999 and 2000, reflecting a significant decline in growth across all regions of the world. The distribution of traffic across regions has remained relatively constant over the past three years, with Europe representing 62 percent of the world's mobile-originated international traffic. Asia & Oceania's share of the global total rose three percentage points over the last year (roughly equal to Europe's decline), to 27 percent (see Figure 1. Mobile versus Fixed International Traffic and Subscribers by Region, 2001).

The rate of mobile-originated traffic growth continues to vary widely across regions, though the degree of variation has remained almost constant over the past year. Europe and Latin America & Caribbean again registered the lowest growth rates, with 12 percent and 13 percent, respectively. Europe, despite its low growth rate, still accounts for the largest volume of any region, with almost 14 billion minutes of international long-distance traffic originated on mobile handsets. Notably, while mobile-originated traffic increased both in terms of volume and proportion in most of the world, the percent of outgoing calls made on mobiles remained almost constant from 2000 to 2001 (see Figure 2. Percent of Mobile-Originated International Traffic, 1999-2001).

From 2000 to 2001, mobile-terminated traffic grew 33 percent (nearly twice the rate of mobile-originated traffic), from 25.6 billion minutes to 34.2 billion minutes, representing 21 percent of the world's total traffic. Again, European users received the bulk of mobile-terminated traffic, with a 56 percent share of the world's total. Regional rankings are similar to those for mobile-originated traffic, with the Americas distantly trailing Europe, Asia, and Africa.

Figure 3. Percent of Mobile-Terminated International Traffic, 2000-2001



Notes: Numbers show total mobile-terminated traffic minutes in billions.
Source: TeleGeography research

Figure 4. Roaming and International Mobile Traffic

An increase in mobile subscribers has a greater impact on international voice traffic than a comparable increase in fixed-line subscribers: fixed lines don't cross political borders with their users, but mobile handsets do. International roaming not only provides a valuable service to mobile users through "seamless" connectivity; it also generates demand for international telecommunications transport. To illustrate the contribution mobile roaming makes to international voice traffic flows, let's consider the case of a German mobile user traveling in Austria.

Upon activating her handset, the German traveler will select an Austrian host network on which to operate. Network selection may be performed manually, in which case the user chooses a host network from a list of available networks. Manual selection locks the mobile user into a specific network, to which the handset will return if the signal is lost or the handset deactivated. More likely, though, host network selection will be performed automatically by the handset, either on the basis of signal strength or preferences pre-programmed by the user's home provider. This selection process establishes a connection between the home and host networks, allowing the host network to locate the user and providing the host network with authentication and billing information.

When the German traveler makes a call from her handset, the call will be processed by the Austrian host network. Thus, when calling another German number, the call will be picked up by the host network and then transmitted along the PSTN to Germany for termination. The resulting traffic, while connecting two German numbers, actually constitutes an international call from Austria to Germany.

Conversely, if one of the traveler's friends in Germany calls her mobile, the call will be forwarded by her home network, via the PSTN, to Austria, where it will be picked up and delivered by the Austrian host network. Again, the call between two German numbers is, in fact, an international call between Germany and Austria.

In either case, the German traveler will incur a roaming charge for using the Austrian network. That charge, plus a markup from her home provider, will then be billed directly to her. For originating calls, the charges she receives are those dictated by the pricing scheme (peak/off-peak, etc.) of the Austrian operator, not her home provider. Billing between operators is generally handled by clearinghouses which compile roaming call records from host networks and distribute them to the users' home networks. The clearinghouse also calculates and collects the charges due the host network operators. Some operators opt to handle roaming relationship and billing management themselves, but clearinghouses are by and large the industry standard.

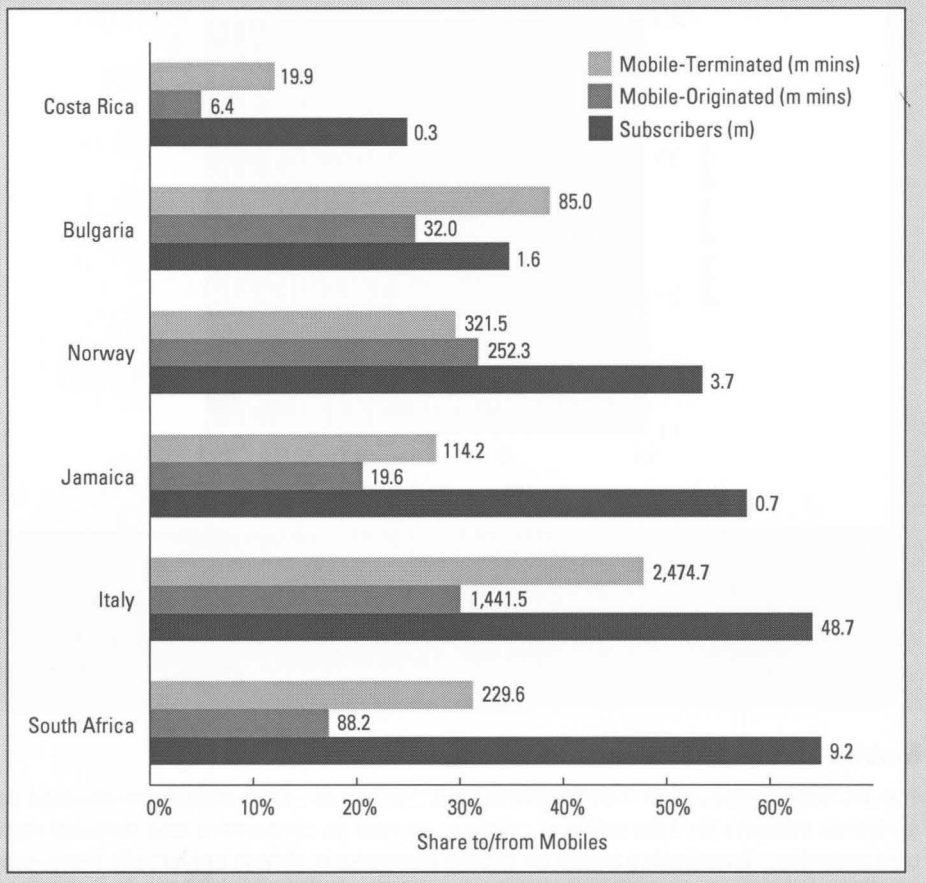
In the above example, we've made a number of assumptions in order to illustrate how roaming contributes to international voice traffic. One of the principal assumptions is the existence of a roaming agreement between the traveler's home mobile provider and at least one Austrian provider. Such agreements are quite common, especially among GSM operators. The GSM Association has established a standard roaming agreement in order to facilitate roaming between providers, as negotiating separate agreements for multiple providers would be prohibitively complicated or, at least, utterly tedious.

By illustrating intra-European roaming, we've also avoided discussing the technical interoperability necessary for international roaming. The European Union shares a common digital standard, GSM, which has been pivotal in facilitating roaming across its member states. GSM has also been deployed in other nations across the globe, but there are other digital standards (CDMA, TDMA, etc.) in use. Interstandard roaming has thus become a central issue in the development of truly global roaming. In order to foster interoperability between digital standards, the GSM Association has established the GSM Forum on Global Roaming, a working group dedicated to resolving the current technical issues involved in interstandard roaming. In addition to coordinating interface interoperability, harmonizing billing standards is a major component of interstandard roaming.

Source: TeleGeography research

Regional growth rates for mobile-terminated traffic were generally higher than those for mobile-originated traffic, ranging from 17 percent in Europe to 75 percent in Asia & Oceania. Incoming calls to mobiles rose 58 percent in Latin America & Caribbean but only account for 12 percent of all incoming traffic. Outside the Americas, mobile-terminated calls accounted for over 20 percent of incoming traffic, between 24 percent in Africa and 30 percent in Europe (see Figure 3. Percent of Mobile-Terminated International Traffic, 2000-2001).

Figure 5. Mobile Subscribers and International Traffic for Selected Countries, 2001

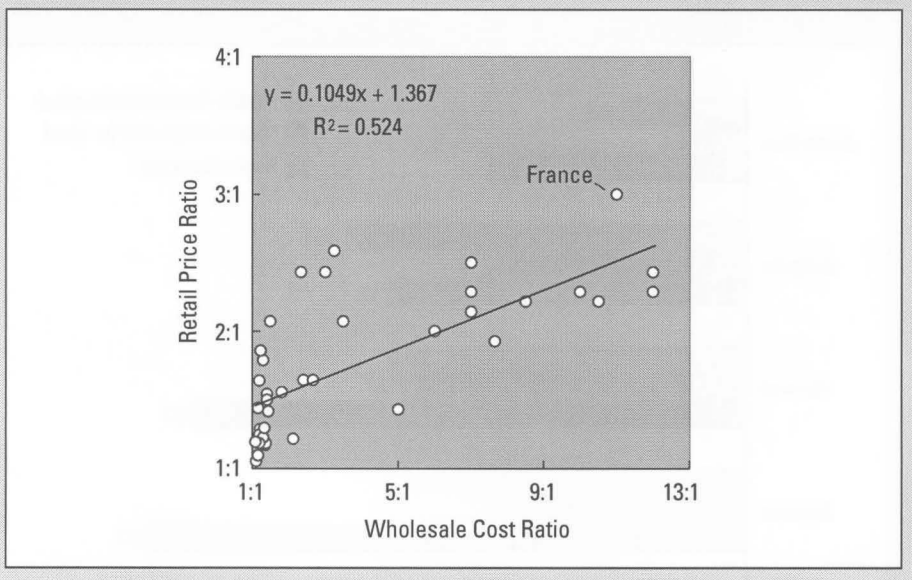


Notes: Numbers show absolute levels of mobile subscriber and traffic. Lengths of bars show relative levels to/from mobiles. Mobile subscriber percentage is based on total number of lines in service.

Source: TeleGeography research

While the decline of growth rates for international mobile traffic is strongly linked to declining subscriber growth, it is also reflective of several trends in the international long-distance market. Although some room for growth remains—the United States & Canada lag well behind Europe in terms of mobile penetration (39 percent for the former and 52 percent for the latter), and developing countries like Nigeria have experienced growth of 1000 percent over the last year—worldwide subscriber growth will undoubtedly be less spectacular in the future than in recent years. Mobile traffic growth, by extension, can be expected to follow the same trend (for a discussion of how roaming contributes to international mobile traffic, see Figure 4. Roaming and International Mobile Traffic).

Figure 6. International Call Prices: Mobile versus Fixed, 2002



Notes: Data show the ratio of international call costs to mobiles over fixed for 38 countries. For example, retail rates to French mobiles are 42 cents per minute while retail rates for French fixed lines are 14 cents per minute, a 3:1 ratio. Wholesale costs to France are 2 cents to fixed lines and 22 cents to mobile phones, an 11:1 ratio.

Retail rates reflect AT&T's Anyhour International Savings plan; wholesale costs are from Band-X Ltd. in London.

Source: TeleGeography research and Band-X Ltd.

Mobile Termination Costs

The increasing amount of mobile-terminated traffic has made mobile termination costs a serious concern for international carriers, as well as consumers and national regulatory agencies. Terminating traffic on mobile networks is almost universally more expensive than terminating traffic on fixed networks, resulting in a significant differential between call prices to mobile and fixed phones. Figure 6 (International Call Prices: Mobile versus Fixed, 2002) show the ratios of mobile and fixed prices, on both wholesale and retail levels. For calls to France, for example, wholesale prices to mobile phones are 11 times those to fixed phones while retail prices to mobiles are 3 times those to fixed phones.

In order to illustrate the economic effects of terminating international traffic on mobile networks, TeleGeography estimated the costs of mobile termination based on wholesale pricing information gathered from the Band-X Switched Minutes Exchange. Though the wholesale rates may not be an exact reflection of actual carrier costs, they serve as an excellent proxy, as differences in wholesale rates between fixed and mobile termination mirror the differences in interconnection rates. If anything, the wholesale rates may provide too conservative an estimate, as the differences between fixed and mobile wholesale rates are sometimes less dramatic than the corresponding interconnection rates (see Figure 7. Interconnection, Wholesale, and Retail Prices for Select Countries, 2002). Note that in some cases, the wholesale rate is actually at or below the interconnection rate as a result of gray market arrangements.

Figure 7. Interconnection, Wholesale, and Retail Prices for Select Countries, 2002

	Interconnection (US$/min)			Wholesale (US$/min)			Retail (US$/min)		
Country	Fixed	Mobile	Percent	Fixed	Mobile	Percent	Fixed	Mobile	Percent
Germany	0.02	0.20	1073.8%	0.02	0.17	850.0%	0.14	0.31	221.4%
Greece	0.03	0.21	826.8%	0.04	0.12	300.0%	0.14	0.26	185.7%
Hungary	0.03	0.13	410.1%	0.04	0.17	425.0%	0.29	0.41	141.4%
Netherlands	0.01	0.18	1880.2%	0.02	0.18	900.0%	0.14	0.32	228.6%
Portugal	0.02	0.21	1224.9%	0.03	0.19	633.3%	0.14	0.32	221.4%
Sweden	0.01	0.10	1151.8%	0.01	0.16	1600.0%	0.14	0.35	250.0%

Notes: Percent reflects the mobile rate as a percentage of the fixed rate. Wholesale rates are from New York as of August 2002. Retail rates are from AT&T.

Source: TeleGeography research and Last Mile Connections, Inc.

Where the rates for fixed and mobile termination are in line (e.g., Asia & Oceania), mobile traffic does not contribute significantly more to the cost of terminating traffic in a particular country. Where the difference is more substantial, mobile traffic contributes disproportionately to the total cost of termination (see Figure 8. Estimated Costs of Wholesale Traffic to Fixed and Mobile Destinations, 2001). For Europe, in particular, the effect is stunning: though mobile calls account for only 30 percent of all incoming international traffic, they represent 67 percent of the total cost for terminating international traffic. Again, these cost estimates are meant to be solely illustrative, but the economic effects they imply are certainly real.

How does one account for such drastic differences in interconnection rates (and, by extension, wholesale and retail prices) for fixed and mobile phones? Certainly, the costs of building and operating mobile networks are greater than those for fixed networks, but, even so, it is difficult to account for such staggering differences (as high as 1780 percent) on a purely economic basis. Thus, to fully understand the dynamics shaping these rates, one must examine the regulatory framework governing telecommunications networks and their interconnection.

When mobile services were first introduced, most national regulatory agencies (NRAs) were concerned with stimulating the growth of the industry and fostering a competitive environment for new operators. Thus, many opted for a calling party pays (CPP) payment structure and required fixed-line operators to provide mobile operators with cost-based access to their fixed networks (for more information on CPP and its alternative, receiving party pays or RPP, see Figure 9. Payment Structures for Mobile Calls). Unsaddled by such regulatory constraints, mobile operators have, in turn, been able to charge fixed-line operators access fees well above the mobile-to-fixed interconnection rate. Initially, this cost differential wasn't considered problematic; mobile services were predominantly limited to business people and wealthy consumers, who could generally afford the premium charge. With such a small subscriber base, the overall economic impact of high fixed-to-mobile interconnection charges was relatively modest. Moreover, a certain degree of cross-subsidization was expected to help new mobile operators become established.

Figure 8. Estimated Costs of Wholesale Traffic to Fixed and Mobile Destinations, 2001

Destination	Global Traffic to Destination (m min) Total Traffic	% to Mobile	Wholesale Rate to Destination (US$/min) Fixed	Mobile	Total Cost of Traffic (US$ m) Fixed	Mobile	% to Mobile
Africa							
Burundi	4.6	26.1%	0.21	0.22	0.7	0.3	27.0%
Egypt	651.8	15.5%	0.31	0.36	170.8	36.3	17.5%
Ghana	139.3	29.0%	0.16	0.19	15.8	7.7	32.7%
Madagascar	24.8	20.0%	0.25	0.29	5.0	1.4	22.5%
Nigeria	114.4	20.8%	0.30	0.39	27.2	9.3	25.5%
South Africa	736.0	31.2%	0.14	0.17	70.9	39.0	35.5%
Africa Total	**4,568.4**	**24.2%**	**0.23**	**0.24**	**781.2**	**265.6**	**25.4%**
L. America & Caribbean							
Bolivia	93.9	30.9%	0.20	0.27	13.0	7.8	37.6%
Brazil	1,351.5	17.3%	0.12	0.14	134.1	32.8	19.7%
Chile	675.1	11.7%	0.05	0.09	29.8	7.1	37.6%
Colombia	835.1	10.8%	0.11	0.14	82.0	12.6	13.3%
Dominican Republic	1,714.6	25.0%	0.08	0.10	102.9	42.9	29.4%
Ecuador	178.6	26.3%	0.21	0.20	27.6	9.4	25.4%
El Salvador	801.9	20.0%	0.13	0.17	83.4	27.3	24.6%
Jamaica	413.8	27.6%	0.22	0.23	65.9	26.3	28.5%
Nicaragua	89.5	21.0%	0.22	0.27	15.6	5.1	24.6%
Paraguay	68.2	41.8%	0.18	0.26	7.1	7.4	50.9%
Uruguay	127.8	15.0%	0.19	0.19	20.6	3.6	15.0%
Venezuela	551.7	36.7%	0.15	0.18	52.4	36.4	41.0%
L. America & Carib. Total	**38,481.9**	**12.0%**	**0.05**	**0.11**	**1,540.7**	**523.9**	**25.4%**
U.S. & Canada							
Canada	9,281.0	5.0%	0.02	0.02	176.3	9.3	5.0%
United States	13,400.0	4.0%	0.02	0.02	257.3	10.7	4.0%
U.S. & Canada Total	**22,681.0**	**4.4%**	**0.02**	**0.02**	**433.6**	**20.0**	**4.4%**

Notes: Global traffic to destination equals total incoming traffic to each country in 2001 and includes both traffic reported to TeleGeography and estimates. As incoming traffic is much more difficult to track than outgoing traffic, the sum of regional averages for incoming traffic does not directly compare to that of outgoing traffic. Bypass, refile, and a number of other factors contribute to the apparent "deficit."

Rates are from the Band-X London switch as of August 2001. Total cost to fixed and mobile destinations are estimated by multiplying the volume of total international minutes to fixed and mobile phones in each country by the wholesale rates to fixed and mobile destinations in the respective country. Figures may show rounding errors and weighting in calculations for regional averages.

Source: TeleGeography research and Band-X Ltd.

Mobile subscribers growth and the corollary growth in mobile-terminated traffic—and termination payments to mobile operators—have caused fixed-line operators to contest the disparity in interconnection charges (between fixed-to-mobile, mobile-to-fixed, and mobile-to-mobile) and the logic underpinning regulatory intervention heretofore. In assessing the market power of the involved parties on the basis of market share rather than control of calling opportunities, they argue, NRAs have failed to take into account the absence of competition in call termination on mobile networks—mobile operators essentially have monopoly power over call termination. In CPP markets, particularly, mobile operators can leverage their position to extract seemingly disproportionate fees from fixed-line operators wishing to connect to their network (again, see Figure 7).

Figure 8. Estimated Costs of Wholesale Traffic to Fixed and Mobile Destinations, 2001 (Continued)

Destination	Global Traffic to Destination (m min) Total Traffic	% to Mobile	Wholesale Rate to Destination (US$/min) Fixed	Mobile	Total Cost of Traffic (US$ m) Fixed	Mobile	% to Mobile
Asia & Oceania							
Australia	2,742.1	18.0%	0.02	0.10	45.0	49.4	52.3%
Japan	2,588.5	25.9%	0.04	0.13	76.7	87.2	53.2%
Korea, Rep.	997.3	30.0%	0.03	0.08	20.9	23.9	53.3%
Lebanon	380.1	30.0%	0.16	0.34	42.6	38.8	47.7%
Malaysia	810.0	31.5%	0.06	0.06	33.3	15.3	31.5%
Oman	108.0	31.0%	0.30	0.30	22.4	10.1	31.0%
Pakistan	1,165.1	13.2%	0.43	0.43	435.0	66.0	13.2%
Qatar	113.5	44.0%	0.28	0.31	17.8	15.5	46.5%
Saudi Arabia	705.5	40.0%	0.34	0.37	143.9	104.4	42.0%
Singapore	3,414.9	30.0%	0.04	0.04	95.6	41.0	30.0%
Syria	325.8	6.0%	0.39	0.39	119.5	7.6	6.0%
Thailand	555.0	50.0%	0.17	0.19	47.2	52.7	52.8%
Asia & Oceania Total	**32,501.3**	**25.7%**	**0.14**	**0.14**	**3,458.4**	**1,204.7**	**25.8%**
Europe							
Andorra	48.1	36.4%	0.06	0.06	1.8	1.1	36.4%
Belgium	1,998.3	27.0%	0.02	0.24	29.2	129.5	81.6%
Bulgaria	220.0	38.6%	0.15	0.15	20.3	12.8	38.6%
Czech Republic	527.2	42.3%	0.09	0.13	27.4	29.0	51.4%
Denmark	1,140.2	26.4%	0.02	0.06	16.8	18.1	51.8%
Estonia	91.9	43.5%	0.10	0.12	5.2	4.8	48.0%
Finland	394.5	35.9%	0.03	0.07	7.6	9.9	56.7%
France	8,284.0	26.9%	0.02	0.22	121.2	489.6	80.2%
Germany	14,666.2	27.1%	0.02	0.21	213.9	833.9	79.6%
Greece	891.0	30.7%	0.09	0.11	55.6	30.1	35.1%
Italy	5,183.4	47.7%	0.02	0.24	54.2	593.9	91.6%
Moldova	161.8	15.5%	0.14	0.14	19.2	3.5	15.5%
Norway	1,089.6	29.5%	0.02	0.12	15.4	38.6	71.5%
Poland	1,390.2	28.0%	0.10	0.12	100.1	46.7	31.8%
Portugal	1,272.5	30.0%	0.05	0.09	44.5	34.4	43.5%
Romania	600.0	25.4%	0.18	0.19	80.6	28.9	26.4%
Sweden	1,391.0	30.0%	0.01	0.07	9.7	29.2	75.0%
Switzerland	1,290.1	30.0%	0.02	0.17	18.1	65.8	78.5%
Europe Total	**64,111.8**	**29.8%**	**0.04**	**0.17**	**1,570.7**	**3,127.2**	**66.6%**

Notes: See facing page.
Source: TeleGeography research and Band-X Ltd.

During the course of the past year, NRAs have responded to these criticisms and turned their attention to mobile operators, particularly in Europe. With the implementation of the European Union Telecommunications Regulatory Package imminent, European NRAs have begun scrutinizing the mobile industry and intervening on behalf of fixed-line operators and consumers. The degree of regulatory intervention varies across countries, ranging from the establishment of best-practice guidelines for setting interconnection prices (in France) to direct mandates for cost-oriented pricing (in Sweden). Much of the variation in regulatory action hinges on the market definitions applied to mobile operators. Where operators are deemed to have significant market power

Figure 9. Payment Structures for Mobile Calls

Two payment structures exist for mobile services: calling party pays (CPP) and receiving party pays (RPP). In the former, the party originating the call to a mobile phone pays a premium for access to the mobile network. That is, the mobile user receiving the call incurs no charge for incoming traffic to her handset. Under the RPP scheme, the premium for mobile services is incurred by the mobile user receiving the call; the calling party pays the same price as for a comparable call to a fixed-line phone.

Of the two, CPP is by far the most commonly implemented payment structure, with RPP limited to only a handful of countries such as the U.S., Canada, China, Singapore, and Sri Lanka. The factors determining the choice of payment structure are largely contextual. CPP has been easy to introduce where consumers are accustomed to metered local calling and additional dialing codes were available for exclusive use by mobile providers. In countries where consumers are more accustomed to unmetered local calling or where technical obstacles (e.g., the availability of dialing codes) were encountered, RPP has been implemented. Mexico and Argentina are notable in that they have both switched from RPP to CPP during the past three years.

Proponents of CPP argue that it increases mobile penetration, especially by facilitating pre-paid mobile services. RPP, they contend, discourages mobile usage, prompting subscribers to turn off their phones or refuse calls rather than incur the charge for receiving them. Advocates of RPP, however, point out that RPP tends to keep fixed-mobile interconnection charges in line with prices for other forms of interconnection. In CPP markets, they contend, the mobile consumer has no incentive to consider the price for call termination on their phones when choosing a mobile provider. For customers in RPP markets, the cost of fixed-mobile interconnection is, in fact, a consideration in provider selection, and providers have nothing to gain by inflating prices. Recent studies have supported both claims: the number of subscribers has grown more rapidly in CPP countries, while fixed-mobile interconnection prices are substantially lower in RPP countries. Mexico provides an acute example of both trends. After the introduction of CPP in 1999, mobile subscribers in Mexico increased dramatically, more than doubling the previous year's growth, and the effective fixed-mobile interconnection tariff increased by approximately 250 percent. Despite the increased tariff, there was a considerable increase in incoming mobile traffic.

Source: TeleGeography research

(SMP), they are generally subject to greater regulatory control. Thus, in Sweden, Telia, identified as bearing SMP due to its market share, is obliged to provide cost-oriented interconnection to its mobile network while the other two mobile operators are not. In the United Kingdom, Oftel has deemed each of the four mobile operators to wield SMP over interconnection, due to their monopoly control over interconnection to their networks rather than their share of the overall market. As a result, all four operators are subject to regulatory intervention regarding interconnection. How these market definitions are developed—and applied—for the European Union as a whole remains to be seen.

The result of regulatory intervention has been a downward trend in interconnection rates to mobile networks, though the exact results vary according to the market definitions in place. In Sweden, for example, Telia's prices for interconnection have continued to drop since December 1999 while its competitors' prices have remained stable. Consequently, the Swedish regulator issued a mandate stating that the competitors' interconnection rates should be within 10 percent of Telia's rates in order not to warrant further regulatory investigation and potential action. In France, the regulator mandated a 20 percent reduction in fixed-to-mobile interconnection rates in 2001

and announced a 40 percent reduction over four years, starting in March of this year. In other countries, appeals of regulatory decisions have delayed any potential reductions in interconnection rates.

That a severe disparity remains between fixed and mobile interconnection rates has also generated considerable interest in the United States over the past year. Early this year, the United States Trade Representative concluded that mobile connection in the EU Member States and Japan was a matter of priority, citing World Trade Organization (WTO) obligations to provide cost-oriented pricing for telecommunications services from major suppliers. In September, the Federal Communications Commission issued a consumer alert regarding foreign mobile termination rates and, in November, adopted a Notice of Proposed Rulemaking to gather information on international calling practices (including foreign mobile termination rates) and evaluate the possible need for reform. The results of these inquiries could place pressure on European NRAs for more immediate action.

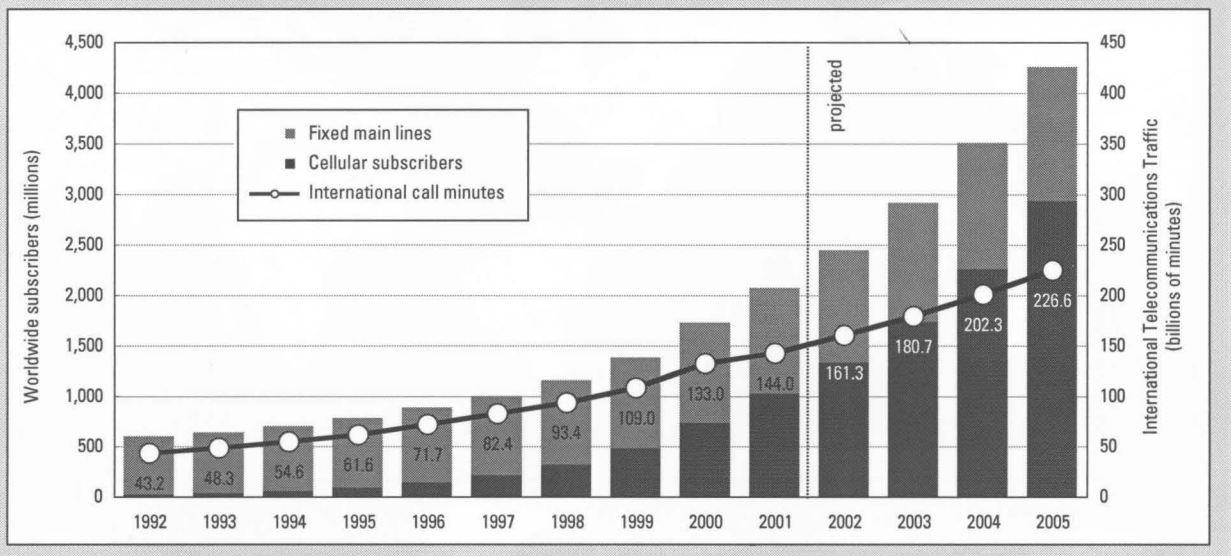
The Future of the Future

Once heralded as the future of mobile telecommunications, the 3G revolution, plagued by technological setbacks and declining investor confidence, has yet to materialize. Mobile data services are being deployed, though much less spectacularly than previously anticipated. For the immediate future, 3G services will not effect any significant change on mobile voice traffic patterns. Thus, the future of termination costs is of much greater import to international carriers. The degree to which regulatory pressure—as there exists no real competitive pressure to lower interconnection charges—forces interconnection prices downward will have a marked impact on carriers' costs and, to a certain extent, traffic patterns. For the time being, the high price of mobile termination underscores an important reality for international carriers: while costs continue to decline in the "middle" of the network (i.e., transport), the ultimate costs of traffic are determined by the terminator, not the carrier.

Traffic Summary

Global Traffic Review

Figure 1. International Traffic and Main Line Growth



Notes: Data include outbound international traffic on public networks only, VoIP call volumes are excluded. Projections assume 12 percent traffic growth, 6 percent main line growth, and 30 percent mobile subscriber growth annually.

Source: TeleGeography research and ITU

Figure 2. International Traffic, Revenue, and Subscriber Growth

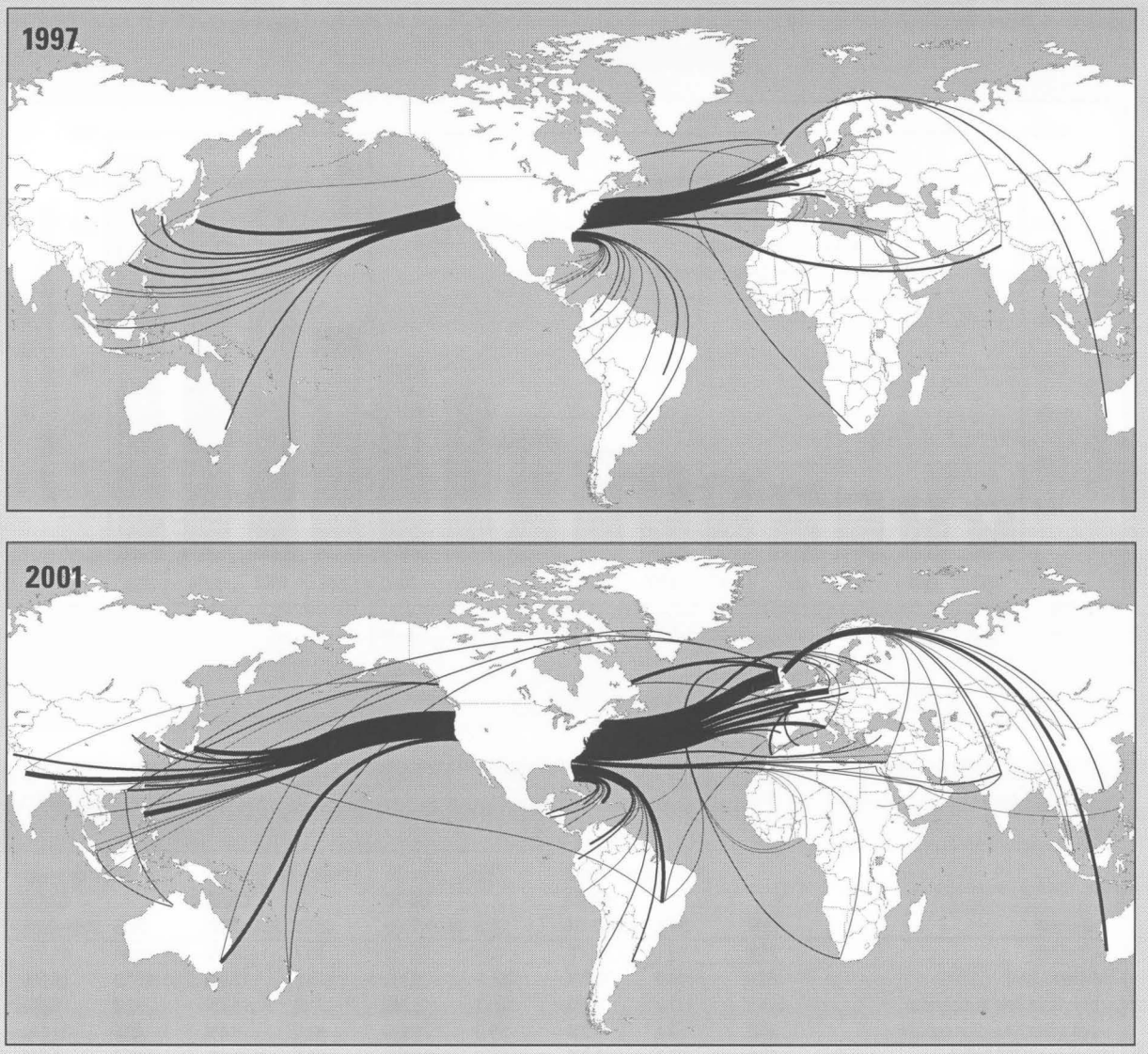
		Historical trend		*Slow growth*		*Moderate growth*		*Fast growth*	
			CAGR		CAGR		CAGR		CAGR
Indicator	**1997**	**2001**	**1997-2001**	**2005**	**2001-2005**	**2005**	**2001-2005**	**2005**	**2001-2005**
Calls (bn)	25.0	49.7	18.7%	78.4	12.1%	90.7	16.2%	100.8	19.3%
Minutes (bn)	82.4	144.0	15.0%	195.9	8.0%	226.6	12.0%	251.9	15.0%
per main line subscriber	104.1	137.7	7.2%	160.1	3.8%	171.6	5.7%	177.0	6.5%
per main line plus mobile	82.2	69.4	-4.2%	58.3	-4.2%	53.2	-6.4%	42.1	-11.7%
Revenue (US$ bn)	66.8	61.1	-2.2%	59.5	-0.6%	57.6	-1.4%	55.8	-2.3%
Assumptions									
Call length (mins)	3.3	2.9	-3.2%	2.5	-3.6%	2.5	-3.6%	2.5	-3.6%
Price per minute (US$)	0.81	0.42	-14.9%	0.30	-8.0%	0.25	-12.0%	0.22	-15.0%
Main lines (bn)	0.8	1.0	7.2%	1.2	4.0%	1.3	6.0%	1.4	8.0%
Mobile subscribers (bn)	0.2	1.0	48.6%	2.1	20.0%	2.9	30.0%	4.6	45.0%
Total subscribers (bn)	1.0	2.1	19.9%	3.4	12.8%	4.3	19.7%	6.0	30.3%

Notes: 1997-2001 based on reported data. 2002-2005 based on ITU and TeleGeography forecasts. Scenarios are as follows:

1. Slow Growth: PSTN traffic continue to grow at a similarly slow pace experienced in 2000-2001 as newly competitive markets mature and as traffic migrates to IP networks.
2. Moderate Growth: PSTN traffic growth returns to rates experienced prior to the widespread market liberalization of the late 1990s as price cutting keeps traffic on the PSTN.
3. Fast Growth: PSTN traffic growth accelerates from 2000-2001 rates as mobile subscriber growth remains strong and continued price cutting stimulates traffic increases.

Source: TeleGeography research and ITU World Telecommunication Indicators Database

Figure 3. Intercontinental Traffic Flows, 1997 and 2001

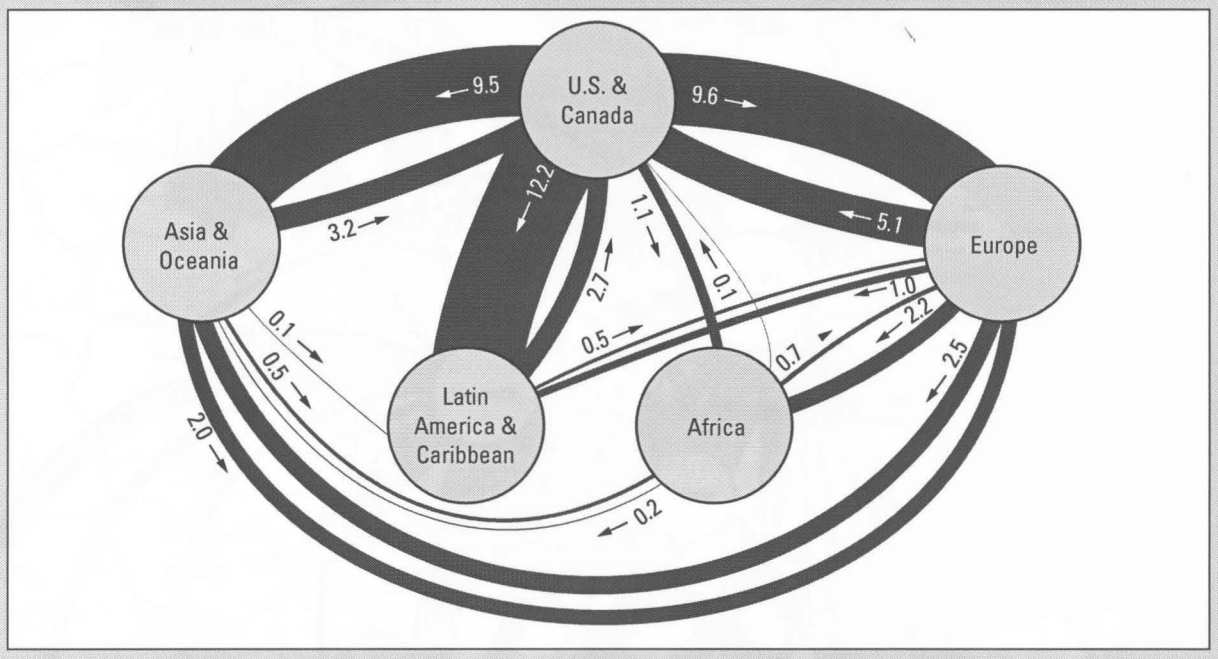


Notes: Each band is proportional to the total annual traffic on the public network in both directions between each pair of countries. These maps show all intercontinental routes with an annual volume of more than 100 million minutes. The total volume of these routes in 2001 was 39.5 billion minutes, approximately 28 percent of global international traffic.

Source: TeleGeography research

International Traffic by Region

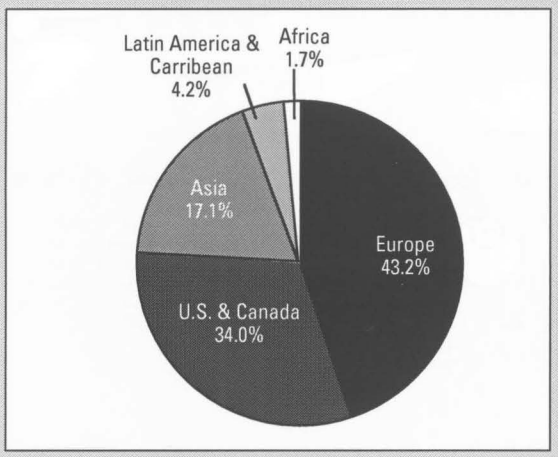
Figure 1. Interregional Traffic Flows, 2001



Notes: These interregional traffic flows total 51.8 billion minutes. That sum does not equal global PSTN total of 144.0 billion minutes because (1) data set is based on top 20 outgoing routes for 130 largest countries only; (2) traffic within regions account for a further 62.4 billion minutes based on data set; (3) interregional routes below 100 million minutes are not shown.

Source: TeleGeography research

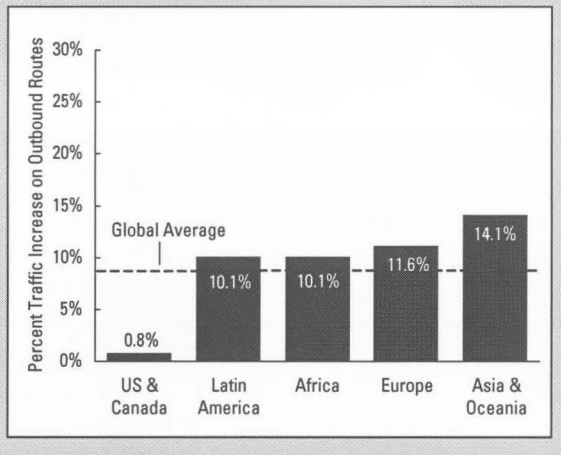
Figure 2. International Traffic by Origin, 2001



Note: Global traffic was 144.0 billion minutes in 2001. Data does not included VoIP calls.

Source: TeleGeography research

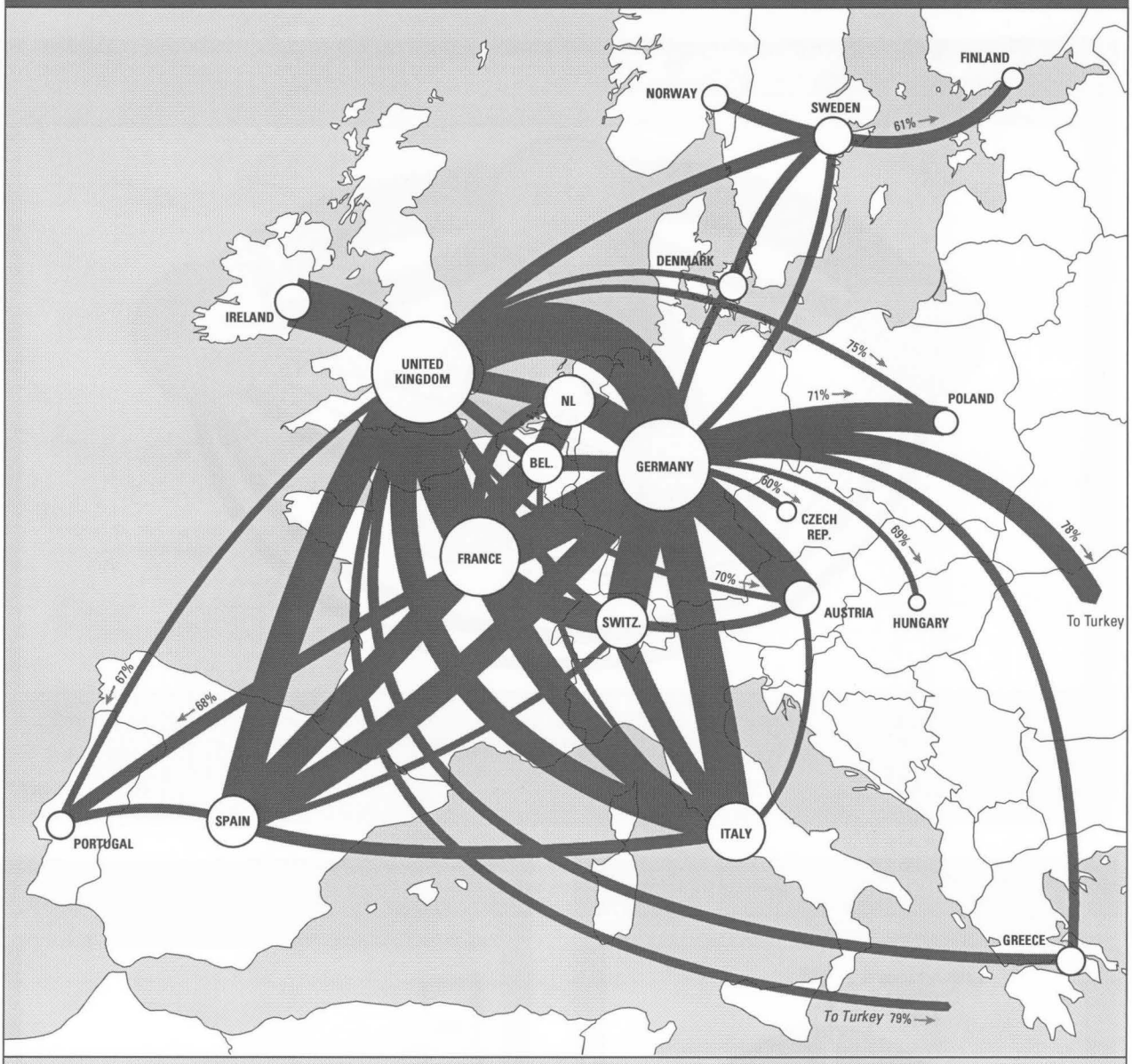
Figure 3. Traffic Growth by Region, 2000-2001



Notes: Global traffic was 144.0 billion minutes in 2001. Data does not include VoIP calls.

Source: TeleGeography research

Figure 4. European Telecommunications Traffic Flows, 2001



Key

All figures are given in millions of minutes of telecommunications traffic for the public telephone network.

The map shows all intra-European routes with a combined 2001 volume of more than 200 million minutes.

Traffic Flows

600 400 200
Million Minutes

Each band is proportional to the total annual traffic on the public telephone network in both directions between each pair of countries.

Total Outgoing Traffic

250
1,000
5,000
Million Minutes

The area of each circle is proportional to the volume of the total annual outgoing traffic from each country.

Balance of Traffic

On routes where traffic in one direction accounts for more than 60 percent of the total, an arrow shows the direction most of the traffic flows.

Source: TeleGeography research

Figure 5. Latin American Telecommunications Traffic Flows, 2001

Key

All figures are given in millions of minutes of telecommunications traffic for the public telephone network.

The map shows all routes within Latin America with a combined 2001 volume of more than 10 million minutes.

Traffic Flows

100 50 10

Million Minutes

Each band is proportional to the total annual traffic on the public telephone network in both directions between each pair of countries.

Total Outgoing Traffic

100
500
1,000

Million Minutes

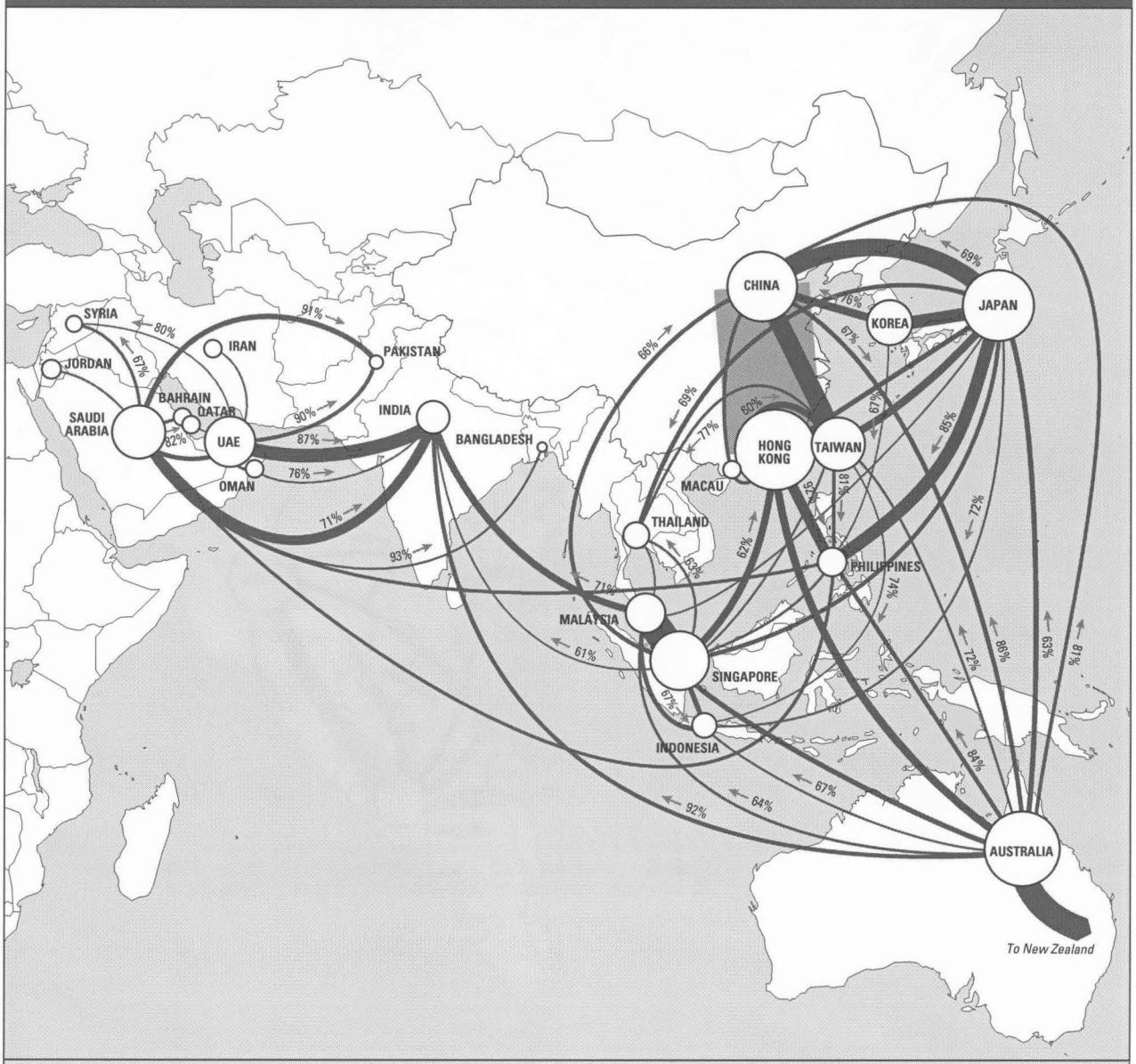
The area of each circle is proportional to the volume of the total annual outgoing traffic from each country.

Balance of Traffic

On routes where traffic in one direction accounts for more than 60 percent of the total, an arrow shows the direction most of the traffic flows.

Source: TeleGeography research

Figure 6. Asian Telecommunications Traffic Flows, 2001



Key

All figures are given in millions of minutes of telecommunications traffic for the public telephone network.

The map shows all intra-Asian routes with a combined 2001 volume of more than 50 million minutes.

Traffic Flows

500 200 50
Million Minutes

Each band is proportional to the total annual traffic on the public telephone network in both directions between each pair of countries.

Total Outgoing Traffic

100
500
1,500
Million Minutes

The area of each circle is proportional to the volume of the total annual outgoing traffic from each country.

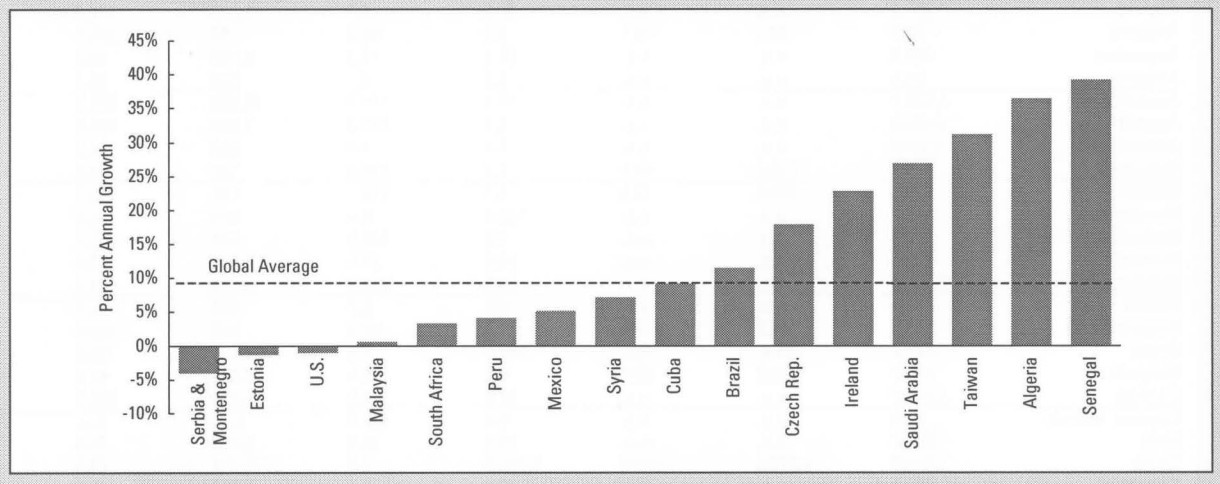
Balance of Traffic

On routes where traffic in one direction accounts for more than 60 percent of the total, an arrow shows the direction of most of the traffic flows.

Source: TeleGeography research

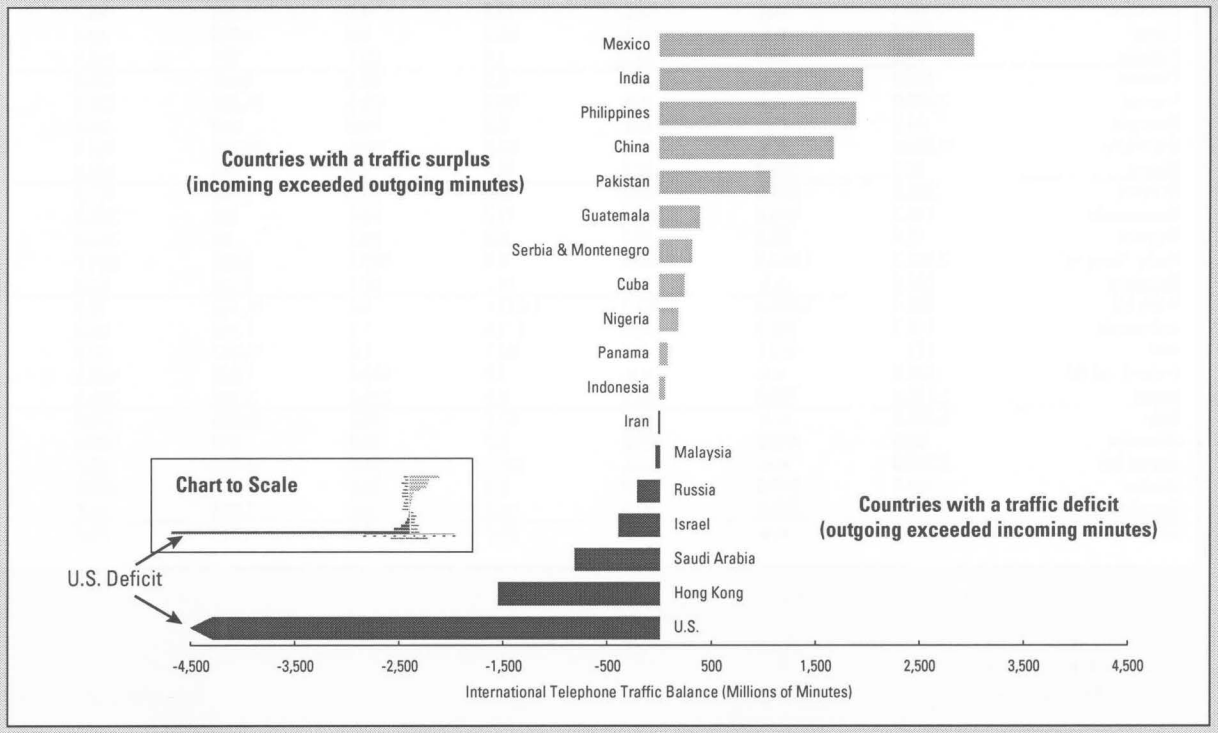
International Traffic by Country

Figure 1. Outgoing International PSTN Traffic Growth for Selected Countries, 2000-2001



Source: TeleGeography research

Figure 2. PSTN Traffic Balances for Selected Countries, 2001



Source: TeleGeography research

Figure 3. International Traffic Indicators, 2001

	Outgoing (m minutes)	Incoming (m minutes)	Balance (m minutes)	Population (m)	Minutes (Out) per Capita	Main Lines (thous.)	Minutes (Out) per Main Line
Albania	65.4	317.0	251.6	3.4	19.0	198	331.1
Algeria	207.1	n.a.	n.a.	30.9	6.7	1,880	110.2
Andorra	63.2	48.1	-15.1	0.7	90.3	35	1,805.7
Argentina	455.9	n.a.	n.a.	37.5	12.2	8,108	56.2
Armenia	34.6	n.a.	n.a.	3.8	9.1	529	65.4
Australia (a)	3,030.0	n.a.	n.a.	19.4	156.3	10,060	301.2
Austria	1,480.0	n.a.	n.a.	8.1	182.2	3,810	388.5
Azerbaijan	29.6	n.a.	n.a.	8.1	3.6	866	34.2
Bahamas	72.5	116.9	44.4	0.3	236.0	123	588.0
Bahrain	170.1	182.6	12.5	0.7	238.1	174	978.1
Bangladesh	47.7	n.a.	n.a.	133.4	0.4	514	92.8
Barbados	37.6	n.a.	n.a.	0.3	140.2	124	303.7
Belarus	209.9	n.a.	n.a.	10.0	21.1	2,858	73.4
Belgium	2,155.0	n.a.	n.a.	10.3	209.8	5,074	424.7
Bolivia	31.6	n.a.	n.a.	8.5	3.7	515	61.4
Botswana (a)	59.0	41.2	-17.8	1.6	36.5	150	392.5
Brazil	772.2	n.a.	n.a.	172.6	4.5	37,431	20.6
Bulgaria	125.0	220.0	95.0	8.1	15.4	2,914	42.9
Canada	7,915.0	n.a.	n.a.	31.0	255.2	20,319	389.5
Cayman Islands	51.0	n.a.	n.a.	0.4	127.5	n.a.	n.a.
Chile	281.2	n.a.	n.a.	15.4	18.3	3,703	75.9
China	2,600.0	4,270.0	1,670.0	1,271.9	2.0	179,034	14.5
Colombia	363.4	n.a.	n.a.	43.0	8.4	7,300	49.8
Costa Rica	131.4	165.5	34.1	3.9	33.8	945	139.0
Côte d'Ivoire	60.3	n.a.	n.a.	16.4	3.7	294	205.4
Croatia	244.5	n.a.	n.a.	4.4	55.8	1,700	143.8
Cuba	22.4	258.0	235.5	11.2	2.0	573	39.1
Cyprus	216.5	164.3	-52.2	0.8	284.6	435	497.7
Czech Republic	424.4	n.a.	n.a.	10.3	41.3	3,846	110.3
Denmark	995.0	n.a.	n.a.	5.4	186.0	3,882	256.3
Dominican Republic	227.4	1,714.6	1,487.2	8.5	26.7	955	238.1
Ecuador	61.1	n.a.	n.a.	12.9	4.7	1,336	45.7
Egypt	192.3	n.a.	n.a.	65.2	3.0	6,650	28.9
Estonia	74.6	91.9	17.3	1.4	55.1	504	148.1
Finland	485.0	n.a.	n.a.	5.2	93.5	2,845	170.5
France	7,605.0	n.a.	n.a.	59.2	128.5	34,033	223.5
Georgia	64.2	n.a.	n.a.	5.0	12.8	868	74.0
Germany	10,320.0	n.a.	n.a.	82.2	125.6	52,280	197.4
Ghana	46.7	139.3	92.5	19.7	2.4	242	192.9
Greece	1,020.0	891.0	-129.0	10.6	96.5	5,608	181.9
Guatemala	156.2	536.8	380.6	11.7	13.4	756	206.6
Guyana	19.4	69.6	50.2	0.8	25.3	80	242.8
Hong Kong (a)	3,487.3	1,942.3	-1,545.0	6.9	505.4	3,898	894.7
Hungary	326.8	n.a.	n.a.	10.2	32.1	3,730	87.6
India (a)	586.4	2,533.6	1,947.2	1,033.4	0.6	34,732	16.9
Indonesia	316.2	365.9	49.7	213.6	1.5	7,949	39.8
Iran	179.1	173.1	-6.0	64.7	2.8	10,347	17.3
Ireland (a) (b)	1,535.0	n.a.	n.a.	3.8	400.4	1,860	825.3
Israel	1,120.0	728.0	-392.0	6.4	176.0	3,100	361.3
Italy	4,805.0	n.a.	n.a.	57.7	83.3	27,303	176.0
Jamaica	95.6	413.8	318.2	2.7	35.8	513	186.5
Japan (a)	2,750.0	n.a.	n.a.	127.1	21.6	76,000	36.2
Jordan	185.3	217.0	31.7	5.0	36.8	660	280.8
Kazakhstan	118.6	206.9	88.4	14.8	8.0	1,834	64.7
Kenya	24.2	n.a.	n.a.	30.7	0.8	313	77.3

Notes: Data are in millions of minutes of public switched traffic. VoIP call volumes are excluded.
a. International traffic for year ending March 31, 2002. Australia, Mauritius, New Zealand, and Pakistan ends June 30, 2002.
b. Traffic data exclude some carriers or routes. (See country table for details.)
c. Data include refile traffic.

Source: TeleGeography research

Figure 3. International Traffic Indicators, 2001 (continued)

	Outgoing (m minutes)	Incoming (m minutes)	Balance (m minutes)	Population (m)	Minutes (Out) per Capita	Main Lines (thous.)	Minutes (Out) per Main Line
Korea, Rep.	1,120.0	n.a.	n.a.	47.6	23.5	22,725	49.3
Kyrgyzstan	23.5	42.3	18.8	5.0	4.7	376	62.5
Latvia	64.7	105.3	40.6	2.3	27.6	725	89.3
Lesotho	21.5	n.a.	n.a.	2.1	10.4	22	968.5
Lithuania	58.1	n.a.	n.a.	3.5	16.7	1,152	50.4
Luxembourg	394.6	n.a.	n.a.	0.4	888.5	350	1,127.4
Macau	156.5	111.9	-44.6	0.4	353.0	176	887.2
Macedonia	66.3	197.2	131.0	2.0	32.4	539	123.1
Malaysia (a)	845.0	810.0	-35.0	23.8	35.5	4,738	178.3
Malta	45.6	65.5	19.9	0.4	116.3	208	219.5
Mauritius	35.6	56.2	20.6	1.2	29.7	307	116.0
Mexico	2,082.0	5,100.0	3,018.0	99.4	20.9	13,773	151.2
Moldova	52.3	161.8	109.6	4.3	12.2	676	77.4
Morocco	269.5	n.a.	n.a.	29.2	9.2	1,191	226.2
Namibia	64.8	46.2	-18.7	1.8	36.2	117	552.0
Netherlands	3,225.0	n.a.	n.a.	16.0	201.2	10,000	322.5
New Zealand (a)	965.0	n.a.	n.a.	3.8	250.7	1,834	526.3
Norway	796.0	n.a.	n.a.	4.5	176.1	3,262	244.0
Oman (b)	159.3	108.0	-51.3	2.5	65.0	235	677.0
Pakistan (a) (b)	110.0	1,165.1	1,055.2	141.5	0.8	3,400	32.4
Palestinian Territory (b)	45.3	47.9	2.6	3.1	14.6	257	176.3
Panama	45.3	119.9	74.6	2.9	15.6	430	105.3
Paraguay	35.3	75.8	40.6	5.6	6.3	289	122.2
Philippines (a)	449.0	2,332.7	1,883.7	77.0	5.8	3,100	144.8
Poland	729.9	n.a.	n.a.	38.7	18.9	11,400	64.0
Portugal	900.0	n.a.	n.a.	10.2	88.0	4,397	204.7
Qatar	171.6	113.5	-58.2	0.6	287.2	167	1,025.1
Russia (b)	1,081.6	869.3	-212.3	144.8	7.5	35,700	30.3
Saudi Arabia	1,516.6	705.5	-811.2	21.4	70.8	3,233	469.1
Serbia & Montenegro	275.5	582.2	306.7	10.6	26.0	1,948	112.7
Singapore (a)	1,870.7	n.a.	n.a.	4.1	456.0	1,556	960.6
Slovak Republic	176.3	n.a.	n.a.	5.4	32.6	4,969	113.3
South Africa (a)	510.7	736.0	225.3	43.2	11.8	17,427	102.8
Spain (c)	4,275.0	n.a.	n.a.	39.5	108.2	828	245.3
Sri Lanka	54.0	180.0	126.0	19.6	2.7	453	65.2
Sudan (b)	36.1	n.a.	n.a.	31.7	1.1	32	79.7
Swaziland (a)	26.3	n.a.	n.a.	1.1	24.6	6,585	821.9
Sweden	1,710.0	n.a.	n.a.	8.9	192.3	5,183	259.7
Switzerland	3,230.0	n.a.	n.a.	7.2	448.1	1,808	623.2
Syria	150.0	325.8	175.8	16.6	9.0	12,847	83.0
Taiwan	1,522.2	n.a.	n.a.	22.4	68.0	223	118.5
Tajikistan (b)	8.6	n.a.	n.a.	6.2	1.4	5,974	38.6
Thailand	377.7	555.0	177.4	61.2	6.2	312	63.2
Trinidad & Tobago (a)	80.9	189.2	108.4	1.3	61.8	18,901	259.5
Turkey	675.0	1,100.0	425.0	66.2	10.2	388	35.7
Turkmenistan (b)	19.3	n.a.	n.a.	5.3	3.6	10,670	49.8
Ukraine	388.0	n.a.	n.a.	49.1	7.9	1,053	36.4
United Arab Emirates	1,395.9	n.a.	n.a.	3.0	469.0	35,326	1,325.8
United Kingdom (a) (c)	12,730.0	7,664.8	-5,065.2	59.9	212.5	190,000	360.4
United States	37,272.4	13,400.0	-23,872.4	284.0	131.3	951	196.2
Uruguay	78.0	127.8	49.8	3.4	23.2	1,663	82.0
Uzbekistan (b)	58.3	n.a.	n.a.	25.1	2.3	2,444	35.1

Notes: Data are in millions of minutes of public switched traffic. VoIP call volumes are excluded.
a. International traffic for year ending March 31, 2002. Australia, Mauritius, New Zealand, and Pakistan ends June 30, 2002.
b. Traffic data exclude some carriers or routes. (See country table for details.)
c. Data include refile traffic.

Source: TeleGeography research

International Traffic by Route

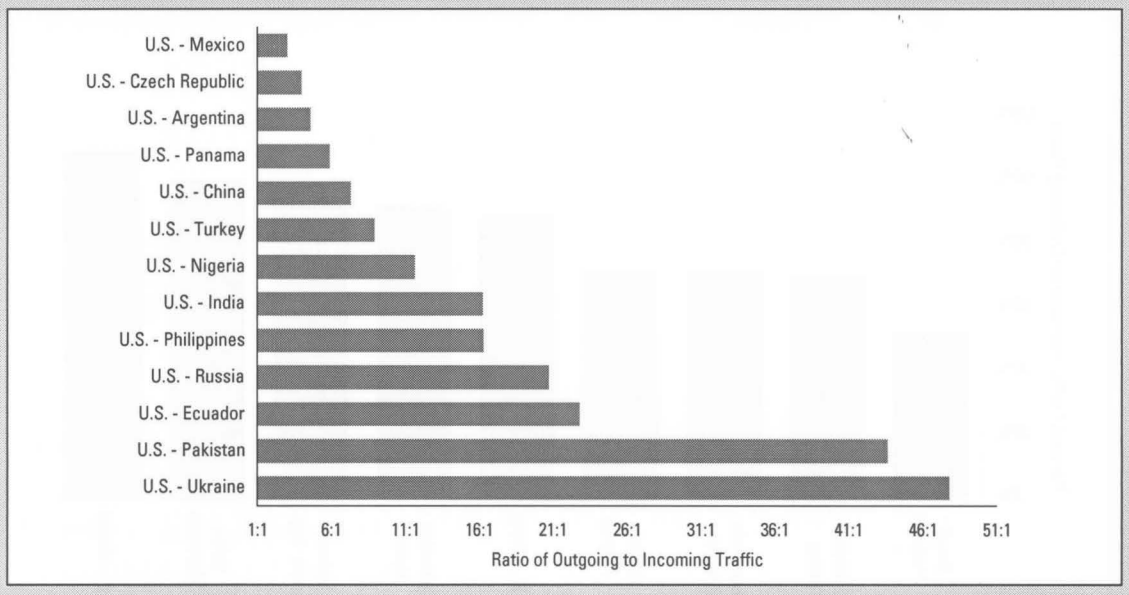
Figure 1. Top 50 International Routes, 2001

Rank	Countries	Minutes each Way	Total Minutes
1.	Canada - U.S.	6,000.0 — 5,105.9	11,105.9
2.	U.S. - Mexico	5,193.1 — 1,723.4	6,916.5
3.	U.K. - U.S.	2,425.2 — 2,066.3	4,491.5
4.	Hong Kong - China	1,668.2 — 1,350.0	3,018.2
5.	U.S. - Germany	1,214.0 — 675.0	1,889.0
6.	U.S. - Philippines	1,627.3 — 100.0	1,727.3
7.	U.K. - Germany	951.4 — 750.0	1,701.4
8.	Ireland - U.K.	865.0 — 710.9	1,575.9
9.	U.S. - India	1,444.7 — 89.0	1,533.7
10.	U.S. - Japan	1,003.5 — 515.0	1,518.5
11.	U.K. - France	836.6 — 680.0	1,516.6
12.	Germany - France	720.0 — 650.0	1,370.0
13.	Germany - Austria	675.0 — 630.0	1,305.0
14.	Switzerland - Germany	655.0 — 630.0	1,285.0
15.	U.S. - France	816.7 — 460.0	1,276.7
16.	Germany - Italy	660.0 — 580.0	1,240.0
17.	Australia - U.S.	605.0 — 591.6	1,196.6
18.	U.S. - Dominican Republic	994.3 — 170.0	1,164.3
19.	Spain - U.K.	605.0 — 558.2	1,163.2
20.	U.S. - Brazil	849.6 — 255.0	1,104.6
21.	Germany - Netherlands	540.0 — 540.0	1,080.0
22.	U.S. - Italy	749.6 — 325.0	1,074.6
23.	France - Belgium	550.0 — 470.0	1,020.0
24.	France - Italy	545.0 — 460.0	1,005.0
25.	Australia - U.K.	550.0 — 437.1	987.1
26.	Singapore - Malaysia	550.0 — 422.0	972.0
27.	Spain - France	510.0 — 425.0	935.0
28.	Germany - Poland	650.0 — 270.0	920.0
29.	Spain - Germany	540.0 — 380.0	920.0
30.	France - Switzerland	450.0 — 450.0	900.0
31.	Netherlands - Belgium	440.0 — 440.0	880.0
32.	U.K. - Canada	428.1 — 400.0	828.1
33.	U.K. - Italy	446.7 — 380.0	826.7
34.	New Zealand - Australia	430.0 — 355.0	785.0
35.	Taiwan - China	423.0 — 340.0	763.0
36.	Germany - Turkey	580.0 — 168.0	748.0
37.	U.S. - Korea, Rep.	470.3 — 270.0	740.3
38.	U.K. - Netherlands	376.6 — 340.0	716.6
39.	Switzerland - Italy	410.0 — 300.0	710.0
40.	U.S. - Colombia	495.1 — 171.7	666.8
41.	U.S. - Hong Kong	341.0 — 308.0	649.0
42.	France - Morocco	520.0 — 110.0	630.0
43.	U.S. - Taiwan	380.4 — 200.0	580.4
44.	U.S. - Israel	302.4 — 260.0	562.4
45.	Japan - China	385.0 — 175.0	560.0
46.	U.S. - Pakistan	519.7 — 11.9	531.6
47.	U.S. - Netherlands	313.5 — 215.0	528.5
48.	Belgium - Germany	260.0 — 245.0	505.0
49.	U.S. - China	444.0 — 61.0	505.0
50.	U.S. - Spain	345.7 — 150.0	495.7

Notes: All data in millions of minutes of telecommunications traffic. The country which generates more traffic on each route is listed first. The routes listed above total 71.1 billion minutes, equal to 49 percent of all international traffic. Data for Australia, Hong Kong, Ireland, Japan, Malaysia, New Zealand, Singapore, and the U.K. are for fiscal year 2001/2001. The sum of minutes each way may not equal the total minutes due to rounding.

Source: TeleGeography research

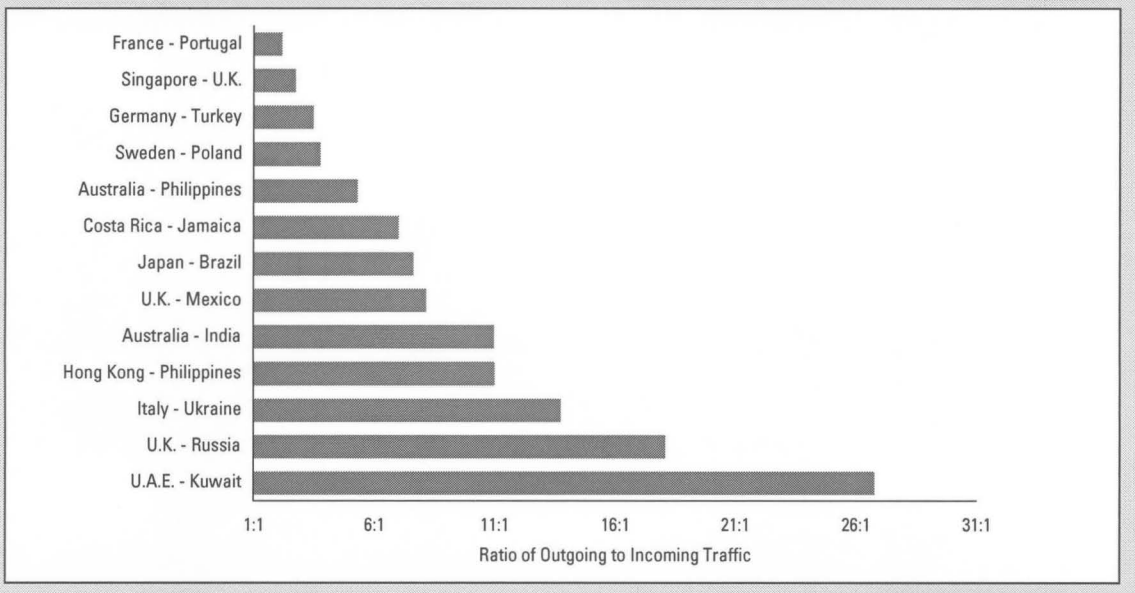
Figure 2. Traffic Imbalances on Selected U.S. Routes, 2001



Notes: Country with traffic deficit on route listed first. A ratio of 1:1 would indicate a perfect balance on a route. U.S. data is based on billing point of call and may not reflect actual call ratios due to refile and call-back. Data exclude VoIP call volumes.

Source: TeleGeography research

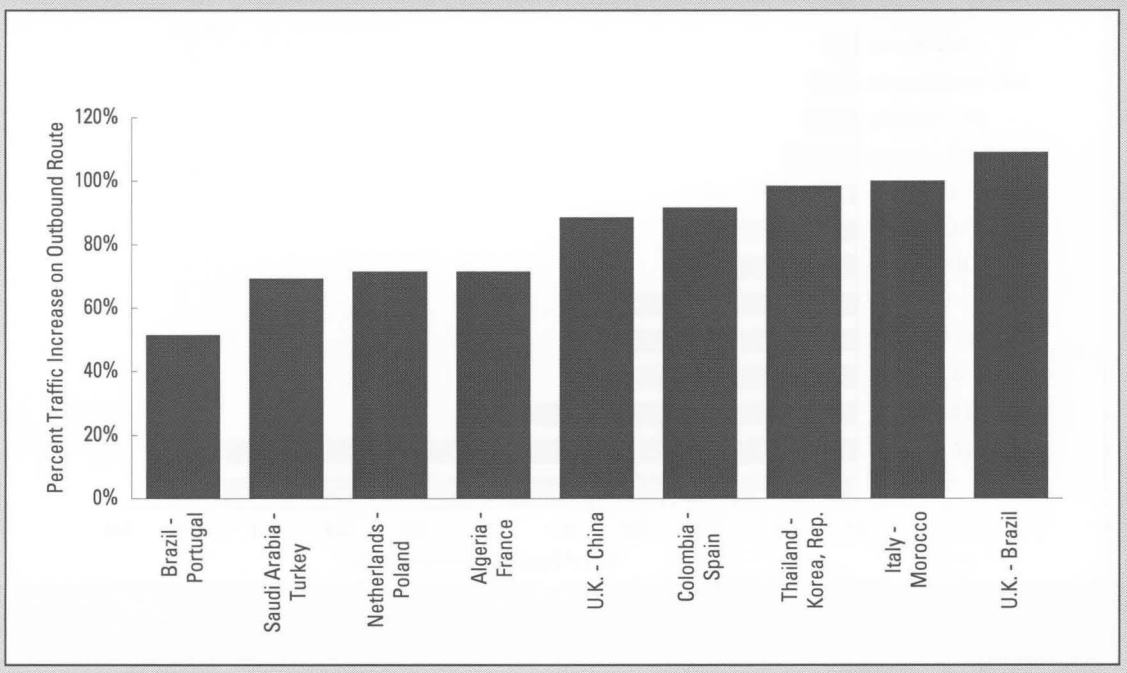
Figure 3. Traffic Imbalances on Selected Non-U.S. Routes, 2001



Notes: Country with traffic deficit on route listed first. A ratio of 1:1 would indicate a perfect balance on a route. Data for some countries is based on billing point of call and may not reflect actual call ratios due to refile and call-back. Data exclude VoIP call volumes.

Source: TeleGeography research

Figure 4. International Outbound Routes with Rapidly Growing Traffic, 2000-2001



Notes: Country originating traffic listed first; country terminating traffic listed second. Some data is based on billing point of call and may not reflect actual route growth rates due to refile and call-back. Data exclude VoIP call volumes.

Source: TeleGeography research

Country Traffic Statistics

Albania

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	Italy	24.6	37.6%
2.	Greece	22.8	34.9%
3.	Germany	2.7	4.2%
4.	United Kingdom	2.6	4.0%
5.	United States	1.9	2.9%
6.	Turkey	1.6	2.5%
7.	France	1.1	1.7%
8.	Belgium	0.9	1.3%
9.	Switzerland	0.6	0.9%
10.	Austria	0.5	0.8%
11.	Bulgaria	0.4	0.6%
12.	Canada	0.3	0.5%
13.	Serbia & Montenegro	0.3	0.5%
14.	Netherlands	0.3	0.5%
15.	Romania	0.3	0.4%
16.	Spain	0.2	0.3%
17.	Croatia	0.2	0.3%
18.	Hungary	0.1	0.2%
19.	Egypt	0.1	0.2%
20.	Denmark	0.1	0.2%
	Others	3.6	5.5%
	TOTAL	**65.4**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	121.7	178.6	317.0
Outgoing	74.6	64.9	65.4
Surplus (Deficit)	47.1	113.7	251.6
Total Volume	196.3	243.5	382.4

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Algeria

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	France	119.8	57.9%
2.	Tunisia	10.3	5.0%
3.	United Kingdom	9.1	4.4%
4.	Spain	8.9	4.3%
5.	Morocco	8.3	4.0%
6.	Italy	7.8	3.8%
7.	Germany	4.7	2.2%
8.	Belgium	3.4	1.6%
9.	Saudi Arabia	3.1	1.5%
10.	Switzerland	3.0	1.5%
11.	Egypt	2.9	1.4%
12.	United States	2.8	1.3%
13.	Canada	2.5	1.2%
14.	United Arab Emirates	2.3	1.1%
15.	Lebanon	1.7	0.8%
16.	Syria	1.6	0.8%
17.	Turkey	1.4	0.7%
18.	Netherlands	1.2	0.6%
19.	Mauritania	0.8	0.4%
20.	Libya	0.8	0.4%
	Others	10.7	5.2%
	TOTAL	**207.1**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	n.a.	n.a.	n.a.
Outgoing	143.5	151.8	207.1
Surplus (Deficit)	n.a.	n.a.	n.a.
Total Volume	n.a.	n.a.	n.a.

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Andorra

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	Spain	43.7	69.2%
2.	France	9.6	15.2%
3.	Portugal	3.8	6.0%
4.	United Kingdom	1.7	2.7%
5.	Germany	0.5	0.7%
6.	Belgium	0.3	0.5%
7.	Netherlands	0.3	0.5%
8.	Switzerland	0.3	0.5%
9.	United States	0.3	0.5%
10.	Italy	0.3	0.4%
11.	Argentina	0.2	0.3%
12.	Russia	0.2	0.3%
13.	Morocco	0.1	0.2%
	Others	1.9	2.9%
	TOTAL	**63.2**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	n.a.	n.a.	48.1
Outgoing	53.2	55.9	63.2
Surplus (Deficit)	n.a.	n.a.	(15.0)
Total Volume	n.a.	n.a.	111.2

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Argentina

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	United States	83.1	18.2%
2.	Peru	48.3	10.6%
3.	Brazil	43.6	9.6%
4.	Uruguay	41.4	9.1%
5.	Spain	39.7	8.7%
6.	Paraguay	38.2	8.4%
7.	Chile	32.8	7.2%
8.	Bolivia	28.7	6.3%
9.	Italy	18.7	4.1%
10.	Mexico	9.4	2.1%
11.	France	7.3	1.6%
12.	United Kingdom	6.0	1.3%
13.	Canada	5.1	1.1%
14.	Cuba	4.8	1.0%
15.	Colombia	4.7	1.0%
16.	Venezuela	4.3	0.9%
17.	Germany	3.1	0.7%
18.	Israel	2.8	0.6%
19.	Dominican Republic	2.6	0.6%
20.	Switzerland	2.3	0.5%
	Others	28.9	6.3%
	TOTAL	**455.9**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	n.a.	n.a.	n.a.
Outgoing	377.6	432.1	455.9
Surplus (Deficit)	n.a.	n.a.	n.a.
Total Volume	n.a.	n.a.	n.a.

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Armenia

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (thousands)	Percent of Outgoing Traffic
1.	Russia	23,903.0	69.0%
2.	Ukraine	1,857.5	5.4%
3.	Georgia	1,657.5	4.8%
4.	United States	795.8	2.3%
5.	Greece	349.4	1.0%
6.	Belarus	312.5	0.9%
7.	Kazakhstan	280.5	0.8%
8.	France	262.0	0.8%
9.	United Kingdom	132.9	0.4%
10.	Uzbekistan	131.5	0.4%
11.	Turkmenistan	127.5	0.4%
12.	Italy	85.1	0.2%
13.	Latvia	83.3	0.2%
14.	Netherlands	78.3	0.2%
15.	Switzerland	70.3	0.2%
16.	Moldova	68.7	0.2%
17.	Poland	68.2	0.2%
18.	Bulgaria	64.7	0.2%
19.	Belgium	63.0	0.2%
20.	Lithuania	55.6	0.2%
	Others	4,180.0	12.1%
	TOTAL	**34,637.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	89.8	n.a.	n.a.
Outgoing	33.7	31.4	34.6
Surplus (Deficit)	56.0	n.a.	n.a.
Total Volume	123.5	n.a.	n.a.

Note: National traffic data are in millions of minutes of outgoing public switched telecommunications traffic; route data are in thousands of minutes of outgoing public switched telecommunications traffic.

Australia

LARGEST TELECOMMUNICATIONS ROUTES, FY 2001/02

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	United States	605.0	20.0%
2.	United Kingdom	550.0	18.2%
3.	New Zealand	355.0	11.7%
4.	Canada	125.0	4.1%
5.	India	120.0	4.0%
6.	Hong Kong	105.0	3.5%
7.	Japan	100.0	3.3%
8.	China	95.0	3.1%
9.	Philippines	95.0	3.1%
10.	Singapore	90.0	3.0%
11.	Germany	65.0	2.1%
12.	Italy	65.0	2.1%
13.	Malaysia	55.0	1.8%
14.	Indonesia	50.0	1.7%
15.	Vietnam	50.0	1.7%
	Others	505.0	16.7%
	TOTAL	**3,030.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	FY 1999/00	FY 2000/01	FY 2001/02
Incoming	n.a.	n.a.	n.a.
Outgoing	2,115.0	2,650.0	3,030.0
Surplus (Deficit)	n.a.	n.a.	n.a.
Total Volume	n.a.	n.a.	n.a.

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic. Fiscal year ends 30 June.

Austria

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	Germany	630.0	42.6%
2.	Switzerland	170.0	11.5%
3.	Italy	90.0	6.1%
4.	Hungary	63.0	4.3%
5.	Serbia & Montenegro	63.0	4.3%
6.	Croatia	58.0	3.9%
7.	United Kingdom	45.0	3.0%
8.	Poland	42.0	2.8%
9.	Czech Republic	37.0	2.5%
10.	France	37.0	2.5%
	Others	245.0	16.6%
	TOTAL	**1,480.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	n.a.	n.a.	n.a.
Outgoing	1,305.0	1,410.0	1,480.0
Surplus (Deficit)	n.a.	n.a.	n.a.
Total Volume	n.a.	n.a.	n.a.

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Azerbaijan

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (thousands)	Percent of Outgoing Traffic
1.	Russia	15,277.0	51.6%
2.	Turkey	2,764.0	9.3%
3.	Ukraine	1,441.0	4.9%
4.	Georgia	1,393.0	4.7%
5.	Kazakhstan	769.0	2.6%
6.	Germany	599.7	2.0%
7.	Uzbekistan	373.0	1.3%
8.	Belgium	286.4	1.0%
9.	Belarus	286.0	1.0%
10.	United States	281.6	1.0%
11.	Turkmenistan	276.0	0.9%
12.	France	218.1	0.7%
13.	Switzerland	167.2	0.6%
14.	United Kingdom	161.5	0.5%
15.	Italy	140.4	0.5%
16.	Netherlands	126.8	0.4%
17.	Moldova	115.6	0.4%
18.	Poland	79.4	0.3%
19.	Latvia	78.6	0.3%
20.	Greece	74.1	0.3%
	Others	4,720.0	15.9%
	TOTAL	**29,631.2**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	68.6	59.7	n.a.
Outgoing	32.2	28.1	29.6
Surplus (Deficit)	36.4	31.6	n.a.
Total Volume	100.8	87.8	n.a.

Note: National traffic data are in millions of minutes of outgoing public switched telecommunications traffic; route data are in thousands of minutes of outgoing public switched telecommunications traffic.

Bahamas

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (thousands)	Percent of Outgoing Traffic
1.	United States	53,284.6	73.5%
2.	Canada	3,224.5	4.4%
3.	Jamaica	1,986.9	2.7%
4.	United Kingdom	1,275.8	1.8%
5.	Mexico	659.6	0.9%
6.	Switzerland	595.8	0.8%
7.	Trinidad & Tobago	305.5	0.4%
8.	France	293.0	0.4%
9.	Germany	204.9	0.3%
10.	Italy	164.3	0.2%
11.	Spain	143.7	0.2%
12.	Brazil	141.8	0.2%
13.	Panama	116.8	0.2%
14.	Guyana	113.6	0.2%
15.	Colombia	74.8	0.1%
16.	Peru	74.6	0.1%
17.	Netherlands	64.4	0.1%
18.	Venezuela	64.3	0.1%
19.	Costa Rica	55.8	0.1%
20.	Dominican Republic	55.8	0.1%
	Others	9,560.0	13.2%
	TOTAL	**72,467.7**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	n.a.	111.8	116.9
Outgoing	65.0	67.3	72.5
Surplus (Deficit)	n.a.	44.5	44.4
Total Volume	n.a.	179.0	189.3

Note: National traffic data are in millions of minutes of outgoing public switched telecommunications traffic; route data are in thousands of minutes of outgoing public switched telecommunications traffic.

Bahrain

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	India	21.4	19.6%
2.	Saudi Arabia	18.2	16.7%
3.	United Arab Emirates	13.3	12.2%
4.	United Kingdom	6.6	6.0%
5.	Kuwait	5.0	4.5%
6.	Pakistan	4.7	4.3%
7.	United States	4.5	4.1%
8.	Qatar	4.5	4.1%
9.	Egypt	3.9	3.6%
10.	Philippines	2.6	2.3%
11.	Jordan	2.0	1.8%
12.	Bangladesh	2.0	1.8%
13.	Morocco	1.9	1.7%
14.	Oman	1.8	1.7%
15.	Lebanon	1.2	1.1%
16.	France	1.1	1.0%
17.	Sri Lanka	1.1	1.0%
18.	Iran	1.0	0.9%
19.	Syria	0.8	0.8%
20.	Germany	0.8	0.7%
	Others	10.9	10.0%
	TOTAL	**109.2**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	106.5	125.6	182.6
Outgoing	134.1	167.7	170.1
Surplus (Deficit)	(27.5)	(42.1)	12.5
Total Volume	240.6	293.3	352.7

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic. Route data excludes 60.92 million minutes of prepaid calling card traffic for which route data is not available.

Bangladesh

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	India	8.7	18.3%
2.	Saudi Arabia	5.6	11.8%
3.	United States	3.6	7.6%
4.	United Kingdom	3.6	7.5%
5.	Korea, Rep.	3.3	7.0%
6.	Singapore	2.4	4.9%
7.	United Arab Emirates	2.2	4.5%
8.	Pakistan	1.6	3.3%
9.	Hong Kong	1.5	3.2%
10.	Malaysia	1.5	3.1%
11.	China	1.3	2.8%
12.	Japan	0.9	1.9%
13.	Italy	0.8	1.8%
14.	Thailand	0.8	1.7%
15.	Canada	0.7	1.5%
16.	Germany	0.7	1.4%
17.	Sri Lanka	0.6	1.2%
18.	Australia	0.6	1.2%
19.	France	0.6	1.2%
20.	French Polynesia	0.6	1.2%
	Others	6.1	12.8%
	TOTAL	**47.7**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	n.a.	n.a.	n.a.
Outgoing	45.1	49.6	47.7
Surplus (Deficit)	n.a.	n.a.	n.a.
Total Volume	n.a.	n.a.	n.a.

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Barbados

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	United States	8.5	22.5%
2.	Trinidad & Tobago	4.9	12.9%
3.	Guyana	4.8	12.7%
4.	Canada	3.4	9.1%
5.	United Kingdom	3.0	8.0%
6.	Saint Vincent & The Grenadines	2.4	6.5%
7.	Saint Lucia	2.0	5.2%
8.	Jamaica	1.8	4.9%
9.	Grenada	0.8	2.2%
10.	Antigua & Barbuda	0.8	2.1%
11.	Dominica	0.4	1.1%
12.	Saint Kitts & Nevis	0.4	1.0%
13.	Bahamas	0.3	0.8%
14.	Cayman Islands	0.3	0.8%
15.	Bermuda	0.2	0.6%
16.	Netherlands Antilles	0.1	0.4%
17.	Anguilla	0.1	0.4%
18.	Venezuela	0.1	0.3%
	Others	2.8	7.4%
	TOTAL	**37.6**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	n.a.	n.a.	n.a.
Outgoing	35.7	32.1	37.6
Surplus (Deficit)	n.a.	n.a.	n.a.
Total Volume	n.a.	n.a.	n.a.

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Belarus

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	Russia	92.3	44.0%
2.	Ukraine	30.0	14.3%
3.	Kazakhstan	2.4	1.1%
4.	Moldova	1.7	0.8%
5.	Azerbaijan	1.3	0.6%
6.	Uzbekistan	1.0	0.5%
7.	Armenia	0.7	0.4%
8.	Georgia	0.6	0.3%
9.	Turkmenistan	0.4	0.2%
10.	Kyrgyzstan	0.3	0.1%
11.	Tajikistan	0.2	0.1%
	Others	79.1	37.7%
	TOTAL	**209.9**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	195.6	n.a.	n.a.
Outgoing	161.2	178.5	209.9
Surplus (Deficit)	34.4	n.a.	n.a.
Total Volume	356.8	n.a.	n.a.

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic. The "Others" category may include routes to non-members of the Commonwealth of Independent States that rank among the top destinations for outgoing traffic.

Belgium

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	France	470.0	21.8%
2.	Netherlands	440.0	20.4%
3.	Germany	260.0	12.1%
4.	United Kingdom	190.0	8.8%
5.	Italy	110.0	5.1%
6.	United States	100.0	4.6%
7.	Luxembourg	75.0	3.5%
8.	Spain	65.0	3.0%
9.	Switzerland	40.0	1.9%
10.	Denmark	32.0	1.5%
11.	Australia	29.0	1.3%
12.	Greece	22.0	1.0%
13.	Poland	21.0	1.0%
14.	Sweden	20.0	0.9%
15.	Canada	19.0	0.9%
	Others	262.0	12.2%
	TOTAL	**2,155.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	n.a.	n.a.	n.a.
Outgoing	1,590.0	1,835.0	2,155.0
Surplus (Deficit)	n.a.	n.a.	n.a.
Total Volume	n.a.	n.a.	n.a.

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Belize

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (thousands)	Percent of Outgoing Traffic
1.	United States	6,070.9	57.0%
2.	Guatemala	784.6	7.4%
3.	Mexico	705.0	6.6%
4.	Honduras	615.2	5.8%
5.	United Kingdom	394.1	3.7%
6.	El Salvador	389.4	3.7%
7.	Canada	306.9	2.9%
8.	Costa Rica	143.6	1.3%
9.	Jamaica	137.0	1.3%
10.	Cuba	118.1	1.1%
11.	Nicaragua	115.2	1.1%
12.	Panama	115.1	1.1%
13.	Barbados	107.3	1.0%
14.	China	72.3	0.7%
15.	Trinidad & Tobago	60.3	0.6%
16.	India	58.8	0.6%
17.	Germany	44.7	0.4%
18.	Taiwan	42.0	0.4%
19.	Bahamas	39.3	0.4%
20.	Belgium	36.0	0.3%
	Others	290.0	2.7%
	TOTAL	**10,655.8**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	n.a.	24.0	28.5
Outgoing	9.6	9.6	10.7
Surplus (Deficit)	n.a.	14.4	17.8
Total Volume	n.a.	33.6	39.1

Note: National traffic data are in millions of minutes of outgoing public switched telecommunications traffic; route data are in thousands of minutes of outgoing public switched telecommunications traffic.

Bolivia

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	United States	8.4	26.6%
2.	Argentina	6.0	19.0%
3.	Brazil	3.7	11.7%
4.	Chile	3.0	9.5%
5.	Peru	2.8	8.9%
6.	Colombia	1.0	3.2%
7.	Spain	1.0	3.2%
8.	Ecuador	0.7	2.2%
9.	Italy	0.6	1.9%
10.	Germany	0.5	1.6%
11.	Mexico	0.5	1.6%
12.	Paraguay	0.5	1.6%
13.	Canada	0.4	1.3%
14.	Switzerland	0.4	1.3%
15.	United Kingdom	0.4	1.3%
	Others	1.7	5.4%
	TOTAL	**31.6**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	82.2	80.8	n.a.
Outgoing	29.7	27.2	31.6
Surplus (Deficit)	52.5	53.6	n.a.
Total Volume	111.9	107.9	n.a.

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Botswana

LARGEST TELECOMMUNICATIONS ROUTES, FY 2001/02

	Destination	Minutes (thousands)	Percent of Outgoing Traffic
1.	South Africa	38,621.0	65.4%
2.	Zimbabwe	6,427.0	10.9%
3.	United Kingdom	2,488.0	4.2%
4.	Zambia	1,738.0	2.9%
5.	United States	1,472.0	2.5%
6.	Namibia	958.0	1.6%
7.	Kenya	515.0	0.9%
8.	Swaziland	304.0	0.5%
9.	Malawi	288.0	0.5%
10.	Lesotho	281.0	0.5%
11.	Tanzania	249.0	0.4%
12.	Germany	239.0	0.4%
13.	Sri Lanka	222.0	0.4%
14.	France	157.0	0.3%
15.	Mauritius	131.0	0.2%
16.	Mozambique	129.0	0.2%
17.	Ireland	116.0	0.2%
18.	Nigeria	111.0	0.2%
19.	United Arab Emirates	100.0	0.2%
20.	Canada	69.0	0.1%
	Others	4,390.0	7.4%
	TOTAL	**59,013.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	FY 1999/00	FY 2000/01	FY 2001/02
Incoming	n.a.	n.a.	41.2
Outgoing	40.0	42.0	59.0
Surplus (Deficit)	n.a.	n.a.	(17.8)
Total Volume	n.a.	n.a.	100.2

Note: National traffic data are in millions of minutes of outgoing public switched telecommunications traffic; route data are in thousands of minutes of outgoing public switched telecommunications traffic. Fiscal year ends 31 March.

Brazil

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	United States	255.0	33.0%
2.	Portugal	63.0	8.2%
3.	Argentina	54.0	7.0%
4.	Italy	38.0	4.9%
5.	Spain	30.0	3.9%
6.	United Kingdom	30.0	3.9%
7.	Germany	26.0	3.4%
8.	Japan	25.0	3.2%
9.	France	23.0	3.0%
10.	Chile	17.0	2.2%
11.	Uruguay	14.0	1.8%
12.	Canada	13.0	1.7%
13.	Paraguay	13.0	1.7%
14.	Bolivia	12.0	1.6%
15.	Switzerland	11.0	1.4%
16.	Mexico	10.0	1.3%
17.	Peru	10.0	1.3%
18.	Netherlands	7.0	0.9%
19.	Colombia	6.0	0.8%
20.	Venezuela	6.0	0.8%
	Others	109.2	14.1%
	TOTAL	**772.2**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	838.5	1,212.4	n.a.
Outgoing	574.8	692.7	772.2
Surplus (Deficit)	263.7	519.8	n.a.
Total Volume	1,413.3	1,905.1	n.a.

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Bulgaria

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	Greece	19.0	15.2%
2.	Germany	16.0	12.8%
3.	Turkey	13.0	10.4%
4.	Italy	7.0	5.6%
5.	Spain	5.0	4.0%
6.	United Kingdom	5.0	4.0%
7.	Austria	4.0	3.2%
8.	France	4.0	3.2%
9.	Russia	4.0	3.2%
10.	United States	4.0	3.2%
11.	Macedonia	3.0	2.4%
12.	Serbia & Montenegro	3.0	2.4%
13.	Belgium	2.0	1.6%
14.	Czech Republic	2.0	1.6%
15.	Netherlands	2.0	1.6%
16.	Romania	2.0	1.6%
17.	Switzerland	2.0	1.6%
18.	Ukraine	2.0	1.6%
19.	Hungary	1.6	1.2%
20.	Poland	1.5	1.2%
	Others	22.9	18.3%
	TOTAL	**125.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	n.a.	211.0	220.0
Outgoing	98.9	110.0	125.0
Surplus (Deficit)	n.a.	101.0	95.0
Total Volume	n.a.	321.0	345.0

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Burkina Faso

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (thousands)	Percent of Outgoing Traffic
1.	France	6,140.2	70.9%
2.	Côte d'Ivoire	1,562.0	18.0%
3.	Switzerland	157.2	1.8%
4.	Netherlands	110.5	1.3%
5.	Denmark	46.2	0.5%
6.	Congo, Rep.	41.7	0.5%
7.	Tunisia	23.8	0.3%
8.	Lebanon	23.5	0.3%
9.	Algeria	19.7	0.2%
10.	Cameroon	18.6	0.2%
11.	Rwanda	15.2	0.2%
12.	Niger	13.5	0.2%
13.	Burundi	12.1	0.1%
14.	Japan	11.8	0.1%
15.	Gabon	10.3	0.1%
16.	Guinea-Bissau	9.9	0.1%
17.	Djibouti	6.2	0.1%
18.	Greece	5.9	0.1%
19.	Cape Verde	4.7	0.1%
20.	Equatorial Guinea	4.5	0.1%
	Others	420.0	4.8%
	TOTAL	**8,663.2**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	16.3	n.a.	n.a.
Outgoing	10.9	10.6	8.7
Surplus (Deficit)	5.4	n.a.	n.a.
Total Volume	27.2	n.a.	n.a.

Note: National traffic data are in millions of minutes of outgoing public switched telecommunications traffic; route data are in thousands of minutes of outgoing public switched telecommunications traffic.

Canada

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	United States	6,000.0	75.8%
2.	United Kingdom	400.0	5.1%
3.	Hong Kong	130.0	1.6%
4.	India	120.0	1.5%
5.	France	115.0	1.5%
6.	Italy	110.0	1.4%
7.	Germany	105.0	1.3%
8.	Philippines	105.0	1.3%
9.	Australia	60.0	0.8%
10.	Japan	57.0	0.7%
	Others	713.0	9.0%
	TOTAL	**7,915.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	n.a.	n.a.	n.a.
Outgoing	5,830.0	7,224.0	7,915.0
Surplus (Deficit)	n.a.	n.a.	n.a.
Total Volume	n.a.	n.a.	n.a.

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Cayman Islands

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	United States	16.9	33.1%
2.	Jamaica	11.3	22.1%
3.	United Kingdom	3.0	5.8%
4.	Canada	2.5	5.0%
5.	Honduras	1.1	2.1%
6.	Philippines	0.7	1.3%
7.	Barbados	0.6	1.1%
8.	Cuba	0.5	1.0%
9.	Trinidad & Tobago	0.5	0.9%
10.	Bahamas	0.4	0.7%
11.	Ireland	0.3	0.6%
12.	Switzerland	0.3	0.6%
13.	India	0.3	0.5%
14.	Bermuda	0.3	0.5%
15.	Brazil	0.2	0.5%
16.	Dominican Republic	0.2	0.4%
17.	Costa Rica	0.2	0.3%
18.	Colombia	0.2	0.3%
19.	Nicaragua	0.2	0.3%
20.	Mexico	0.1	0.3%
	Others	11.4	22.4%
	TOTAL	**51.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	n.a.	27.3	n.a.
Outgoing	33.4	51.0	51.0
Surplus (Deficit)	n.a.	(23.7)	n.a.
Total Volume	n.a.	78.3	n.a.

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Chad

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (thousands)	Percent of Outgoing Traffic
1.	France	1,277.2	32.9%
2.	Cameroon	475.8	12.2%
3.	Saudi Arabia	281.8	7.3%
4.	Sudan	149.2	3.8%
5.	Netherlands	147.1	3.8%
6.	United Kingdom	124.2	3.2%
7.	Côte d'Ivoire	100.5	2.6%
8.	Nigeria	96.5	2.5%
9.	Senegal	87.0	2.2%
10.	Central African Rep.	78.6	2.0%
11.	Germany	76.1	2.0%
12.	Benin	75.3	1.9%
13.	Canada	75.0	1.9%
14.	Egypt	69.9	1.8%
15.	Belgium	55.6	1.4%
16.	Gabon	49.7	1.3%
17.	Togo	43.8	1.1%
18.	Italy	43.8	1.1%
19.	Niger	41.9	1.1%
20.	Switzerland	37.7	1.0%
	Others	490.0	12.6%
	TOTAL	**3,884.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	n.a.	n.a.	n.a.
Outgoing	2.8	3.4	3.9
Surplus (Deficit)	n.a.	n.a.	n.a.
Total Volume	n.a.	n.a.	n.a.

Note: National traffic data are in millions of minutes of outgoing public switched telecommunications traffic; route data are in thousands of minutes of outgoing public switched telecommunications traffic.

Chile

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	United States	79.3	28.2%
2.	Argentina	37.2	13.2%
3.	Peru	26.9	9.6%
4.	Spain	16.4	5.8%
5.	Brazil	15.4	5.5%
6.	Mexico	7.9	2.8%
7.	Bolivia	6.1	2.2%
8.	Colombia	6.1	2.2%
9.	Ecuador	6.1	2.2%
10.	Canada	5.7	2.0%
11.	Germany	5.7	2.0%
12.	France	5.0	1.8%
13.	United Kingdom	4.5	1.6%
14.	Venezuela	4.1	1.5%
15.	Italy	3.8	1.4%
16.	Uruguay	3.2	1.1%
17.	Australia	2.9	1.0%
18.	Switzerland	2.1	0.7%
19.	Paraguay	1.7	0.6%
20.	Japan	1.4	0.5%
	Others	39.7	14.1%
	TOTAL	**281.2**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	n.a.	n.a.	n.a.
Outgoing	265.3	261.4	281.2
Surplus (Deficit)	n.a.	n.a.	n.a.
Total Volume	n.a.	n.a.	n.a.

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

China

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	Hong Kong	1,350.0	51.9%
2.	Taiwan	340.0	13.1%
3.	Japan	175.0	6.7%
4.	United States	61.0	2.3%
5.	Korea, Rep.	60.0	2.3%
6.	Macau	52.0	2.0%
7.	Singapore	46.0	1.8%
8.	United Kingdom	29.0	1.1%
9.	Australia	23.0	0.9%
10.	Canada	23.0	0.9%
11.	Germany	22.0	0.8%
12.	France	16.0	0.6%
13.	Italy	13.0	0.5%
14.	Malaysia	11.0	0.4%
15.	Russia	10.0	0.4%
	Others	369.0	14.2%
	TOTAL	**2,600.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	n.a.	3,500.0	4,270.0
Outgoing	1,950.0	2,240.0	2,600.0
Surplus (Deficit)	n.a.	1,260.0	1,670.0
Total Volume	n.a.	5,740.0	6,870.0

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic. Data are for PSTN traffic only. VoIP traffic accounted for over one billion minutes of additional call volumes from China in 2001.

Colombia

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	United States	171.7	47.2%
2.	Spain	45.8	12.6%
3.	Venezuela	39.7	10.9%
4.	Ecuador	13.3	3.7%
5.	Mexico	10.2	2.8%
6.	United Kingdom	7.1	2.0%
7.	Canada	7.0	1.9%
8.	Panama	6.8	1.9%
9.	Brazil	6.3	1.7%
10.	Peru	5.5	1.5%
11.	Italy	5.2	1.4%
12.	Costa Rica	5.0	1.4%
13.	France	4.5	1.2%
14.	Germany	4.0	1.1%
15.	Chile	3.9	1.1%
16.	Argentina	2.4	0.7%
17.	Aruba	2.2	0.6%
18.	Switzerland	1.5	0.4%
19.	Australia	1.0	0.3%
20.	Netherlands Antilles	1.0	0.3%
	Others	19.3	5.3%
	TOTAL	**363.4**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	n.a.	n.a.	n.a.
Outgoing	245.4	312.0	363.4
Surplus (Deficit)	n.a.	n.a.	n.a.
Total Volume	n.a.	n.a.	n.a.

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Costa Rica

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	United States	46.6	35.5%
2.	Nicaragua	23.7	18.0%
3.	Mexico	5.9	4.5%
4.	Guatemala	5.8	4.4%
5.	El Salvador	5.0	3.8%
6.	Panama	4.4	3.3%
7.	Colombia	4.4	3.3%
8.	Honduras	3.3	2.5%
9.	Canada	2.6	2.0%
10.	Cuba	1.6	1.2%
11.	Spain	1.3	1.0%
12.	Argentina	1.2	0.9%
13.	Venezuela	1.2	0.9%
14.	Italy	1.0	0.7%
15.	Dominican Republic	0.8	0.6%
16.	Peru	0.7	0.5%
17.	Chile	0.7	0.5%
18.	Germany	0.7	0.5%
19.	Brazil	0.6	0.5%
20.	France	0.6	0.4%
	Others	19.6	14.9%
	TOTAL	**131.4**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	109.0	137.8	165.5
Outgoing	94.1	99.6	131.4
Surplus (Deficit)	14.9	38.2	34.1
Total Volume	203.1	237.4	296.9

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Côte d'Ivoire

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	France	18.0	29.8%
2.	Senegal	7.7	12.8%
3.	Burkina Faso	2.7	4.5%
4.	United States	1.6	2.6%
5.	Mali	1.5	2.4%
6.	Benin	1.3	2.2%
7.	United Kingdom	1.2	2.0%
8.	Italy	1.2	1.9%
9.	Lebanon	1.2	1.9%
10.	Togo	1.1	1.8%
11.	Switzerland	0.8	1.3%
12.	Belgium	0.8	1.3%
13.	Cameroon	0.7	1.2%
14.	Germany	0.7	1.2%
15.	Nigeria	0.6	1.1%
16.	Niger	0.6	1.0%
17.	Ghana	0.6	1.0%
18.	Morocco	0.6	1.0%
19.	Gabon	0.6	1.0%
20.	Spain	0.5	0.8%
	Others	16.5	27.3%
	TOTAL	**60.3**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	n.a.	n.a.	n.a.
Outgoing	71.3	74.0	60.3
Surplus (Deficit)	n.a.	n.a.	n.a.
Total Volume	n.a.	n.a.	n.a.

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Croatia

LARGEST TELECOMMUNICATIONS ROUTES, 2000

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	Germany	44.9	20.2%
2.	Austria	27.1	12.2%
3.	Switzerland	23.8	10.7%
4.	Italy	20.5	9.2%
5.	Macedonia	14.6	6.6%
6.	France	12.3	5.5%
7.	Greece	10.3	4.6%
8.	Hungary	10.2	4.6%
9.	United Kingdom	8.2	3.7%
10.	Russia	7.1	3.2%
11.	United States	6.2	2.8%
12.	Sweden	6.0	2.7%
13.	Netherlands	4.5	2.0%
14.	Romania	4.0	1.8%
15.	Belgium	2.9	1.3%
16.	Turkey	2.7	1.2%
17.	Spain	2.4	1.1%
18.	Bulgaria	2.3	1.0%
19.	Australia	1.7	0.8%
20.	Denmark	1.7	0.8%
	Others	8.8	4.0%
	TOTAL	**222.3**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	FY 2001/02
Incoming	n.a.	512.0	n.a.
Outgoing	323.4	222.3	244.5
Surplus (Deficit)	n.a.	289.6	n.a.
Total Volume	n.a.	734.3	n.a.

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic. 2001 traffic data are not available. Data exclude traffic to Slovenia, Serbia, and Bosnia.

Cuba

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	United States	3.8	16.8%
2.	Spain	2.8	12.7%
3.	Canada	2.1	9.4%
4.	Italy	1.7	7.8%
5.	Mexico	1.7	7.8%
6.	France	1.2	5.2%
7.	Germany	0.9	3.9%
8.	Venezuela	0.6	2.6%
9.	United Kingdom	0.5	2.3%
10.	Chile	0.5	2.2%
11.	Panama	0.5	2.1%
12.	Argentina	0.4	2.0%
13.	Brazil	0.4	1.6%
14.	Dominican Republic	0.3	1.5%
15.	Colombia	0.3	1.3%
16.	Jamaica	0.3	1.3%
17.	Costa Rica	0.2	0.7%
18.	Sweden	0.1	0.6%
19.	Switzerland	0.1	0.6%
	Others	4.0	17.7%
	TOTAL	**22.4**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	225.3	284.4	258.0
Outgoing	32.6	20.6	22.4
Surplus (Deficit)	192.7	263.8	235.5
Total Volume	257.8	304.9	280.4

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Cyprus

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	Greece	66.6	30.7%
2.	United Kingdom	56.6	26.1%
3.	Russia	10.5	4.8%
4.	United States	10.0	4.6%
5.	Germany	5.4	2.5%
6.	Bulgaria	4.6	2.1%
7.	Romania	4.2	1.9%
8.	Lebanon	4.0	1.8%
9.	Ukraine	4.0	1.8%
10.	Serbia & Montenegro	2.7	1.2%
11.	Italy	2.7	1.2%
12.	Switzerland	2.4	1.1%
13.	France	2.3	1.1%
14.	Egypt	2.2	1.0%
15.	Syria	2.2	1.0%
16.	Philippines	2.2	1.0%
17.	Sweden	2.2	1.0%
18.	Netherlands	2.1	1.0%
19.	Australia	1.7	0.8%
20.	Israel	1.7	0.8%
	Others	26.3	12.2%
	TOTAL	**216.5**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	134.1	159.7	164.3
Outgoing	168.2	192.6	216.5
Surplus (Deficit)	(34.0)	(32.9)	(52.2)
Total Volume	302.3	352.3	380.8

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Czech Republic

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	Germany	105.0	24.7%
2.	Slovak Republic	87.0	20.5%
3.	Austria	31.0	7.3%
4.	United Kingdom	26.0	6.1%
5.	Poland	18.0	4.2%
6.	Italy	17.0	4.0%
7.	France	14.0	3.3%
8.	Netherlands	13.0	3.1%
9.	Ukraine	12.0	2.8%
10.	United States	12.0	2.8%
11.	Switzerland	10.0	2.4%
12.	Russia	9.0	2.1%
13.	Hungary	8.0	1.9%
14.	Spain	7.0	1.6%
15.	Belgium	6.0	1.4%
16.	Croatia	5.0	1.2%
17.	Sweden	5.0	1.2%
18.	Greece	4.0	0.9%
19.	Belarus	3.0	0.7%
20.	Denmark	3.0	0.7%
	Others	30.0	7.1%
	TOTAL	**424.4**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	452.2	n.a.	n.a.
Outgoing	364.0	359.9	424.4
Surplus (Deficit)	88.2	n.a.	n.a.
Total Volume	816.2	n.a.	n.a.

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Denmark

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	Sweden	170.0	17.1%
2.	Germany	130.0	13.1%
3.	Norway	100.0	10.1%
4.	United Kingdom	95.0	9.5%
5.	United States	51.0	5.1%
6.	France	39.0	3.9%
7.	Netherlands	33.0	3.3%
8.	Spain	21.0	2.1%
9.	Italy	20.0	2.0%
10.	Belgium	17.0	1.7%
11.	Finland	16.0	1.6%
12.	Switzerland	15.0	1.5%
13.	Turkey	14.0	1.4%
14.	Canada	8.0	0.8%
15.	Iceland	8.0	0.8%
16.	Greece	6.0	0.6%
17.	Ireland	6.0	0.6%
18.	Australia	5.0	0.5%
19.	Latvia	4.0	0.4%
	Others	223.0	22.4%
	TOTAL	**995.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	n.a.	n.a.	n.a.
Outgoing	800.0	905.0	995.0
Surplus (Deficit)	n.a.	n.a.	n.a.
Total Volume	n.a.	n.a.	n.a.

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Dominican Republic

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	United States	170.0	74.8%
2.	Spain	10.0	4.4%
3.	Italy	5.2	2.3%
4.	Canada	3.8	1.7%
5.	Germany	3.2	1.4%
6.	Mexico	2.6	1.1%
7.	Venezuela	2.6	1.1%
8.	Cuba	2.1	0.9%
9.	Switzerland	2.0	0.9%
10.	Argentina	1.9	0.8%
11.	Colombia	1.9	0.8%
12.	France	1.9	0.8%
13.	Haiti	1.7	0.7%
14.	Netherlands Antilles	1.7	0.7%
15.	United Kingdom	1.5	0.7%
16.	Panama	1.4	0.6%
17.	Chile	1.2	0.5%
18.	Netherlands	1.1	0.5%
19.	Costa Rica	0.8	0.4%
20.	Guatemala	0.5	0.2%
	Others	10.3	4.5%
	TOTAL	**227.4**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	920.0	1,340.0	1,714.6
Outgoing	185.7	211.7	227.4
Surplus (Deficit)	734.3	1,128.3	1,487.2
Total Volume	1,105.7	1,551.7	1,942.0

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Ecuador

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	United States	17.0	27.8%
2.	Colombia	16.0	26.2%
3.	United Kingdom	4.0	6.5%
4.	Peru	3.3	5.4%
5.	Spain	3.3	5.4%
6.	Chile	2.0	3.3%
7.	Venezuela	2.0	3.3%
8.	Brazil	1.9	3.1%
9.	Argentina	1.8	2.9%
10.	Mexico	1.6	2.6%
	Others	8.2	13.4%
	TOTAL	**61.1**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	n.a.	n.a.	n.a.
Outgoing	57.4	55.5	61.1
Surplus (Deficit)	n.a.	n.a.	n.a.
Total Volume	n.a.	n.a.	n.a.

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Egypt

LARGEST TELECOMMUNICATIONS ROUTES, 2000

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	Saudi Arabia	40.2	22.0%
2.	United States	14.1	7.7%
3.	United Arab Emirates	13.9	7.6%
4.	Italy	11.3	6.2%
5.	United Kingdom	11.1	6.0%
6.	Kuwait	10.3	5.6%
7.	Germany	9.8	5.4%
8.	France	7.3	4.0%
9.	Yemen	6.8	3.7%
10.	Lebanon	5.5	3.0%
11.	Jordan	4.2	2.3%
12.	Syria	3.2	1.7%
13.	Switzerland	3.1	1.7%
14.	Netherlands	2.6	1.4%
15.	Spain	2.5	1.4%
16.	Qatar	2.4	1.3%
17.	Libya	2.3	1.2%
18.	Morocco	2.1	1.1%
19.	Greece	2.0	1.1%
20.	Canada	1.9	1.1%
	Others	26.9	14.7%
	TOTAL	**183.1**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	554.6	620.6	n.a.
Outgoing	171.0	183.1	n.a.
Surplus (Deficit)	383.6	437.5	n.a.
Total Volume	725.6	803.7	n.a.

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic. 2001 traffic data are not available.

Eritrea

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (thousands)	Percent of Outgoing Traffic
1.	Italy	541.4	15.2%
2.	United States	436.9	12.2%
3.	Saudi Arabia	399.7	11.2%
4.	United Kingdom	199.5	5.6%
5.	Sudan	187.8	5.3%
6.	Germany	169.6	4.8%
7.	Kenya	146.5	4.1%
8.	Netherlands	106.7	3.0%
9.	Egypt	84.6	2.4%
10.	India	79.7	2.2%
11.	Sweden	70.2	2.0%
12.	Korea, Rep.	67.4	1.9%
13.	South Africa	59.1	1.7%
14.	Canada	48.1	1.3%
15.	Denmark	44.8	1.3%
16.	Switzerland	43.4	1.2%
17.	France	35.3	1.0%
18.	Norway	31.2	0.9%
19.	Uganda	20.1	0.6%
20.	Nigeria	19.8	0.6%
	Others	770.0	21.6%
	TOTAL	**3,568.8**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	13.8	17.9	22.7
Outgoing	2.5	2.9	3.6
Surplus (Deficit)	11.3	15.0	19.1
Total Volume	16.3	20.8	26.2

Note: National traffic data are in millions of minutes of outgoing public switched telecommunications traffic; route data are in thousands of minutes of outgoing public switched telecommunications traffic.

Estonia

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	Finland	21.9	29.4%
2.	Russia	14.0	18.7%
3.	Sweden	7.3	9.7%
4.	Latvia	4.6	6.2%
5.	Germany	4.5	6.0%
6.	Lithuania	3.1	4.1%
7.	United Kingdom	2.3	3.1%
8.	Norway	2.2	2.9%
9.	Ukraine	2.1	2.8%
10.	Denmark	1.8	2.5%
11.	United States	1.8	2.5%
12.	France	1.2	1.6%
13.	Italy	1.0	1.3%
14.	Netherlands	0.9	1.2%
15.	Belarus	0.9	1.2%
16.	Belgium	0.8	1.1%
17.	Poland	0.8	1.1%
18.	Spain	0.5	0.7%
19.	Austria	0.5	0.7%
20.	Canada	0.3	0.4%
	Others	2.1	2.8%
	TOTAL	**74.6**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	84.8	n.a.	91.9
Outgoing	74.6	75.5	74.6
Surplus (Deficit)	10.2	n.a.	17.3
Total Volume	159.4	n.a.	166.5

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Ethiopia

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (thousands)	Percent of Outgoing Traffic
1.	United States	1,529.6	11.4%
2.	Kenya	959.4	7.2%
3.	United Kingdom	916.2	6.8%
4.	Italy	802.5	6.0%
5.	Saudi Arabia	799.6	6.0%
6.	United Arab Emirates	566.0	4.2%
7.	Djibouti	539.9	4.0%
8.	Germany	507.7	3.8%
9.	France	409.7	3.1%
10.	South Africa	391.1	2.9%
11.	Switzerland	341.9	2.5%
12.	India	318.3	2.4%
13.	Netherlands	285.3	2.1%
14.	Sweden	204.1	1.5%
15.	Yemen	197.6	1.5%
16.	Egypt	178.4	1.3%
17.	Canada	171.2	1.3%
18.	Sudan	171.2	1.3%
19.	Belgium	127.1	0.9%
20.	Greece	119.2	0.9%
	Others	3,870.0	28.8%
	TOTAL	**13,415.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	46.5	51.2	43.3
Outgoing	12.5	13.4	13.4
Surplus (Deficit)	34.0	37.7	29.8
Total Volume	59.0	64.6	56.7

Note: National traffic data are in millions of minutes of outgoing public switched telecommunications traffic; route data are in thousands of minutes of outgoing public switched telecommunications traffic.

Finland

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	Sweden	155.0	32.0%
2.	Germany	44.0	9.1%
3.	United Kingdom	41.0	8.5%
4.	Estonia	32.0	6.6%
5.	Russia	29.0	6.0%
6.	Norway	21.0	4.3%
7.	United States	20.0	4.1%
	Others	143.0	29.5%
	TOTAL	**485.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	n.a.	n.a.	n.a.
Outgoing	423.9	468.0	485.0
Surplus (Deficit)	n.a.	n.a.	n.a.
Total Volume	n.a.	n.a.	n.a.

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

France

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	United Kingdom	680.0	8.9%
2.	Germany	650.0	8.5%
3.	Belgium	550.0	7.2%
4.	Italy	545.0	7.2%
5.	Morocco	520.0	6.8%
6.	United States	460.0	6.0%
7.	Switzerland	450.0	5.9%
8.	Spain	425.0	5.6%
9.	Algeria	350.0	4.6%
10.	Portugal	300.0	3.9%
11.	Tunisia	300.0	3.9%
12.	Netherlands	210.0	2.8%
13.	Canada	170.0	2.2%
14.	Turkey	120.0	1.6%
15.	Monaco	105.0	1.4%
16.	Poland	100.0	1.3%
17.	Luxembourg	80.0	1.1%
18.	Senegal	74.0	1.0%
19.	Sweden	55.0	0.7%
20.	Serbia & Montenegro	45.0	0.6%
	Others	1,416.0	18.6%
	TOTAL	**7,605.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	n.a.	n.a.	n.a.
Outgoing	5,165.0	6,500.0	7,605.0
Surplus (Deficit)	n.a.	n.a.	n.a.
Total Volume	n.a.	n.a.	n.a.

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Gabon

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	France	7.9	31.7%
2.	Senegal	2.2	8.9%
3.	Cameroon	1.8	7.3%
4.	Mali	1.8	7.1%
5.	Benin	1.6	6.3%
6.	Côte d'Ivoire	1.2	5.0%
7.	Togo	1.0	4.0%
8.	Lebanon	0.6	2.4%
9.	United States	0.6	2.2%
10.	Morocco	0.5	2.0%
11.	Congo, Rep.	0.5	1.9%
12.	United Kingdom	0.4	1.5%
13.	Mauritania	0.3	1.2%
14.	Burkina Faso	0.3	1.2%
15.	Belgium	0.3	1.2%
16.	Equatorial Guinea	0.3	1.1%
17.	Italy	0.3	1.0%
18.	South Africa	0.2	1.0%
19.	Germany	0.2	1.0%
20.	Canada	0.2	0.9%
	Others	2.8	11.0%
	TOTAL	**25.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	n.a.	n.a.	n.a.
Outgoing	18.6	22.0	25.0
Surplus (Deficit)	n.a.	n.a.	n.a.
Total Volume	n.a.	n.a.	n.a.

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Gambia

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (thousands)	Percent of Outgoing Traffic
1.	United Kingdom	2,174.0	30.6%
2.	Canada	1,406.2	19.8%
3.	United States	908.6	12.8%
4.	France	575.5	8.1%
5.	Germany	291.9	4.1%
6.	Sierra Leone	231.3	3.3%
7.	Mauritania	209.9	3.0%
8.	Nigeria	154.4	2.2%
9.	Spain	129.1	1.8%
10.	Senegal	81.7	1.2%
11.	Guinea	51.8	0.7%
12.	Netherlands	44.2	0.6%
13.	Sweden	41.8	0.6%
14.	Morocco	38.2	0.5%
15.	Saudi Arabia	37.5	0.5%
16.	Denmark	29.5	0.4%
17.	Norway	27.9	0.4%
18.	South Africa	27.4	0.4%
19.	Belgium	26.0	0.4%
20.	Hong Kong	26.0	0.4%
	Others	580.0	8.2%
	TOTAL	**7,100.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	n.a.	n.a.	n.a.
Outgoing	6.4	6.7	7.1
Surplus (Deficit)	n.a.	n.a.	n.a.
Total Volume	n.a.	n.a.	n.a.

Note: National traffic data are in millions of minutes of outgoing public switched telecommunications traffic; route data are in thousands of minutes of outgoing public switched telecommunications traffic.

Georgia

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (thousands)	Percent of Outgoing Traffic
1.	Russia	18,096.4	28.2%
2.	Azerbaijan	3,315.2	5.2%
3.	Ukraine	2,893.3	4.5%
4.	Armenia	2,355.8	3.7%
5.	Kazakhstan	452.9	0.7%
6.	Belarus	367.4	0.6%
7.	Uzbekistan	181.4	0.3%
8.	Turkmenistan	131.4	0.2%
9.	Moldova	99.2	0.2%
10.	Kyrgyzstan	39.6	0.1%
	Others	36,260.0	56.5%
	TOTAL	**64,200.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	65.7	37.6	n.a.
Outgoing	46.7	45.6	64.2
Surplus (Deficit)	19.0	(8.0)	n.a.
Total Volume	112.4	83.2	n.a.

Note: National traffic data are in millions of minutes of outgoing public switched telecommunications traffic; route data are in thousands of minutes of outgoing public switched telecommunications traffic. The "Others" category may include routes to non-members of the Commonwealth of Independent States that rank among the top destinations for outgoing traffic.

Germany

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	United Kingdom	750.0	7.3%
2.	France	720.0	7.0%
3.	Austria	675.0	6.5%
4.	United States	675.0	6.5%
5.	Italy	660.0	6.4%
6.	Poland	650.0	6.3%
7.	Switzerland	630.0	6.1%
8.	Turkey	580.0	5.6%
9.	Netherlands	540.0	5.2%
10.	Spain	380.0	3.7%
11.	Belgium	245.0	2.4%
12.	Greece	190.0	1.8%
13.	Denmark	180.0	1.7%
14.	Croatia	160.0	1.6%
15.	Czech Republic	160.0	1.6%
16.	Hungary	145.0	1.4%
17.	Serbia & Montenegro	145.0	1.4%
18.	Canada	125.0	1.2%
19.	Sweden	125.0	1.2%
20.	Portugal	95.0	0.9%
	Others	2,490.0	24.1%
	TOTAL	**10,320.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	n.a.	n.a.	n.a.
Outgoing	7,565.0	9,570.0	10,320.0
Surplus (Deficit)	n.a.	n.a.	n.a.
Total Volume	n.a.	n.a.	n.a.

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Ghana

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (thousands)	Percent of Outgoing Traffic
1.	United States	19,150.7	41.0%
2.	United Kingdom	6,786.2	14.5%
3.	Germany	3,886.3	8.3%
4.	France	2,800.4	6.0%
5.	Canada	2,587.3	5.5%
6.	Italy	1,527.5	3.3%
7.	Nigeria	1,385.2	3.0%
8.	Netherlands	1,044.0	2.2%
9.	Togo	754.6	1.6%
10.	South Africa	600.8	1.3%
11.	Burkina Faso	402.3	0.9%
12.	Belgium	281.7	0.6%
13.	Korea, Rep.	276.1	0.6%
14.	Senegal	121.3	0.3%
15.	Cameroon	87.8	0.2%
16.	Guinea	85.5	0.2%
17.	Malaysia	79.9	0.2%
18.	Japan	72.3	0.2%
19.	Denmark	55.1	0.1%
	Others	4,760.0	10.2%
	TOTAL	**46,747.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	118.4	166.4	139.3
Outgoing	30.1	42.1	46.7
Surplus (Deficit)	88.2	124.3	92.5
Total Volume	148.5	208.4	186.0

Note: National traffic data are in millions of minutes of outgoing public switched telecommunications traffic; route data are in thousands of minutes of outgoing public switched telecommunications traffic.

Greece

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	United Kingdom	160.0	15.7%
2.	Germany	130.0	12.7%
3.	Albania	80.0	7.8%
4.	Italy	75.0	7.4%
5.	United States	55.0	5.4%
6.	Cyprus	40.0	3.9%
7.	Bulgaria	37.0	3.6%
8.	France	36.0	3.5%
9.	Romania	30.0	2.9%
10.	Netherlands	21.0	2.1%
11.	Belgium	19.0	1.9%
12.	Switzerland	17.0	1.7%
13.	Russia	16.0	1.6%
14.	Ukraine	16.0	1.6%
15.	Turkey	14.5	1.4%
16.	Australia	14.0	1.4%
17.	Sweden	13.0	1.3%
18.	Poland	12.5	1.2%
19.	Canada	11.5	1.1%
20.	Serbia & Montenegro	11.5	1.1%
	Others	164.0	16.1%
	TOTAL	**1,020.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	794.2	889.8	891.0
Outgoing	725.7	793.2	1,020.0
Surplus (Deficit)	68.5	96.6	(129.0)
Total Volume	1,519.9	1,683.0	1,911.0

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Guatemala

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	United States	79.7	51.0%
2.	El Salvador	17.6	11.2%
3.	Mexico	12.5	8.0%
4.	Honduras	8.7	5.5%
5.	Costa Rica	5.7	3.7%
6.	Nicaragua	4.1	2.6%
7.	Colombia	2.9	1.9%
8.	Spain	2.9	1.8%
9.	France	2.5	1.6%
10.	Panama	2.1	1.3%
11.	Korea, Rep.	1.9	1.2%
12.	Italy	1.7	1.1%
13.	Canada	1.5	0.9%
14.	Germany	1.0	0.7%
15.	Peru	1.0	0.6%
16.	United Kingdom	0.7	0.5%
17.	Chile	0.6	0.4%
18.	Venezuela	0.6	0.4%
19.	Argentina	0.6	0.4%
20.	Cuba	0.5	0.4%
	Others	7.5	4.8%
	TOTAL	**156.2**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	208.6	295.9	536.8
Outgoing	83.3	125.9	156.2
Surplus (Deficit)	125.3	170.0	380.6
Total Volume	291.9	421.8	693.1

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Guyana

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (thousands)	Percent of Outgoing Traffic
1.	United States	10,256.0	52.9%
2.	Canada	2,702.0	13.9%
3.	Trinidad & Tobago	1,688.0	8.7%
4.	Barbados	1,288.0	6.6%
5.	United Kingdom	817.0	4.2%
6.	Antigua & Barbuda	455.0	2.3%
7.	Suriname	407.0	2.1%
8.	Jamaica	272.0	1.4%
9.	Germany	150.0	0.8%
10.	Brazil	149.0	0.8%
11.	Saint Kitts & Nevis	139.0	0.7%
12.	Saint Lucia	131.0	0.7%
13.	Netherlands	113.0	0.6%
14.	Netherlands Antilles	113.0	0.6%
15.	Grenada	99.0	0.5%
16.	China	94.0	0.5%
17.	Venezuela	89.0	0.5%
18.	Bahamas	68.0	0.4%
19.	Anguilla	42.0	0.2%
	Others	240.0	1.2%
	TOTAL	**19,400.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	101.0	52.3	69.6
Outgoing	16.1	15.0	19.4
Surplus (Deficit)	84.9	37.2	50.2
Total Volume	117.1	67.3	89.0

Note: National traffic data are in millions of minutes of outgoing public switched telecommunications traffic; route data are in thousands of minutes of outgoing public switched telecommunications traffic.

Hong Kong

LARGEST TELECOMMUNICATIONS ROUTES, FY 2001/02

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	China	1,668.2	47.8%
2.	United States	308.0	8.8%
3.	Philippines	307.3	8.8%
4.	Canada	204.3	5.9%
5.	United Kingdom	158.8	4.6%
6.	Australia	142.8	4.1%
7.	Taiwan	131.0	3.8%
8.	Singapore	86.9	2.5%
9.	Japan	85.6	2.5%
10.	Macau	47.0	1.3%
	Others	347.4	10.0%
	TOTAL	**3,487.3**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	FY 1999/00	FY 2000/01	FY 2001/02
Incoming	1,747.2	1,858.0	1,942.3
Outgoing	2,720.3	3,074.9	3,487.3
Surplus (Deficit)	(973.1)	(1,216.8)	(1,545.0)
Total Volume	4,467.5	4,932.9	5,429.6

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic. Fiscal year ends 31 March.

Hungary

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	Germany	74.6	22.8%
2.	Romania	53.9	16.5%
3.	Austria	28.3	8.6%
4.	Italy	16.7	5.1%
5.	United Kingdom	15.6	4.8%
6.	Serbia & Montenegro	14.6	4.5%
7.	United States	14.6	4.5%
8.	France	10.4	3.2%
9.	Slovak Republic	9.2	2.8%
10.	Switzerland	6.6	2.0%
11.	Netherlands	6.3	1.9%
12.	Croatia	6.1	1.9%
13.	Poland	6.1	1.9%
14.	Ukraine	5.8	1.8%
15.	Czech Republic	5.1	1.6%
16.	Belgium	4.3	1.3%
17.	Spain	3.9	1.2%
18.	Israel	3.4	1.0%
19.	Russia	3.3	1.0%
20.	Sweden	3.2	1.0%
	Others	34.9	10.7%
	TOTAL	**326.8**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	n.a.	n.a.	n.a.
Outgoing	343.9	349.2	326.8
Surplus (Deficit)	n.a.	n.a.	n.a.
Total Volume	n.a.	n.a.	n.a.

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

India

LARGEST TELECOMMUNICATIONS ROUTES, FY 2001/02

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	Saudi Arabia	89.5	15.3%
2.	United States	89.0	15.2%
3.	United Arab Emirates	54.6	9.3%
4.	United Kingdom	54.3	9.3%
5.	Singapore	26.1	4.4%
6.	Kuwait	20.9	3.6%
7.	Oman	15.5	2.6%
8.	Germany	14.3	2.4%
9.	Canada	11.3	1.9%
10.	Australia	11.0	1.9%
11.	Hong Kong	10.6	1.8%
12.	Malaysia	10.3	1.8%
13.	Sri Lanka	9.7	1.6%
14.	France	8.7	1.5%
15.	Qatar	8.7	1.5%
16.	Italy	8.2	1.4%
17.	Japan	7.8	1.3%
18.	Pakistan	7.4	1.3%
19.	Bangladesh	6.4	1.1%
20.	Bahrain	6.2	1.1%
	Others	115.9	19.8%
	TOTAL	**586.4**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	FY 1999/00	FY 2000/01	FY 2001/02
Incoming	1,772.5	2,161.4	2,533.6
Outgoing	473.3	527.1	586.4
Surplus (Deficit)	1,299.2	1,634.3	1,947.2
Total Volume	2,245.8	2,688.5	3,120.0

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic. Fiscal year ends 31 March. Data exclude some cross-border traffic with Bangladesh, Nepal, and Pakistan.

Indonesia

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	Singapore	71.8	22.7%
2.	Malaysia	49.4	15.6%
3.	Australia	24.9	7.9%
4.	Japan	20.3	6.4%
5.	United States	18.0	5.7%
6.	Taiwan	13.2	4.2%
7.	Hong Kong	10.9	3.4%
8.	Korea, Rep.	9.0	2.9%
9.	China	7.9	2.5%
10.	United Kingdom	7.8	2.5%
11.	Thailand	6.5	2.1%
12.	Philippines	6.0	1.9%
13.	Germany	5.1	1.6%
14.	Netherlands	5.1	1.6%
15.	India	4.9	1.6%
16.	Brunei	3.4	1.1%
17.	France	3.3	1.0%
18.	Italy	2.3	0.7%
19.	Canada	1.9	0.6%
20.	New Zealand	1.3	0.4%
	Others	43.3	13.7%
	TOTAL	**316.2**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	n.a.	345.8	365.9
Outgoing	269.6	315.5	316.2
Surplus (Deficit)	n.a.	30.3	49.6
Total Volume	n.a.	661.3	682.1

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Iran

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	United Arab Emirates	32.4	18.1%
2.	United States	22.4	12.5%
3.	Pakistan	14.1	7.9%
4.	United Kingdom	13.6	7.6%
5.	Germany	10.9	6.1%
6.	Turkey	5.8	3.2%
7.	Saudi Arabia	5.0	2.8%
8.	Azerbaijan	4.9	2.7%
9.	Kuwait	4.5	2.5%
10.	Italy	4.5	2.5%
11.	Sweden	3.6	2.0%
12.	France	3.3	1.8%
13.	India	3.2	1.8%
14.	Japan	3.0	1.7%
15.	Switzerland	2.6	1.4%
16.	Qatar	2.5	1.4%
17.	Netherlands	2.5	1.4%
18.	Canada	2.3	1.3%
19.	Austria	2.1	1.2%
20.	Bahrain	2.0	1.1%
	Others	33.8	18.9%
	TOTAL	**179.1**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	191.5	216.8	173.1
Outgoing	156.1	176.8	179.1
Surplus (Deficit)	35.4	40.0	(6.0)
Total Volume	347.6	393.6	352.2

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Ireland

LARGEST TELECOMMUNICATIONS ROUTES, FY 2001/02

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	United Kingdom	865.0	56.4%
2.	United States	165.0	10.7%
3.	Germany	47.0	3.1%
4.	France	45.0	2.9%
5.	Spain	31.0	2.0%
6.	Netherlands	30.0	2.0%
7.	Canada	25.0	1.6%
8.	Australia	21.0	1.4%
9.	Italy	21.0	1.4%
10.	Belgium	12.0	0.8%
11.	Sweden	10.0	0.7%
12.	Denmark	6.0	0.4%
13.	Finland	6.0	0.4%
14.	Romania	6.0	0.4%
15.	Switzerland	6.0	0.4%
16.	Poland	5.0	0.3%
17.	Austria	4.0	0.3%
18.	Portugal	4.0	0.3%
19.	South Africa	4.0	0.3%
20.	Norway	3.0	0.2%
	Others	219.0	14.3%
	TOTAL	**1,535.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	FY 1999/00	FY 2000/01	FY 2001/02
Incoming	n.a.	n.a.	n.a.
Outgoing	1,015.0	1,250.0	1,535.0
Surplus (Deficit)	n.a.	n.a.	n.a.
Total Volume	n.a.	n.a.	n.a.

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic. Fiscal year ends 31 March. Data exclude at least 100 million minutes of cross-border traffic to Northern Ireland.

Israel

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	United States	260.0	23.2%
2.	United Kingdom	75.0	6.7%
3.	Canada	64.0	5.7%
4.	France	53.0	4.7%
5.	Germany	53.0	4.7%
6.	Italy	37.0	3.3%
7.	Russia	32.0	2.9%
8.	Ukraine	27.0	2.4%
9.	Netherlands	21.0	1.9%
	Others	498.0	44.5%
	TOTAL	**1,120.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	539.6	661.0	728.0
Outgoing	803.7	1,022.4	1,120.0
Surplus (Deficit)	(264.1)	(361.4)	(392.0)
Total Volume	1,343.3	1,683.4	1,848.0

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Italy

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	Germany	580.0	12.1%
2.	France	460.0	9.6%
3.	United Kingdom	380.0	7.9%
4.	United States	325.0	6.8%
5.	Switzerland	300.0	6.2%
6.	Romania	240.0	5.0%
7.	Spain	195.0	4.1%
8.	Morocco	180.0	3.7%
9.	Albania	140.0	2.9%
10.	Austria	115.0	2.4%
11.	Belgium	100.0	2.1%
12.	Poland	100.0	2.1%
13.	Greece	90.0	1.9%
14.	Netherlands	85.0	1.8%
15.	Serbia & Montenegro	78.0	1.6%
16.	Croatia	75.0	1.6%
17.	Tunisia	75.0	1.6%
18.	Ukraine	70.0	1.5%
19.	Egypt	67.0	1.4%
20.	Canada	55.0	1.1%
	Others	1,095.0	22.8%
	TOTAL	**4,805.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	n.a.	n.a.	n.a.
Outgoing	3,250.0	4,160.0	4,805.0
Surplus (Deficit)	n.a.	n.a.	n.a.
Total Volume	n.a.	n.a.	n.a.

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Jamaica

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	United States	63.4	66.3%
2.	United Kingdom	13.6	14.2%
3.	Cayman Islands	3.1	3.3%
4.	Canada	2.4	2.5%
5.	Bahamas	2.1	2.2%
6.	Trinidad & Tobago	1.8	1.9%
7.	Barbados	1.2	1.3%
8.	Germany	0.5	0.6%
9.	Antigua & Barbuda	0.5	0.5%
10.	India	0.4	0.4%
11.	Dominican Republic	0.3	0.4%
12.	Bermuda	0.3	0.3%
13.	Guyana	0.3	0.3%
14.	Saint Lucia	0.3	0.3%
15.	Colombia	0.3	0.3%
16.	Panama	0.2	0.2%
17.	Mexico	0.2	0.2%
18.	China	0.2	0.2%
	Others	4.0	4.2%
	TOTAL	**95.6**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	347.4	328.5	413.8
Outgoing	64.4	73.9	95.6
Surplus (Deficit)	283.0	254.6	318.2
Total Volume	411.8	402.3	509.4

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Japan

LARGEST TELECOMMUNICATIONS ROUTES, FY 2001/02

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	United States	515.0	18.7%
2.	China	385.0	14.0%
3.	Philippines	345.0	12.5%
4.	Korea, Rep.	210.0	7.6%
5.	Brazil	190.0	6.9%
6.	Taiwan	135.0	4.9%
7.	Thailand	100.0	3.6%
8.	United Kingdom	85.0	3.1%
9.	Hong Kong	80.0	2.9%
10.	Singapore	60.0	2.2%
11.	Australia	58.0	2.1%
12.	Indonesia	52.0	1.9%
13.	Seychelles	48.0	1.7%
14.	Germany	42.0	1.5%
15.	Malaysia	38.0	1.4%
16.	Canada	36.0	1.3%
17.	France	36.0	1.3%
18.	Peru	30.0	1.1%
19.	Russia	21.0	0.8%
20.	Vietnam	21.0	0.8%
	Others	263.0	9.6%
	TOTAL	**2,750.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	FY 1999/00	FY 2000/01	FY 2001/02
Incoming	1,929.6	n.a.	n.a.
Outgoing	2,050.0	2,575.0	2,750.0
Surplus (Deficit)	(120.4)	n.a.	n.a.
Total Volume	3,979.6	n.a.	n.a.

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic. Fiscal year ends 31 March.

Jordan

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	Saudi Arabia	27.6	14.9%
2.	Egypt	24.3	13.1%
3.	United Arab Emirates	15.0	8.1%
4.	Palestinian Territory	15.0	8.1%
5.	Syria	12.9	7.0%
6.	Iraq	12.7	6.9%
7.	United States	10.6	5.7%
8.	Israel	8.7	4.7%
9.	Kuwait	7.1	3.8%
10.	Lebanon	6.0	3.3%
11.	United Kingdom	4.1	2.2%
12.	Qatar	3.8	2.0%
13.	Bahrain	3.3	1.8%
14.	Germany	3.1	1.7%
15.	Yemen	1.8	0.9%
16.	France	1.7	0.9%
17.	Oman	1.7	0.9%
18.	Italy	1.7	0.9%
19.	Canada	1.5	0.8%
20.	Sudan	1.3	0.7%
	Others	21.6	11.6%
	TOTAL	**185.3**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	191.5	214.1	217.0
Outgoing	145.6	170.6	185.3
Surplus (Deficit)	45.9	43.5	31.7
Total Volume	337.2	384.7	402.3

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Kazakhstan

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (thousands)	Percent of Outgoing Traffic
1.	Russia	49,800.0	42.0%
2.	Uzbekistan	18,100.0	15.3%
3.	Kyrgyzstan	9,000.0	7.6%
4.	Ukraine	4,100.0	3.5%
5.	Tajikistan	3,900.0	3.3%
6.	Germany	3,196.0	2.7%
7.	Turkmenistan	2,700.0	2.3%
8.	Belarus	1,500.0	1.3%
9.	Azerbaijan	1,100.0	0.9%
10.	Armenia	800.0	0.7%
11.	Georgia	600.0	0.5%
12.	China	440.0	0.4%
13.	France	310.0	0.3%
14.	Moldova	300.0	0.3%
15.	India	180.0	0.2%
	Others	22,550.0	19.0%
	TOTAL	**118,577.3**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	149.8	183.1	206.9
Outgoing	104.5	105.4	118.6
Surplus (Deficit)	45.3	77.8	88.4
Total Volume	254.3	288.5	325.5

Note: National traffic data are in millions of minutes of outgoing public switched telecommunications traffic; route data are in thousands of minutes of outgoing public switched telecommunications traffic.

Kenya

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	United Kingdom	5.5	22.8%
2.	United States	3.6	14.8%
3.	India	1.9	8.0%
4.	South Africa	1.3	5.5%
5.	Germany	0.9	3.6%
6.	Italy	0.8	3.3%
7.	France	0.7	2.9%
8.	United Arab Emirates	0.7	2.8%
9.	Ethiopia	0.7	2.8%
10.	Canada	0.5	2.2%
11.	Switzerland	0.5	2.2%
12.	Somalia	0.5	2.0%
13.	Netherlands	0.5	2.0%
14.	Belgium	0.3	1.3%
15.	Australia	0.3	1.2%
16.	Japan	0.3	1.2%
17.	Egypt	0.3	1.2%
18.	Zimbabwe	0.3	1.2%
19.	Pakistan	0.3	1.2%
20.	Rwanda	0.3	1.1%
	Others	4.1	16.8%
	TOTAL	**24.2**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	n.a.	57.2	n.a.
Outgoing	25.0	21.0	24.2
Surplus (Deficit)	n.a.	36.2	n.a.
Total Volume	n.a.	78.2	n.a.

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Korea, Rep.

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	United States	270.0	24.1%
2.	Japan	195.0	17.4%
3.	China	193.0	17.2%
4.	Philippines	39.1	3.5%
5.	Canada	30.0	2.7%
6.	Indonesia	25.8	2.3%
7.	Australia	23.9	2.1%
8.	Hong Kong	22.9	2.0%
9.	Vietnam	21.5	1.9%
10.	United Kingdom	17.3	1.5%
11.	Germany	15.4	1.4%
12.	Taiwan	15.2	1.4%
13.	Singapore	14.2	1.3%
14.	Thailand	13.9	1.2%
15.	Russia	10.6	0.9%
16.	Mongolia	8.6	0.8%
17.	New Zealand	7.5	0.7%
18.	Italy	7.5	0.7%
19.	Pakistan	7.1	0.6%
20.	Bangladesh	7.0	0.6%
	Others	174.6	15.6%
	TOTAL	**1,120.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	n.a.	n.a.	n.a.
Outgoing	898.0	1,063.0	1,120.0
Surplus (Deficit)	n.a.	n.a.	n.a.
Total Volume	n.a.	n.a.	n.a.

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Kyrgyzstan

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (thousands)	Percent of Outgoing Traffic
1.	Russia	11,247.0	47.9%
2.	Kazakhstan	6,357.0	27.1%
3.	Uzbekistan	2,416.0	10.3%
4.	Tajikistan	703.0	3.0%
5.	Turkey	483.0	2.1%
6.	Ukraine	465.0	2.0%
7.	Belarus	201.0	0.9%
8.	Germany	199.0	0.8%
9.	Azerbaijan	167.0	0.7%
10.	Turkmenistan	137.0	0.6%
11.	United Kingdom	101.0	0.4%
12.	China	97.0	0.4%
13.	United Arab Emirates	50.0	0.2%
14.	France	38.0	0.2%
15.	India	38.0	0.2%
16.	Iran	26.0	0.1%
17.	Korea, Rep.	19.0	0.1%
18.	Pakistan	14.0	0.1%
19.	Belgium	13.0	0.1%
20.	Japan	12.0	0.1%
	Others	710.0	3.0%
	TOTAL	**23,496.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	n.a.	36.4	42.3
Outgoing	23.5	23.1	23.5
Surplus (Deficit)	n.a.	13.3	18.8
Total Volume	n.a.	59.5	65.8

Note: National traffic data are in millions of minutes of outgoing public switched telecommunications traffic; route data are in thousands of minutes of outgoing public switched telecommunications traffic.

Latvia

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	Russia	14.5	22.4%
2.	Lithuania	7.8	12.1%
3.	Estonia	5.7	8.8%
4.	Germany	4.4	6.8%
5.	Ukraine	2.9	4.5%
6.	Belarus	2.7	4.1%
7.	Sweden	2.3	3.6%
8.	Finland	2.0	3.1%
9.	Denmark	1.7	2.6%
10.	United Kingdom	1.6	2.5%
11.	Poland	1.4	2.2%
12.	France	0.9	1.4%
13.	Italy	0.9	1.4%
14.	Netherlands	0.8	1.2%
15.	Norway	0.8	1.2%
16.	United States	0.8	1.2%
17.	Ireland	0.7	1.1%
18.	Switzerland	0.6	0.9%
19.	Austria	0.4	0.6%
20.	Czech Republic	0.3	0.5%
	Others	11.5	17.8%
	TOTAL	**64.7**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	90.0	90.1	105.3
Outgoing	55.6	54.8	64.7
Surplus (Deficit)	34.4	35.3	40.6
Total Volume	145.6	144.9	170.0

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Lesotho

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (thousands)	Percent of Outgoing Traffic
1.	South Africa	18,804.9	87.6%
2.	Botswana	212.0	1.0%
3.	United States	175.1	0.8%
4.	United Kingdom	167.6	0.8%
5.	China	152.7	0.7%
6.	Swaziland	134.5	0.6%
7.	Zimbabwe	114.7	0.5%
8.	Taiwan	90.3	0.4%
9.	Germany	73.9	0.3%
10.	India	56.6	0.3%
11.	Namibia	36.6	0.2%
12.	Italy	30.7	0.1%
13.	Malawi	30.7	0.1%
14.	Kenya	27.6	0.1%
15.	Switzerland	25.2	0.1%
16.	Nigeria	24.9	0.1%
17.	Ireland	23.6	0.1%
18.	Mozambique	22.2	0.1%
19.	Zambia	22.0	0.1%
20.	Uganda	20.8	0.1%
	Others	1,220.0	5.7%
	TOTAL	**21,474.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	n.a.	n.a.	n.a.
Outgoing	35.8	21.6	21.5
Surplus (Deficit)	n.a.	n.a.	n.a.
Total Volume	n.a.	n.a.	n.a.

Note: National traffic data are in millions of minutes of outgoing public switched telecommunications traffic; route data are in thousands of minutes of outgoing public switched telecommunications traffic.

Lithuania

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	Russia	10.8	18.6%
2.	Latvia	6.6	11.4%
3.	Germany	5.0	8.5%
4.	Belarus	4.8	8.2%
5.	Poland	4.3	7.4%
6.	Estonia	2.6	4.6%
7.	Ukraine	2.3	4.0%
8.	United Kingdom	2.1	3.6%
9.	Denmark	1.5	2.6%
10.	United States	1.4	2.5%
11.	Finland	1.4	2.3%
12.	Sweden	1.2	2.0%
13.	Italy	0.9	1.6%
14.	Netherlands	0.9	1.5%
15.	France	0.7	1.2%
16.	Spain	0.7	1.2%
17.	Norway	0.5	0.9%
18.	Czech Republic	0.4	0.7%
19.	Belgium	0.4	0.7%
20.	Austria	0.3	0.5%
	Others	9.3	16.0%
	TOTAL	**58.1**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	n.a.	n.a.	n.a.
Outgoing	52.0	54.6	58.1
Surplus (Deficit)	n.a.	n.a.	n.a.
Total Volume	n.a.	n.a.	n.a.

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Luxembourg

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	France	95.0	24.1%
2.	Belgium	88.0	22.3%
3.	Germany	88.0	22.3%
4.	Portugal	24.0	6.1%
5.	United Kingdom	20.0	5.1%
6.	Italy	19.0	4.8%
7.	Netherlands	14.0	3.5%
8.	Switzerland	11.0	2.8%
9.	United States	7.0	1.8%
10.	Spain	6.0	1.5%
	Others	22.6	5.7%
	TOTAL	**394.6**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	n.a.	n.a.	n.a.
Outgoing	319.1	381.0	394.6
Surplus (Deficit)	n.a.	n.a.	n.a.
Total Volume	n.a.	n.a.	n.a.

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Macau

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	China	62.5	39.9%
2.	Hong Kong	57.0	36.4%
3.	Taiwan	9.8	6.2%
4.	United States	6.0	3.8%
5.	Philippines	3.2	2.1%
6.	United Kingdom	3.1	2.0%
7.	Canada	3.1	2.0%
8.	Portugal	2.8	1.8%
9.	Australia	2.4	1.6%
10.	Thailand	1.2	0.8%
11.	Singapore	0.7	0.5%
12.	Japan	0.5	0.3%
13.	Korea, Rep.	0.5	0.3%
14.	Vietnam	0.5	0.3%
15.	Malaysia	0.4	0.3%
16.	France	0.3	0.2%
17.	Nepal	0.2	0.2%
18.	New Zealand	0.2	0.1%
19.	Indonesia	0.2	0.1%
20.	Cambodia	0.2	0.1%
	Others	1.6	1.0%
	TOTAL	**156.5**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	97.7	103.2	111.9
Outgoing	132.8	152.1	156.5
Surplus (Deficit)	(35.1)	(48.9)	(44.6)
Total Volume	230.5	255.2	268.4

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Macedonia

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	Serbia & Montenegro	17.1	25.9%
2.	Germany	6.6	10.0%
3.	Greece	5.6	8.4%
4.	Bulgaria	4.8	7.2%
5.	Switzerland	3.8	5.7%
6.	Italy	3.6	5.4%
7.	Turkey	2.6	4.0%
8.	Croatia	2.3	3.4%
9.	Slovenia	2.1	3.2%
10.	United Kingdom	2.0	2.9%
11.	United States	1.9	2.8%
12.	Austria	1.7	2.6%
13.	Monaco	1.2	1.8%
14.	France	1.2	1.8%
15.	Albania	1.1	1.7%
16.	Bosnia-Herzegovina	1.1	1.7%
17.	Netherlands	0.8	1.2%
18.	Belgium	0.7	1.0%
19.	Australia	0.7	1.0%
20.	Hungary	0.6	0.9%
	Others	4.8	7.2%
	TOTAL	**66.3**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	152.5	166.4	197.2
Outgoing	82.3	73.2	66.3
Surplus (Deficit)	70.3	93.2	131.0
Total Volume	234.8	239.6	263.5

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic. Traffic from Serbia & Montenegro is for the period August 2001-December 2001

Malaysia

LARGEST TELECOMMUNICATIONS ROUTES, FY 2001/02

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	Singapore	422.0	49.9%
2.	Indonesia	99.0	11.7%
3.	Thailand	38.0	4.5%
4.	Australia	31.0	3.7%
5.	United States	28.0	3.3%
6.	Japan	26.0	3.1%
7.	India	25.0	3.0%
8.	United Kingdom	24.0	2.8%
9.	Taiwan	22.0	2.6%
10.	Hong Kong	21.0	2.5%
11.	China	16.0	1.9%
12.	Philippines	12.0	1.4%
13.	Bangladesh	9.0	1.1%
14.	Myanmar	3.9	0.5%
15.	Germany	3.1	0.4%
16.	Brunei	3.0	0.4%
17.	Canada	2.5	0.3%
18.	Korea, Rep.	2.0	0.2%
19.	Saudi Arabia	1.4	0.2%
20.	France	1.1	0.1%
	Others	55.0	6.5%
	TOTAL	**845.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	FY 1999/00	FY 2000/01	FY 2001/02
Incoming	n.a.	765.0	810.0
Outgoing	690.0	840.0	845.0
Surplus (Deficit)	n.a.	(75.0)	(35.0)
Total Volume	n.a.	1,605.0	1,655.0

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic. Fiscal year ends 31 March.

Malta

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	United Kingdom	14.0	30.7%
2.	Italy	7.1	15.5%
3.	Germany	3.7	8.0%
4.	France	2.0	4.5%
5.	Libya	1.8	4.0%
6.	United States	1.5	3.3%
7.	Netherlands	1.3	2.9%
8.	Australia	1.3	2.8%
9.	Switzerland	1.0	2.3%
10.	Belgium	0.8	1.7%
11.	Sweden	0.8	1.7%
12.	Spain	0.7	1.6%
13.	Austria	0.6	1.4%
14.	Ireland	0.5	1.2%
15.	Canada	0.5	1.2%
16.	Tunisia	0.5	1.1%
17.	Greece	0.4	0.9%
18.	Turkey	0.4	0.9%
19.	Norway	0.4	0.9%
20.	Serbia & Montenegro	0.3	0.8%
	Others	5.8	12.8%
	TOTAL	**45.6**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	50.2	56.5	65.5
Outgoing	39.0	43.0	45.6
Surplus (Deficit)	11.2	13.4	19.9
Total Volume	89.2	99.5	111.0

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Mauritius

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	France	7.2	20.2%
2.	United Kingdom	5.4	15.1%
3.	Reunion	3.7	10.3%
4.	South Africa	3.0	8.5%
5.	India	2.6	7.3%
6.	Italy	1.3	3.5%
7.	Australia	1.1	3.0%
8.	Germany	1.0	2.7%
9.	Madagascar	0.9	2.6%
10.	China	0.8	2.3%
11.	Switzerland	0.7	2.0%
12.	United States	0.6	1.6%
13.	Seychelles	0.6	1.6%
14.	Singapore	0.5	1.5%
15.	Hong Kong	0.5	1.5%
16.	Belgium	0.5	1.4%
17.	Canada	0.3	0.9%
18.	Spain	0.3	0.7%
19.	Malaysia	0.2	0.6%
20.	Taiwan	0.2	0.6%
	Others	4.3	12.2%
	TOTAL	**35.6**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	FY 1999/00	FY 2000/01	2001
Incoming	43.3	49.0	56.2
Outgoing	31.4	35.1	35.6
Surplus (Deficit)	11.9	13.9	20.6
Total Volume	74.7	84.0	91.8

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Mexico

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	United States	1,723.4	82.8%
2.	Canada	21.6	1.0%
3.	Spain	19.1	0.9%
4.	Guatemala	13.3	0.6%
5.	Cuba	13.2	0.6%
6.	Argentina	10.6	0.5%
7.	Colombia	10.1	0.5%
8.	France	9.8	0.5%
9.	United Kingdom	8.7	0.4%
10.	Germany	7.7	0.4%
	Others	244.5	11.7%
	TOTAL	**2,082.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	4,007.5	5,896.0	5,100.0
Outgoing	1,563.0	1,981.0	2,082.0
Surplus (Deficit)	2,444.5	3,915.0	3,018.0
Total Volume	5,570.5	7,877.0	7,182.0

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Micronesia

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (thousands)	Percent of Outgoing Traffic
1.	United States	1,294.0	53.9%
2.	Philippines	398.4	16.6%
3.	China	186.4	7.8%
4.	Japan	125.5	5.2%
5.	Australia	49.7	2.1%
6.	Marshall Islands	39.7	1.7%
7.	Fiji	31.4	1.3%
8.	Taiwan	25.7	1.1%
9.	Indonesia	15.7	0.7%
10.	New Zealand	10.5	0.4%
	Others	220.0	9.2%
	TOTAL	**2,400.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	n.a.	n.a.	n.a.
Outgoing	1.8	1.9	2.4
Surplus (Deficit)	n.a.	n.a.	n.a.
Total Volume	n.a.	n.a.	n.a.

Note: National traffic data are in millions of minutes of outgoing public switched telecommunications traffic; route data are in thousands of minutes of outgoing public switched telecommunications traffic.

Moldova

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	Russia	16.5	31.5%
2.	Ukraine	10.5	20.1%
3.	Romania	7.5	14.4%
4.	Italy	3.5	6.7%
5.	Germany	2.1	3.9%
6.	Turkey	1.8	3.5%
7.	Belarus	1.4	2.6%
8.	Portugal	1.4	2.6%
9.	Greece	0.8	1.6%
10.	France	0.7	1.3%
11.	Israel	0.5	1.0%
12.	United States	0.5	0.9%
13.	Poland	0.5	0.9%
14.	Bulgaria	0.4	0.8%
15.	Spain	0.4	0.8%
16.	Czech Republic	0.4	0.8%
17.	United Kingdom	0.4	0.7%
18.	Hungary	0.3	0.6%
19.	Belgium	0.3	0.5%
20.	Cyprus	0.3	0.5%
	Others	2.2	4.2%
	TOTAL	**52.3**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	101.1	120.8	161.8
Outgoing	49.0	50.8	52.3
Surplus (Deficit)	52.1	70.1	109.6
Total Volume	150.1	171.6	214.1

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Mongolia

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (thousands)	Percent of Outgoing Traffic
1.	Russia	750.8	21.6%
2.	China	688.8	19.9%
3.	Korea, Rep.	380.6	11.0%
4.	Japan	325.9	9.4%
5.	Germany	258.3	7.4%
6.	United States	245.5	7.1%
7.	United Kingdom	102.2	2.9%
8.	Hong Kong	65.5	1.9%
9.	Singapore	38.8	1.1%
10.	Ukraine	38.5	1.1%
11.	Kazakhstan	37.6	1.1%
12.	Switzerland	33.6	1.0%
13.	Czech Republic	32.7	0.9%
14.	Australia	32.4	0.9%
15.	France	27.4	0.8%
16.	Italy	18.1	0.5%
17.	Hungary	17.6	0.5%
18.	Philippines	17.4	0.5%
19.	Canada	16.2	0.5%
	Others	340.0	9.8%
	TOTAL	**3,469.1**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	18.1	n.a.	n.a.
Outgoing	n.a.	3.1	3.5
Surplus (Deficit)	n.a.	n.a.	n.a.
Total Volume	n.a.	n.a.	n.a.

Note: National traffic data are in millions of minutes of outgoing public switched telecommunications traffic; route data are in thousands of minutes of outgoing public switched telecommunications traffic.

Morocco

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	France	110.0	40.8%
2.	Spain	24.0	8.9%
3.	United Kingdom	21.0	7.8%
4.	Italy	20.0	7.4%
5.	Belgium	11.0	4.1%
6.	Germany	11.0	4.1%
7.	United States	11.0	4.1%
8.	Netherlands	10.0	3.7%
9.	Saudi Arabia	10.0	3.7%
10.	Canada	5.5	2.0%
	Others	36.0	13.4%
	TOTAL	**269.5**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	n.a.	n.a.	n.a.
Outgoing	219.5	245.0	269.5
Surplus (Deficit)	n.a.	n.a.	n.a.
Total Volume	n.a.	n.a.	n.a.

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Myanmar

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (thousands)	Percent of Outgoing Traffic
1.	Thailand	2,394.4	23.6%
2.	Singapore	1,923.0	19.0%
3.	China	886.7	8.8%
4.	Malaysia	728.9	7.2%
5.	Japan	684.5	6.8%
6.	Taiwan	500.3	4.9%
7.	Hong Kong	410.2	4.0%
8.	India	388.4	3.8%
9.	Korea, Rep.	354.8	3.5%
10.	United States	291.0	2.9%
11.	United Kingdom	201.7	2.0%
12.	Indonesia	140.3	1.4%
13.	Australia	132.3	1.3%
14.	Bangladesh	95.6	0.9%
15.	France	88.0	0.9%
16.	Philippines	74.1	0.7%
17.	Germany	69.0	0.7%
18.	Pakistan	58.8	0.6%
19.	Vietnam	55.7	0.6%
20.	Cambodia	39.8	0.4%
	Others	610.0	6.0%
	TOTAL	**10,130.5**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	29.8	37.0	55.1
Outgoing	17.4	11.4	10.1
Surplus (Deficit)	12.4	25.6	44.9
Total Volume	47.2	48.4	65.2

Note: National traffic data are in millions of minutes of outgoing public switched telecommunications traffic; route data are in thousands of minutes of outgoing public switched telecommunications traffic.

Namibia

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (thousands)	Percent of Outgoing Traffic
1.	South Africa	49,600.0	76.5%
2.	Germany	1,700.0	2.6%
3.	Botswana	800.0	1.2%
4.	United Kingdom	800.0	1.2%
5.	Zimbabwe	800.0	1.2%
6.	United States	600.0	0.9%
7.	Angola	500.0	0.8%
8.	Spain	400.0	0.6%
9.	Zambia	400.0	0.6%
10.	France	200.0	0.3%
11.	Portugal	180.0	0.3%
12.	China	170.0	0.3%
13.	Italy	170.0	0.3%
14.	Russia	150.0	0.2%
15.	Switzerland	150.0	0.2%
16.	Netherlands	140.0	0.2%
17.	Austria	130.0	0.2%
18.	Australia	120.0	0.2%
19.	Mozambique	100.0	0.2%
20.	Nigeria	100.0	0.2%
	Others	7,630.0	11.8%
	TOTAL	**64,846.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	51.2	50.7	46.2
Outgoing	61.2	60.2	64.8
Surplus (Deficit)	(10.0)	(9.5)	(18.7)
Total Volume	112.4	110.8	111.0

Note: National traffic data are in millions of minutes of outgoing public switched telecommunications traffic; route data are in thousands of minutes of outgoing public switched telecommunications traffic.

Netherlands

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	Germany	540.0	16.7%
2.	Belgium	440.0	13.6%
3.	United Kingdom	340.0	10.5%
4.	United States	215.0	6.7%
5.	France	210.0	6.5%
6.	Italy	90.0	2.8%
7.	Spain	85.0	2.6%
8.	Switzerland	85.0	2.6%
9.	Turkey	70.0	2.2%
10.	Poland	60.0	1.9%
11.	Canada	55.0	1.7%
12.	Morocco	41.0	1.3%
13.	Sweden	40.0	1.2%
14.	Portugal	36.0	1.1%
15.	Denmark	34.0	1.1%
16.	Australia	33.0	1.0%
17.	Austria	32.0	1.0%
18.	Greece	30.0	0.9%
19.	Ireland	25.0	0.8%
20.	Suriname	25.0	0.8%
	Others	739.0	22.9%
	TOTAL	**3,225.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	n.a.	n.a.	n.a.
Outgoing	2,380.0	2,830.0	3,225.0
Surplus (Deficit)	n.a.	n.a.	n.a.
Total Volume	n.a.	n.a.	n.a.

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

New Zealand

LARGEST TELECOMMUNICATIONS ROUTES, FY 2001/02

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	Australia	430.0	44.6%
2.	United Kingdom	150.0	15.5%
3.	United States	115.0	11.9%
4.	Canada	48.0	5.0%
5.	Philippines	25.0	2.6%
6.	Hong Kong	16.0	1.7%
7.	South Africa	15.0	1.6%
8.	Japan	12.0	1.2%
9.	Malaysia	12.0	1.2%
10.	Singapore	12.0	1.2%
11.	Fiji	10.0	1.0%
12.	China	9.0	0.9%
13.	India	9.0	0.9%
14.	Samoa	7.0	0.7%
	Others	95.0	9.8%
	TOTAL	**965.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	FY 1999/00	FY 2000/01	FY 2001/02
Incoming	n.a.	n.a.	n.a.
Outgoing	815.0	950.0	965.0
Surplus (Deficit)	n.a.	n.a.	n.a.
Total Volume	n.a.	n.a.	n.a.

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic. Fiscal year ends 30 June.

Niger

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (thousands)	Percent of Outgoing Traffic
1.	France	1,218.5	18.2%
2.	Benin	745.4	11.1%
3.	Côte d'Ivoire	694.3	10.4%
4.	Togo	577.4	8.6%
5.	Burkina Faso	502.6	7.5%
6.	Senegal	305.1	4.6%
7.	Nigeria	304.4	4.5%
8.	United States	285.0	4.3%
9.	Mali	201.2	3.0%
10.	Belgium	163.5	2.4%
11.	Morocco	123.3	1.8%
12.	Saudi Arabia	113.2	1.7%
13.	Algeria	95.3	1.4%
14.	Germany	94.1	1.4%
15.	Ghana	77.8	1.2%
16.	Cameroon	67.3	1.0%
17.	Gabon	63.9	1.0%
18.	Chad	62.7	0.9%
19.	Libya	62.5	0.9%
20.	Switzerland	53.7	0.8%
	Others	880.0	13.1%
	TOTAL	**6,700.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	n.a.	n.a.	n.a.
Outgoing	6.1	6.4	6.7
Surplus (Deficit)	n.a.	n.a.	n.a.
Total Volume	n.a.	n.a.	n.a.

Note: National traffic data are in millions of minutes of outgoing public switched telecommunications traffic; route data are in thousands of minutes of outgoing public switched telecommunications traffic.

Nigeria

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	United Kingdom	12.4	20.5%
2.	United States	10.5	17.3%
3.	India	2.8	4.7%
4.	South Africa	2.6	4.3%
5.	Germany	2.6	4.3%
6.	Italy	2.3	3.8%
7.	France	2.1	3.5%
8.	Netherlands	1.6	2.6%
9.	Lebanon	1.5	2.5%
10.	Spain	1.0	1.6%
11.	Ghana	0.8	1.4%
12.	Canada	0.7	1.2%
13.	Saudi Arabia	0.7	1.1%
14.	Switzerland	0.6	1.0%
15.	Benin	0.6	1.0%
16.	Australia	0.6	0.9%
17.	Belgium	0.6	0.9%
18.	United Arab Emirates	0.5	0.8%
19.	Cameroon	0.4	0.7%
20.	Côte d'Ivoire	0.4	0.7%
	Others	15.2	25.0%
	TOTAL	**60.7**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	n.a.	n.a.	238.0
Outgoing	57.9	66.0	60.7
Surplus (Deficit)	n.a.	n.a.	177.3
Total Volume	n.a.	n.a.	298.7

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Norway

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	Sweden	200.0	25.1%
2.	United Kingdom	94.0	11.8%
3.	Denmark	90.0	11.3%
4.	United States	69.0	8.7%
5.	Germany	42.0	5.3%
6.	Netherlands	36.0	4.5%
7.	Spain	30.0	3.8%
8.	Finland	24.0	3.0%
9.	France	20.0	2.5%
10.	Belgium	13.0	1.6%
11.	Australia	12.0	1.5%
12.	Italy	12.0	1.5%
13.	Poland	10.0	1.3%
14.	Russia	10.0	1.3%
15.	Canada	8.0	1.0%
16.	Switzerland	8.0	1.0%
17.	Greece	7.0	0.9%
18.	Ireland	5.0	0.6%
19.	Turkey	5.0	0.6%
20.	Iceland	4.0	0.5%
	Others	97.0	12.2%
	TOTAL	**796.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	n.a.	n.a.	n.a.
Outgoing	667.0	737.0	796.0
Surplus (Deficit)	n.a.	n.a.	n.a.
Total Volume	n.a.	n.a.	n.a.

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Oman

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	India	50.2	31.5%
2.	United Arab Emirates	40.3	25.3%
3.	Pakistan	10.7	6.7%
4.	United Kingdom	7.1	4.5%
5.	Bangladesh	6.1	3.8%
6.	Saudi Arabia	5.8	3.6%
7.	Egypt	5.6	3.5%
8.	Bahrain	4.3	2.7%
9.	Jordan	2.2	1.4%
10.	United States	2.2	1.4%
11.	Sri Lanka	2.1	1.3%
12.	Qatar	2.0	1.3%
13.	Philippines	1.9	1.2%
14.	Kuwait	1.8	1.1%
15.	Sudan	1.3	0.8%
16.	Tanzania	1.3	0.8%
17.	Germany	1.0	0.6%
18.	Morocco	1.0	0.6%
19.	Lebanon	0.8	0.5%
20.	France	0.7	0.4%
	Others	10.9	6.8%
	TOTAL	**159.3**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	83.4	n.a.	108.0
Outgoing	101.3	116.8	159.3
Surplus (Deficit)	(17.9)	n.a.	(51.3)
Total Volume	184.7	n.a.	267.3

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic. Data exclude some cross-border traffic to the United Arab Emirates.

Pakistan

LARGEST TELECOMMUNICATIONS ROUTES, FY 2001/02

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	United Kingdom	22.2	20.2%
2.	Saudi Arabia	15.2	13.9%
3.	United Arab Emirates	15.0	13.6%
4.	United States	11.9	10.8%
5.	Canada	10.5	9.6%
6.	Iran	3.5	3.2%
7.	Japan	2.4	2.1%
8.	Kuwait	2.3	2.1%
9.	Germany	2.0	1.8%
10.	Singapore	1.8	1.7%
11.	India	1.7	1.6%
12.	Bangladesh	1.5	1.4%
13.	Hong Kong	1.5	1.4%
14.	France	1.5	1.3%
15.	China	1.5	1.3%
16.	Italy	1.4	1.3%
17.	Oman	1.4	1.3%
18.	Qatar	1.1	1.0%
19.	Turkey	1.1	1.0%
20.	Australia	1.1	1.0%
	Others	9.4	8.5%
	TOTAL	**110.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	FY 1999/00	FY 2000/01	FY 2001/02
Incoming	644.9	896.1	1,165.1
Outgoing	75.1	98.6	110.0
Surplus (Deficit)	569.8	797.4	1,055.2
Total Volume	720.0	994.7	1,275.1

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic. Fiscal year ends 30 June. Data exclude some cross-border traffic to India.

Palestinian Territory

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	Jordan	18.8	41.6%
2.	United States	4.4	9.7%
3.	Egypt	4.3	9.6%
4.	Saudi Arabia	2.8	6.1%
5.	United Arab Emirates	1.9	4.2%
6.	Bahrain	1.3	2.9%
7.	United Kingdom	1.0	2.2%
8.	Germany	0.9	2.1%
9.	Yemen	0.7	1.5%
10.	Syria	0.7	1.4%
11.	Italy	0.6	1.2%
12.	Turkey	0.5	1.1%
13.	France	0.5	1.0%
14.	Lebanon	0.4	0.9%
15.	Canada	0.4	0.8%
16.	Qatar	0.4	0.8%
17.	Kuwait	0.4	0.8%
18.	China	0.3	0.7%
19.	Iraq	0.3	0.7%
20.	Ukraine	0.3	0.7%
	Others	4.5	10.0%
	TOTAL	**45.3**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	n.a.	37.2	47.9
Outgoing	34.9	45.6	45.3
Surplus (Deficit)	n.a.	(8.4)	2.6
Total Volume	n.a.	82.8	93.1

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic. Data exclude traffic with Israel.

Panama

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	United States	13.0	28.8%
2.	Colombia	5.3	11.7%
3.	Costa Rica	3.3	7.2%
4.	Mexico	2.0	4.4%
5.	Venezuela	1.1	2.4%
6.	Dominican Republic	1.0	2.3%
7.	Guatemala	1.0	2.2%
8.	Spain	1.0	2.1%
9.	Nicaragua	0.9	2.0%
10.	Cuba	0.8	1.7%
11.	El Salvador	0.7	1.6%
12.	Honduras	0.6	1.4%
13.	Peru	0.6	1.4%
14.	Chile	0.5	1.2%
15.	Brazil	0.5	1.0%
16.	Ecuador	0.5	1.0%
17.	Canada	0.4	0.9%
18.	United Kingdom	0.4	0.9%
19.	Italy	0.2	0.5%
20.	France	0.2	0.5%
	Others	11.2	24.7%
	TOTAL	**45.3**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	96.2	111.7	119.9
Outgoing	53.6	51.9	45.3
Surplus (Deficit)	42.6	59.7	74.6
Total Volume	149.8	163.6	165.2

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Paraguay

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	Argentina	11.6	32.9%
2.	Brazil	8.7	24.7%
3.	United States	3.4	9.6%
4.	Uruguay	1.5	4.3%
5.	Chile	1.1	3.1%
6.	Spain	0.6	1.6%
7.	Bolivia	0.5	1.4%
8.	Germany	0.5	1.4%
9.	Peru	0.3	1.0%
10.	Lebanon	0.3	0.9%
11.	Taiwan	0.3	0.8%
12.	Italy	0.3	0.7%
13.	Mexico	0.3	0.7%
14.	France	0.2	0.6%
15.	Colombia	0.2	0.5%
16.	Japan	0.2	0.5%
17.	Korea, Rep.	0.2	0.5%
18.	China	0.2	0.5%
19.	Switzerland	0.2	0.5%
20.	Canada	0.2	0.5%
	Others	4.6	13.2%
	TOTAL	**35.3**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	54.8	71.6	75.8
Outgoing	34.7	33.3	35.3
Surplus (Deficit)	20.1	38.4	40.6
Total Volume	89.5	104.9	111.1

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Philippines

LARGEST TELECOMMUNICATIONS ROUTES, FY 2001/02

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	United States	100.0	22.3%
2.	Japan	62.0	13.8%
3.	Saudi Arabia	48.0	10.7%
4.	Singapore	34.0	7.6%
5.	Hong Kong	28.0	6.2%
6.	Canada	21.0	4.7%
7.	Taiwan	21.0	4.7%
8.	Korea, Rep.	19.0	4.2%
9.	Australia	18.0	4.0%
10.	Malaysia	9.0	2.0%
	Others	89.0	19.8%
	TOTAL	**449.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	FY 1999/00	FY 2000/01	FY 2001/02
Incoming	n.a.	1,977.6	2,332.7
Outgoing	260.0	327.0	449.0
Surplus (Deficit)	n.a.	1,650.6	1,883.7
Total Volume	n.a.	2,304.6	2,781.7

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic. Fiscal year ends 31 March.

Poland

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	Germany	270.0	37.0%
2.	United Kingdom	59.0	8.1%
3.	Italy	54.0	7.4%
4.	France	43.0	5.9%
5.	United States	32.0	4.4%
6.	Austria	25.0	3.4%
7.	Netherlands	25.0	3.4%
8.	Ukraine	24.0	3.3%
9.	Sweden	20.0	2.7%
10.	Czech Republic	17.0	2.3%
	Others	160.9	22.0%
	TOTAL	**729.9**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	n.a.	n.a.	n.a.
Outgoing	624.0	675.8	729.9
Surplus (Deficit)	n.a.	n.a.	n.a.
Total Volume	n.a.	n.a.	n.a.

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Portugal

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	France	140.0	15.6%
2.	Spain	130.0	14.4%
3.	United Kingdom	80.0	8.9%
4.	Brazil	79.0	8.8%
5.	Germany	72.0	8.0%
6.	Switzerland	40.0	4.4%
7.	United States	37.0	4.1%
8.	Ukraine	30.0	3.3%
9.	Italy	25.0	2.8%
10.	Netherlands	24.0	2.7%
11.	Angola	23.0	2.6%
12.	Belgium	17.0	1.9%
13.	Cape Verde	16.0	1.8%
14.	Canada	14.0	1.6%
15.	Guinea-Bissau	12.0	1.3%
16.	Luxembourg	9.0	1.0%
17.	Moldova	9.0	1.0%
18.	Romania	8.0	0.9%
19.	Mozambique	7.0	0.8%
20.	Venezuela	6.5	0.7%
	Others	121.5	13.5%
	TOTAL	**900.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	753.3	n.a.	n.a.
Outgoing	532.8	720.0	900.0
Surplus (Deficit)	220.5	n.a.	n.a.
Total Volume	1,286.0	n.a.	n.a.

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic. 1999 data are for Portugal Telecom only, and may exclude some cross-border traffic to Spain.

Qatar

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	United Arab Emirates	26.6	15.5%
2.	India	24.6	14.3%
3.	Saudi Arabia	15.9	9.3%
4.	Bahrain	14.2	8.3%
5.	Egypt	12.2	7.1%
6.	Pakistan	5.5	3.2%
7.	Jordan	5.4	3.1%
8.	Sudan	4.5	2.6%
9.	Kuwait	4.3	2.5%
10.	Lebanon	2.5	1.5%
11.	United Kingdom	2.5	1.4%
12.	Oman	2.4	1.4%
13.	Bangladesh	2.3	1.3%
14.	Sri Lanka	2.1	1.2%
15.	Iran	2.1	1.2%
16.	Philippines	2.1	1.2%
17.	Syria	2.0	1.1%
18.	Yemen	1.4	0.8%
19.	Morocco	0.9	0.5%
20.	Germany	0.6	0.4%
	Others	37.6	21.9%
	TOTAL	**171.6**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	84.0	95.5	113.5
Outgoing	128.5	143.0	171.6
Surplus (Deficit)	(44.5)	(47.5)	(58.1)
Total Volume	212.5	238.6	285.1

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Russia

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	Ukraine	184.0	17.0%
2.	Belarus	136.5	12.6%
3.	Kazakhstan	75.1	6.9%
4.	Azerbaijan	60.7	5.6%
5.	Germany	50.6	4.7%
6.	Moldova	47.6	4.4%
7.	Armenia	45.1	4.2%
8.	Uzbekistan	43.3	4.0%
9.	Georgia	27.5	2.5%
10.	Latvia	24.3	2.2%
11.	Lithuania	19.0	1.8%
12.	Kyrgyzstan	18.6	1.7%
13.	Italy	13.2	1.2%
14.	United States	11.0	1.0%
15.	Poland	8.1	0.7%
16.	United Kingdom	7.7	0.7%
17.	Estonia	7.4	0.7%
18.	France	5.9	0.5%
19.	China	5.6	0.5%
20.	Turkey	5.2	0.5%
	Others	285.2	26.4%
	TOTAL	**1,081.6**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	929.3	n.a.	869.3
Outgoing	928.2	944.0	1,081.6
Surplus (Deficit)	1.1	n.a.	(212.3)
Total Volume	1,857.5	n.a.	1,950.9

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic. Data are for Rostelecom only.

Saint Vincent & The Grenadines

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (thousands)	Percent of Outgoing Traffic
1.	United States	770.1	25.5%
2.	Barbados	582.5	19.3%
3.	Trinidad & Tobago	352.7	11.7%
4.	Canada	210.6	7.0%
5.	United Kingdom	152.4	5.0%
6.	Grenada	120.9	4.0%
7.	Saint Lucia	108.6	3.6%
8.	Antigua & Barbuda	53.4	1.8%
9.	Saint Kitts & Nevis	48.3	1.6%
10.	Martinique	33.7	1.1%
11.	Jamaica	33.1	1.1%
12.	Guyana	26.7	0.9%
13.	France	26.5	0.9%
14.	Dominica	21.8	0.7%
15.	Italy	17.7	0.6%
16.	Germany	15.8	0.5%
17.	Venezuela	15.1	0.5%
	Others	350.0	11.6%
	TOTAL	**3,022.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	n.a.	n.a.	n.a.
Outgoing	n.a.	n.a.	3.0
Surplus (Deficit)	n.a.	n.a.	n.a.
Total Volume	n.a.	n.a.	n.a.

Note: National traffic data are in millions of minutes of outgoing public switched telecommunications traffic; route data are in thousands of minutes of outgoing public switched telecommunications traffic.

Saudi Arabia

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	Egypt	225.0	14.8%
2.	India	216.0	14.2%
3.	Pakistan	154.0	10.2%
4.	Sudan	99.0	6.5%
5.	Bahrain	84.0	5.5%
6.	Bangladesh	70.0	4.6%
7.	Yemen	70.0	4.6%
8.	United Arab Emirates	68.0	4.5%
9.	Syria	66.0	4.4%
10.	Philippines	63.0	4.2%
11.	Kuwait	44.0	2.9%
12.	Jordan	40.0	2.6%
13.	United States	34.0	2.2%
14.	Lebanon	30.0	2.0%
15.	Morocco	30.0	2.0%
16.	United Kingdom	30.0	2.0%
17.	Indonesia	23.0	1.5%
18.	Turkey	22.0	1.5%
19.	Qatar	16.0	1.1%
20.	Sri Lanka	14.0	0.9%
	Others	118.6	7.8%
	TOTAL	**1,516.6**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	n.a.	n.a.	705.5
Outgoing	1,060.0	1,194.9	1,516.6
Surplus (Deficit)	n.a.	n.a.	(811.2)
Total Volume	n.a.	n.a.	2,222.1

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Serbia & Montenegro

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	Germany	38.9	14.1%
2.	Austria	28.1	10.2%
3.	Croatia	24.6	8.9%
4.	Switzerland	23.0	8.4%
5.	Italy	20.8	7.5%
6.	France	11.7	4.3%
7.	Bosnia-Herzegovina	11.6	4.2%
8.	Hungary	9.9	3.6%
9.	Slovenia	7.9	2.9%
10.	Greece	7.6	2.8%
11.	Russia	7.1	2.6%
12.	United States	6.5	2.3%
13.	United Kingdom	6.4	2.3%
14.	Sweden	5.3	1.9%
15.	Macedonia	5.1	1.9%
16.	Romania	5.1	1.9%
17.	Netherlands	4.8	1.7%
18.	Turkey	3.8	1.4%
19.	Bulgaria	3.5	1.3%
20.	Belgium	3.0	1.1%
	Others	40.7	14.8%
	TOTAL	**275.5**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	498.8	n.a.	582.2
Outgoing	227.0	286.9	275.5
Surplus (Deficit)	271.7	n.a.	306.7
Total Volume	725.8	n.a.	857.7

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Seychelles

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (thousands)	Percent of Outgoing Traffic
1.	United Kingdom	1,427.1	17.4%
2.	India	1,035.6	12.6%
3.	France	841.3	10.3%
4.	Mauritius	741.3	9.0%
5.	Italy	715.7	8.7%
6.	South Africa	543.9	6.6%
7.	Germany	387.7	4.7%
8.	United States	253.4	3.1%
9.	Spain	243.9	3.0%
10.	Australia	223.1	2.7%
11.	Singapore	219.8	2.7%
12.	China	182.8	2.2%
13.	Switzerland	176.8	2.2%
14.	Reunion	143.7	1.8%
15.	United Arab Emirates	140.1	1.7%
16.	Canada	104.6	1.3%
17.	Belgium	88.4	1.1%
18.	Bahrain	77.8	0.9%
19.	Netherlands	58.7	0.7%
20.	Sweden	43.0	0.5%
	Others	550.0	6.7%
	TOTAL	**8,200.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	n.a.	n.a.	n.a.
Outgoing	4.3	6.7	8.2
Surplus (Deficit)	n.a.	n.a.	n.a.
Total Volume	n.a.	n.a.	n.a.

Note: National traffic data are in millions of minutes of outgoing public switched telecommunications traffic; route data are in thousands of minutes of outgoing public switched telecommunications traffic.

Singapore

LARGEST TELECOMMUNICATIONS ROUTES, FY 2001/02

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	Malaysia	550.0	29.4%
2.	United Kingdom	155.0	8.3%
3.	Hong Kong	140.0	7.5%
4.	China	90.0	4.8%
5.	Indonesia	90.0	4.8%
6.	United States	85.0	4.5%
7.	Australia	75.0	4.0%
8.	Japan	75.0	4.0%
9.	Thailand	50.0	2.7%
10.	Philippines	45.0	2.4%
11.	India	40.0	2.1%
12.	Taiwan	37.0	2.0%
13.	Korea, Rep.	18.0	1.0%
14.	Bangladesh	16.0	0.9%
15.	Germany	10.0	0.5%
	Others	394.7	21.1%
	TOTAL	**1,870.7**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	FY 1999/00	FY 2000/01	FY 2001/02
Incoming	n.a.	n.a.	n.a.
Outgoing	1,350.0	1,515.0	1,870.7
Surplus (Deficit)	n.a.	n.a.	n.a.
Total Volume	n.a.	n.a.	n.a.

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic. Fiscal year ends 31 March.

Slovak Republic

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	Czech Republic	64.4	36.6%
2.	Germany	24.6	13.9%
3.	Austria	14.1	8.0%
4.	Hungary	8.9	5.0%
5.	Poland	7.2	4.1%
6.	Italy	7.2	4.1%
7.	United Kingdom	6.3	3.5%
8.	United States	5.4	3.0%
9.	France	3.7	2.1%
10.	Switzerland	3.2	1.8%
11.	Ukraine	3.1	1.8%
12.	Netherlands	2.4	1.3%
13.	Spain	1.9	1.1%
14.	Belgium	1.8	1.0%
15.	Russia	1.7	1.0%
16.	Croatia	1.1	0.6%
17.	Serbia & Montenegro	0.9	0.5%
18.	Canada	0.9	0.5%
19.	Sweden	0.8	0.5%
20.	Romania	0.8	0.4%
	Others	16.2	9.2%
	TOTAL	**176.3**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	208.7	233.1	n.a.
Outgoing	162.8	162.7	176.3
Surplus (Deficit)	45.9	70.4	n.a.
Total Volume	371.5	395.7	n.a.

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

South Africa

LARGEST TELECOMMUNICATIONS ROUTES, FY 2001/02

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	United Kingdom	95.2	18.6%
2.	Zimbabwe	61.4	12.0%
3.	Namibia	39.0	7.6%
4.	Botswana	32.9	6.4%
5.	United States	25.2	4.9%
6.	Mozambique	21.7	4.2%
7.	Swaziland	17.9	3.5%
8.	Germany	16.3	3.2%
9.	Australia	13.8	2.7%
10.	Lesotho	13.6	2.7%
11.	Malawi	8.6	1.7%
12.	Netherlands	8.4	1.6%
13.	Zambia	8.4	1.6%
14.	Nigeria	7.3	1.4%
15.	France	6.7	1.3%
16.	Portugal	6.1	1.2%
17.	Canada	6.0	1.2%
18.	Italy	5.7	1.1%
19.	India	5.4	1.1%
20.	Congo, Dem. Rep.	5.2	1.0%
	Others	105.9	20.7%
	TOTAL	**510.7**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	FY 1999/00	FY 2000/01	FY 2001/02
Incoming	n.a.	700.0	736.0
Outgoing	461.1	494.6	510.7
Surplus (Deficit)	n.a.	205.4	225.3
Total Volume	n.a.	1,194.6	1,246.7

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic. Fiscal year ends 31 March.

Spain

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	United Kingdom	605.0	14.2%
2.	Germany	540.0	12.6%
3.	France	510.0	11.9%
4.	Italy	225.0	5.3%
5.	Portugal	190.0	4.4%
6.	Morocco	165.0	3.9%
7.	United States	150.0	3.5%
8.	Netherlands	115.0	2.7%
9.	Switzerland	100.0	2.3%
10.	Belgium	95.0	2.2%
11.	Ecuador	90.0	2.1%
12.	Cuba	80.0	1.9%
13.	Colombia	78.0	1.8%
14.	Argentina	60.0	1.4%
15.	Ireland	60.0	1.4%
16.	Romania	60.0	1.4%
17.	Sweden	60.0	1.4%
18.	Andorra	46.0	1.1%
19.	Dominican Republic	40.0	0.9%
20.	Peru	40.0	0.9%
	Others	966.0	22.6%
	TOTAL	**4,275.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	n.a.	n.a.	n.a.
Outgoing	2,340.0	3,215.0	4,275.0
Surplus (Deficit)	n.a.	n.a.	n.a.
Total Volume	n.a.	n.a.	n.a.

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic. Total traffic volumes may include some refile traffic to Latin America originated outside of Spain.

Sri Lanka

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	India	8.7	16.2%
2.	United Kingdom	5.5	10.2%
3.	United States	3.2	6.0%
4.	Singapore	2.7	4.9%
5.	Australia	2.6	4.9%
6.	Japan	2.6	4.8%
7.	United Arab Emirates	2.3	4.3%
8.	Saudi Arabia	2.0	3.6%
9.	Maldives	1.6	2.9%
10.	Germany	1.6	2.9%
11.	Kuwait	1.4	2.7%
12.	Hong Kong	1.4	2.6%
13.	Italy	1.3	2.4%
14.	Canada	1.0	1.8%
15.	Pakistan	0.9	1.6%
16.	France	0.8	1.5%
17.	Korea, Rep.	0.8	1.5%
18.	Malaysia	0.8	1.5%
19.	Thailand	0.8	1.5%
20.	China	0.8	1.4%
	Others	11.2	20.7%
	TOTAL	**54.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	n.a.	157.0	180.0
Outgoing	45.5	42.0	54.0
Surplus (Deficit)	n.a.	115.0	126.0
Total Volume	n.a.	199.0	234.0

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Sudan

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	Saudi Arabia	12.5	34.5%
2.	United Arab Emirates	4.2	11.5%
3.	Egypt	2.4	6.6%
4.	United Kingdom	1.6	4.4%
5.	Bahrain	1.0	2.8%
6.	Qatar	1.0	2.8%
7.	Australia	0.8	2.2%
8.	United States	0.7	2.1%
9.	Jordan	0.6	1.7%
10.	Syria	0.5	1.4%
11.	Germany	0.4	1.0%
12.	China	0.3	0.9%
13.	India	0.3	0.9%
14.	Yemen	0.3	0.8%
15.	Libya	0.3	0.8%
16.	Eritrea	0.3	0.8%
17.	Italy	0.3	0.7%
18.	France	0.2	0.7%
19.	Oman	0.2	0.6%
20.	Canada	0.2	0.6%
	Others	8.1	22.3%
	TOTAL	**36.1**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	105.3	155.7	n.a.
Outgoing	21.9	31.8	36.1
Surplus (Deficit)	83.3	123.9	n.a.
Total Volume	127.2	187.6	n.a.

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic. Data exclude some cross-border traffic to Chad.

Swaziland

LARGEST TELECOMMUNICATIONS ROUTES, FY 2001/02

	Destination	Minutes (thousands)	Percent of Outgoing Traffic
1.	South Africa	20,800.0	79.1%
2.	United Kingdom	720.0	2.7%
3.	Botswana	370.0	1.4%
4.	United States	140.0	0.5%
5.	Zimbabwe	140.0	0.5%
6.	Lesotho	120.0	0.5%
7.	Zambia	80.0	0.3%
8.	Kenya	60.0	0.2%
9.	Taiwan	50.0	0.2%
10.	Uganda	50.0	0.2%
11.	India	40.0	0.2%
12.	Malawi	40.0	0.2%
13.	Namibia	40.0	0.2%
14.	Portugal	40.0	0.2%
15.	Tanzania	40.0	0.2%
16.	Australia	30.0	0.1%
17.	Canada	30.0	0.1%
18.	Germany	30.0	0.1%
19.	Ghana	30.0	0.1%
20.	Italy	30.0	0.1%
	Others	3,420.0	13.0%
	TOTAL	**26,300.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	FY 1999/00	FY 2000/01	FY 2001/02
Incoming	n.a.	22.5	n.a.
Outgoing	29.3	25.1	26.3
Surplus (Deficit)	n.a.	(2.6)	n.a.
Total Volume	n.a.	47.6	n.a.

Note: National traffic data are in millions of minutes of outgoing public switched telecommunications traffic; route data are in thousands of minutes of outgoing public switched telecommunications traffic. Fiscal year ends 31 March.

Sweden

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	Finland	240.0	14.0%
2.	Norway	235.0	13.7%
3.	United Kingdom	230.0	13.5%
4.	Denmark	190.0	11.1%
5.	United States	170.0	9.9%
6.	Germany	160.0	9.4%
7.	Poland	75.0	4.4%
8.	France	70.0	4.1%
9.	Netherlands	60.0	3.5%
10.	Switzerland	60.0	3.5%
	Others	220.0	12.9%
	TOTAL	**1,710.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	n.a.	n.a.	n.a.
Outgoing	1,365.0	1,550.0	1,710.0
Surplus (Deficit)	n.a.	n.a.	n.a.
Total Volume	n.a.	n.a.	n.a.

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Switzerland

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	Germany	655.0	20.3%
2.	France	450.0	13.9%
3.	Italy	410.0	12.7%
4.	United Kingdom	180.0	5.6%
5.	United States	155.0	4.8%
6.	Austria	140.0	4.3%
7.	Spain	135.0	4.2%
8.	Portugal	110.0	3.4%
9.	Serbia & Montenegro	85.0	2.6%
10.	Netherlands	65.0	2.0%
	Others	845.0	26.2%
	TOTAL	**3,230.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	n.a.	n.a.	n.a.
Outgoing	2,120.0	2,780.0	3,230.0
Surplus (Deficit)	n.a.	n.a.	n.a.
Total Volume	n.a.	n.a.	n.a.

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Syria

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	Lebanon	41.5	27.7%
2.	Saudi Arabia	32.5	21.7%
3.	United Arab Emirates	12.1	8.1%
4.	Jordan	9.6	6.4%
5.	Iraq	6.3	4.2%
6.	Egypt	5.2	3.5%
7.	United States	5.1	3.4%
8.	Kuwait	4.9	3.3%
9.	France	3.2	2.1%
10.	Turkey	3.2	2.1%
11.	United Kingdom	3.2	2.1%
12.	Germany	2.8	1.9%
13.	Bahrain	2.2	1.5%
14.	Qatar	1.2	0.8%
15.	Sudan	1.2	0.8%
16.	Russia	1.1	0.7%
17.	Switzerland	1.0	0.7%
18.	Greece	1.0	0.7%
19.	Iran	1.0	0.6%
20.	Morocco	0.8	0.5%
	Others	10.9	7.3%
	TOTAL	**150.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	256.7	286.0	325.8
Outgoing	125.6	140.0	150.0
Surplus (Deficit)	131.1	146.0	175.8
Total Volume	382.3	426.0	475.8

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Taiwan

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	China	423.0	27.8%
2.	United States	200.0	13.1%
3.	Japan	105.0	6.9%
4.	Philippines	88.6	5.8%
5.	Hong Kong	87.0	5.7%
6.	Thailand	66.1	4.3%
7.	Vietnam	64.9	4.3%
8.	Indonesia	37.1	2.4%
9.	Canada	32.9	2.2%
10.	Singapore	32.0	2.1%
11.	Australia	21.0	1.4%
12.	Malaysia	19.0	1.2%
13.	United Kingdom	15.1	1.0%
14.	Korea, Rep.	12.6	0.8%
15.	Germany	11.0	0.7%
16.	New Zealand	7.0	0.5%
17.	France	6.3	0.4%
18.	Macau	4.8	0.3%
19.	Myanmar	4.7	0.3%
20.	Italy	3.7	0.2%
	Others	280.6	18.4%
	TOTAL	**1,522.2**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	882.0	n.a.	n.a.
Outgoing	949.3	1,160.0	1,522.2
Surplus (Deficit)	(67.3)	n.a.	n.a.
Total Volume	1,831.3	n.a.	n.a.

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Tajikistan

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (thousands)	Percent of Outgoing Traffic
1.	Russia	5,521.3	64.5%
2.	Uzbekistan	1,391.4	16.2%
3.	Kazakhstan	634.4	7.4%
4.	Kyrgyzstan	303.9	3.5%
5.	Ukraine	140.2	1.6%
6.	Turkmenistan	112.2	1.3%
7.	Belarus	72.1	0.8%
8.	Azerbaijan	22.9	0.3%
9.	Armenia	10.1	0.1%
10.	Georgia	10.1	0.1%
	Others	340.0	4.0%
	TOTAL	**8,565.8**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	n.a.	18.5	n.a.
Outgoing	9.0	6.8	8.6
Surplus (Deficit)	n.a.	11.7	n.a.
Total Volume	n.a.	25.3	n.a.

Note: National traffic data are in millions of minutes of outgoing public switched telecommunications traffic; route data are in thousands of minutes of outgoing public switched telecommunications traffic. The "Others" category may include routes to non-members of the Commonwealth of Independent States that rank among the top destinations for outgoing traffic.

Thailand

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	Japan	45.4	12.0%
2.	United States	34.5	9.1%
3.	Singapore	29.8	7.9%
4.	Malaysia	26.0	6.9%
5.	Laos	22.5	6.0%
6.	Taiwan	19.8	5.2%
7.	Australia	17.3	4.6%
8.	Hong Kong	17.1	4.5%
9.	United Kingdom	17.0	4.5%
10.	Myanmar	13.5	3.6%
11.	Germany	10.8	2.9%
12.	Korea, Rep.	10.4	2.8%
13.	China	8.1	2.1%
14.	Philippines	7.5	2.0%
15.	France	5.6	1.5%
16.	Sweden	5.0	1.3%
17.	India	4.8	1.3%
18.	Switzerland	4.8	1.3%
19.	Indonesia	4.3	1.1%
20.	Italy	4.2	1.1%
	Others	69.4	18.4%
	TOTAL	**377.7**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	327.8	426.6	555.0
Outgoing	298.7	355.2	377.7
Surplus (Deficit)	29.1	71.4	177.4
Total Volume	626.5	781.8	932.6

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic. 1999 data exclude some cross-border traffic with Laos, Malaysia, and Myanmar.

Togo

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (thousands)	Percent of Outgoing Traffic
1.	France	2,940.0	20.8%
2.	Benin	1,816.0	12.9%
3.	Burkina Faso	1,326.0	9.4%
4.	Côte d'Ivoire	1,066.0	7.5%
5.	Ghana	698.0	4.9%
6.	Senegal	580.0	4.1%
7.	Nigeria	562.0	4.0%
8.	United States	513.0	3.6%
9.	Germany	495.0	3.5%
10.	Niger	347.0	2.5%
11.	Mali	306.0	2.2%
12.	Lebanon	299.0	2.1%
13.	Gabon	271.0	1.9%
14.	United Kingdom	267.0	1.9%
15.	Belgium	246.0	1.7%
16.	Liechtenstein	152.0	1.1%
17.	Cameroon	142.0	1.0%
18.	Netherlands	119.0	0.8%
19.	India	115.0	0.8%
20.	China	111.0	0.8%
	Others	1,750.0	12.4%
	TOTAL	**14,125.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	21.6	12.2	48.8
Outgoing	8.5	10.2	14.1
Surplus (Deficit)	13.1	2.0	34.6
Total Volume	30.1	22.4	62.9

Note: National traffic data are in millions of minutes of outgoing public switched telecommunications traffic; route data are in thousands of minutes of outgoing public switched telecommunications traffic.

Tonga

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (thousands)	Percent of Outgoing Traffic
1.	New Zealand	1,250.3	40.7%
2.	Australia	500.9	16.3%
3.	United States	477.2	15.5%
4.	Fiji	351.9	11.4%
5.	Japan	44.8	1.5%
6.	Samoa	41.8	1.4%
7.	China	40.9	1.3%
8.	Papua New Guinea	31.8	1.0%
9.	United Kingdom	28.2	0.9%
10.	Vietnam	0.1	<0.1%
11.	Macau	0.1	<0.1%
	Others	240.0	7.8%
	TOTAL	**3,074.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	n.a.	8.0	n.a.
Outgoing	3.0	2.5	3.1
Surplus (Deficit)	n.a.	5.5	n.a.
Total Volume	n.a.	10.5	n.a.

Note: National traffic data are in millions of minutes of outgoing public switched telecommunications traffic; route data are in thousands of minutes of outgoing public switched telecommunications traffic.

Trinidad & Tobago

LARGEST TELECOMMUNICATIONS ROUTES, FY 2001/02

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	United States	39.1	48.4%
2.	Canada	7.5	9.3%
3.	United Kingdom	5.4	6.7%
4.	Barbados	4.3	5.3%
5.	Grenada	2.9	3.6%
6.	Jamaica	2.7	3.4%
7.	Guyana	2.3	2.9%
8.	Venezuela	2.0	2.5%
9.	Saint Vincent & The Grenadines	2.0	2.5%
10.	Saint Lucia	1.6	2.0%
11.	Antigua & Barbuda	1.1	1.4%
12.	Dominica	0.6	0.7%
13.	Saint Kitts & Nevis	0.5	0.6%
14.	Netherlands Antilles	0.4	0.5%
15.	Germany	0.4	0.4%
16.	India	0.4	0.4%
17.	Netherlands	0.3	0.4%
18.	Cayman Islands	0.3	0.4%
19.	Bahamas	0.3	0.3%
	Others	6.3	7.8%
	TOTAL	**80.9**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	FY 1999/00	FY 2000/01	FY 2001/02
Incoming	158.8	167.7	189.2
Outgoing	67.2	80.5	80.9
Surplus (Deficit)	91.6	87.2	108.3
Total Volume	226.0	248.2	270.0

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic. Fiscal year ends 31 March.

Turkey

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	Germany	168.0	24.9%
2.	United Kingdom	50.0	7.4%
3.	France	31.0	4.6%
4.	United States	28.0	4.1%
5.	Netherlands	25.0	3.7%
6.	Bulgaria	20.0	3.0%
7.	Italy	16.0	2.4%
8.	Switzerland	16.0	2.4%
9.	Austria	15.0	2.2%
10.	Russia	13.5	2.0%
11.	Belgium	13.0	1.9%
12.	Greece	12.0	1.8%
13.	Romania	12.0	1.8%
14.	Azerbaijan	10.0	1.5%
15.	Ukraine	8.5	1.3%
16.	Syria	8.0	1.2%
17.	Moldova	7.5	1.1%
18.	Iran	7.0	1.0%
19.	Israel	6.5	1.0%
20.	Sweden	5.2	0.8%
	Others	202.8	30.0%
	TOTAL	**675.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	1,122.7	1,240.0	1,100.0
Outgoing	698.4	731.8	675.0
Surplus (Deficit)	424.3	508.2	425.0
Total Volume	1,821.1	1,971.8	1,775.0

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Turkmenistan

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (thousands)	Percent of Outgoing Traffic
1.	Russia	7,103.5	36.8%
2.	Uzbekistan	1,282.1	6.6%
3.	Kazakhstan	1,085.1	5.6%
4.	Azerbaijan	1,011.2	5.2%
5.	Ukraine	925.9	4.8%
6.	Belarus	384.3	2.0%
7.	Armenia	345.7	1.8%
8.	Tajikistan	265.9	1.4%
9.	Georgia	222.0	1.2%
10.	Kyrgyzstan	187.7	1.0%
11.	Moldova	101.4	0.5%
	Others	6,380.0	33.1%
	TOTAL	**19,295.4**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	n.a.	11.3	n.a.
Outgoing	16.5	15.7	19.3
Surplus (Deficit)	n.a.	(4.5)	n.a.
Total Volume	n.a.	27.0	n.a.

Note: National traffic data are in millions of minutes of outgoing public switched telecommunications traffic; route data are in thousands of minutes of outgoing public switched telecommunications traffic. The "Others" category may include routes to non-members of the Commonwealth of Independent States that rank among the top destinations for outgoing traffic.

Ukraine

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	Russia	235.1	60.6%
2.	Belarus	21.8	5.6%
3.	Moldova	12.6	3.2%
4.	Poland	12.3	3.2%
5.	Germany	12.2	3.1%
6.	Italy	5.1	1.3%
7.	Czech Republic	4.8	1.2%
8.	Armenia	4.4	1.1%
9.	Azerbaijan	4.3	1.1%
10.	Kazakhstan	4.0	1.0%
11.	Hungary	3.7	1.0%
12.	Georgia	3.5	0.9%
13.	Turkey	3.1	0.8%
14.	United States	2.8	0.7%
15.	Uzbekistan	2.8	0.7%
16.	Bulgaria	2.2	0.6%
17.	United Kingdom	2.2	0.6%
18.	Lithuania	2.1	0.5%
19.	Greece	2.0	0.5%
20.	Israel	1.9	0.5%
	Others	43.7	11.2%
	TOTAL	**388.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	n.a.	269.5	n.a.
Outgoing	359.2	363.0	388.0
Surplus (Deficit)	n.a.	(93.4)	n.a.
Total Volume	n.a.	632.5	n.a.

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

United Arab Emirates

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	India	381.3	27.3%
2.	Pakistan	142.7	10.2%
3.	Egypt	83.3	6.0%
4.	Saudi Arabia	72.2	5.2%
5.	United Kingdom	57.4	4.1%
6.	Oman	50.8	3.6%
7.	Syria	48.0	3.4%
8.	Philippines	44.3	3.2%
9.	Bangladesh	43.1	3.1%
10.	United States	34.8	2.5%
11.	Iran	33.9	2.4%
12.	Jordan	33.7	2.4%
13.	Lebanon	31.7	2.3%
14.	Bahrain	28.6	2.0%
15.	Qatar	27.2	1.9%
16.	Sudan	25.5	1.8%
17.	Kuwait	22.7	1.6%
18.	Sri Lanka	17.8	1.3%
19.	Morocco	17.0	1.2%
20.	Yemen	16.0	1.1%
	Others	183.8	13.2%
	TOTAL	**1,395.9**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	n.a.	n.a.	n.a.
Outgoing	963.0	1,123.6	1,395.9
Surplus (Deficit)	n.a.	n.a.	n.a.
Total Volume	n.a.	n.a.	n.a.

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

United Kingdom–Outgoing

LARGEST TELECOMMUNICATIONS ROUTES, FY 2001/02

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	United States	2,425.2	19.1%
2.	Germany	951.4	7.5%
3.	France	836.6	6.6%
4.	Ireland	710.9	5.6%
5.	Spain	558.2	4.4%
6.	Italy	446.7	3.5%
7.	Australia	437.1	3.4%
8.	Canada	428.1	3.4%
9.	Netherlands	376.6	3.0%
10.	India	299.2	2.4%
11.	Pakistan	250.2	2.0%
12.	Belgium	237.5	1.9%
13.	Japan	223.7	1.8%
14.	Sweden	216.6	1.7%
15.	Turkey	211.7	1.7%
16.	Switzerland	210.3	1.7%
17.	Hong Kong	200.1	1.6%
18.	Poland	181.2	1.4%
19.	Greece	178.0	1.4%
20.	Brazil	177.8	1.4%
	Others	3,172.9	24.9%
	TOTAL	**12,730.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	FY 1999/00	FY 2000/01	FY 2001/02
Incoming	6,853.4	7,463.2	7,664.8
Outgoing	10,141.0	12,242.7	12,730.0
Surplus (Deficit)	(3,287.6)	(4,779.5)	(5,065.2)
Total Volume	16,994.4	19,705.9	20,394.8

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic. Fiscal year ends 31 March. Data include include approximately two billion minutes of traffic refiled via the U.K., thus overstating U.K.-originated volumes.

United Kingdom–Incoming

LARGEST TELECOMMUNICATIONS ROUTES, FY 2001/02

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	United States	1,677.0	21.9%
2.	Germany	659.4	8.6%
3.	France	568.1	7.4%
4.	Ireland	537.7	7.0%
5.	Spain	378.7	4.9%
6.	Australia	362.9	4.7%
7.	Canada	300.0	3.9%
8.	Netherlands	268.5	3.5%
9.	Italy	253.7	3.3%
10.	Sweden	166.7	2.2%
11.	Singapore	155.3	2.0%
12.	Switzerland	152.7	2.0%
13.	Greece	129.2	1.7%
14.	Belgium	124.7	1.6%
15.	South Africa	106.5	1.4%
16.	Denmark	91.9	1.2%
17.	Hong Kong	90.1	1.2%
18.	India	88.3	1.2%
19.	New Zealand	67.7	0.9%
20.	United Arab Emirates	66.5	0.9%
	Others	1,419.2	18.5%
	TOTAL	**7,664.8**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	FY 1999/00	FY 2000/01	FY 2001/02
Incoming	6,853.4	7,463.2	7,664.8
Outgoing	10,141.0	12,242.7	12,730.0
Surplus (Deficit)	(3,287.6)	(4,779.5)	(5,065.2)
Total Volume	16,994.4	19,705.9	20,394.8

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic. Fiscal year ends 31 March. Data include include approximately two billion minutes of traffic refiled via the U.K., thus overstating U.K.-originated volumes.

United States–Outgoing

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	Mexico	5,193.1	13.9%
2.	Canada	5,105.9	13.7%
3.	United Kingdom	2,066.3	5.5%
4.	Philippines	1,627.3	4.4%
5.	India	1,444.7	3.9%
6.	Germany	1,214.0	3.3%
7.	Japan	1,003.5	2.7%
8.	Dominican Republic	994.3	2.7%
9.	Brazil	849.6	2.3%
10.	France	816.7	2.2%
11.	Italy	749.6	2.0%
12.	Australia	591.6	1.6%
13.	Pakistan	519.7	1.4%
14.	Colombia	495.1	1.3%
15.	Korea, Rep.	470.3	1.3%
16.	Poland	455.5	1.2%
17.	China	444.0	1.2%
18.	El Salvador	435.7	1.2%
19.	Jamaica	423.0	1.1%
20.	Guatemala	406.9	1.1%
	Others	11,965.5	32.1%
	TOTAL	**37,272.4**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	10,640.8	13,010.7	13,400.0
Outgoing	29,358.8	37,594.8	37,272.4
Surplus (Deficit)	(18,718.0)	(24,584.1)	(23,872.4)
Total Volume	39,999.5	50,605.6	50,672.4

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic. Data exclude VoIP traffic volumes which accounted for over 3 billion minutes of outgoing traffic and 100 million minutes of incoming traffic. Carriers and traffic from points beyond the United States, Puerto Rico, and the U.S. Virgin Islands are excluded.

United States–Incoming

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	Canada	5,071.0	37.8%
2.	Mexico	1,703.9	12.7%
3.	United Kingdom	1,398.3	10.4%
4.	Germany	501.0	3.7%
5.	Japan	346.0	2.6%
6.	Australia	284.3	2.1%
7.	Korea, Rep.	267.8	2.0%
8.	Israel	263.8	2.0%
9.	France	244.6	1.8%
10.	Brazil	234.2	1.7%
11.	Netherlands	211.4	1.6%
12.	Dominican Republic	190.7	1.4%
13.	Taiwan	171.5	1.3%
14.	Italy	130.5	1.0%
15.	Belgium	103.6	0.8%
16.	Switzerland	99.4	0.7%
17.	Ireland	97.4	0.7%
18.	Spain	95.9	0.7%
19.	Colombia	95.1	0.7%
20.	Sweden	94.9	0.7%
	Others	1,794.7	13.4%
	TOTAL	**13,400.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	10,640.8	13,010.7	13,400.0
Outgoing	29,358.8	37,594.8	37,272.4
Surplus (Deficit)	(18,718.0)	(24,584.1)	(23,872.4)
Total Volume	39,999.5	50,605.6	50,672.4

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic. Data exclude VoIP traffic volumes which accounted for over 3 billion minutes of outgoing traffic and 100 million minutes of incoming traffic. Carriers and traffic from points beyond the United States, Puerto Rico, and the U.S. Virgin Islands are excluded.

Uruguay

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	Argentina	40.0	51.3%
2.	Brazil	10.5	13.5%
3.	United States	8.0	10.3%
4.	Spain	4.2	5.4%
5.	Chile	1.7	2.2%
6.	Paraguay	1.5	1.9%
7.	Italy	1.2	1.5%
8.	Peru	0.9	1.2%
9.	France	0.8	1.0%
10.	Mexico	0.8	1.0%
11.	Canada	0.5	0.6%
12.	Germany	0.5	0.6%
13.	United Kingdom	0.5	0.6%
14.	Cuba	0.4	0.5%
15.	Switzerland	0.4	0.5%
16.	Ecuador	0.3	0.4%
17.	Australia	0.2	0.3%
18.	Bolivia	0.2	0.3%
19.	Netherlands	0.2	0.3%
20.	Venezuela	0.2	0.3%
	Others	5.0	6.4%
	TOTAL	**78.0**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	98.3	110.9	127.8
Outgoing	80.1	78.0	78.0
Surplus (Deficit)	18.2	33.0	49.8
Total Volume	178.4	188.9	205.8

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic.

Uzbekistan

LARGEST TELECOMMUNICATIONS ROUTES, 2001

	Destination	Minutes (millions)	Percent of Outgoing Traffic
1.	Russia	29.5	50.6%
2.	Kazakhstan	5.1	8.8%
3.	Kyrgyzstan	3.2	5.5%
4.	Ukraine	2.0	3.4%
5.	Tajikistan	1.7	3.0%
6.	Turkmenistan	1.4	2.5%
7.	Belarus	0.6	1.0%
8.	Azerbaijan	0.5	0.8%
9.	Armenia	0.3	0.6%
10.	Georgia	0.2	0.3%
11.	Moldova	0.1	0.1%
	Others	13.7	23.5%
	TOTAL	**58.3**	

NATIONAL TRAFFIC BALANCE

Minutes (millions)	1999	2000	2001
Incoming	75.0	54.3	n.a.
Outgoing	68.5	71.4	58.3
Surplus (Deficit)	6.6	(17.0)	n.a.
Total Volume	143.5	125.7	n.a.

Note: Data are in millions of minutes of outgoing public switched telecommunications traffic. The "Others" category may include routes to non-members of the Commonwealth of Independent States that rank among the top destinations for outgoing traffic.

Methodology

The traffic statistics in *TeleGeography 2003* were compiled primarily from an independent survey of telecommunications service providers. For some countries and carriers, traffic data have been estimated based upon annual reports, government publications, and industry interviews.

To enable comparisons of countries' international traffic statistics, TeleGeography has endeavored to apply a consistent methodology. When reviewing the traffic statistics in *TeleGeography 2003,* however, readers should keep in mind the following issues.

Public Switched Network vs. Private Line Traffic

Traffic volumes in *TeleGeography 2003* are generally reported in minutes. In most cases, the statistics refer to paid minutes on public switched circuits and thus include voice as well as fax traffic.

Traffic volumes include traffic carried by wholesale carriers that is resold by "pure" resellers. These resellers do not own or lease their own international transmission facilities. Instead, they resell the services of other carriers; thus, pure resale traffic is counted as part of the minutes for the facilities-based carrier whose services are resold. Many companies act both as carriers of traffic and as reselllers of other carriers' services. To avoid double counting, TeleGeography's carrier survey specifically counts only traffic actually carried by the company.

Traffic carried by International Simple Resale (ISR) carriers is also included. ISR carriers lease international private lines (IPLs) for switched services by interconnecting their IPLs to the public switched network at one or both ends and resell this capacity.

Illicit Bypass

While traffic volumes include ISR, they generally do not include illicit bypass traffic that bypasses the international settlement rate regime. One form of illicit bypass is Voice-over-Internet-Protocol (VoIP). For an overview of Voice-over-IP traffic volumes, see "VoIP Routes and Traffic."

Cross-Border Traffic

Neighboring countries may not classify local cross-border traffic in the same way. That is, one country may treat some cross-border traffic as domestic while its neighbor counts all such traffic as international.

Transit Traffic

Unless otherwise stated, *TeleGeography 2003* excludes refile and transit traffic from the totals of countries acting as transit hubs. Notable exceptions include the U.K. and U.S. statistics, which do include some traffic reoriginated from other countries.

Inbound vs. Outbound Statistics

Comparisons of inbound traffic statistics reported by the United States and the United Kingdom may not match up exactly with outbound traffic reported by the originating country. Reasons for discrepancies may include differences in reporting methodologies (e.g. billing point vs. originating point) and inclusion of some refile or bypass traffic. Carriers or regulators may also exclude some cross-border traffic (e.g., between Ireland and Northern Ireland).

Fixed vs. Mobile Traffic

Traffic volumes include international calls originated and terminated on both fixed and mobile networks.

Rounding

Rounding may cause the figures on total national incoming and outgoing traffic to appear inconsistent with other national data.

Revised Data

Some differences exist between the historical statistics reported in *TeleGeography 2003* and data published in prior TeleGeography reports or Direction of Traffic. The variations reflect corrections and/or revised data subsequently provided to TeleGeography. 

Bandwidth

Bandwidth

The statistics and analysis presented on the following pages are excerpted from Submarine Bandwidth 2002 *and* Terrestrial Bandwidth 2002*, published in March and April 2002, respectively.*

After five years of frenzied network construction, the fiber-optic industry is suffering a hangover so severe that it's hard to remember why anyone ever thought it was a good idea to lay an undersea cable in the first place. While the pain will likely persist for some time to come, TeleGeography's analysis of bandwidth demand suggests that the underlying idea may not have been so far off the mark.

Supply

The construction boom experienced at the end of the twentieth century has yielded a vast supply of fiber-optic capacity and a diverse array of suppliers. Over the past year, a number of bandwidth providers have disappeared, unable to surmount the debt incurred through ambitious network construction. Others have scaled back their activities and pruned plans for network expansion while diversifying their product and service offerings. In the midst of such volatility, incumbent carriers have re-emerged as the industry's prominent players—nearly all of the few companies still extending their networks in 2001 were owned by incumbents.

While the number of providers may be dwindling, supply remains abundant, if not excessive. Major cities in the U.S., for example, are routinely traversed by a thousand (or more) pairs of optical fiber while pan-European networks have laid hundreds of pairs through population centers. Only a small portion of those fibers are actually lit: on average, 10 percent of potential wavelengths on 10 percent of available fiber pairs. As a result, only one to two percent of potential bandwidth is active. The potential capacity is even more astonishing, reaching petabits per second in the U.S. (on domestic and international networks) and hundreds of terabits in Europe (on international networks alone).

Since 1998, lit capacity on both trans-Atlantic and trans-Pacific cables has grown more than 20-fold while lit capacity on intra-Asian regional cables has increased more than 50-fold in only four years (see Figure 1. Submarine Cable Capacity Trends by Route, 1998-2004). Although construction of new cables has slowed sharply, two high-capacity cables are still scheduled to be deployed this year, one each in the Atlantic and Pacific.

Demand

The incredible supply available in the bandwidth market has generated much discussion of an industry glut. Given the tremendous amount of fiber laid over the past few years and the waning of dark fiber sales, industry analysts and network builders have focused on the distinction between oversupply of fiber and oversupply of bandwidth. That the current supply of fiber exceeds demand is now a foregone conclusion, but, according to many in the industry, surplus fiber does not directly imply surplus bandwidth—after all, only a small portion of that fiber is actually lit. TeleGeography's research, unfortu-

nately, suggests that a bandwidth glut does indeed exist alongside the fiber glut. London has 6.5 Tbps of capacity running through it on cross-border networks, yet the combined bandwidth on Internet, voice, and private data networks to and from the top forty European metropolitan areas (ranked by international circuit usage) was only 1.6 Tbps in 2001.

How severe is this disjuncture between supply and demand? TeleGeography research indicates that demand is certainly growing, though not as vigorously as the industry might hope. The Internet has long been touted as the pivotal driver of bandwidth demand, and research confirms its importance in generating demand for bandwidth products and services. Between 2000 and 2001, international Internet bandwidth tripled, far outpacing growth on other, private networks. While still robust, the rate of Internet bandwidth growth appears to be slowing, despite increased broadband access to homes and businesses.

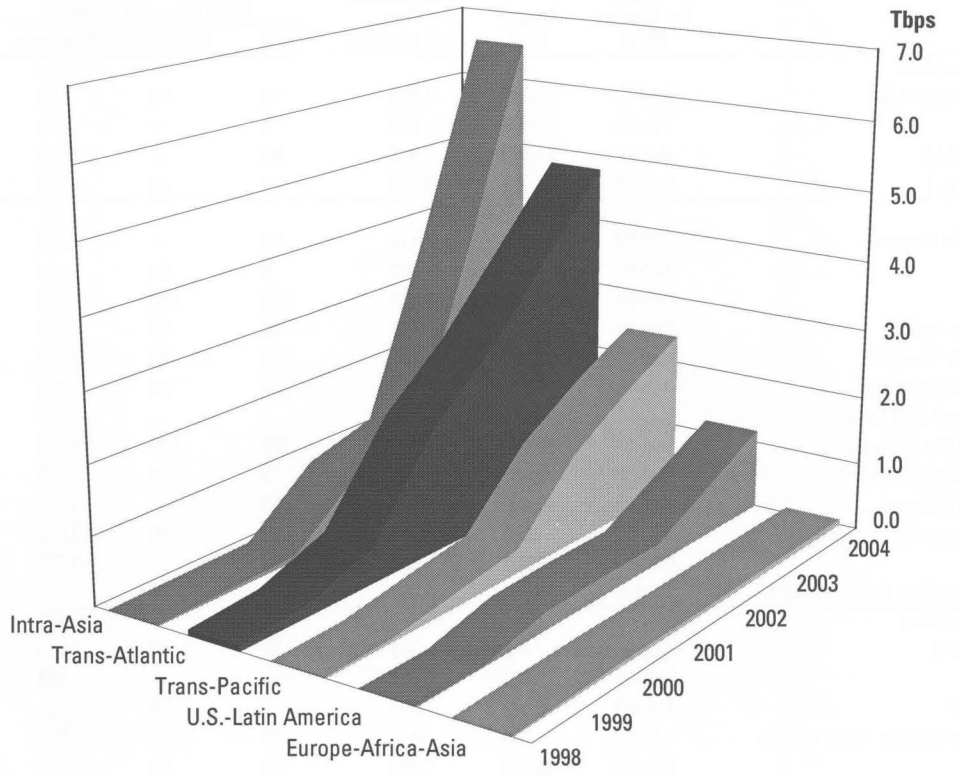
For all the industry worry over capacity gluts, it is ironic that the supply/demand equation now has little bearing on price changes. The overhang of bandwidth is so large that, for the foreseeable future, the supply/demand equation will not strongly determine price swings in either direction. With bandwidth prices already at or even below costs, however, it seems unlikely that the capacity overhang, alone, can depress prices any further. If prices do continue their steep descent, it will be due to other market forces—cheaper provisioning costs or distressed sales by providers nearing bankruptcy—rather than the continuing capacity glut.

The Road Ahead

Unfortunately, the elusive state of market equilibrium will not arrive soon enough for some companies. Caught between falling prices, slowing demand, and difficult debt covenants, a number of bandwidth providers showed signs in 2002 that they may join scores of other telecom companies in bankruptcy. Even so, supply costs are falling, demand continues to grow, and prices will eventually stabilize. Once the current market chaos finally does subside, investors will likely perceive what no one wanted to admit in the 1990s: when stripped of its "new economy" glamour, the bandwidth industry fundamentally is a competitive one. As with most companies in competitive industries, the surviving bandwidth suppliers will likely earn a respectable—if unspectacular—return on their capital investments.

Submarine Cable Systems

Figure 1. Submarine Cable Capacity Trends by Route, 1998-2004



Submarine Cable Capacity (Gbps)

	1998	1999	2000	2001	2002	2003	2004	Fully Upgraded
Intra-Asia	16.1	41.1	66.1	826.1	1,106.1	3,637.1	6,440.1	30,591.1
Trans-Atlantic	83.0	168.0	537.4	1,862.4	2,682.4	3,729.1	4,775.8	12,322.4
Trans-Pacific	14.1	44.1	204.1	344.1	1,314.1	1,896.1	2,388.1	6,984.1
U.S.-Latin America	10.6	13.1	250.6	275.6	275.6	725.6	1,171.1	4,915.6
Europe-Africa-Asia	11.1	31.1	51.1	51.1	61.1	71.1	81.1	171.1

Notes: Capacity figures denote lit, protected capacity at the end of the respective year. Projected capacity assumes trans-Atlantic cables will reach half of their fully upgradeable capacities by 2005 while cables on other routes will reach half of their fully upgradeable capacities by 2007. Projections for 360atlantic assume no capacity upgrades.

Notes on submarine cable maps: Cable systems profiled include international cables and U.S. domestic cables with a fully upgradeable capacity of at least 10 Gbps and an announced Ready for Service (RFS) date before January 1, 2004.

Source: TeleGeography research, *Submarine Bandwidth 2002*

Submarine Cable Systems

Figure 2. Major Submarine Networks: Length, Cost, and Capacity

	Ready for Service (RFS)	Length (km)	Construction Cost (US$ Millions)	Cable Capacity (Gbps)		
				RFS	March 2002	Maximum
Europe-Africa-Asia						
FLAG Europe-Asia	Nov-97	28,000	1,600	10	10	10
SAFE	Apr-02	13,500	290	10	—	130
SAT-3/WASC	Apr-02	14,350	507	20	—	120
SeaMeWe-3	Sep-99	38,000	1,173	20	20	40
Intra-Asian						
A2A Cable Network	Jun-03	4,600	n.a.	40	—	1,920
APCN	Feb-97	5,234	550	5	10	10
APCN-2	Dec-01	19,000	1,060	160	160	2,560
Australia-Japan	Dec-01	12,700	450	40	40	320
C2C Cable Network	Nov-01	17,000	2,100	160	160	7,680
East Asia Crossing	Jan-01	19,500	1,280	80	80	2,560
FLAG North Asia Loop/ REACH North Asia Loop	Jun-01	10,000	750	320	320	3,840
Guam-Philippines (G-P)	Mar-99	3,600	100	5	5	40
i2i Cable Network	Apr-02	11,400	650	160	—	8,400
Korea-Japan Cable Network	Mar-02	500	60	50	50	2,880
Nava-1	Dec-03	9,000	645	160	—	3,200
South East Asia Cable Network	n.a.	19,000	1,250	640	—	7,680
U.S.-Latin America						
Americas-II	Aug-00	7,350	365	80	80	80
ARCOS	Dec-01	8,600	400	15	15	960
Atlantis-2	Feb-00	8,500	230	5	20	20
Bahamas Internet Cable System	Jul-01	600	n.a.	15	15	240
Emergia	Mar-01	25,000	1,600	40	40	1,920
GlobeNet/360americas	Oct-00	29,000	1,000	80	80	1,360
Maya-1	Oct-00	4,400	152	8	8	20
Mid-Atlantic Crossing	Jun-00	6,700	415	20	20	320
Pan-American Crossing	Mar-00	9,000	280	10	20	240
South American Crossing	Sep-00	16,000	800	40	60	1,280
Trans-Atlantic						
360atlantic	Apr-01	11,700	770	160	160	1,920
Apollo	Dec-02	13,000	1,200	640	—	3,200
Atlantic Crossing-1	May-98	14,521	750	40	140	160
Columbus-III	Dec-99	10,000	236	10	40	40
FLAG Atlantic-1	Jun-01	14,500	1,100	160	160	2,400
Gemini Cable System	Feb-98	12,115	600	10	60	60
TAT-12/13	Sep-96	12,766	750	10	30	30
TAT-14	Apr-01	15,300	1,400	640	640	640
Tyco Transatlantic	Jun-01	13,000	n.a.	280	460	2,560
Yellow/Atlantic Crossing-2	Sep-00	6,000	800	320	320	1,280

Source: TeleGeography research, *Submarine Bandwidth 2002*

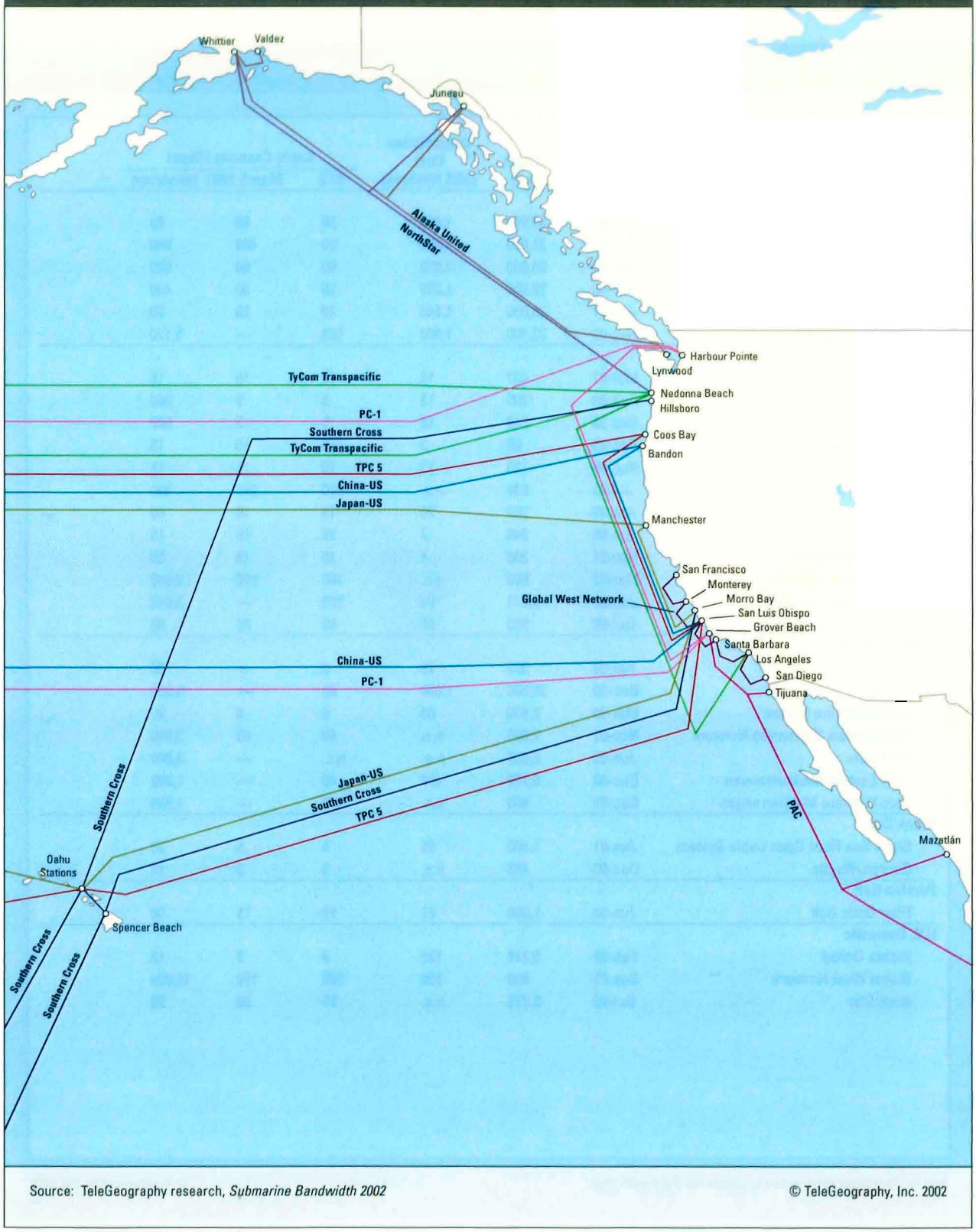
Submarine Cable Systems

Figure 2. Major Submarine Networks: Length, Cost, and Capacity

	Ready for Service (RFS)	Length (km)	Construction Cost (US$ Millions)	Cable Capacity (Gbps)		
				RFS	March 2002	Maximum
Trans-Pacific						
China-U.S. Cable Network	Jan-00	30,800	1,400	80	80	80
Japan-U.S. Cable Network	Aug-01	21,000	1,000	80	400	640
Pacific Crossing-1	Dec-99	20,900	1,200	80	80	640
Southern Cross Cable Network	Nov-00	30,500	1,300	20	80	480
TPC 5	Jan-97	25,000	1,240	10	20	20
Tyco Transpacific	Aug-02	22,100	1,900	580	—	5,120
Intra-European						
Baltica	Mar-97	437	16	15	15	15
ESAT-1	Aug-99	200	13	5	5	960
ESAT-2	Sep-99	240	16	5	5	960
Germany-Denmark 2	Dec-95	60	3	10	10	15
Kattegat	Aug-95	180	13	15	15	15
NorSea Com	Jul-99	930	n.a.	240	240	960
Solas	Apr-99	200	20	15	15	60
Sweden-Estonia	Jun-95	240	7	15	15	15
Sweden-Lithuania	Nov-97	200	4	20	15	20
Tyco Northern Europe	Mar-02	600	n.a.	160	160	3,840
Tyco Western Europe	Jun-02	6,174	90	120	—	3,840
UK-Germany 6	Oct-98	560	50	40	40	80
Mediterranean						
ALPAL-2	Apr-02	308	15	3	—	160
Axone	Dec-03	20,000	1,000	80	—	4,000
Lev Submarine System	Mar-99	2,600	66	5	5	40
MedNautilus Submarine Network	Nov-01	7,000	n.a.	40	40	3,840
Silk Route	Jun-03	2,000	n.a.	n.a.	—	3,840
Tyco Eastern Mediterranean	Dec-03	6,719	400	40	—	1,280
Tyco Western Mediterranean	Dec-03	400	n.a.	40	—	1,920
Black Sea						
Black Sea Fiber Optic Cable System	Jan-01	1,300	55	5	5	20
Georgia-Russia	Dec-00	433	n.a.	3	3	10
Persian Gulf						
Fiber Optic Gulf	Jun-98	1,300	81	15	15	30
U.S. Domestic						
Alaska United	Feb-99	3,218	125	3	3	10
Global West Network	Sep-01	930	160	160	160	15,360
NorthStar	Oct-99	3,229	n.a.	20	20	30

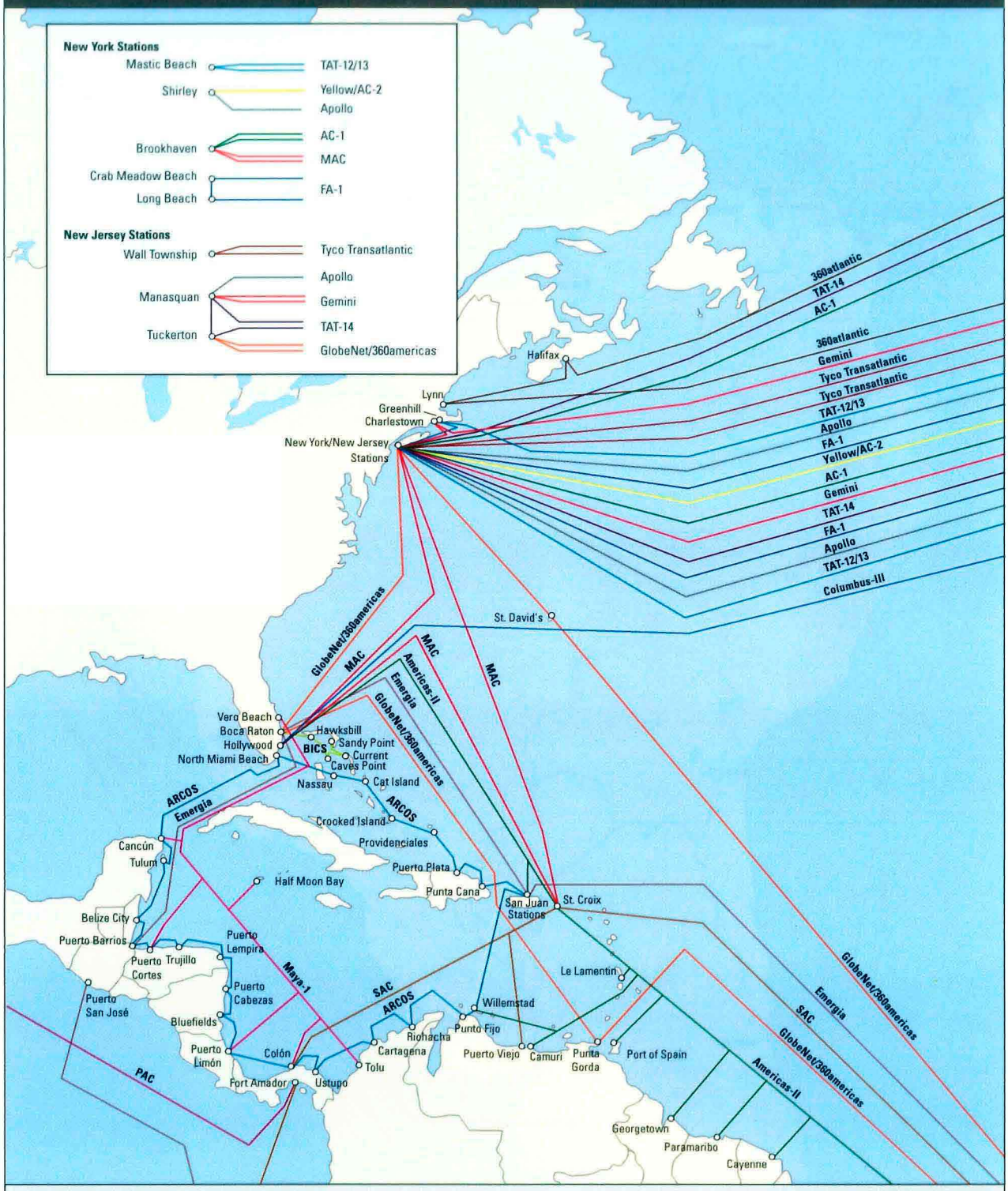
Source: TeleGeography research, *Submarine Bandwidth 2002*

Figure 3. Map of Major Submarine Cable Systems in North America (Pacific Coast)



Source: TeleGeography research, *Submarine Bandwidth 2002*

Figure 4. Map of Major Submarine Cable Systems in North America (Atlantic Coast) & Caribbean

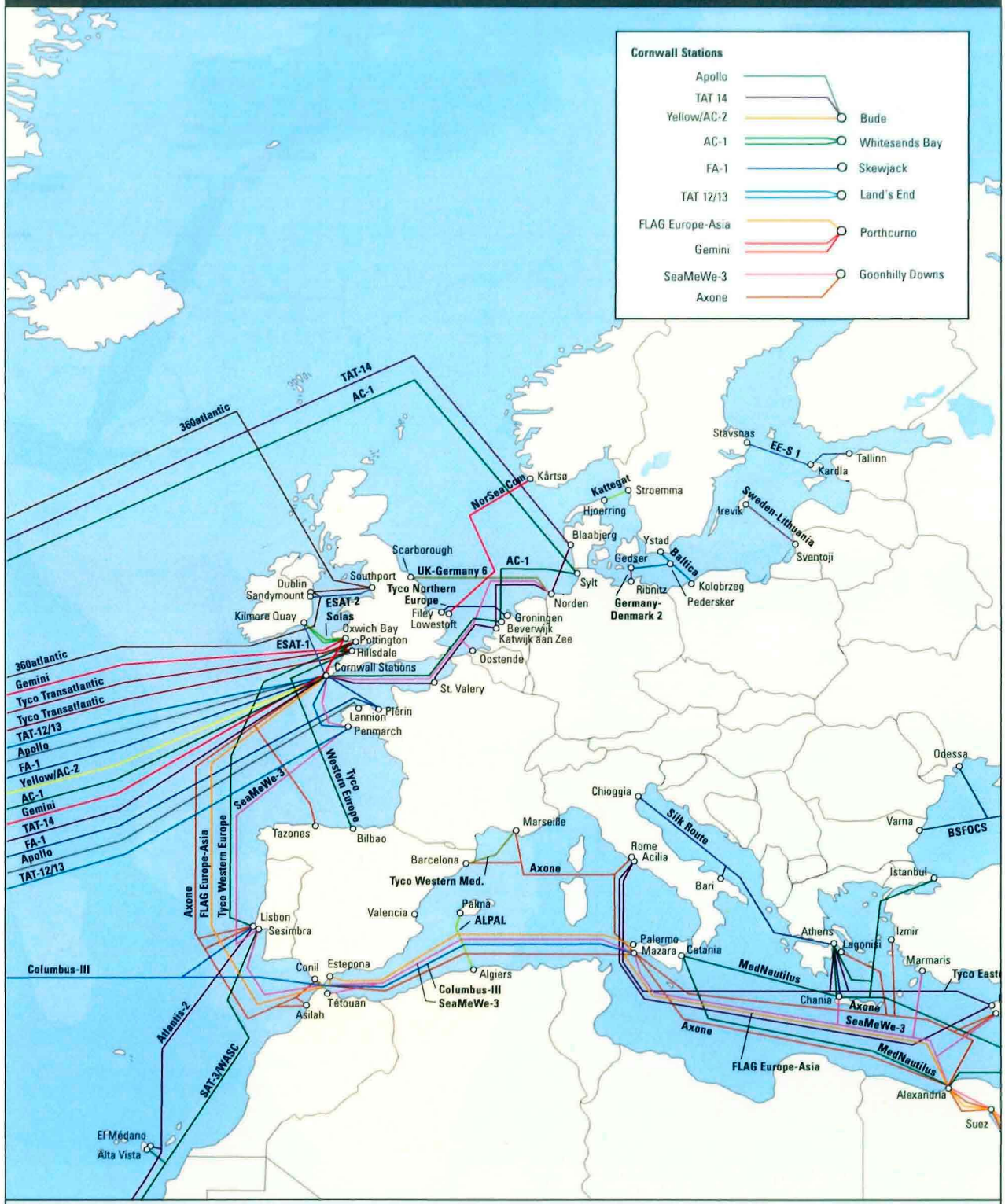


Source: TeleGeography research, *Submarine Bandwidth 2002*

Figure 5. Map of Major Submarine Cable Systems in South America & Caribbean

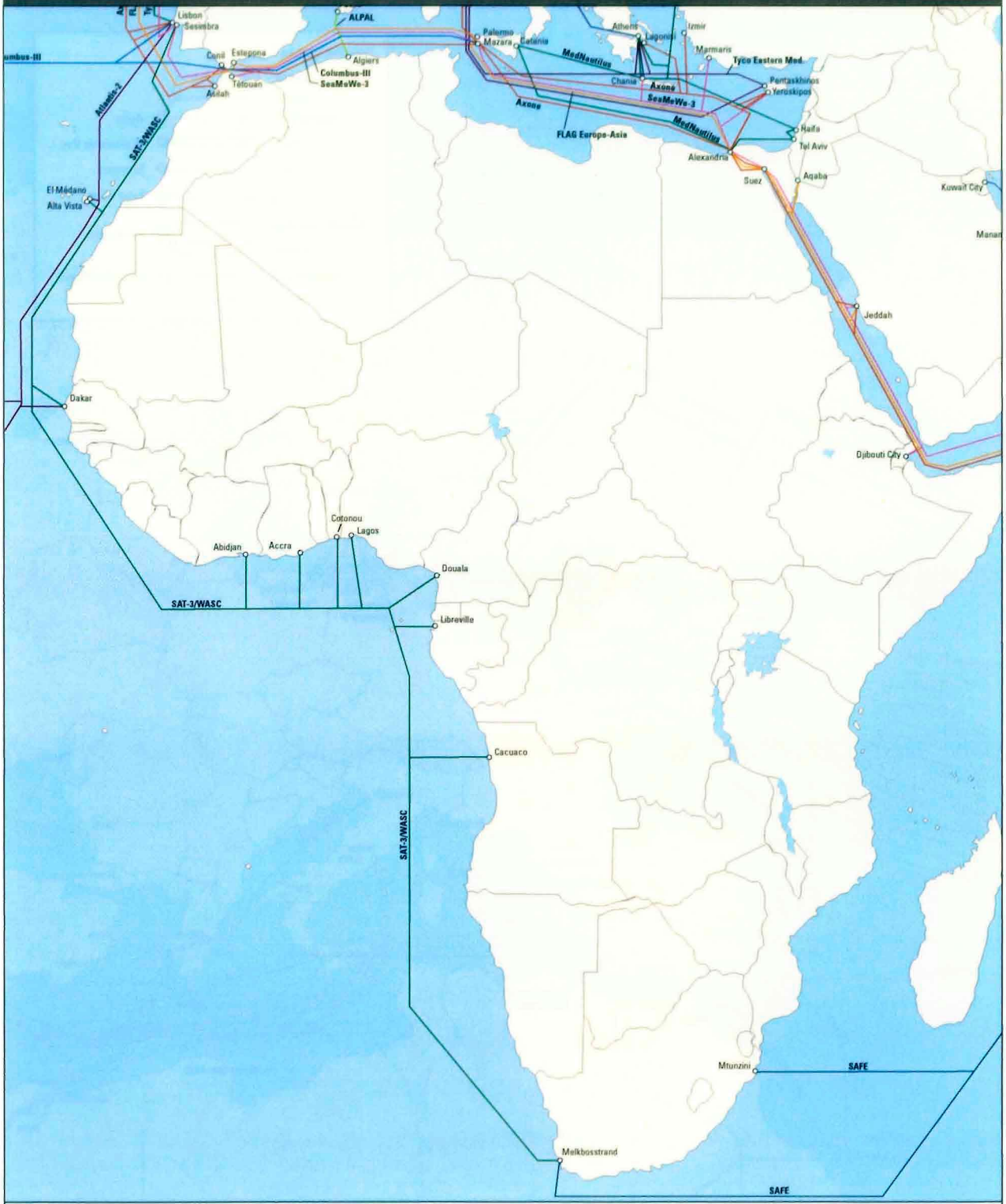
Source: TeleGeography research, *Submarine Bandwidth 2002*

Figure 6. Map of Major Submarine Cable Systems in Europe



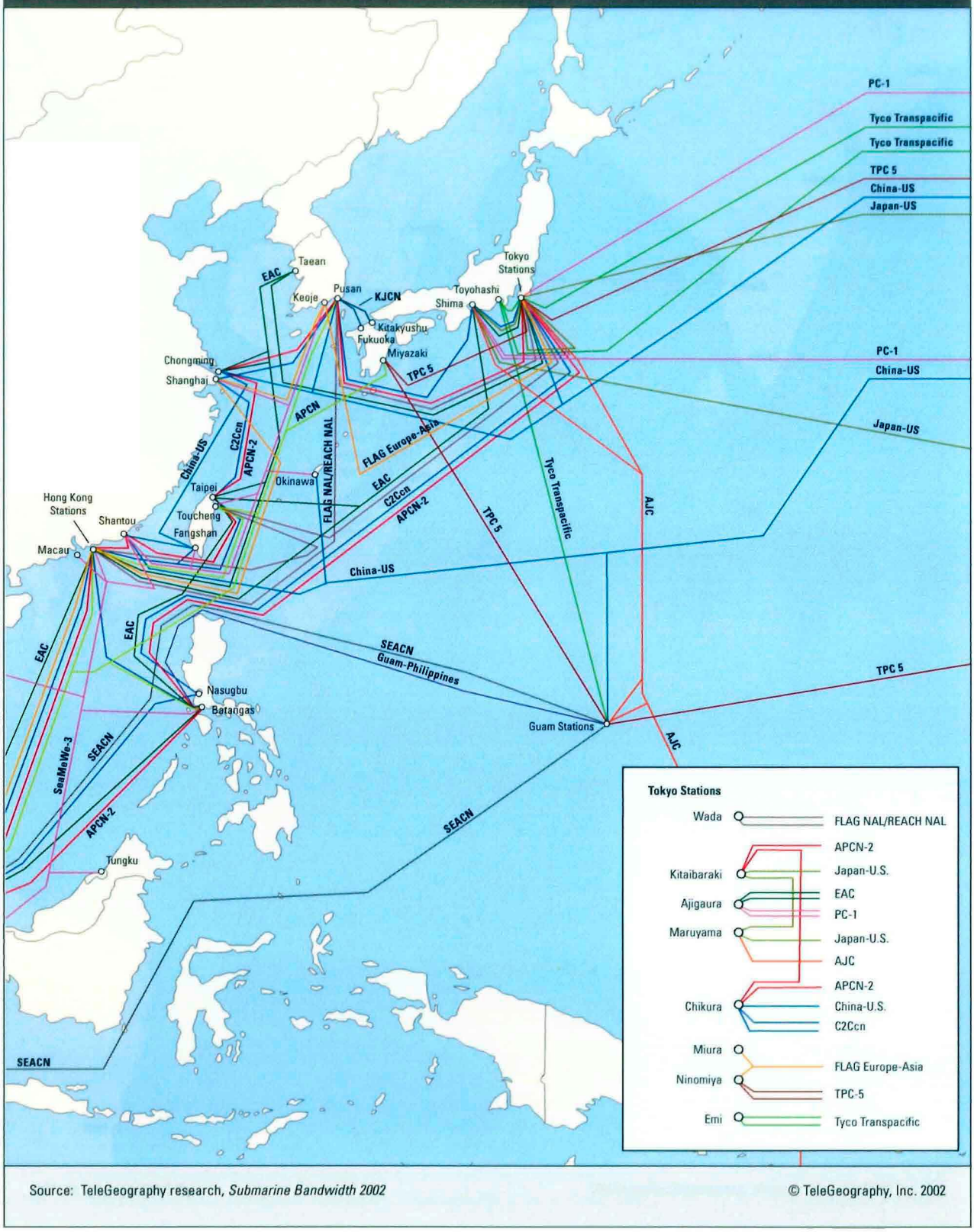
Source: TeleGeography research, *Submarine Bandwidth 2002*

Figure 7. Map of Major Submarine Cable Systems in Africa and the Mediterranean



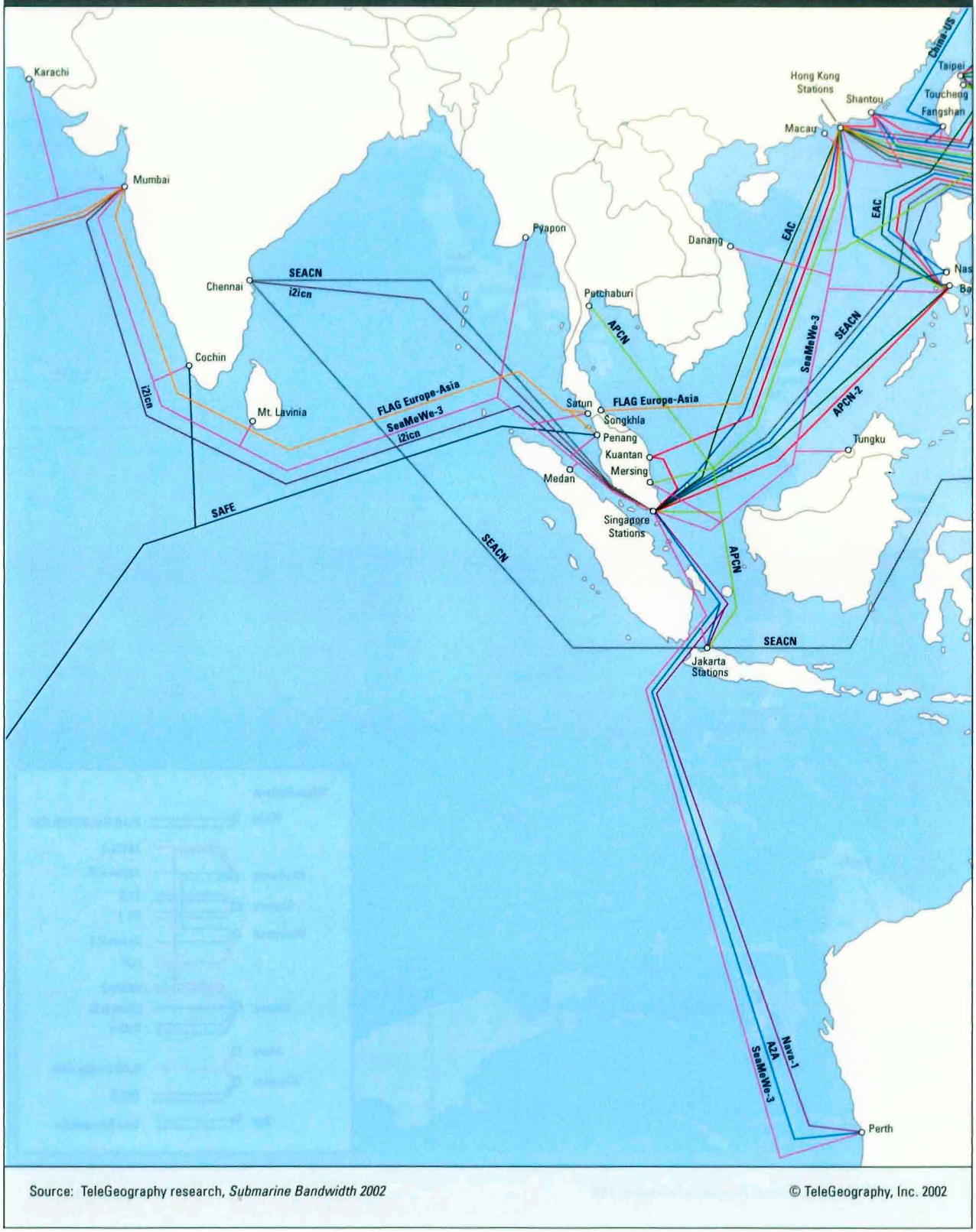
Source: TeleGeography research, *Submarine Bandwidth 2002*

Figure 8. Map of Major Submarine Cable Systems in East Asia



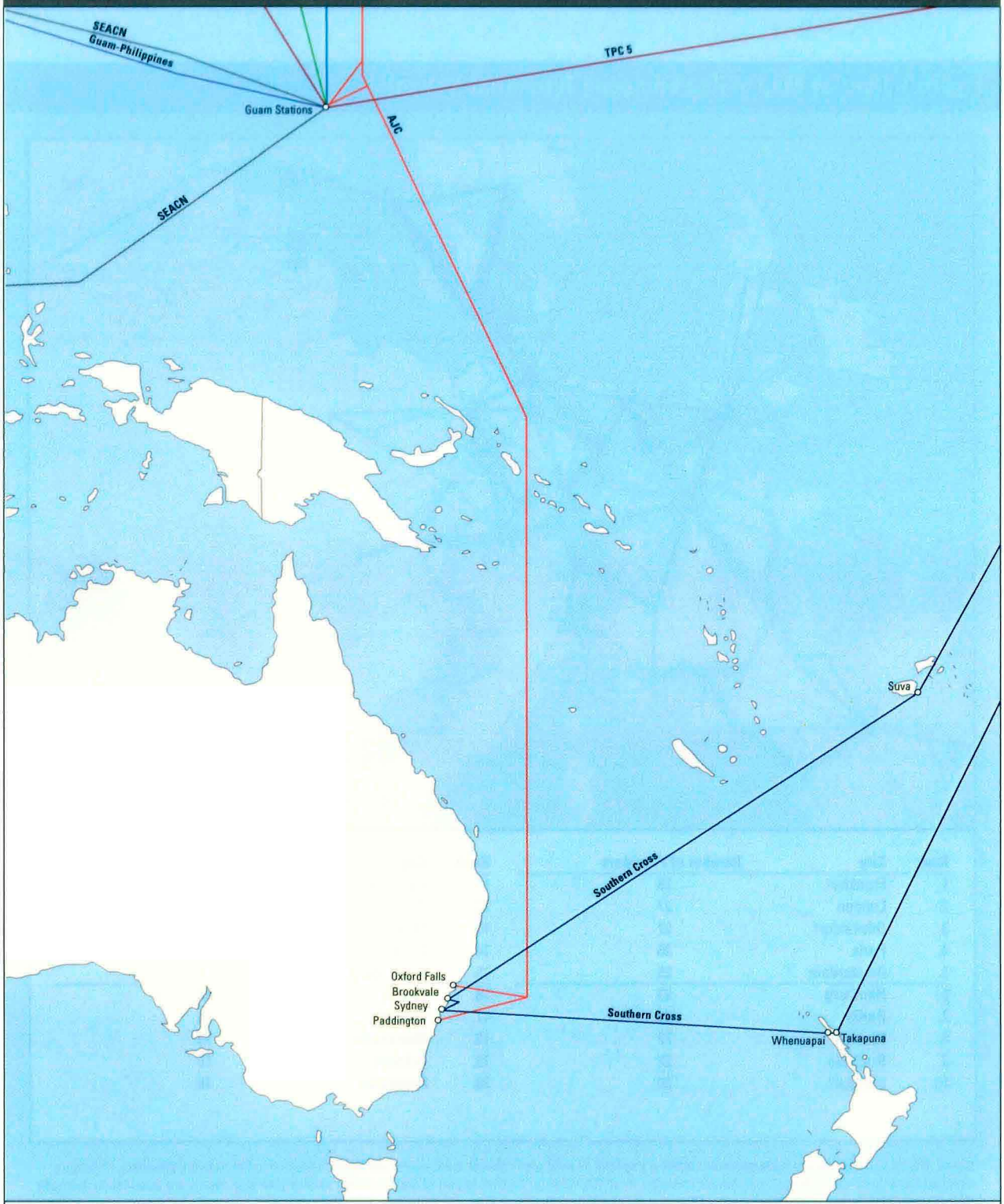
Source: TeleGeography research, *Submarine Bandwidth 2002*

Figure 9. Map of Major Submarine Cable Systems in South Asia



Source: TeleGeography research, *Submarine Bandwidth 2002*

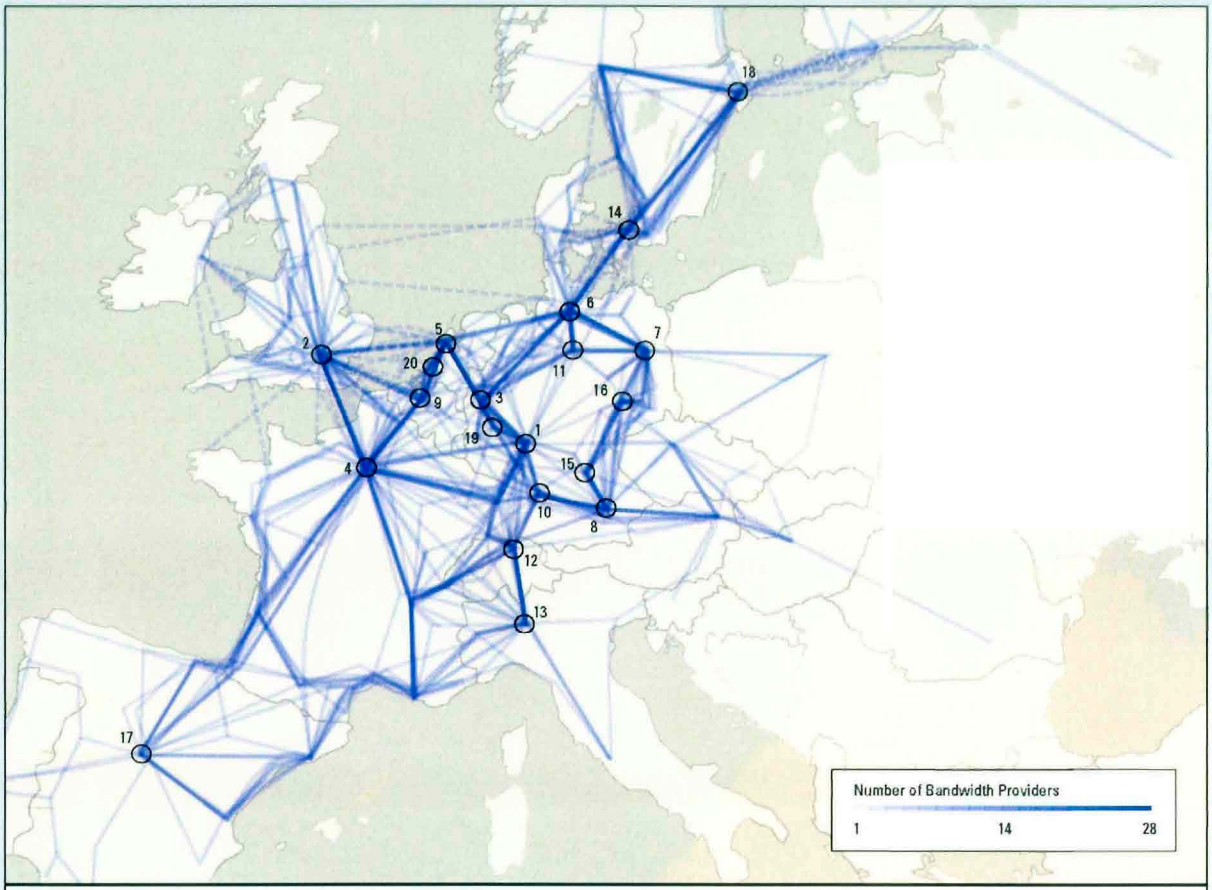
Figure 10. Map of Major Submarine Cable Systems in Oceania



Source: TeleGeography research, *Submarine Bandwidth 2002*

Terrestrial Networks

Figure 1. Overlay Map of Pan-European Terrestrial Networks

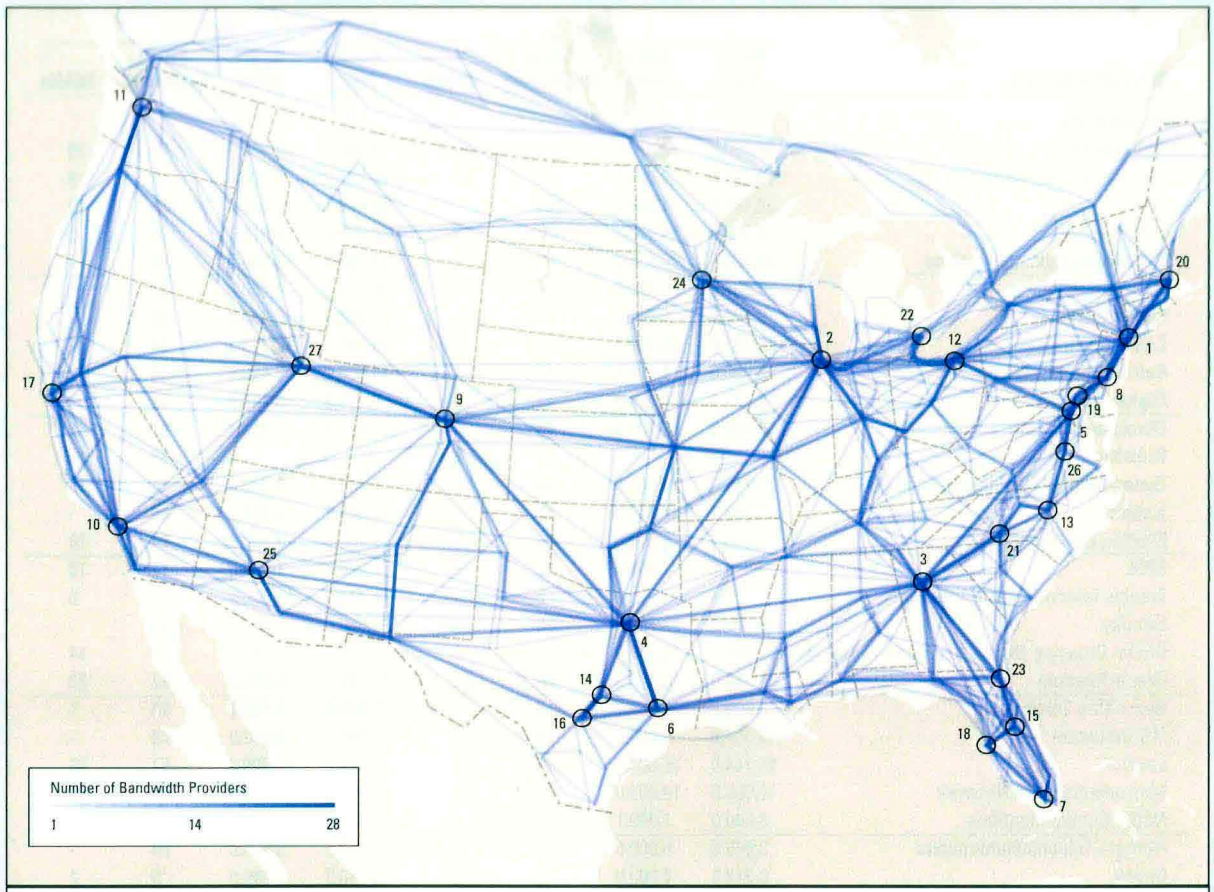


Rank	City	Number of Providers	Rank	City	Number of Providers
1.	Frankfurt	28	11.	Hannover	18
2.	London	27	12.	Zürich	18
3.	Düsseldorf	27	13.	Milan	17
4.	Paris	26	14.	Copenhagen	16
5.	Amsterdam	25	15.	Nuremberg	16
6.	Hamburg	23	16.	Leipzig	16
7.	Berlin	22	17.	Madrid	16
8.	Munich	22	18.	Stockholm	15
9.	Brussels	22	19.	Cologne	15
10.	Stuttgart	20	20.	Rotterdam	15

Notes: Bandwidth providers include operators offering capacity on their own network build and/or via fiber leased from other network providers. Providers included were those who offered cross-border connectivity at 155 Mbps (or higher) as part of their standard service offerings. Maps are designed to illustrate intercity connectivity and do not necessarily reflect the exact physical routing of fiber.

Source: TeleGeography research, *Terrestrial Bandwidth 2002*

Figure 2. Overlay Map of U.S. Terrestrial Networks



Rank	City	Number of Providers
1.	New York	28
2.	Chicago	27
3.	Atlanta	26
4.	Dallas	24
5.	Washington	22
6.	Houston	21
7.	Miami	21
8.	Philadelphia	21
9.	Denver	20
10.	Los Angeles	20
11.	Seattle	20
12.	Cleveland	19
13.	Raleigh	19
14.	Austin	18

Rank	City	Number of Providers
15.	Orlando	18
16.	San Antonio	18
17.	San Francisco	18
18.	Tampa	18
19.	Baltimore	17
20.	Boston	17
21.	Charlotte	17
22.	Detroit	17
23.	Jacksonville	17
24.	Minneapolis	17
25.	Phoenix	17
26.	Richmond	17
27.	Salt Lake City	17

Notes: Bandwidth providers include operators offering capacity on their own network build and/or via fiber leased from other network providers. Providers included were those who offered connectivity to three or more states at 155 Mbps (or higher) as part of their standard service offerings. Maps are designed to illustrate intercity connectivity and do not necessarily reflect the exact physical routing of fiber.

Source: TeleGeography research, *Terrestrial Bandwidth 2002*

Figure 3. Major Terrestrial Networks: Length, Connectivity, and MANs

Terrestrial System	2001 Route kms	2001 Route miles	2001 Cities Connected	2001 MANs	2002 Route kms	2002 Route miles	2002 Cities Connected	2002 MANs
North America								
360networks	36,000.0	22,370.4	51	13	40,000.0	24,856.0	66	29
America's Fiber Network	12,872.0	8,000.0	35	18	12,872.0	8,000.0	58	18
AT&T	98,149.0	61,000.0	189	-	98,149.0	61,000.0	189	12
BCE Teleglobe	24,000.0	14,913.6	27	3	24,000.0	14,913.6	27	3
Broadwing Communications	29,766.5	18,500.0	59	-	29,766.5	18,500.0	59	-
BTI	6,757.8	4,200.0	28	-	6,757.8	4,200.0	28	-
C3 Networks	9,332.2	5,800.0	23	-	12,872.0	8,000.0	25	-
Cable & Wireless	30,191.0	18,760.7	24	-	30,191.0	18,760.7	24	-
Call-Net Enterprises	14,000.0	8,699.6	44	1	14,000.0	8,699.6	44	1
Digital Teleport	9,171.3	5,700.0	13	-	9,171.3	5,700.0	13	-
Dominion Telecom	10,458.5	6,500.0	49	7	23,491.4	14,600.0	82	32
DukeNet	-	-	17	8	-	-	19	14
Dynegy Global Communications (DGC)	25,744.0	16,000.0	44	16	25,744.0	16,000.0	44	16
e.spire	47,948.2	29,800.0	49	-	47,948.2	29,800.0	49	-
Electric Lightwave, Inc.	7,240.5	4,500.0	24	6	7,240.5	4,500.0	24	10
EPIK	2,976.7	1,850.0	12	7	2,976.7	1,850.0	12	10
France Telecom North America	-	-	2	-	25,744.0	16,000.0	15	3
Genuity	28,479.3	17,700.0	68	-	33,530.0	20,839.0	104	-
Global Crossing (North American Crossing)	31,761.7	19,740.0	115	14	31,761.7	19,740.0	115	14
Group Telecom	25,789.0	16,025.3	26	23	25,789.0	16,025.3	27	23
Hydro One Telecom Inc.	3,000.0	1,864.2	18	1	5,100.0	3,169.1	20	1
ITC Deltacom	16,057.8	9,980.0	48	-	16,057.8	9,980.0	48	-
Level 3	25,744.0	16,000.0	57	26	25,744.0	16,000.0	57	26
Metromedia Fiber Network	16,090.0	10,000.0	28	26	19,308.0	12,000.0	28	26
NEON Communications	3,040.0	1,889.1	29	-	4,032.0	2,505.5	49	12
Norlight Telecommunications	8,045.0	5,000.0	50	-	8,849.5	5,500.0	50	-
Onvoy	3,218.0	2,000.0	9	2	3,218.0	2,000.0	9	2
Progress Telecom	13,515.6	8,400.0	25	24	16,090.0	10,000.0	26	25
Qwest	41,029.5	25,500.0	125	-	41,029.5	25,500.0	125	1
Southern Telecom	1,930.8	1,200.0	9	1	1,930.8	1,200.0	9	2
Sprint	54,947.4	34,150.0	151	-	54,947.4	34,150.0	151	6
Telia	18,000.0	11,185.2	13	-	18,000.0	11,185.2	14	-
TELUS	14,930.0	9,277.5	32	-	16,500.0	10,253.1	32	-
Time Warner Telecom, Inc.	27,040.9	16,806.0	46	-	27,040.9	16,806.0	46	-
Touch America	41,834.0	26,000.0	48	-	41,834.0	26,000.0	66	-
Velocita	32,180.0	20,000.0	56	-	32,180.0	20,000.0	56	-
Williams Communications Group	53,097.0	33,000.0	113	20	53,097.0	33,000.0	113	34
WorldCom	89,600.0	55,677.4	102	102	110,558.0	68,700.7	102	102
XO Communications N. American Network	25,534.8	15,870.0	64	35	25,534.8	15,870.0	64	35
Mexico								
Alestra	5,740.0	3,566.8	19	3	5,840.0	3,629.0	28	3
Bestel	6,022.0	3,742.1	22	4	6,022.0	3,742.1	26	4
Global Crossing (Mexico Crossing)	3,506.0	2,179.0	4	-	3,506.0	2,179.0	4	-
Marcatel	2,000.0	1,242.8	14	3	2,000.0	1,242.8	14	5

Notes: Terrestrial systems listed include those on which capacity may be leased in increments of at least 155 Mbps (one STM-1) as part of standard products and service offerings. European systems include only cross-border European networks.

Source: TeleGeography research, *Terrestrial Bandwidth 2002*

Figure 3. Major Terrestrial Networks: Length, Connectivity, and MANs (continued)

Terrestrial System	2001 Route kms	2001 Route miles	2001 Cities Connected	2001 MANs	2002 Route kms	2002 Route miles	2002 Cities Connected	2002 MANs
South America								
Embratel	23,000.0	14,292.2	19	8	23,000.0	14,292.2	19	8
Global Crossing (Trans Andean Crossing)	2,518.1	1,565.0	7	-	2,595.3	1,613.0	7	-
Impsat	6,400.0	3,977.0	25	15	6,400.0	3,977.0	25	15
Intelig Telecomunicações Ltda.	15,000.0	9,321.0	102	10	15,000.0	9,321.0	123	10
Latin America Nautilus	-	-	-	-	5,400.0	3,355.6	6	-
Silica Networks	4,300.0	2,672.0	13	-	4,300.0	2,672.0	13	-
Europe								
360networks	20,100.0	12,490.1	30	-	20,100.0	12,490.1	30	-
BCE Teleglobe (GlobeSystem Europe)	14,200.0	8,823.9	27	-	23,000.0	14,292.2	27	-
Belgacom	11,300.0	7,021.8	9	-	15,300.0	9,507.4	13	5
BT Ignite	54,000.0	33,555.6	33	-	55,000.0	34,177.0	33	-
Cable & Wireless Europe	7,500.0	4,660.5	28	3	7,500.0	4,660.5	32	5
Carrier1	15,000.0	9,321.0	26	2	15,000.0	9,321.0	26	2
CECOM BV	2,000.0	1,242.8	9	-	2,500.0	1,553.5	11	-
COLT (EuroLAN)	14,000.0	8,699.6	39	32	15,000.0	9,321.0	39	32
Dynegy Europe Communications (DEC)	18,661.0	11,595.9	25	2	18,661.0	11,595.9	28	3
Energis	12,500.0	7,767.5	62	10	12,500.0	7,767.5	62	15
Fibernet	13,400.0	8,326.8	92	16	13,400.0	8,326.8	92	17
France Telecom	20,000.0	12,428.0	32	-	20,000.0	12,428.0	44	6
Genuity	-	-	13	-	-	-	14	-
Global Crossing (Pan European Crossing)	24,986.0	15,526.3	32	7	24,986.0	15,526.3	33	7
GlobalConnect A/S	1,900.0	1,180.7	4	4	1,900.0	1,180.7	5	4
Infigate	4,098.0	2,546.5	8	-	4,098.0	2,546.5	10	-
Interoute (i-21 network)	14,500.0	9,010.3	45	-	14,500.0	9,010.3	45	8
KPNQwest (EuroRings)	25,000.0	15,535.0	60	10	25,000.0	15,535.0	60	14
LambdaNet Communications	22,000.0	13,670.8	100	7	22,000.0	13,670.8	104	10
LDCOM Networks	11,000.0	6,835.4	30	29	14,000.0	8,699.6	30	29
Level 3 (Europe)	6,000.0	3,728.4	9	9	6,000.0	3,728.4	17	10
Metromedia Fiber Network	-	-	16	16	-	-	16	16
Pangea Network	10,500.0	6,524.7	19	-	10,500.0	6,524.7	19	-
Song Networks Holding AB	12,706.0	7,895.5	47	22	-	-	47	22
Storm Telecommunications	9,500.0	5,903.3	20	12	-	-	20	12
TDC Tele Danmark	6,000.0	3,728.4	17	-	9,500.0	5,903.3	21	-
Telia (Viking)	16,000.0	9,942.4	50	2	22,000.0	13,670.8	67	2
Tiscali International Network BV	12,000.0	7,456.8	37	6	14,000.0	8,699.6	58	7
Utfors	4,000.0	2,485.6	6	-	7,000.0	4,349.8	7	6
Verizon	3,236.0	2,010.9	6	-	5,910.0	3,672.5	8	-
Versatel	3,500.0	2,174.9	45	41	4,000.0	2,485.6	49	45
Viatel (Circe)	10,400.0	6,462.6	39	-	10,400.0	6,462.6	39	-
Williams Communications Group	10,940.0	6,798.1	21	-	10,940.0	6,798.1	24	-
WorldCom (Ulysses)	16,260.0	10,104.0	75	44	16,260.0	10,104.0	75	44

Notes: Terrestrial systems listed include those on which capacity may be leased in increments of at least 155 Mbps (one STM-1) as part of standard products and service offerings. European systems include only cross-border European networks.

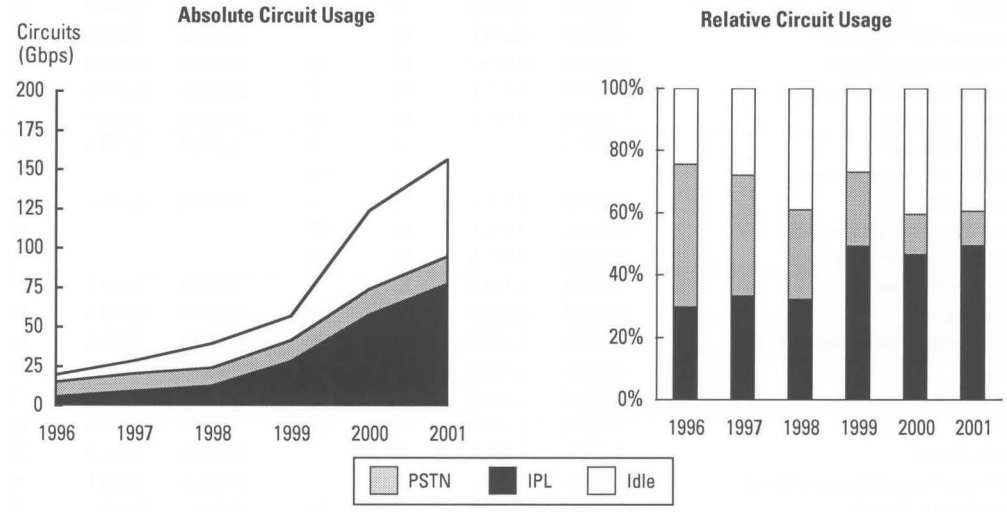
Source: TeleGeography research, *Terrestrial Bandwidth 2002*

International Circuit Usage by U.S. Carriers

Each year, the U.S. Federal Communications Commission (FCC) releases aggregate circuit usage statistics based on reports filed by the three largest U.S. facilities-based carriers (AT&T, WorldCom, and Sprint). As of 2000, these three carriers accounted for only 50.1 percent of total international bandwidth from the U.S. Nevertheless, the "Big Three" statistics are still useful for baseline comparisons along two axes. First, the data illuminates year-to-year growth trends in overall cable connectivity. Second, the statistics break down how much capacity is used for public switched telephone network (PSTN) traffic and international private lines (IPLs), as well as how much capacity is reported "idle" each year.

Although private lines can carry voice traffic, the circuit usage statistics provide a rough proxy for determining the balance of voice and data traffic on international networks connecting to the U.S. Assuming that increased IPL circuit deployment represents increased data traffic flows, the voice/data "crossover"—occurred sometime in 1998. Since 1996, the PSTN's share of used capacity dropped from 83 to 18 percent. During 2001, private line deployments grew by 34 percent, while public telephone line capacity increased by a stately 8 percent.

Figure 1. International Circuit Usage Summary, 1996-2001



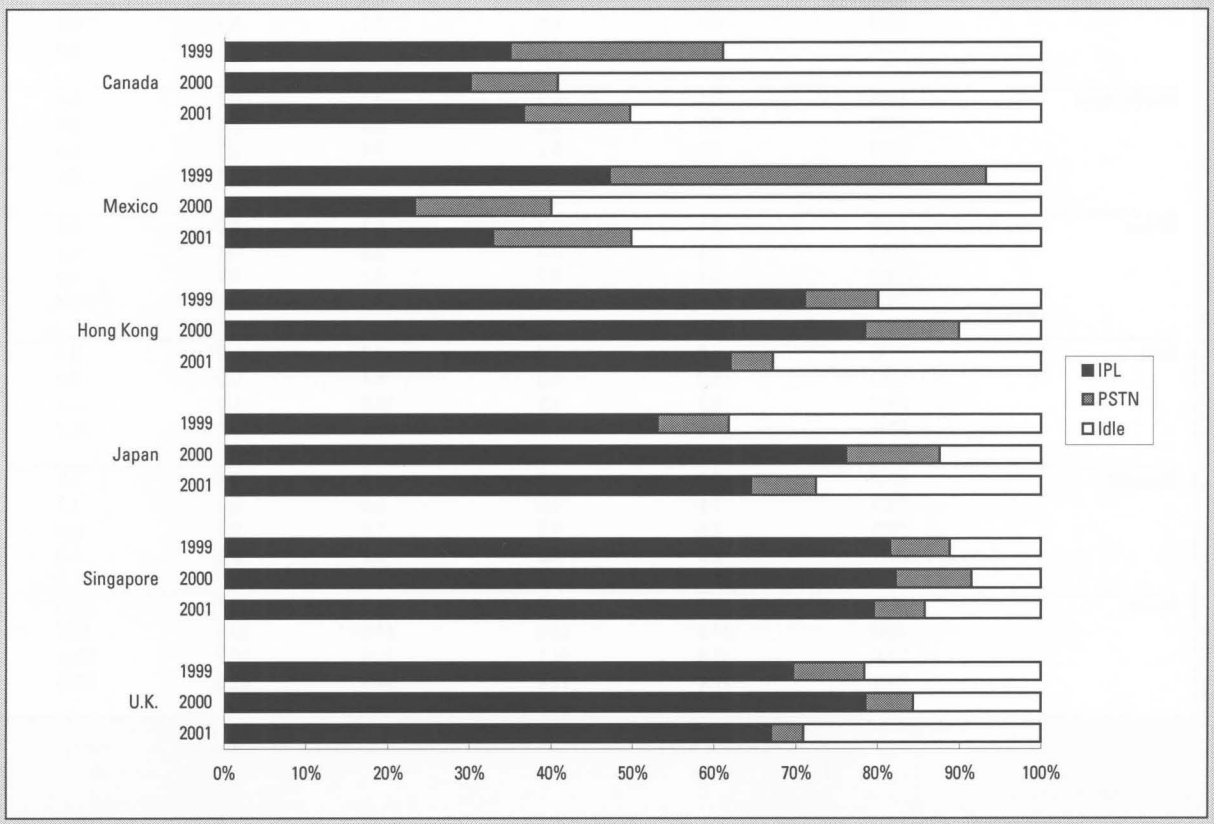
Circuit Usage (Gbps)

	IPL	PSTN	Idle	Total Available	Usage %
1996	5.8	9.0	4.8	19.6	75.6%
1997	9.4	10.9	7.9	28.3	72.0%
1998	12.7	11.3	15.4	39.5	60.9%
1999	27.9	13.5	15.3	56.7	73.1%
2000	57.8	16.1	50.2	124.1	59.6%
2001	77.4	17.4	61.8	156.6	60.6%

Source: FCC

Figure 2. International Circuit Usage for Selected Routes, 1999-2001

		U.S. Carrier Circuit Usage (Gbps)				
		For Private Lines	For Public Switched Network	Total Circuits In Use	Idle Circuits	Total Available
Canada	1999	6.3	4.7	10.9	7.0	17.9
	2000	13.7	4.8	18.5	26.8	45.3
	2001	14.1	5.0	19.1	19.4	38.5
Mexico	1999	3.3	3.2	6.5	0.5	7.0
	2000	5.7	4.1	9.9	14.8	24.6
	2001	8.5	4.3	12.8	12.9	25.7
Hong Kong	1999	0.5	0.1	0.5	0.1	0.7
	2000	0.6	0.1	0.7	0.1	0.8
	2001	0.9	0.1	1.0	0.5	1.5
Japan	1999	2.5	0.4	2.9	1.8	4.7
	2000	3.8	0.6	4.3	0.6	4.9
	2001	4.8	0.6	5.3	2.0	7.4
Singapore	1999	0.5	0.0	0.5	0.1	0.6
	2000	0.5	0.1	0.5	0.0	0.6
	2001	0.8	0.1	0.9	0.1	1.1
United Kingdom	1999	7.0	0.9	7.9	2.2	10.1
	2000	19.6	1.5	21.0	3.9	24.9
	2001	27.2	1.6	28.7	11.8	40.5



Notes: Data based on year-end FCC circuit status reports filed by AT&T, WorldCom, and Sprint for circuits originating in the continental U.S. as well as Puerto Rico, Guam, and other U.S. territories. "Idle" circuits are owned by a carrier at year end but not in use. The FCC estimates that 25-30 percent of total submarine cable capacity landed in the U.S. is controlled by foreign carriers and thus not reported here.

Source: FCC

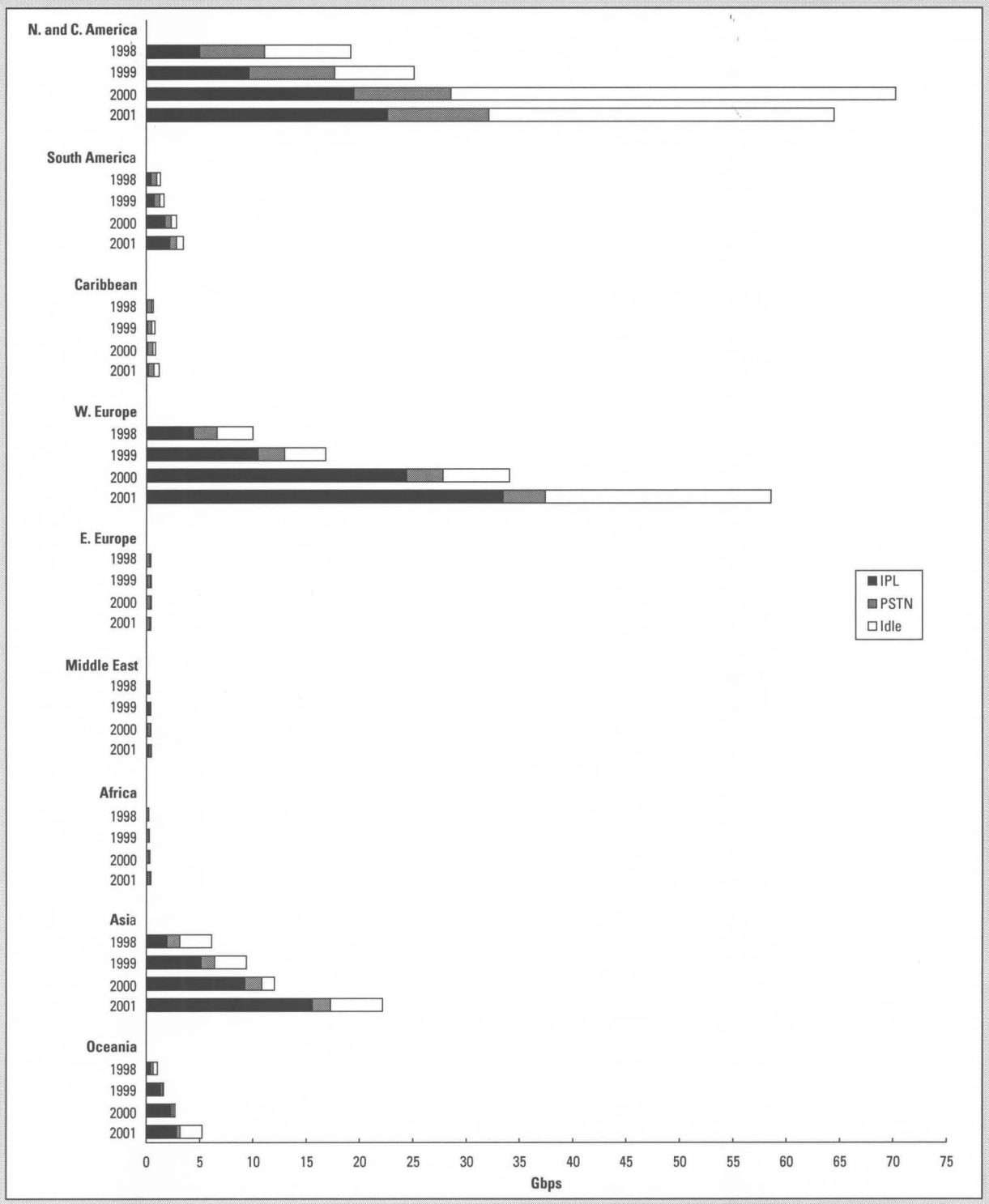
Figure 3. International Circuit Usage by Region, 1998-2001

		U.S. Carrier Circuit Usage (Gbps)				
		For Private Lines	For Public Switched Network	Total Circuits In Use	Idle Circuits	Total Available
N. and C. America	1998	5.0	6.1	11.1	8.1	19.2
	1999	9.6	8.0	17.7	7.5	25.1
	2000	19.5	9.1	28.6	41.6	70.2
	2001	22.6	9.5	32.2	32.3	64.5
South America	1998	0.5	0.5	1.0	0.4	1.4
	1999	0.8	0.5	1.3	0.4	1.7
	2000	1.8	0.6	2.4	0.5	2.9
	2001	2.2	0.6	2.9	0.7	3.5
Caribbean	1998	0.1	0.4	0.5	0.1	0.7
	1999	0.1	0.4	0.6	0.3	0.8
	2000	0.2	0.5	0.6	0.3	0.9
	2001	0.2	0.5	0.7	0.5	1.2
W. Europe	1998	4.4	2.2	6.6	3.4	10.0
	1999	10.5	2.5	13.0	3.8	16.8
	2000	24.4	3.4	27.8	6.2	34.1
	2001	33.5	4.0	37.4	21.1	58.6
E. Europe	1998	0.1	0.3	0.3	0.1	0.4
	1999	0.1	0.3	0.4	0.1	0.5
	2000	0.1	0.3	0.4	0.1	0.5
	2001	0.0	0.3	0.4	0.1	0.4
Middle East	1998	0.1	0.2	0.3	0.1	0.4
	1999	0.2	0.2	0.4	0.1	0.4
	2000	0.2	0.2	0.4	0.1	0.4
	2001	0.2	0.2	0.4	0.1	0.5
Africa	1998	0.1	0.2	0.2	0.0	0.3
	1999	0.1	0.2	0.2	0.1	0.3
	2000	0.1	0.2	0.3	0.1	0.3
	2001	0.1	0.2	0.3	0.1	0.4
Asia	1998	2.0	1.2	3.2	2.9	6.1
	1999	5.2	1.3	6.4	3.0	9.4
	2000	9.3	1.6	10.9	1.2	12.0
	2001	15.6	1.7	17.3	4.9	22.2
Oceania	1998	0.4	0.3	0.7	0.4	1.1
	1999	1.4	0.2	1.6	0.1	1.7
	2000	2.3	0.2	2.6	0.2	2.7
	2001	2.9	0.3	3.2	2.0	5.3
Totals	1998	12.7	11.3	24.0	15.4	39.5
	1999	27.9	13.5	41.5	15.3	56.7
	2000	57.8	16.1	73.9	50.2	124.1
	2001	77.4	17.4	94.9	61.8	156.6

Notes: Data based on year-end FCC circuit status reports filed by AT&T, WorldCom, and Sprint for circuits originating in the continental U.S. as well as Puerto Rico, Guam, and other U.S. territories. "Idle" circuits are owned by a carrier at year end but not in use. The FCC estimates that 25-30 percent of total submarine cable capacity landed in the U.S. is controlled by foreign carriers and thus not reported here.

Source: FCC

Figure 4. International Circuits of U.S. Carriers by Region, 1998-2001



Notes: Data based on year-end FCC circuit status reports filed by AT&T, WorldCom, and Sprint for circuits originating in the continental U.S. as well as Puerto Rico, Guam, and other U.S. territories. "Idle" circuits are owned by a carrier at year end but not in use. The FCC estimates that 25-30 percent of total submarine cable capacity landed in the U.S. is controlled by foreign carriers and thus not reported here.

Source: FCC

Internet Backbones

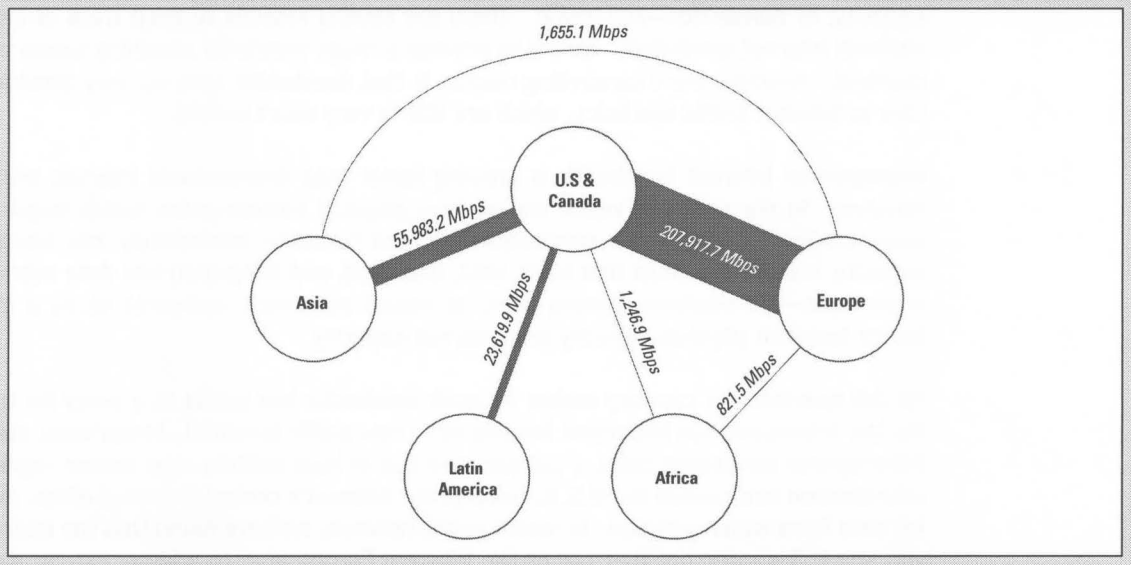
International Internet Backbones

The statistics and analysis presented on the following pages are excerpted from Global Internet Geography 2003 *and* U.S. Internet Geography 2003 *published in October 2002 and July 2002, respectively.*

What is an Internet backbone? And when is it international? The questions are not as straightforward as they might seem. International Internet backbones are private data links which cross international political borders, run the Internet Protocol (IP), are reachable from other parts of the Internet, and carry general Internet traffic: e-mail, Web pages, and most of the other popular services which have come to define today's Internet. That means that international IP links devoted to just one type of traffic—notably, Voice-over-IP (VoIP)—are excluded from our definition of backbones on the public Internet. If VoIP is excluded, though, then why publish international Internet backbone data in a book on international telephony? The answer: because it just might be important.

Despite a history stretching back more than 30 years, today's Internet really began its push toward ubiquity during the 1990s in a rapid transition from academic network to commercial networks. What evolved was a decentralized infrastructure whose end-to-end design made it possible for users to create new network applications without asking too many people's permission.

Figure 1. Interregional Internet Bandwidth, 2002



Notes: Figure represents Internet bandwidth connected across international borders. Data as of mid-2002.
Source: TeleGeography research, *Global Internet Geography 2003*

The resulting infrastructure took media services based on text and simple graphics and turned them into the most widespread media platform since television. That ubiquity only fueled its popularity, however, and soon people were stuffing two-way voice telephony, streaming video, and other bandwidth-intensive applications into the public Internet. This convergence occurred not because the Internet's then-infrastructure was particularly well-suited to such services but because running them over the Internet meant bringing together multiple services on a single platform. On networks, the whole is always more than the sum of its parts.

The so-called "public Internet" is at a crossroads. How will it accommodate very different types of traffic inside the same networks? Some want to solve the problem by bestowing Quality of Service (QoS) provisions upon IP so that networks can distinguish between what needs to be delivered immediately and what needs to be delivered with care. Some, pressed for time, prefer to forego fancy traffic engineering by throwing more bandwidth at the problem, hoping to give every packet enough room to get to its destination in style. Others are abandoning the public Internet altogether by building distinct backbones for self-similar traffic generators, such as VoIP. These private IP networks—and most corporate networks—are excluded from our backbone research.

That sharpens the scope of what we mean by "Internet" backbones, but it doesn't close off their possibilities. There is increasing excitement over a "new public network" infrastructure which meshes PSTN (public switched telephone network) and IP infrastructure into the backbone of tomorrow's public communications facilities. If the feverish activity taking place around the world can successfully achieve the economies of scale and creative possibilities that interoperable communications services represent, these backbones will have to come together to look like the Internet as many engineers have always drawn it—a cloud.

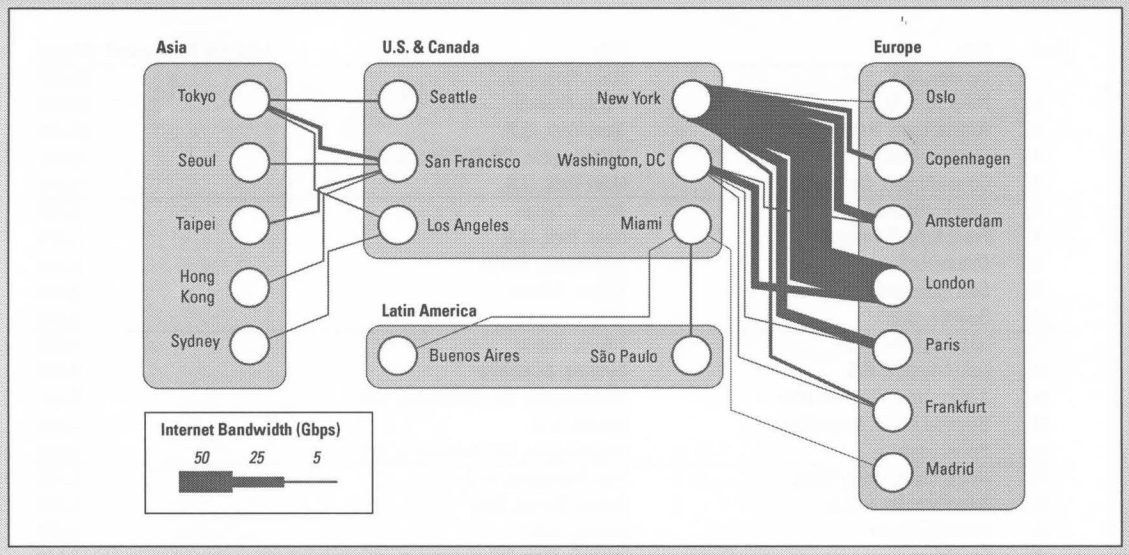
Bandwidth, Not Traffic

The maps and statistics on the following pages show international Internet backbone capacity, or bandwidth—not traffic. There are several reasons to keep track of international Internet bandwidth. One is to provide a rough metric for matching supply and demand. Another, more compelling reason is that bandwidth take-up may provide a clue to Internet traffic statistics, which are still in very short supply.

International Internet bandwidth is growing faster than international Internet traffic, however. In the past few years, tremendous physical infrastructure builds began to come on-line. Because raw bandwidth does not translate immediately into Internet capacity, however—it must first be lit, sold, deployed, and integrated into data network operations—the numbers showed what, to casual observers, appeared to be a mismatch between physical capacity and Internet capacity.

All this new Internet capacity makes network bandwidth less useful as a proxy for traffic, but it does provide important insights as to how traffic is routed. Historically, steep intraregional bandwidth costs, a comparative lack of local content, and limited regional coordination had caused the U.S. to become the Internet's central switching office, even for data flows within a region. In recent years, however, we have found that the Internet was still U.S.-centric but that places like Western Europe and, to a lesser extent, eastern Asia were beginning to develop as secondary hubs (see Figure 1. Interregional Internet Bandwidth, 2002).

Figure 2. Major Interregional Internet Routes, 2002



Notes: Figure represents Internet bandwidth connected across international borders to Consolidated Metropolitan Statistical Areas or equivalents. Intraregional and domestic routes are omitted. Data as of mid-2002.

Source: TeleGeography research, *Global Internet Geography 2003*

Enormous differences still remain from country to country. The U.S.-centric pattern wanes only with substantial and sustained infrastructure builds of the sort that has swept Europe, rolled into Asia, announced itself in Latin America, and stalled in most of Africa.

Methodology

The data depicted on the following pages—using different scales for different regions—result from a TeleGeography, Inc., study completed in October 2002. The research focused on the network topologies of over 300 IISPs operating international Internet links—routers or switches directly connected across an international border over an internal network. These links and their capacities were then tracked through over 300 cities in more than 180 countries. Each IISP's network routes and capacities were derived from a combination of public documents, confidential interviews, and computer-based network analysis tools.

The study grouped specific switch and router locations according to Consolidated Metropolitan Statistical Area, Census Metropolitan Area, or the equivalent. Only the IP network was mapped, instead of the physical network infrastructure which runs beneath it. In cases where IISPs had provisioned relatively new dedicated IP capacity, the study did not include the capacity unless it was believed to be operational and available for public Internet traffic as of mid-2000 (i.e., bandwidth kept in reserve was excluded). A final note: due to the complex and ever-changing nature of network architectures, omissions may have occurred.

Figure 3. Top 50 Interregional Internet Routes, 2002

Rank	City	City	Internet Bandwidth (Mbps)
1.	London, U.K.	New York, U.S.	96,599
2.	New York, U.S.	Paris, France	25,502
3.	Amsterdam, Netherlands	New York, U.S.	22,489
4.	London, U.K.	Washington, DC-Baltimore, U.S.	18,037
5.	Copenhagen, Denmark	New York, U.S.	11,819
6.	San Francisco, U.S.	Tokyo, Japan	9,707
7.	Frankfurt, Germany	New York, U.S.	7,970
8.	Miami, U.S.	São Paulo, Brazil	5,523
9.	San Francisco, U.S.	Taipei, Taiwan	5,474
10.	Seattle, U.S.	Tokyo, Japan	4,815
11.	Los Angeles, U.S.	Tokyo, Japan	4,605
12.	Los Angeles, U.S.	Sydney, Australia	4,039
13.	Amsterdam, Netherlands	Washington, DC-Baltimore, U.S.	3,887
14.	Buenos Aires, Argentina	Miami, U.S.	3,086
15.	Paris, France	Washington, DC-Baltimore, U.S.	2,953
16.	Hong Kong, Hong Kong	San Francisco, U.S.	2,734
17.	San Francisco, U.S.	Seoul, Korea, Rep.	2,718
18.	Madrid, Spain	Miami, U.S.	2,655
19.	Frankfurt, Germany	Washington, DC-Baltimore, U.S.	2,643
20.	New York, U.S.	Oslo, Norway	2,488
21.	Hong Kong, Hong Kong	Los Angeles, U.S.	2,354
22.	San Francisco, U.S.	Sydney, Australia	2,254
23.	New York, U.S.	Stockholm, Sweden	2,021
24.	San Francisco, U.S.	Singapore, Singapore	1,633
25.	Miami, U.S.	Rio de Janeiro, Brazil	1,401
26.	Beijing, China	Seattle, U.S.	1,348
27.	Amsterdam, Netherlands	Chicago, U.S.	1,244
28.	San Francisco, U.S.	Shanghai, China	977
29.	Dallas-Fort Worth, U.S.	Mexico City, Mexico	934
30.	New York, U.S.	Zürich, Switzerland	932
-	Beijing, China	San Francisco, U.S.	932
32.	Miami, U.S.	Santiago, Chile	826
33.	Geneva, Switzerland	New York, U.S.	811
34.	Guangzhou, China	San Francisco, U.S.	798
35.	Lima, Peru	Miami, U.S.	797
36.	Los Angeles, U.S.	Shanghai, China	777
37.	Auckland, New Zealand	Los Angeles, U.S.	775
38.	New York, U.S.	Tel Aviv, Israel	709
39.	Houston, U.S.	Mexico City, Mexico	667
40.	Mexico City, Mexico	Miami, U.S.	660
41.	Los Angeles, U.S.	Mexico City, Mexico	654
42.	Guatemala City, Guatemala	Miami, U.S.	650
43.	Milan, Italy	New York, U.S.	622
-	Lisbon, Portugal	Miami, U.S.	622
-	Miami, U.S.	Milan, Italy	622
-	Miami, U.S.	Palermo, Italy	622
-	New York, U.S.	Palermo, Italy	622
-	Guangzhou, China	Seattle, U.S.	622
-	Nagoya, Japan	San Francisco, U.S.	622
-	Atlanta, U.S.	Monterrey, Mexico	622

Notes: Figures represent Internet bandwidth connected across international borders to Consolidated Metropolitan Statistical Areas or equivalents as of mid-2002. Intraregional and domestic routes are omitted.

Source: TeleGeography research, *Global Internet Geography 2003*

Figure 4. Top 50 Interregional Internet Hub Cities, 2002

Rank	City	Country	Internet Bandwidth (Mbps)
1.	New York	U.S.	179,278
2.	London	U.K.	115,619
3.	San Francisco	U.S.	30,198
4.	Paris	France	29,083
5.	Washington, DC-Baltimore	U.S.	28,653
6.	Amsterdam	Netherlands	27,656
7.	Miami	U.S.	20,163
8.	Tokyo	Japan	19,300
9.	Los Angeles	U.S.	15,561
10.	Copenhagen	Denmark	11,819
11.	Frankfurt	Germany	10,690
12.	Seattle	U.S.	6,876
13.	Sydney	Australia	6,738
14.	São Paulo	Brazil	6,630
15.	Hong Kong	Hong Kong	5,764
16.	Taipei	Taiwan	5,645
17.	Mexico City	Mexico	3,827
18.	Buenos Aires	Argentina	3,621
19.	Seoul	Korea, Rep.	3,387
20.	Beijing	China	2,685
21.	Madrid	Spain	2,658
22.	Oslo	Norway	2,495
23.	Stockholm	Sweden	2,023
24.	Singapore	Singapore	2,006
25.	Shanghai	China	1,754
26.	Rio de Janeiro	Brazil	1,592
27.	Sacramento	U.S.	1,533
28.	Monterrey	Mexico	1,442
29.	Guangzhou	China	1,420
30.	Palermo	Italy	1,385
31.	Milan	Italy	1,350
32.	Chicago	U.S.	1,334
33.	Tel Aviv	Israel	1,236
34.	Dallas-Fort Worth	U.S.	1,148
35.	Santiago	Chile	1,139
36.	Auckland	New Zealand	1,130
37.	Houston	U.S.	1,022
38.	Zürich	Switzerland	932
39.	Perth	Australia	930
40.	Lima	Peru	865
41.	Geneva	Switzerland	813
42.	San Antonio	U.S.	775
43.	Cairo	Egypt	722
44.	Atlanta	U.S.	676
45.	Moscow	Russia	671
46.	Guatemala City	Guatemala	654
47.	Lisbon	Portugal	645
48.	Nagoya	Japan	622
49.	Osaka	Japan	620
50.	Caracas	Venezuela	598

Notes: Figures represent Internet bandwidth connected across international borders from Consolidated Metropolitan Statistical Areas or equivalents. Data as of mid-2002. Intraregional and domestic routes are omitted.

Source: TeleGeography research, *Global Internet Geography 2003*

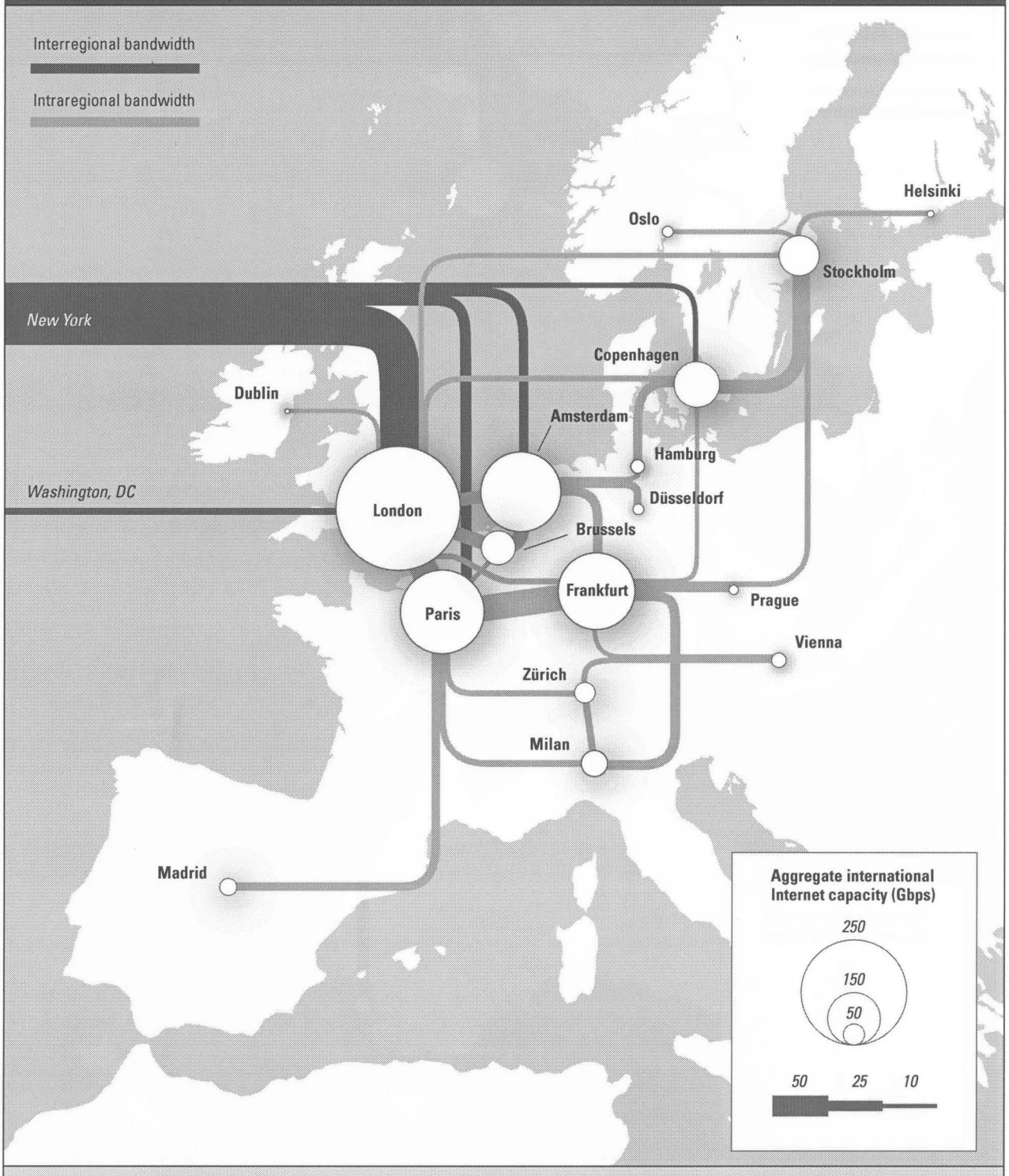
Figure 5. Top 100 U.S. Internet Routes, 2002

Rank	Route	Internet Bandwidth (Gbps)
1.	New York—Washington, DC-Baltimore	137.4
2.	Los Angeles—San Francisco	129.9
3.	Sacramento—San Francisco	124.9
4.	Atlanta—Washington, DC-Baltimore	111.1
5.	Chicago—New York	110.3
6.	Dallas-Fort Worth—Los Angeles	72.9
7.	Philadelphia—Washington, DC-Baltimore	68.9
8.	San Francisco—Seattle	68.3
9.	Dallas-Fort Worth—Houston	67.9
10.	Portland, OR—Seattle	64.9
11.	Chicago—Washington, DC-Baltimore	63.9
12.	New York—Philadelphia	60.7
13.	Boston—New York	57.9
14.	Atlanta—Dallas-Fort Worth	56.0
15.	Atlanta—Houston	53.5
16.	Chicago—Denver	47.8
17.	Los Angeles—San Diego	45.9
18.	Chicago—Kansas City	45.7
19.	Chicago—Sacramento	44.8
20.	Los Angeles—Sacramento	43.5
21.	San Francisco—Washington, DC-Baltimore	42.2
22.	Atlanta—Miami	41.1
23.	Denver—San Francisco	37.1
-	Chicago—Dallas-Fort Worth	37.1
25.	Dallas-Fort Worth—Kansas City	36.2
26.	Atlanta—Orlando	34.7
27.	Chicago—San Francisco	34.4
28.	Dallas-Fort Worth—Denver	31.3
29.	Atlanta—Chicago	29.7
30.	Chicago—Seattle	28.2
31.	Chicago—Indianapolis	27.8
32.	Denver—Kansas City	27.4
33.	Orlando—Tampa-St. Petersburg	27.3
34.	Kansas City—San Francisco	25.5
35.	Boston—Chicago	23.2
36.	Chicago—Minneapolis-St. Paul	22.6
37.	Houston—Los Angeles	22.5
38.	New York—San Francisco	22.2
39.	Jacksonville—Orlando	21.8
40.	Atlanta—Jacksonville	21.4
41.	Chicago—Philadelphia	20.7
42.	Los Angeles—Phoenix	20.6
43.	Jacksonville—Miami	20.2
44.	Houston—Tampa-St. Petersburg	20.1
-	Chicago—Cleveland	20.1
46.	Miami—Tampa-St. Petersburg	20.0
47.	Denver—Sacramento	19.9
-	Atlanta—New York	19.9
49.	Dallas-Fort Worth—Washington, DC-Baltimore	19.6
50.	Chicago—St. Louis	19.5

Notes: Figures represent Internet bandwidth connecting Consolidated Metropolitan Statistical Areas or equivalents as of May 2002. Intracity routes are omitted.

Source: TeleGeography research, *U.S. Internet Geography 2003*

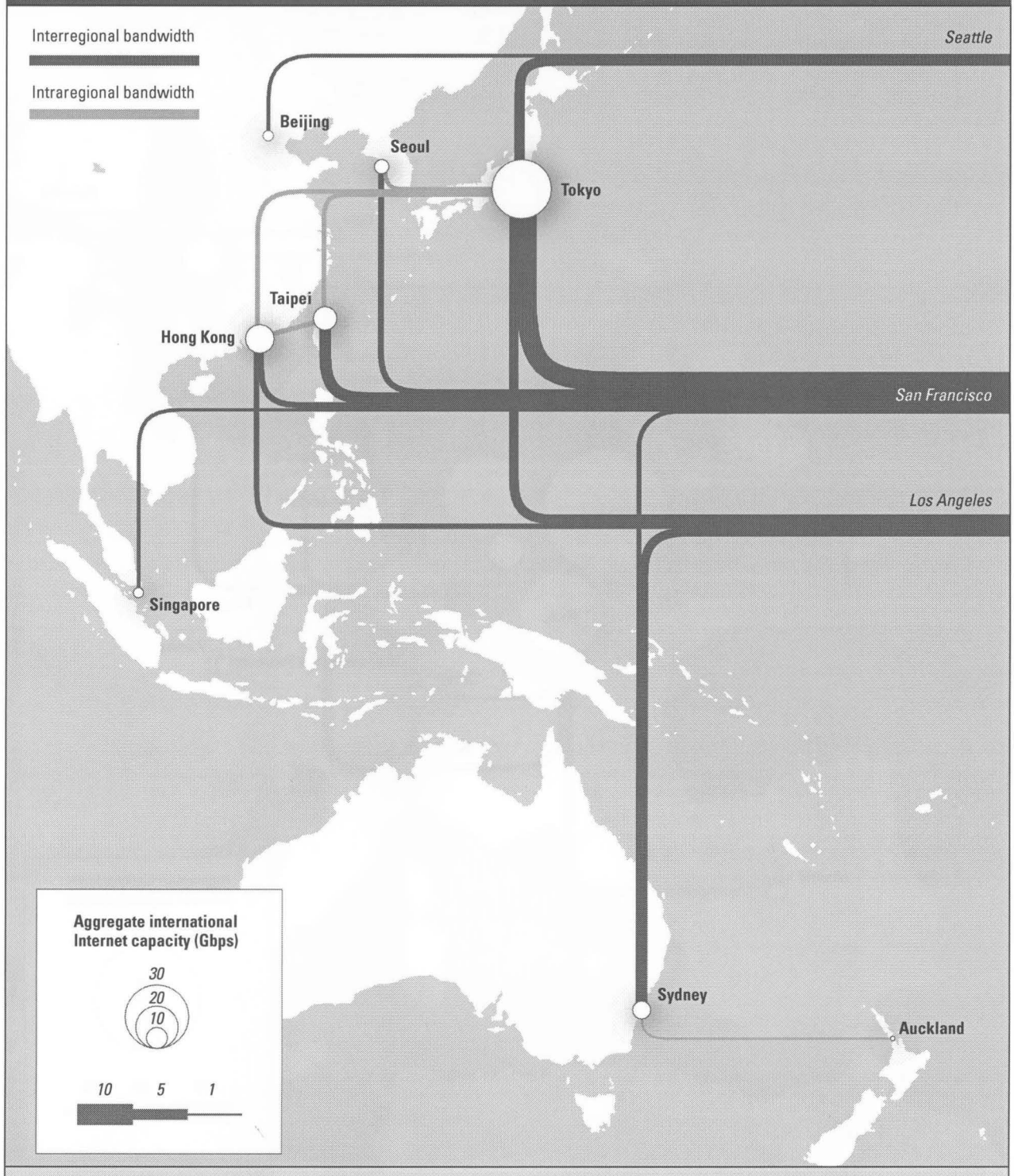
Figure 6. Major International Internet Routes in Europe, 2002



Notes: Map includes international Internet routes with at least 10 Gbps of aggregate capacity. Figures represent Internet bandwidth connected across international borders to each Consolidated Metropolitan Statistical Area or equivalent. Domestic routes are omitted. Data as of mid-2002.

Source: TeleGeography research, *Global Internet Geography 2003*

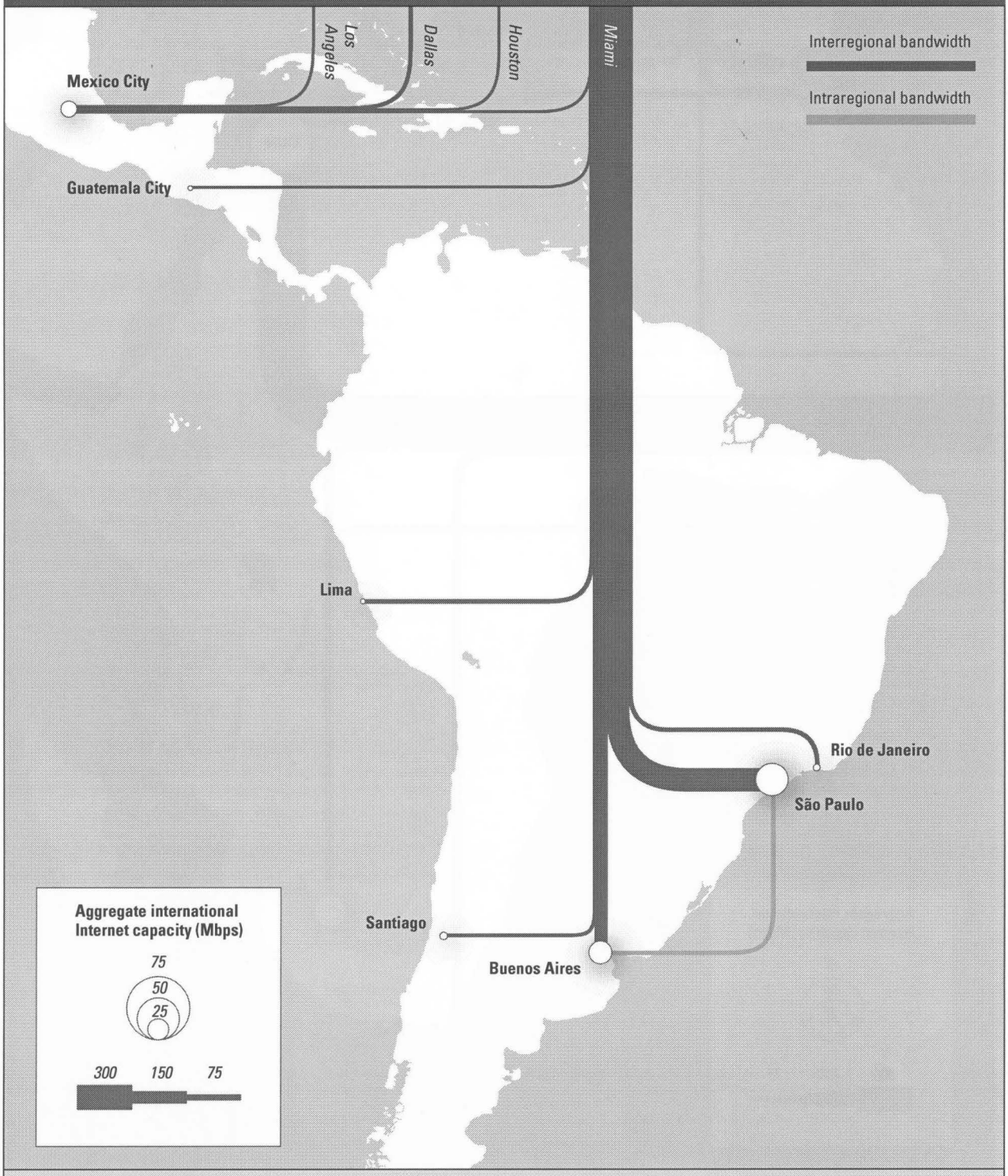
Figure 7. Major International Internet Routes in Asia, 2002



Notes: Map includes international Internet routes with at least 1 Gbps of aggregate capacity. Figures represent Internet bandwidth connected across international borders to each Consolidated Metropolitan Statistical Area or equivalent. Domestic routes are omitted. Data as of mid-2002.

Source: TeleGeography research, *Global Internet Geography 2003*

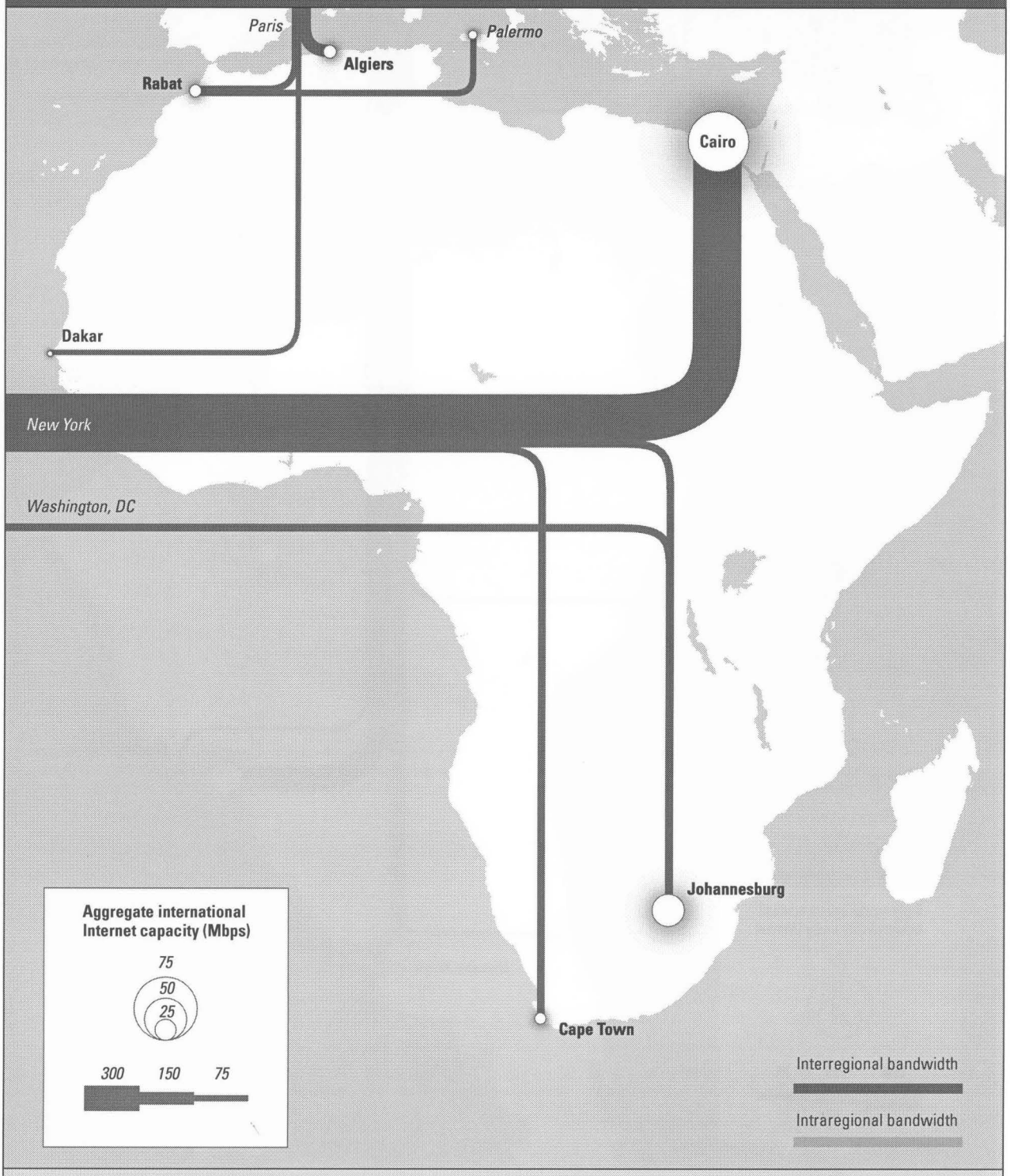
Figure 8. Major International Internet Routes in Latin America, 2002



Notes: Map includes international Internet routes with at least 625 Mbps of aggregate capacity. Figures represent Internet bandwidth connected across international borders to each Consolidated Metropolitan Statistical Area or equivalent. Domestic routes are omitted. Data as of mid-2002.

Source: TeleGeography research, *Global Internet Geography 2003*

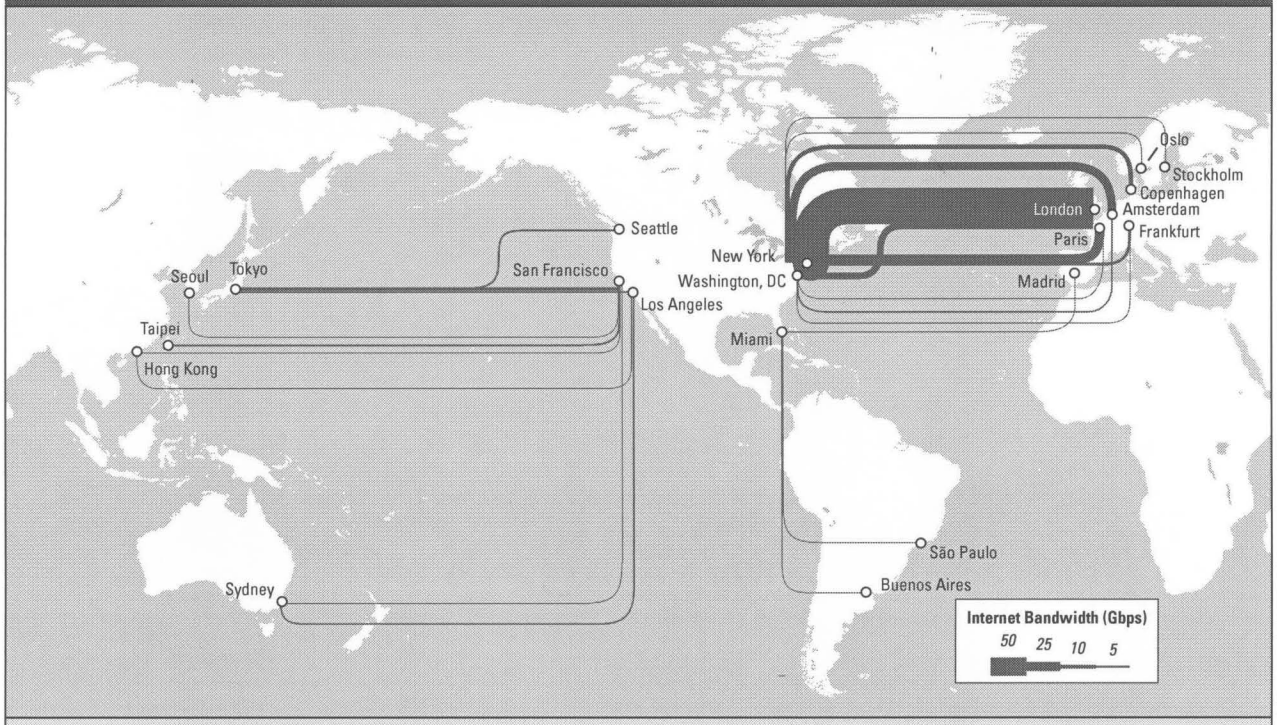
Figure 9. Major International Internet Routes in Africa, 2002



Notes: Map includes international Internet routes with at least 50 Mbps of aggregate capacity. Figures represent Internet bandwidth connected across international borders to each Consolidated Metropolitan Statistical Area or equivalent. Domestic routes are omitted. Data as of mid-2002.

Source: TeleGeography research, *Global Internet Geography 2003*

Figure 10. Map of Major Interregional Internet Routes, 2002



Notes: Map includes interregional Internet routes with at least 1,500 Mbps of aggregate capacity. Figures represent Internet bandwidth connected across international borders to each Consolidated Metropolitan Statistical Area or equivalent. Domestic routes are omitted. Data as of mid-2002.

Source: TeleGeography research, *Global Internet Geography 2003*

INTERNET BACKBONES

Reference

National Telecommunications Indicators (A-K)

Countries	GDP 2001 (US$ billions)	Population 2001 (millions)	Main Lines 2001 (thous.)	Lines Per 100 people	Cellular Users 2001 (thous.)	International Carriers 2001	Internet Hosts 2001 (thous.)
Albania	4.1	3.4	197.5	5.7	350	1	<1
Algeria	53.0	30.9	1,880.0	6.1	100	1	<1
Andorra	n.a.	0.1	35.0	52.2	24	1	3
Argentina	268.8	37.5	8,108.0	21.6	6,975	66	465
Armenia	2.0	3.8	529.3	13.9	25	1	2
Australia (a)	368.6	19.4	10,060.0	51.9	11,169	75	2,289
Austria	188.7	8.1	3,810.0	46.9	6,566	65	326
Azerbaijan	5.7	8.1	865.5	10.7	620	1	1
Bahamas	4.8.	0.3	123.3	40.1	61	1	<1
Bahrain	7.8.	0.7	173.9	24.3	300	1	2
Bangladesh	46.7	133.4	514.0	0.4	520	1	<1
Barbados	2.6	0.3	123.8	46.2	29	1	<1
Belarus	12.1	10.0	2,857.9	28.7	138	1	3
Belgium	227.6	10.3	5,074.0	49.4	7,690	50	352
Bolivia	8.0	8.5	514.8	6	744	7	2
Botswana (a)	5.1	1.6	150.3	9.3	278	1	1
Brazil	502.5	172.6	37,430.8	21.7	28,746	4	1,645
Bulgaria	12.7	8.1	2,913.9	35.9	1,550	1	27
Canada	677.2	31.0	20,319.3	65.5	9,924	96	2,890
Cayman Islands	n.a.	0.4	n.a.	n.a.	n.a.	1	n.a.
Chile	63.5	15.4	3,703.3	24.1	5,272	34	123
China	1,159.0	1,271.9	179,034.0	14.1	144,812	3	89
Colombia	83.4	43.0	7,300.0	17	3,265	3	57
Costa Rica	16.2	3.9	945.0	24.3	311	1	9
Côte d'Ivoire	10.4	16.4	293.6	1.8	729	1	3
Croatia	19.8	4.4	1,700.0	38.8	1,755	1	22
Cuba	n.a.	11.2	572.6	5.1	8	1	1
Cyprus	8.7	0.8	435.0	57.2	314	1	2
Czech Republic	56.4	10.3	3,846.0	37.5	6,769	15	216
Denmark	162.8	5.4	3,882.0	72.6	3,954	45	561
Dominican Republic	21.2	8.5	955.1	11.2	1,270	5	42
Ecuador	18.0	12.9	1,335.8	10.4	859	3	3
Egypt	97.5	65.2	6,650.0	10.2	2,794	1	2
Estonia	5.3	1.4	503.6	37.2	651	15	51
Finland	122.0	5.2	2,845.0	54.8	4,044	32	887
France	1,302.8	59.2	34,032.9	57.5	35,922	130	789
Georgia	3.1	5.0	867.6	17.3	295	2	2
Germany	1,873.9	82.2	52,280.0	63.6	56,245	135	2,426
Ghana	5.3	19.7	242.1	1.2	194	2	<1
Greece	116.3	10.6	5,607.7	53	7,962	15	143
Guatemala	20.6	11.7	756.0	6.5	1,134	15	7
Guyana	0.7	0.8	79.9	10.4	75	1	<1
Hong Kong (a)	162.6.	6.9	3,897.6	56.7	5,776	235	388
Hungary	52.4	10.2	3,730.0	36.6	4,968	1	168
India (a)	477.6	1,033.4	34,732.1	3.4	6,431	4	83
Indonesia	145.3	213.6	7,949.3	3.7	5,303	1	46
Iran	118.9	64.7	10,346.8	16.0	1,725	1	2
Ireland (a) (b)	101.2	3.8	1,860.0	48.5	2,800	45	128
Israel	110.4	6.4	3,100.0	48.7	5,260	3	144
Italy	1,090.9	57.7	27,303.0	47.3	48,698	120	680
Jamaica	7.8	2.7	512.6	19.2	700	1	1
Japan (a)	4,245.2	127.1	76,000.0	59.8	74,819	150	7,118
Jordan	8.8	5.0	660.0	13.1	746	1	2

Source: TeleGeography research, ITU, and World Bank

International Telephone Traffic (A-K)

Outgoing Minutes (millions)			Incoming Minutes (millions)			Traffic Balance		
2000	2001	% Change	2000	2001	% Change	2000	2001	Countries
64.9	65.4	0.7%	178.6	317.0	77.5%	113.7	251.6	Albania
151.8	207.1	36.4%	n.a.	n.a.	n.a.	n.a.	n.a.	Algeria
55.9	63.2	13.0%	n.a.	48.1	n.a.	n.a.	-15.1	Andorra
432.1	455.9	5.5%	n.a.	n.a.	n.a.	n.a.	n.a.	Argentina
31.4	34.6	10.2%	n.a.	n.a.	n.a.	n.a.	n.a.	Armenia
2,650.0	3,030.0	14.3%	n.a.	n.a.	n.a.	n.a.	n.a.	Australia (a)
1,410.0	1,480.0	5.0%	n.a.	n.a.	n.a.	n.a.	n.a.	Austria
28.1	29.6	5.5%	59.7	n.a.	n.a.	31.6	n.a.	Azerbaijan
67.3	72.5	7.8%	111.8	116.9	4.6%	44.5	44.4	Bahamas
139.5	170.1	21.9%	125.6	182.6	45.3%	-13.9	12.5	Bahrain
49.6	47.7	-3.8%	n.a.	n.a.	n.a.	n.a.	n.a.	Bangladesh
32.1	37.6	17.1%	n.a.	n.a.	n.a.	n.a.	n.a.	Barbados
178.5	209.9	17.6%	n.a.	n.a.	n.a.	n.a.	n.a.	Belarus
1,835.0	2,155.0	17.4%	n.a.	n.a.	n.a.	n.a.	n.a.	Belgium
27.2	31.6	16.4%	80.8	n.a.	n.a.	53.6	n.a.	Bolivia
42.0	59.0	40.5%	n.a.	41.2	n.a.	n.a.	-17.8	Botswana (a)
692.7	772.2	11.5%	1,212.4	n.a.	n.a.	519.8	n.a.	Brazil
110.0	125.0	13.6%	211.0	220.0	4.3%	101.0	95.0	Bulgaria
7,224.0	7,915.0	9.6%	n.a.	n.a.	n.a.	n.a.	n.a.	Canada
51.0	51.0	0.0%	27.3	n.a.	n.a.	-23.7	n.a.	Cayman Islands
261.4	281.2	7.6%	n.a.	n.a.	n.a.	n.a.	n.a.	Chile
2,240.0	2,600.0	16.1%	3,500.0	4,270.0	22.0%	1,260.0	1,670.0	China
312.0	363.4	16.5%	n.a.	n.a.	n.a.	n.a.	n.a.	Colombia
99.6	131.4	32.0%	137.8	165.5	20.1%	38.2	34.1	Costa Rica
74.0	60.3	-18.4%	n.a.	n.a.	n.a.	n.a.	n.a.	Côte d'Ivoire
222.3	244.5	10.0%	512.0	n.a.	n.a.	289.6	n.a.	Croatia
20.6	22.4	9.1%	284.4	258.0	-9.3%	263.8	235.5	Cuba
192.6	216.5	12.4%	159.7	164.3	2.9%	-32.9	-52.2	Cyprus
359.9	424.4	17.9%	n.a.	n.a.	n.a.	n.a.	n.a.	Czech Republic
905.0	995.0	9.9%	n.a.	n.a.	n.a.	n.a.	n.a.	Denmark
211.7	227.4	7.4%	1,340.0	1,714.6	28.0%	1,128.3	1,487.2	Dominican Republic
55.5	61.1	10.1%	n.a.	n.a.	n.a.	n.a.	n.a.	Ecuador
183.1	192.3	5.0%	620.6	n.a.	n.a.	437.5	n.a.	Egypt
75.5	74.6	-1.2%	n.a.	91.9	n.a.	n.a.	17.3	Estonia
468.0	485.0	3.6%	n.a.	n.a.	n.a.	n.a.	n.a.	Finland
6,500.0	7,605.0	17.0%	n.a.	n.a.	n.a.	n.a.	n.a.	France
45.6	64.2	40.8%	37.6	n.a.	n.a.	-8.0	n.a.	Georgia
9,570.0	10,320.0	7.8%	n.a.	n.a.	n.a.	n.a.	n.a.	Germany
42.1	46.7	11.1%	166.4	139.3	-16.3%	124.3	92.5	Ghana
793.2	1,020.0	28.6%	889.8	891.0	0.1%	96.6	-129.0	Greece
125.9	156.2	24.1%	295.9	536.8	81.4%	170.0	380.6	Guatemala
15.0	19.4	29.2%	52.3	69.6	33.2%	37.2	50.2	Guyana
3,074.9	3,487.3	13.4%	1,858.0	1,942.3	4.5%	-1,216.8	-1,545.0	Hong Kong (a)
349.2	326.8	-6.4%	n.a.	n.a.	n.a.	n.a.	n.a.	Hungary
527.1	586.4	11.3%	2,161.4	2,533.6	17.2%	1,634.3	1,947.2	India (a)
315.5	316.2	0.2%	345.8	365.9	5.8%	30.3	49.7	Indonesia
176.8	179.1	1.3%	216.8	173.1	-20.2%	40.0	-6.0	Iran
1,250.0	1,535.0	22.8%	n.a.	n.a.	n.a.	n.a.	n.a.	Ireland (a) (b)
1,022.4	1,120.0	9.5%	661.0	728.0	10.1%	-361.4	-392.0	Israel
4,160.0	4,805.0	15.5%	n.a.	n.a.	n.a.	n.a.	n.a.	Italy
73.9	95.6	29.5%	328.5	413.8	26.0%	254.6	318.2	Jamaica
2,575.0	2,750.0	6.8%	n.a.	n.a.	n.a.	n.a.	n.a.	Japan (a)
170.6	185.3	8.6%	214.1	217.0	1.4%	43.5	31.7	Jordan

Notes: Data are in millions of minutes of public switched traffic. VoIP call volumes are excluded.
a. International traffic for year ending March 31. Year for Australia, New Zealand, and Pakistan ends June 30.
b. Traffic data exclude some carriers or routes. (See country table for details.)
c. 2000 and 2001 traffic data not directly comparable. (See country table for details.)
d. Data include some refile traffic. (See country table for details.)

National Telecommunications Indicators (K-Z)

Countries	GDP 2001 (US$ billions)	Population 2001 (millions)	Main Lines 2001 (thous.)	Lines Per 100 people	Cellular Users 2001 (thous.)	International Carriers 2001	Internet Hosts 2001 (thous.)
Kazakhstan	22.6	14.8	1,834.2	12.4	582	3	11
Kenya	10.4	30.7	313.1	1	500	1	3
Korea, Rep.	422.2	47.6	22,724.7	47.7	29,046	60	440
Kyrgyzstan	1.5	5.0	376.1	7.6	27	1	5
Latvia	7.5	2.3	724.8	31	657	1	25
Lesotho	0.8	2.1	22.2	1.1	33	1	<1
Lithuania	11.8	3.5	1,151.7	33	932	1	35
Luxembourg	19.8	0.4	350.0	78.8	432	11	14
Macau	6.2	0.4	176.4	39.4	195	1	<1
Macedonia	3.4	2.0	538.5	26.4	223	1	3
Malaysia (a)	87.5	23.8	4,738.0	19.9	7,128	16	74
Malta	3.6	0.4	207.7	53	139	1	9
Mauritius	4.5	1.2	306.8	25.6	300	1	3
Mexico	617.8	99.4	13,773.0	13.9	21,757	21	918
Moldova	1.5	4.3	676.1	15.8	210	1	2
Morocco	33.7	29.2	1,191.3	4.1	4,772	1	2
Namibia	3.2	1.8	117.4	6.6	100	1	5
Netherlands	375.0	16.0	10,000.0	62.4	11,900	95	2,632
New Zealand (a)	48.3	3.8	1,833.6	47.6	2,417	30	408
Norway	165.5	4.5	3,262.0	72.2	3,737	70	305
Oman (b)	n.a.	2.5	235.3	9.6	325	1	5
Pakistan (a) (b)	59.6	141.5	3,400.0	2.4	800	1	11
Palestinian Territory (b)	4.0	3.1	256.9	8.3	300	1	n.a.
Panama	10.2	2.9	430.0	14.8	600	1	8
Paraguay	6.9	5.6	288.8	5.1	1,150	1	3
Philippines (a)	71.4	77.0	3,100.0	4	10,568	11	31
Poland	174.6	38.7	11,400.0	29.5	10,050	1	490
Portugal	108.5	10.2	4,397.4	43	7,978	32	247
Qatar	14.5.	0.6	167.4	28	179	1	<1
Russia (b)	310.0	144.8.	35,700.0	24.7	5,560	30	354
Saudi Arabia	173.3	21.4	3,232.9	15.1	2,529	1	11
Serbia & Montenegro	10.9	10.6	2,443.9	23	1,998	1	16
Singapore (a)	92.3	4.1	1,947.5	47.5	2,992	93	198
Slovak Republic	20.5	5.4	1,556.3	28.8	2,147	1	73
South Africa (a)	113.3	43.2	4,969.0	11.5	9,197	1	238
Spain (d)	577.5	39.5	17,427.0	44.1	26,494	85	539
Sri Lanka	16.3	19.6	828.0	4.2	720	1	2
Sudan (b)	12.6	31.7	453.0	1.4	105	1	n.a.
Swaziland (a)	1.3	1.1	32.0	3	66	1	1
Sweden	210.1	8.9	6,585.0	74	7,042	120	735
Switzerland	247.4	7.2	5,183.0	71.9	5,226	60	528
Syria	17.9	16.6	1,807.6	10.9	200	1	<1
Taiwan	n.a.	22.4.	12,846.9	57.34	21,633	29	1,713
Tajikistan (b)	1.1	6.2	223.0	3.6	2	1	<1
Thailand (c)	114.8	61.2	5,973.5	9.8	7,550	1	72
Trinidad & Tobago (a)	8.4	1.3	311.8	23.8	225	1	7
Turkey (b)	147.6	66.2	18,900.9	28.5	20,000	1	107
Turkmenistan (b)	6.0	5.3	387.6	7.3	10	1	2
Ukraine (b)	37.6	49.1	10,669.6	21.7	2,225	2	58
United Arab Emirates	n.a.	3.0	1,052.9	35.4	1,909	1	77
United Kingdom (a) (d)	1,406.3	59.9	35,326.0	59	47,026	500	2,231
United States	10,171.4	284.0	190,000.0	66.9	127,000	1,800	106,193
Uruguay	18.4	3.4	950.9	28.3	520	13	71
Uzbekistan (b)	11.3	25.1	1,663.0	6.6	63	1	<1

Source: TeleGeography research, ITU, and World Bank

International Telephone Traffic (K-Z)

Outgoing Minutes (millions)			Incoming Minutes (millions)			Traffic Balance		
2000	2001	% Change	2000	2001	% Change	2000	2001	Countries
105.4	118.6	12.5%	183.1	206.9	13.0%	77.8	88.4	Kazakhstan
21.0	24.2	15.2%	57.2	n.a.	n.a.	36.2	n.a.	Kenya
1,063.0	1,120.0	5.4%	n.a.	n.a.	n.a.	n.a.	n.a.	Korea, Rep.
23.1	23.5	1.7%	36.4	42.3	16.2%	13.3	18.8	Kyrgyzstan
54.8	64.7	18.0%	90.1	105.3	16.9%	35.3	40.6	Latvia
21.6	21.5	-0.5%	n.a.	n.a.	n.a.	n.a.	n.a.	Lesotho
54.6	58.1	6.4%	n.a.	n.a.	n.a.	n.a.	n.a.	Lithuania
381.0	394.6	3.6%	n.a.	n.a.	n.a.	n.a.	n.a.	Luxembourg
152.1	156.5	2.9%	103.2	111.9	8.5%	-48.9	-44.6	Macau
73.2	66.3	-9.5%	166.4	197.2	18.5%	93.2	131.0	Macedonia
840.0	845.0	0.6%	765.0	810.0	5.9%	-75.0	-35.0	Malaysia (a)
43.0	45.6	5.8%	56.5	65.5	16.0%	13.4	19.9	Malta
35.1	35.6	1.5%	49.0	56.2	14.8%	13.9	20.6	Mauritius
1,981.0	2,082.0	5.1%	5,896.0	5,100.0	-13.5%	3,915.0	3,018.0	Mexico
50.8	52.3	3.0%	120.8	161.8	33.9%	70.1	109.6	Moldova
245.0	269.5	10.0%	n.a.	n.a.	n.a.	n.a.	n.a.	Morocco
60.2	64.8	7.8%	50.7	46.2	-8.9%	-9.5	-18.7	Namibia
2,830.0	3,225.0	14.0%	n.a.	n.a.	n.a.	n.a.	n.a.	Netherlands
950.0	965.0	1.6%	n.a.	n.a.	n.a.	n.a.	n.a.	New Zealand (a)
737.0	796.0	8.0%	n.a.	n.a.	n.a.	n.a.	n.a.	Norway
116.8	159.3	36.4%	n.a.	108.0	n.a.	n.a.	-51.3	Oman (b)
98.6	110.0	11.5%	896.1	1,165.1	30.0%	797.4	1,055.2	Pakistan (a) (b)
45.6	45.3	-0.8%	37.2	47.9	28.7%	-8.4	2.6	Palestinian Territory (b)
51.9	45.3	-12.8%	111.7	119.9	7.4%	59.7	74.6	Panama
33.3	35.3	5.9%	71.6	75.8	5.8%	38.4	40.6	Paraguay
327.0	449.0	37.3%	1,977.6	2,332.7	18.0%	1,650.6	1,883.7	Philippines (a)
675.8	729.9	8.0%	n.a.	n.a.	n.a.	n.a.	n.a.	Poland
720.0	900.0	25.0%	n.a.	n.a.	n.a.	n.a.	n.a.	Portugal
143.0	171.6	20.0%	95.5	113.5	18.8%	-47.5	-58.2	Qatar
944.0	1,081.6	14.6%	n.a.	869.3	n.a.	n.a.	-212.3	Russia (b)
1,194.9	1,516.6	26.9%	n.a.	705.5	n.a.	n.a.	-811.2	Saudi Arabia
286.9	275.5	-4.0%	n.a.	582.2	n.a.	n.a.	306.7	Serbia & Montenegro
1,515.0	1,870.7	23.5%	n.a.	n.a.	n.a.	n.a.	n.a.	Singapore (a)
162.7	176.3	8.4%	233.1	n.a.	n.a.	70.4	n.a.	Slovak Republic
494.6	510.7	3.3%	700.0	736.0	5.1%	205.4	225.3	South Africa (a)
3,215.0	4,275.0	33.0%	n.a.	n.a.	n.a.	n.a.	n.a.	Spain (d)
42.0	54.0	28.6%	157.0	180.0	14.6%	115.0	126.0	Sri Lanka
31.8	36.1	13.4%	155.7	n.a.	n.a.	123.9	n.a.	Sudan (b)
25.1	26.3	4.9%	22.5	n.a.	n.a.	-2.6	n.a.	Swaziland (a)
1,550.0	1,710.0	10.3%	n.a.	n.a.	n.a.	n.a.	n.a.	Sweden
2,780.0	3,230.0	16.2%	n.a.	n.a.	n.a.	n.a.	n.a.	Switzerland
140.0	150.0	7.1%	286.0	325.8	13.9%	146.0	175.8	Syria
1,160.0	1,522.2	31.2%	n.a.	n.a.	n.a.	n.a.	n.a.	Taiwan
6.8	8.6	26.6%	18.5	n.a.	n.a.	11.7	n.a.	Tajikistan (b)
355.2	377.7	6.3%	426.6	555.0	30.1%	71.4	177.4	Thailand (c)
80.5	80.9	0.4%	167.7	189.2	12.8%	87.2	108.4	Trinidad & Tobago (a)
731.8	675.0	-7.8%	1,240.0	1,100.0	-11.3%	508.2	425.0	Turkey (b)
15.7	19.3	22.6%	11.3	n.a.	n.a.	-4.5	n.a.	Turkmenistan (b)
363.0	388.0	6.9%	269.5	n.a.	n.a.	-93.4	n.a.	Ukraine (b)
1,123.6	1,395.9	24.2%	n.a.	n.a.	n.a.	n.a.	n.a.	United Arab Emirates
12,242.7	12,730.0	4.0%	7,463.2	7,664.8	2.7%	-4,779.5	-5,065.2	United Kingdom (a) (d)
37,594.8	37,272.4	-0.9%	13,010.7	13,400.0	3.0%	-24,584.1	-23,872.4	United States
78.0	78.0	0.1%	110.9	127.8	15.2%	33.0	49.8	Uruguay
71.4	58.3	-18.3%	54.3	n.a.	n.a.	-17.0	n.a.	Uzbekistan (b)

Notes: Data are in millions of minutes of public switched traffic. VoIP call volumes are excluded.

a. International traffic for year ending March 31. Year for Australia, New Zealand, and Pakistan ends June 30.

b. Traffic data exclude some carriers or routes. (See country table for details.)

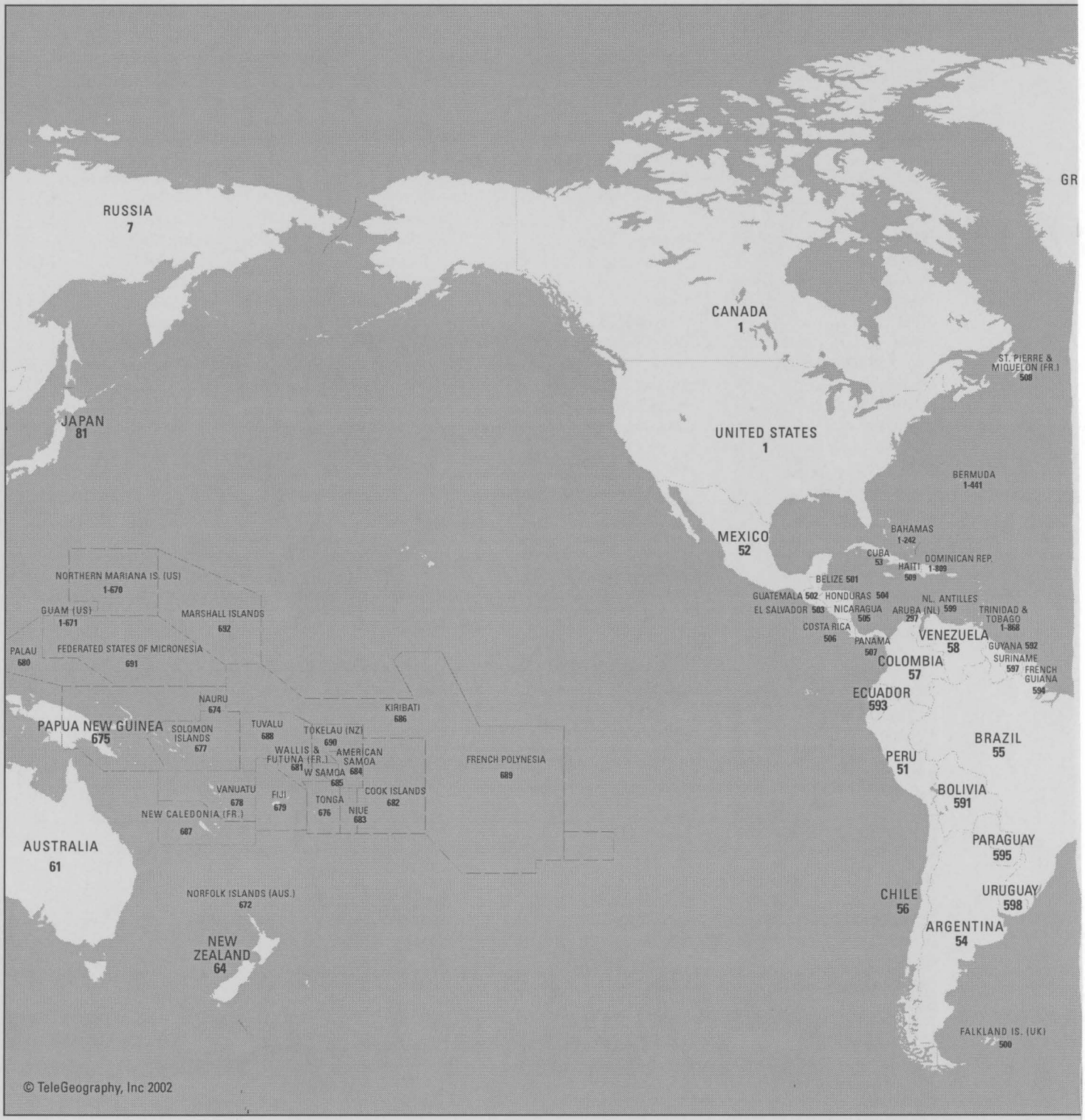
c. 2000 and 2001 traffic data not directly comparable. (See country table for details.)

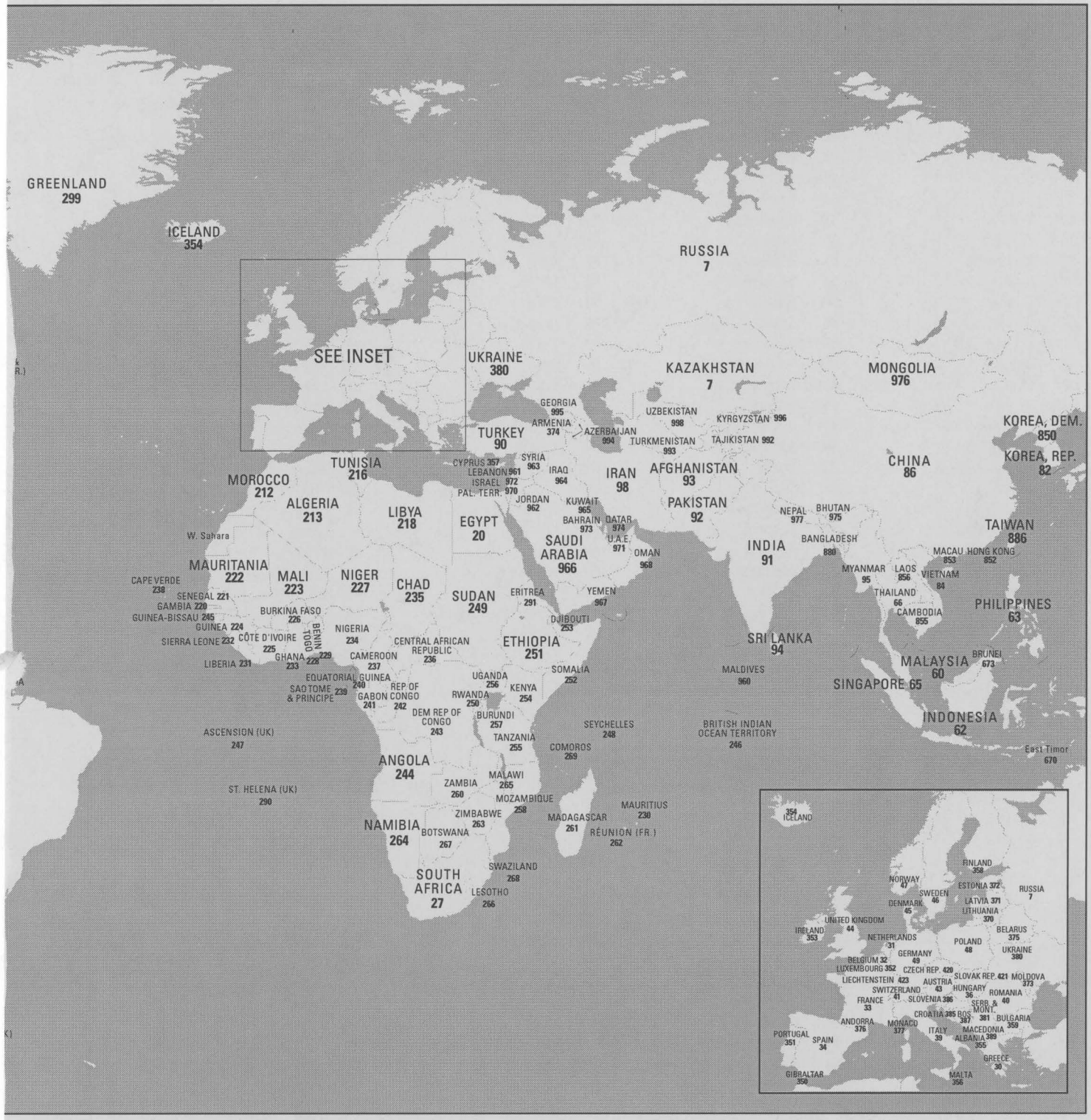
d. Data include some refile traffic. (See country table for details.)

International Dialing Codes, by Country

Afghanistan 93
Albania 355
Tirana 4
Algeria 213
Algiers 21
American Samoa 684
Andorra 376
Angola 244
Luanda 2
Anguilla 1-264
Antigua & Barbuda 1-268
Argentina 54
Buenos Aires 1
Armenia 374
Yerevan 1
Aruba 297
Ascension Island 247
Australia 61
Melbourne 3
Sydney 2
Australian Territories 672
Austria 43
Vienna 1
Azerbaijan 994
Baku 12
Bahamas 1-242
Bahrain 973
Bangladesh 880
Dhaka 2
Barbados 1-246
Belarus 375
Minsk 172
Belgium 32
Brussels 2
Belize 501
Belmopan 8
Benin 229
Bermuda 1-441
Bhutan 975
Bolivia 591
La Paz 2
Bosnia-Herzegovina 387
Sarajevo 71
Botswana 267
Brazil 55
Brasilia 61
Rio de Janeiro 21
São Paulo 11
British Indian Ocean Terr. 246
British Virgin Islands ...1-284
Brunei 673
Bandar Seri Begawan ...2
Bulgaria 359
Sofia 2
Burkina Faso 226
Burundi 257
Cambodia 855
Cameroon 237
Canada 1
Montreal 514/450
Ottawa 613
Toronto 416/647
Vancouver 604/778
Cape Verde 238
Cayman Islands 1-345
Central African Republic ..236
Bangui 61
Chad 235
Chile 56
Santiago 2
China, People's Republic of 86
Beijing 10
Guangzhou 20
Shanghai 21
Colombia 57
Bogota 1
Cocos Islands; Norfolk & Christmas Islands 672
Comoros 269
Congo, Dem. Rep. of 243
Kinshasa 12
Congo, Republic of 242
Brazzaville 81/82/83
Cook Islands 682
Costa Rica 506
Côte d'Ivoire 225
Croatia 385
Zagreb 1
Cuba 53
Havana 7
Cyprus 357
Nicosia 2
Czech Republic 420
Prague 2
Denmark 45
Djibouti 253
Dominica 1-767
Dominican Republic 1-809
East Timor 670
Ecuador 593
Quito 2
Egypt 20
Cairo 2
El Salvador 503
Equatorial Guinea 240
Eritrea 291
Estonia 372
Tallinn 2
Ethiopia 251
Addis Ababa 1
Falkland Islands 500
Faroe Islands 298
Fiji 679
Finland 358
Helsinki 9
France 33
Paris 1
Marseille 491
French Antilles 596
French Guiana 594
French Polynesia 689
Gabon 241
Gambia 220
Georgia 995
Tbilisi 32
Germany 49
Berlin 30
Bonn 228
Frankfurt 69
Munich 89
Ghana 233
Accra 21
Gibraltar 350
Greece 30
Athens 1
Greenland 299
Grenada 1-473
Guadeloupe 590
Guam 1-671
Guatemala 502
Guinea 224
Guinea-Bissau 245
Guyana 592
Georgetown 2
Haiti 509
Honduras 504
Hong Kong 852
Hungary 36
Budapest 1
Iceland 354
India 91
Mumbai 22
Calcutta 33
New Delhi 11
Indonesia 62
Jakarta 21
Inmarsat
Special 870
East Atlantic 871
Pacific 872
Indian 873
West Atlantic 874
International Freephone ..800
Iran 98
Tehran 21
Iraq 964
Baghdad 1
Ireland 353
Dublin 1
Israel 972
Jerusalem 2
Tel Aviv 3
Italy 39
Rome 06
Milan 02
Jamaica 1-876
Japan 81
Osaka 6
Tokyo 3
Jordan 962
Amman 6
Kazakhstan 7
Almaty 3272
Kenya 254
Nairobi 2
Kiribati 686
Korea, Dem. Rep. of 850
Pyongyang 2
Korea, Republic of 82
Seoul 2
Kuwait 965
Kyrgyzstan 996
Bishkek 312
Laos 856
Latvia 371
Riga 2
Lebanon 961
Beirut 1
Lesotho 266

World Dialing Codes





International Dialing Codes, by Number

1	Canada
	Guam
	Northern Marianas
	United States
	Caribbean
20	Egypt
212	Morocco
213	Algeria
216	Tunisia
218	Libya
220	Gambia
221	Senegal
222	Mauritania
223	Mali
224	Guinea
225	Côte d'Ivoire
226	Burkina Faso
227	Niger
228	Togo
229	Benin
230	Mauritius
231	Liberia
232	Sierra Leone
233	Ghana
234	Nigeria
235	Chad
236	Central African Republic
237	Cameroon
238	Cape Verde
239	Sao Tome & Principe
240	Equatorial Guinea
241	Gabon
242	Congo, Republic of
243	Congo, Dem. Rep. of
244	Angola
245	Guinea-Bissau
246	British Indian Ocean Terr.
247	Ascension Island
248	Seychelles
249	Sudan
250	Rwanda
251	Ethiopia
252	Somalia
253	Djibouti
254	Kenya
255	Tanzania
256	Uganda
257	Burundi
258	Mozambique
260	Zambia
261	Madagascar
262	Réunion Island
263	Zimbabwe
264	Namibia
265	Malawi
266	Lesotho
267	Botswana
268	Swaziland
269	Comoros & Mayotte
27	South Africa
290	St. Helena
291	Eritrea
297	Aruba
298	Faroe Islands
299	Greenland
30	Greece
31	Netherlands
32	Belgium
33	France
34	Spain
350	Gibraltar
351	Portugal
352	Luxembourg
353	Ireland
354	Iceland
355	Albania
356	Malta
357	Cyprus
358	Finland
359	Bulgaria
36	Hungary
370	Lithuania
371	Latvia
372	Estonia
373	Moldova
374	Armenia
375	Belarus
376	Andorra
377	Monaco
378	San Marino
379	Vatican City
380	Ukraine
381	Serbia & Montenegro
385	Croatia
386	Slovenia
387	Bosnia-Herzegovina
389	Macedonia
39	Italy
40	Romania
41	Switzerland
420	Czech Republic
421	Slovak Republic
423	Liechtenstein
43	Austria
44	United Kingdom
45	Denmark
46	Sweden
47	Norway
48	Poland
49	Germany
500	Falkland Islands
501	Belize
502	Guatemala
503	El Salvador
504	Honduras
505	Nicaragua
506	Costa Rica
507	Panama
508	St. Pierre & Miquelon
509	Haiti
51	Peru
52	Mexico
53	Cuba
54	Argentina
55	Brazil
56	Chile
57	Colombia
58	Venezuela
590	Guadeloupe
591	Bolivia
592	Guyana
593	Ecuador
594	French Guiana
595	Paraguay
596	Martinique
597	Suriname
598	Uruguay
599	Netherlands Antilles
60	Malaysia
61	Australia
62	Indonesia
63	Philippines
64	New Zealand
65	Singapore
66	Thailand
670	East Timor
672	Australian Territories
673	Brunei
674	Nauru
675	Papua New Guinea
676	Tonga
677	Solomon Islands
678	Vanuatu
679	Fiji Islands
680	Palau
681	Wallis & Futuna
682	Cook Islands
683	Niue
684	American Samoa
685	Western Samoa
686	Kiribati
687	New Caledonia
688	Tuvalu
689	French Polynesia
690	Tokelau
691	Micronesia
692	Marshall Islands
7	Kazakhstan
	Russia
800	International Freephone
81	Japan
82	Korea, Republic of
84	Vietnam
850	Korea, Dem. Rep. of
852	Hong Kong
853	Macau
855	Cambodia
856	Laos
86	China
870	Inmarsat Special
871	Inmarsat East Atlantic
872	Inmarsat Pacific
873	Inmarsat Indian
874	Inmarsat West Atlantic
880	Bangladesh
886	Taiwan
90	Turkey
91	India
92	Pakistan
93	Afghanistan
94	Sri Lanka
95	Myanmar
960	Maldives
961	Lebanon
962	Jordan
963	Syria
964	Iraq
965	Kuwait
966	Saudi Arabia
967	Yemen
968	Oman
970	Palestinian Territory
971	United Arab Emirates
972	Israel
973	Bahrain
974	Qatar
975	Bhutan
976	Mongolia
977	Nepal
98	Iran
992	Tajikistan
993	Turkmenistan
994	Azerbaijan
995	Georgia
996	Kyrgyzstan
998	Uzbekistan

North American Area Codes, by Number

201 New Jersey
202 Dist. of Columbia
203 Connecticut
204 Manitoba
205 Alabama
206 Washington
207 Maine
208 Idaho
209 California
210 Texas
212 New York
213 California
214 Texas
215 Pennsylvania
216 Ohio
217 Illinois
218 Minnesota
219 Indiana
224 Illinois
225 Louisiana
228 Mississippi
229 Georgia
231 Michigan
234 Ohio
236 Virginia
239 Florida
240 Maryland
242 Bahamas
246 Barbados
248 Michigan
250 British Columbia
251 Alabama
252 North Carolina
253 Washington
254 Texas
256 Alabama
262 Wisconsin
264 Anguilla
267 Pennsylvania
268 Antigua
269 Michigan
270 Kentucky
276 Virginia
281 Texas
284 British Virgin Is.
289 Ontario
301 Maryland
302 Delaware
303 Colorado
304 West Virginia
305 Florida
306 Saskatchewan
307 Wyoming
308 Nebraska
309 Illinois
310 California
312 Illinois
313 Michigan
314 Missouri
315 New York
316 Kansas
317 Indiana
318 Louisiana
319 Iowa
320 Minnesota
321 Florida
323 California
330 Ohio
331 Illinois
334 Alabama
336 North Carolina
337 Louisiana
339 Massachusetts
340 U.S. Virgin Is.
345 Cayman Islands
347 New York
351 Massachusetts
352 Florida
360 Washington
361 Texas
386 Florida
401 Rhode Island
402 Nebraska
403 Alberta
404 Georgia
405 Oklahoma
406 Montana
407 Florida
408 California
409 Texas
410 Maryland
411 Directory Assist.
412 Pennsylvania
413 Massachusetts
414 Wisconsin
415 California
416 Ontario
417 Missouri
418 Quebec
419 Ohio
423 Tennessee
425 Washington
434 Virginia
435 Utah
440 Ohio
441 Bermuda
443 Maryland
450 Quebec
464 Illinois
469 Texas
473 Grenada
478 Georgia
480 Arizona
484 Pennsylvania
500 Pers. Comm. Serv. (PCS)
501 Arkansas
502 Kentucky
503 Oregon
504 Louisiana
505 New Mexico
506 Nebraska
507 Minnesota
508 Massachusetts
509 Washington
510 California
512 Texas
513 Ohio
514 Quebec
515 Iowa
516 New York
517 Michigan
518 New York
519 Ontario
520 Arizona
530 California
540 Virginia
541 Oregon
551 New Jersey
559 California
561 Florida
562 California
563 Iowa
567 Ohio
570 Pennsylvania
571 Virginia
573 Missouri
574 Indiana
580 Oklahoma
585 New York
586 Michigan
601 Mississippi
602 Arizona
603 New Hampshire
604 British Columbia
605 South Dakota
606 Kentucky
607 New York
608 Wisconsin
609 New Jersey
610 Pennsylvania
611 Repair Service
612 Minnesota
613 Ontario
614 Ohio
615 Tennessee
616 Michigan
617 Massachusetts
618 Illinois
619 California
620 Kansas
623 Arizona
626 California
630 Illinois
631 New York
636 Missouri
641 Iowa
646 New York
647 Ontario
649 Turks & Caicos Is.
650 California
651 Minnesota
660 Missouri
661 California
662 Mississippi
664 Montserrat
670 Northern Marianas
671 Guam
678 Georgia
679 Michigan
682 Texas
701 North Dakota
702 Nevada
703 Virginia
704 North Carolina
705 Ontario
706 Georgia
707 California
708 Illinois
709 Newfoundland
710 U.S. Government Emergency
712 Iowa
713 Texas
714 California
715 Wisconsin
716 New York
717 Pennsylvania
718 New York
719 Colorado
720 Colorado
724 Pennsylvania
727 Florida
731 Tennessee
732 New Jersey
734 Michigan
740 Ohio
754 Florida
757 Virginia
758 St. Lucia
760 California
763 Minnesota
765 Indiana
767 Dominica
770 Georgia
772 Florida
773 Illinois
774 Massachusetts
775 Nevada
778 British Colombia
780 Alberta
781 Massachusetts
784 St. Vincent & Grenadines
785 Kansas
786 Florida
787 Puerto Rico
800 Toll-free serv.
801 Utah
802 Vermont
803 South Carolina
804 Virginia
805 California
806 Texas
807 Ontario
808 Hawaii
809 Dominican Rep.
810 Michigan
812 Indiana
813 Florida
814 Pennsylvania
815 Illinois
816 Missouri
817 Texas
818 California
819 Quebec
828 North Carolina
830 Texas
831 California
832 Texas
843 South Carolina
845 New York
847 Illinois
848 New Jersey
850 Florida
856 New Jersey
857 Massachusetts
858 California
859 Kentucky
860 Connecticut
862 New Jersey
863 Florida
864 South Carolina
865 Tennessee
867 Northwest Territories/Yukon
868 Trinidad & Tobago
869 St. Kitts & Nevis
870 Arkansas
872 Illinois
876 Jamaica
877 Toll-free serv.
878 Pennsylvania
880 Toll-free serv.
881 Toll-free serv.
882 Toll-free serv.
888 Toll-free serv.
900 Info. Servs.
901 Tennessee
902 Nova Scotia & Prince Edward Is.
903 Texas
904 Florida
905 Ontario
906 Michigan
907 Alaska
908 New Jersey
909 California
910 North Carolina
911 Emergency Servs.
912 Georgia
913 Kansas
914 New York
915 Texas
916 California
917 New York
918 Oklahoma
919 North Carolina
920 Wisconsin
925 California
928 Arizona
931 Tennessee
936 Texas
937 Ohio
939 Puerto Rico
940 Texas
941 Florida
947 Michigan
949 California
952 Minnesota
954 Florida
956 Texas
970 Colorado
971 Oregon
972 Texas
973 New Jersey
978 Massachusetts
979 Texas
980 North Carolina
985 Louisiana
989 Michigan

North American Area Codes, by Jurisdiction

Alabama
- Birmingham and west-central Alabama 205
- Mobile and southwestern Alabama 251
- Huntsville and northern Alabama 256
- Montgomery and southern Alabama ...334

Alaska 907

Alberta
- Calgary and southern Alberta 403
- Edmonton and northern Alberta 780

Anguilla 264

Antigua 268

Arizona
- Eastern Phoenix area 480
- Tucson and southeastern Arizona 520
- Central Phoenix 602
- Western Phoenix 623
- Northern and southwestern Arizona ...928

Arkansas
- Little Rock, Fayetteville and northwestern Arkansas 501
- Jonesboro and southern Arkansas 870

Bahamas 242

Barbados 246

Bermuda 441

British Columbia
- British Columbia except Vancouver area 250
- Vancouver area 604/778

British Virgin Islands 284

California
- Stockton, Fresno, Modesto, and central California 209
- Los Angeles 213
- Malibu, Beverly Hills and west Los Angeles suburbs 310
- Florence 323
- San Jose, Sunnyvale, and Cupertino ..408
- San Francisco 415
- Oakland and Berkeley areas 510
- Chico, Redding, and northeastern California 530
- Fresno and central California 559
- Long Beach 562
- San Diego and southwestern California 619
- Pasadena 626
- San Mateo, Palo Alto and south San Francisco suburbs 650
- Bakersfield and south central California 661
- Fort Bragg, Eureka, Ukiah and northern California 707
- Northern Orange County 714
- Ontario and San Bernadino 909
- Barstow, Encito, Palm Springs and southeastern California 760
- Santa Barbara, Bakersfield, and central western California 805
- Burbank and Glendale areas 818
- Monterey, Santa Cruz, and west-central California 831
- Northern San Diego and Del Mar 858
- Sacramento 916
- Concord, Livermore, Walnut Creek 925
- Anaheim, Irvine, and southern Orange County 949

Cayman Islands 345

Colorado
- Denver area 303/720
- Colorado Springs, Pueblo and southeastern Colorado 719
- Aspen, Durango, and northwestern Colorado 970

Connecticut
- Bridgeport, New Haven and southwestern Connecticut 203
- Hartford, Bristol, and northeastern Connecticut 860

Delaware 302

District of Columbia
- Washington 202

Dominica 767

Dominican Republic 809

Florida
- Miami, Key West and southeastern Florida 305/786
- Orlando and central eastern Florida 321/407
- Gainesville and central Florida 352
- Daytona Beach, area west of Jacksonville 386
- West Palm Beach, Boca Raton, and east central Florida 561/772
- Tampa Bay 727
- St. Petersburg 813
- Pensacola, Tallahassee, and northwestern Florida 850
- Lakeland, Sebring and south-central Florida 863
- Jacksonville, Daytona, and northeastern Florida 904
- Bradenton, Sarasota, and southwestern Florida 239/941
- Fort Lauderdale 754/954

Georgia
- Albany, Valdosta, and south-central Georgia 229
- Atlanta 404/678/770
- Macon, Swainsboro and south-central Georgia 478
- N Georgia: Columbus, Augusta 706
- Savannah, Vidalia, and southeastern Georgia 912

Grenada 473

Guam 671

Hawaii 808

Idaho 208

Illinois
- Champaign, Urbana, Springfield, and central Illinois 217
- Northeastern Illinois and northwest Chicago suburbs 224/847
- Peoria, Rock Island, and west-central Illinois 309
- Chicago 312/872
- Southern Chicago suburbs 464/708
- Alton, Mount Vernon, and southern Illinois 618
- Central Chicago suburbs 630/331
- Chicago/outside downtown 773
- La Salle, Rockford, and northern Illinois 815

Indiana
- Gary. Fort Wayne and northern Indiana 219/260/574
- Indianapolis 317
- Central Indiana excluding Indianapolis 765
- Evansville and southern Indiana 812

Iowa
- Cedar Rapids and eastern Iowa 319
- Des Moines, Ames, and central Iowa 515
- Davenport, Dubuque, and notheastern Iowa 563
- Mason City, Pella, and central Iowa 641
- Council Bluffs, Sioux City, and western Iowa 712

Jamaica 876

Kansas
- Dodge City, Wichita, and southern Kansas 316
- Southern Kansas except Wichita metro area 620
- Topeka, Lawrence, and northern Kansas 785
- Kansas City and eastern Kansas 913

Kentucky
- Paducah, Bowling Green, and western Kentucky 270
- Louisville, Shelbyville, and north-central Kentucky 502
- Eastern Kentucky 606
- Richmond, Danville, and northeastern Kentucky 859

Louisiana
- Baton Rouge and central-eastern Louisiana 225
- Shreveport, Monroe, and northern Louisiana 318
- Lake Charles, Lafayette, and southwestern Louisiana 337
- New Orleans and southeastern Louisiana 504
- Southeastern Louisiana except New Orleans and Baton Rouge 985

Maine 207

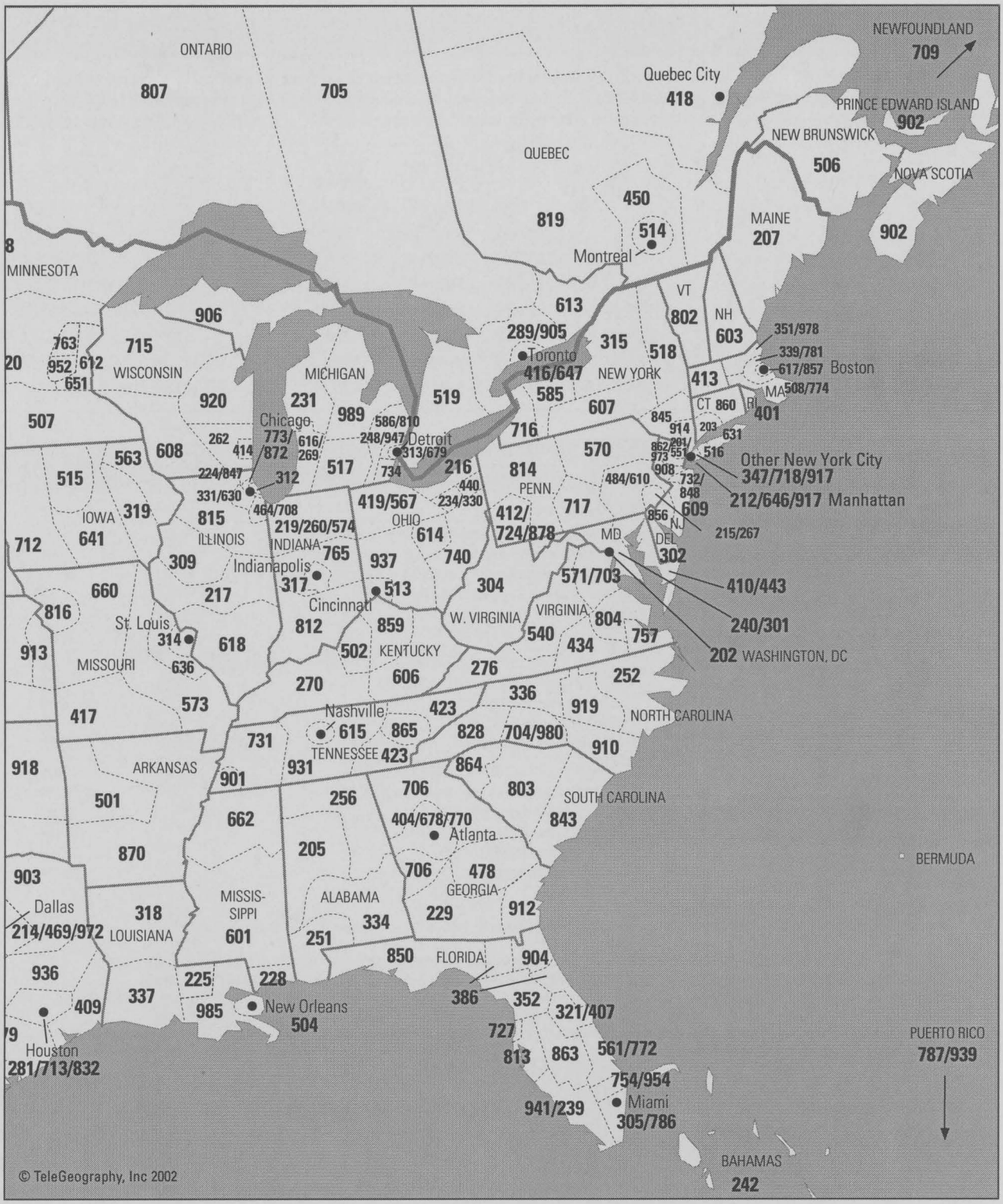
Manitoba 204

Maryland
- Rockville, Hagerstown, and western Maryland 240/301
- Baltimore, Annapolis, and eastern Maryland 410/443

Massachusetts
- Waltham, Lexington, and Boston suburbs 339/781
- Lowell, Salem, and northern Massachusetts 351/978
- Pittsfield, Springfield, and western Massachusetts 413
- Framingham, Cape Cod, and southern Massachusetts 508/774
- Boston 617/857

Michigan
- Traverse City, Muskegon, and northwestern Michigan 231
- Pontiac, Southfield, and Oakland County 248/947
- Detroit 313/679
- Lansing and central Michigan 517
- Flint, Flushing, and southeastern Michigan 586/810

North American Area Codes



A Primer on Bits

Measuring Bytes Bit by Bit

Below are the standard metric prefixes used in the SI (Système International) conventions for scientific measurement. With units of time (e.g., gigabits per second) or things that come in powers of 10, they retain their usual meanings of multiplication by powers of $1,000 = 10^3$. When used with bytes (e.g., gigabytes of data storage) or other things that naturally come in powers of 2, they usually denote multiplication by powers of $1,024 = 2^{10}$.

Base 10			Base 2		
1 Kilobit/s	$= 1,000^1 = 10^3$ =	1,000	1 Kilobyte	$= 1,024^1 = 2^{10}$ =	1,024
1 Megabit/s	$= 1,000^2 = 10^6$ =	1,000,000	1 Megabyte	$= 1,024^2 = 2^{20}$ =	1,048,576
1 Gigabit/s	$= 1,000^3 = 10^9$ =	1,000,000,000	1 Gigabyte	$= 1,024^3 = 2^{30}$ =	1,073,741,824
1 Terabit/s	$= 1,000^4 = 10^{12}$ =	1,000,000,000,000	1 Terabyte	$= 1,024^4 = 2^{40}$ =	1,099,511,627,776
1 Petabit/s	$= 1,000^5 = 10^{15}$ =	1,000,000,000,000,000	1 Petabyte	$= 1,024^5 = 2^{50}$ =	1,125,899,906,842,624
1 Exabit/s	$= 1,000^6 = 10^{18}$ =	1,000,000,000,000,000,000	1 Exabyte	$= 1,024^6 = 2^{60}$ =	1,152,921,504,606,846,976
1 Zettabit/s	$= 1,000^7 = 10^{21}$ =	1,000,000,000,000,000,000,000	1 Zettabyte	$= 1,024^7 = 2^{70}$ =	1,180,591,620,717,411,303,424
1 Yottabit/s	$= 1,000^8 = 10^{24}$ =	1,000,000,000,000,000,000,000,000	1 Yottabyte	$= 1,024^8 = 2^{80}$ =	1,208,925,819,614,629,174,706,176

Measuring Telecommunications Bandwidth—DS-0 to OC-192

Carrier Technology	Data Rate (Mbps)	Description	64 Kbps Circuits*
DS-0	0.064	Base rate in the Digital Signal (DS) level hierarchy	1
T-1 (DS-1)	1.544	Primary level of the American T-carrier multiplexing system; capacity is the same as a DS 1 carrier	24
T-2 (DS-2)	6.312	Four times the capacity of T-1	96
T-3 (DS-3)	44.736	28 times the capacity of T-1	672
T-4 (DS-4)	274.176	168 times the capacity of T-1	4,032
E-1	2.048	Primary level of the European E-carrier multiplexing system	30
E-2	8.448	Carries four multiplexed E-1 signals	120
E-3	34.368	Carries four E-2 signals	480
E-4	139.264	Carries four E-3 signals	1,920
E-5	565.148	Carries four E-4 signals	7,680
OC-1/STS-1	51.840	Basic signaling rate of SONET hierarchy	672
OC-3/STM-1	155.520	Exactly three times the capacity of OC-1**	2,016
OC-12/STM-4	622.080	12 times the capacity of OC-1	8,064
OC-24	1,244.160	24 times the capacity of OC-1	16,128
OC-48/STM-16	2,488.320	48 times the capacity of OC-1	32,256
OC-192/STM-64	9,953.280	192 times the capacity of OC-1	129,024

Key

"T" T-carrier system in U.S., Canada, and Japan with 1.544 Mbps as the primary level (24 voice channels x 64 Kbps per channel).

"DS" Digital Signal that travels on the T-carrier or E-carrier.

"E" Used in countries other than U.S., Canada, and Japan. The hierarchy was established by the CEPT (Conférence Européenne des Postes et Télécommunications) with 2.048 Mbps as the primary level ([30 voice channels + 2 channels for overhead] x 64 Kbps per channel).

"OC" Optical Carrier interface designed to work with STS-*n* (Synchronous Transport Signal) signaling rate in a SONET (Synchronous Optical Network).

"STM" Synchronous Transport Module refers to a large carrier (base signal 155.52 Mbps) in a SONET.

"STS" Synchronous Transport Signal is the electrical counterpart to the Optical Carrier (OC).

Notes:

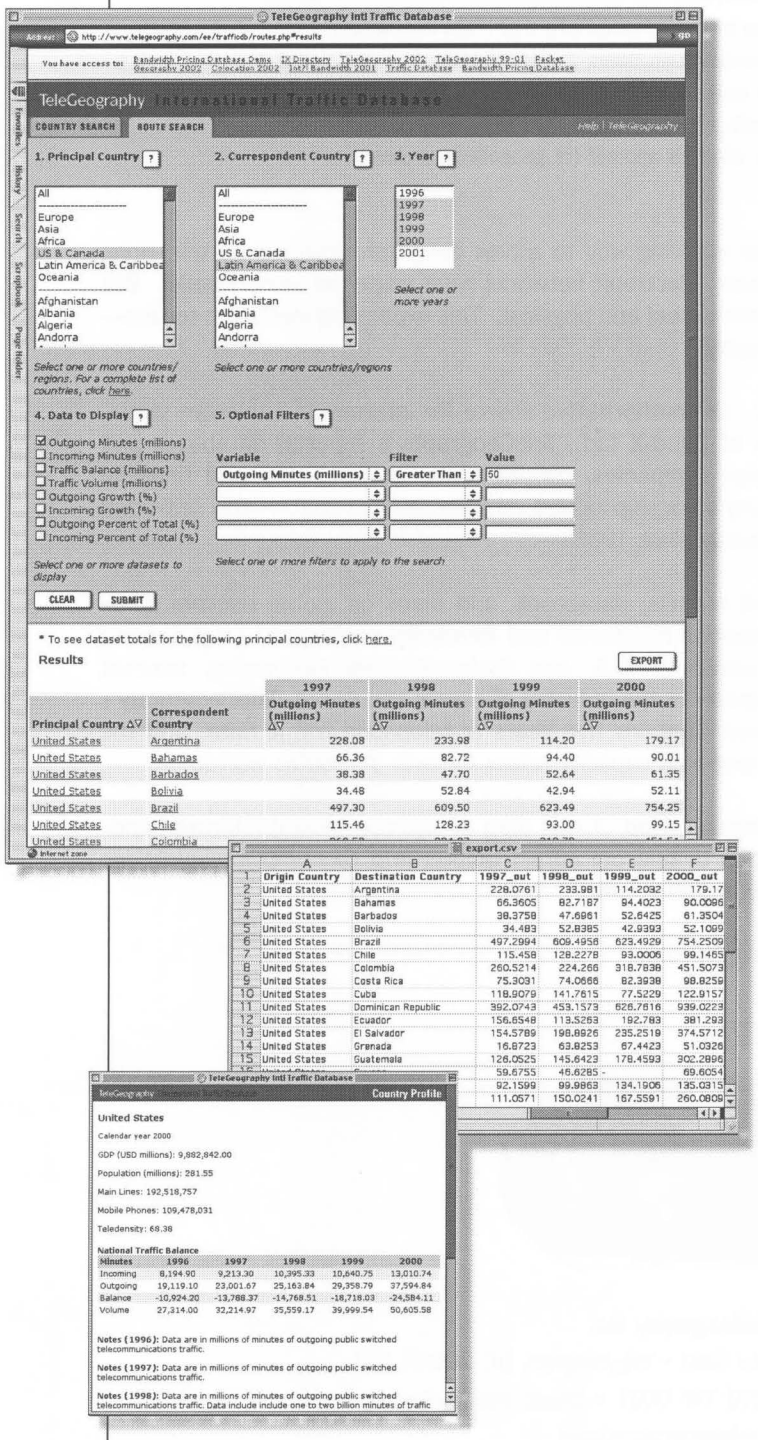
* The number of 64 Kbps is presented for comparative purposes only. The actual number of simultaneous conversations possible over a given carrier may vary depending on the encoding scheme used.

** In the "E" and "T" hierarchies, each higher level is set to be "almost but not exactly" a multiple of the bit rate for the previous order (plesiochronous). To eliminate problems associated with plesiochronous multiplexing, SONET, a synchronous hierarchy, was defined in the United States in 1986. As a result, the "OC" and "STM" carriers are exact bit-rate multiples of their primary levels, OC-1 and STM-1, respectively.

Source: TeleGeography research, Alcatel, *Newton's Telecommunications Dictionary*

TeleGeography International Traffic Database

Now with six years of traffic data to complement your *TeleGeography 2003*



The ***International Traffic Database*** is the most comprehensive source for current and historical cross-border telephone traffic statistics. The database contains six years of our authoritative research on route-by-route traffic volumes for 120 countries, from *TeleGeography 1997* up to the most recent *TeleGeography 2003*. All data may be viewed on screen with your Web browser or downloaded into spreadsheet format.

- All available route-by-route outgoing and incoming traffic volumes (not just the top 20 printed each year)
- Vital data for your models: country totals for traffic, national income, telephone subscribers, and population
- Search, display, and export data to spreadsheets
- Detailed profiles for more than 120 countries
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TeleGeography, Inc.
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Email: info@telegeography.com
www.telegeography.com

About TeleGeography, Inc.

telegeography \tĕl´ə-jē-ŏg´rə-fē\ *n* (1990) abbrv. of telecommunications geography [fr. Gk *tele,* far off, at a distance and L. *communicatus,* pp. of communicare to impart + fr. Gk *geo* (earth) + *graphein,* (to write)] 1. a new branch of geography that maps the pattern of telephone traffic and other electronic communication flows; 2. places created by or perceived solely via telecommunications (e.g., a computer network address); 3. the telecommunications artifacts (radio antennae, terminals, signs) on a site; 4. the balance of telecommunications power in one country or region vis-à-vis another (cf. geopolitics, *archaic*).

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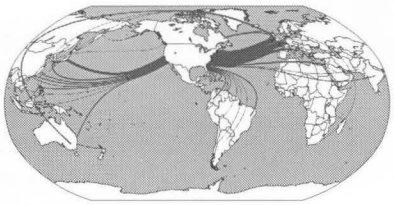

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Tel. +1 202 741 0020 • Fax +1 202 741 0021 • Email: info@telegeography.com
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1909 K Street, NW
Suite 380
Washintgon, DC 20006 USA
Tel: +1 202 741 0020
Fax: +1 202 741 0021
info@telegeography.com
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