AN IIC RESEARCH REPORT

THE GLOBAL TELECOMMUNICATION TRAFFIC BOOM:

> A QUANTITATIVE BRIEF ON CROSS-BORDER MARKETS AND REGULATION



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by Gregory C. Staple

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EXECUTIVE SUMMARY

The axis of power in the world is shifting from geo-politics to tele-geography. Governments are defined by the boundaries they keep; modern telecommunication networks are global.

The remarkable growth of cross-border communication in the 1980s has made the power of telecom networks everywhere apparent. This report charts the dimensions of the current bull market for international telecommunication services. It updates the IIC's 1989 publication: <u>Global Telecommunication Traffic Flows and Market Structures.</u>

At its center are comprehensive statistics on telecommunication traffic to and from 16 countries, including the United States, Canada, Mexico, the United Kingdom, Germany, France, Italy, Japan, Hong Kong, Taiwan and South Korea. Drawing upon this unique factual brief, the report appraises the business and regulatory conditions facing the international telecoms industry in the 1990s.

A principal conclusion is that the market for cross-border telecommunication has reached a crossroads. In 1990, international traffic will exceed 30 billion MiTT (Minutes of Telecommunication Traffic). Assuming only modest growth in the world's major economies, global traffic is likely to keep on expanding at 15-20% annually.

Telecommunication has the potential, however, to play a far larger international role. In many countries, rising demand and new services are being inhibited by inflexible regulatory and pricing arrangements. Perhaps the most pressing question facing the industry consequently is how to respond to changing market conditions without impairing the broad connectivity which has served the world so well.

In answering this challenge, the industry must also address the new trade and competition rules which national governments have begun to craft for cross-border telecommunication services. The balance between the weight given to these rules and that given to traditional concerns (universal service, modernization) will have a major impact on industry profits in the 1990s.

Changing Sources Of Demand

As background to these issues, the report looks first at the origin of today's traffic boom and the direction of future demands.

Of prime importance is the way in which global structures of production and distribution have begun to change the market for telecommunication. In this new environment, the electronic network plays a crucial role in creating economic value and competitive advantage. This trend cuts across manufacturing and service industries.

The rise of networked relationships and the telecommunication services upon which they rely have been spurred by a new preference for market relationships. This preference, part economic and part political, is manifest within the private and public sectors alike, East and West. Every fall in the relative cost of computers and communications (C&C) tends to reinforce it.

The potential for cross-border telecommunication is also enhanced by new media. The telephone is going through a metamorphosis. The black bakelite chrysalis is becoming an electronic butterfly. The fax machine has begun to show us its flight path.

Facsimile, now the preferred medium for trans-Pacific business communication, has let us imagine a world where cross-border communication is not typified by 5 or 10 minutes on the telephone each day, but is part of a much longer series of continuing exchanges between multi-media electronic terminals. We are not there yet, but the market suggests that we may be well on our way by the mid-1990s.

Prospects For Markets And Carriers

The second part of the report examines the status of markets and carriers in North America, Europe and Asia at the end of the 1980s. It finds:

** Cross-border traffic volumes grew particularly rapidly in the late 1980s, but the market continued to be highly concentrated. AT&T remains the world's largest carrier followed by DBP Telekom of Germany. Carriers based in the G-7 countries still account for about 60% of the international services market.

** Competition has borne fruit; MCI and Cable & Wireless are now among the world's top 20 carriers. The impact of competition has been most striking in Japan, however, where new carriers, after operating for 6 months, have a combined 15% market share.

** The North American cross-border market is becoming progressively more liberalized. Of particular note is the provision of newly competitive service to Mexico and the continued expansion of traffic between the U.S. and Canada, the largest bilateral market in the world.

** The 1988-1989 data confirm the Euro-centric traffic patterns of Germany, France and Italy in contrast to the U.K. The data also underscore the central role of Germany as a junction state for international telecommunication. 1992, German reunification and the rise of market economies in Eastern Europe therefore are likely further to advantage DBP Telekom.

** Asia-Pacific countries have, in large part, been the engine of growth for international telecom services in the late 1980s; annual increases of 30-50% have been common. Japan continues to play a decisive role and the rapid emergence of a competitive Japanese market structure is likely to have a follow-on impact beyond Pacific basin markets.

Regulatory Developments To Watch

The weight of cross-border telecommunication traffic is driving the industry toward new regulatory arrangements on tariffs, settlements and leased lines. These issues are linked. Monopoly tariffs and rigid accounting rates (the basis upon which international carriers divide revenues), just like unreasonable restrictions on using leased lines, inhibit demand and maintain supra-competitive margins.

The 1980s bull market has placed growing pressure on these conditions. Traffic growth and new technologies (eg, fiber-optic cables) have substantially reduced the cost of cross-border service, and thus the opportunities for competition, tariff discounts and service expansion.

Current regulations, however, penalize competitive carriers which reduce their tariffs by giving their foreign correspondents a larger share of total end-to-end revenues. Trade deficits of carriers serving richer countries, which tend to make more international calls than they receive, also have been exacerbated. In 1989, for example, the United States telecom services deficit was approximately \$2.5 billion.

The present situation is inherently unstable. It invites, on the one hand, abuse of monopoly power, and on the other, price cutting and uneconomic new entry which may impair long-run industry investment. Multilateral reform of the present system of settlements and accounting rates, although preferable, is likely to be drawn-out. In the interim, national pressures for tariff and regulatory reform will increase.

The following bear watching:

- ** FCC consideration of novel service and settlement arrangements in the U.S. Canada cross-border market;
- ** Joint Oftel-FCC approval of leased-line resale on the U.K. U.S. route;
- ** New discount tariff offerings in the North Atlantic and Pacific basin markets.

Conclusion

Cross-border telecommunication facilities are the oil pipelines of the modern economy. Keeping them open, widening them and ensuring broad public access at reasonable prices is essential to international prosperity. And to every country which desires to have a share in it.

The international telecom network now involves the widest spectrum of economic and social interests. That realization may be the most lasting legacy of the bull market chronicled here. It may also be the best hope for progressive stewardship of the network in the future.

THE GLOBAL TELECOMMUNICATION TRAFFIC BOOM: A QUANTITATIVE BRIEF ON CROSS-BORDER MARKETS AND REGULATION

by Gregory C. Staple¹

I. Introduction

We are in the midst of a sustained bull market for international telecommunication. Boosted by 20% annual growth rates, cross-border traffic on public circuits alone will exceed 30 billion minutes in 1990, an increase of over 500% since 1980. In its wake, last decade's business buzzwords -- globalization, interdependence -- have become this decade's popular conventions.²

The communications boom is also redrawing the political map. The power of telegeography is supplanting geo-politics. 1989 dramatized its international dimensions. It was a year when a fax machine could create a liberated zone; when the telephone became the popular tribune of new democracies; when television provided the world with daily reports, live <u>via</u> satellite, on the unfolding drama in Eastern Europe.³

A working knowledge about the world's telecommunication facilities and how they are used is essential to this new environment. The current report, the second in the IIC series on global telecom traffic flows, addresses this need. It quantifies the major streams of cross-border traffic flowing in and out of the global telephone network and discusses their significance.

Among the major questions addressed are:

-- Who are the world's major international telecommunication carriers and how much traffic do they carry? Between which countries?

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-- Which carriers and markets have grown fastest in the 1980s and what are their future prospects?

-- What do telecommunication traffic trends imply about economic and regulatory linkages between nations?

-- How will the very rapid growth of traffic affect the level of international tariffs and the current regulatory regime for the settlement of accounts between interconnecting carriers?

How To Use This Report

The Global Telecommunication Traffic Boom is divided into five main sections as follows:

The next part -- Part II -- explores the sources of the international traffic boom. It discusses (a) the supply side legacy of the 1980s (the construction of massive new international facilities, market liberalization) and; (b) the impact of new demands (networked production, facsimile) on the market for cross-border telecom services. This part is intended to provide a historical context for succeeding sections on market trends and regulation.

Part III -- uses the report's data base of cross-border traffic statistics to highlight business opportunities and consequences arising from the current traffic boom. There are tables on Minutes of Telecommunication Traffic (MiTT) to and from 16 major markets: the United States, Canada, Mexico, the United Kingdom, France, West Germany, Italy, the Netherlands, Switzerland, Japan, Hong Kong, Australia, Singapore, Republic of China (Taiwan), South Korea and Thailand.

Part III also looks at the changes among the ranks of the world's top 25 international carriers; the rising importance of traffic in the Asia-Pacific market; and the likely impact of European integration on traffic patterns.

Part IV -- shows how the bull market for telecommunication services is pushing tariff rebalancing, accounting rate reform and the resale of international leased lines to the top of the regulatory agenda. In addition, Part IV contains a background brief on several regulatory proceedings which are likely to set the tone for further liberalization in the 1990s.

Part V -- offers concluding thoughts about the international telecommunication boom and the impact of the telecom industry's new prominence in the global economy.

A Note On Further Research

The report builds upon the studies of telecommunication traffic pioneered at the IIC in 1988 - 1989.⁴ By compiling and analyzing standard statistics on telecom traffic, this school of work seeks to fill a gap in industry analysis, now heavily dependent upon revenue and facilities data. The IIC's work argues for giving new attention to "the weight of traffic" in shaping industry and regulatory agendas.

Traffic analysis should not be seen as preclusive of other methodologies; data on industry costs, capacity and earnings generally has a greater value when it is paired with data on traffic. That is why such basic consumption data is widely used in other international industries (air travel, financial services, energy). Basic data on the demand for telecommunication traffic promises to be of equal value.

Our message accordingly is: Follow the traffic. Listen to what it is saying about the industry and the economy, or would, if unreasonable supply or price constraints did not exist.

As economies become ever more telecom intensive, the public interest is likely to require a new informational balance regarding the publication of telecom traffic statistics. We have previously suggested that a priority be given to publication of MiTT statistics on: (1) domestic public voice-grade circuits; (2) international public voice-grade circuits; and (3) international private lines.

Publication of such statistics would have substantial benefits. The business and regulatory briefs contained in Parts III and IV offer some examples. Further, as demonstrated in our earlier work, MiTT statistics have the ability to serve as a new macro-economic indicator and planning tool.⁵ In addition, close analysis of MiTT patterns can help to make visible the complex ethnic, social and cultural linkages between countries which shape and, in turn, are shaped by today's global telecommunication order.

The analysis of cross-border telecommunication traffic here is thus but one of many areas in which traffic analysis may bear fruit.⁶

II. The Origins Of Today's Bull Market

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The sustained growth of demand for international telecom services since 1987 is unprecedented, even in an industry which has grown accustomed to double digit growth rates. At least two factors distinguish the current bull market.

First, today's boom appears to be much broader than the last market expansion (approximately 1976 - 1982). This time the volume of cross-border traffic has been swelled jointly by demand from European, North American and Asian markets.

Indeed, in significant part, the current bull market reflects the sustained rise in international demand in the Asia-Pacific basin throughout the 1980s. This surge of new demand, with year-on-year traffic growth of 30-40%, has primed demand in North American and European markets. International carriers based in these markets saw slackening growth in the mid-1980s but, since at least 1987, have seen annual traffic growth rise to 15-20% or more. See Table 1.

Second, since the early 1980s, the global traffic base has increased 400-500%. Absolute traffic volumes being handled by carriers today are thus very large by historical standards. In the U.S., for example, outbound traffic is expected to continue growing at about 20% in 1990, or over 1,200 million more MiTT annually. In absolute terms, this is equivalent to a doubling of 1980 outbound international traffic every year!

The vast majority of cross-border traffic is carried on public voice circuits. However, a significant proportion -- perhaps 10 -15% depending upon the route -- transits private or leased lines. Traffic on these circuits is primarily intra-corporate voice and data traffic; a small volume is also generated by Value Added Networks (VANs).

The VAN and International VAN (I-VAN) market has yet to experience a substantial take-off. A recent industry report estimated that 1988 revenues for VAN services (domestic and international) were only \$574 million for U.S. based service providers. (U.S. companies probably have 30-40% of global VAN revenues.) Further, the report estimated only 10% annual revenue growth through 1993. These facts suggest both how important future bilateral agreements to facilitate I-VAN services may be to the fortunes of this new industry and the continuing dominance of public voice circuit traffic in the 1990s.⁷

Table 1

THE NEW BULL MARKET: Annual Growth Rates For Outgoing International MiTT*

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Country	Avg. 1980-86	1987	1988	1989	
United States	19.0%	18.1%	20.0%	20.0%	
U. K.	12.3%	14.0%	15.0%	17.0%	
Japan	22.8%	31.5%	34.5%	38.0%	
W. Germarıy	11.6%	10.0%	1 6 .6%	18.0%	
France	. -	19.3%	18.7%	14.5%	



* MiTT is Minutes of Telecommunication Traffic. Data are for international public voice circuits only. Fiscal year data used for U.K. and Japan. Figures for 1989 have been estimated for W. Germany and Japan.

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A. The supply side legacy of the 1980s

The origins of today's bull market can be found in the bull market of the late 1970s; it led to a vast expansion of international capacity. Much of the new capacity was (and is) largely invisible, involving the addition of incremental cross-border terrestrial links, regional undersea cable and international switching facilities. But, on the intercontinental scale, there were two signal developments.

The first was the launch of the Intelsat V (1980) and V-A (1985) satellite series (with capacities of 12,000 and 15,000 voice circuits respectively.) Intelsat also committed itself to build and launch the Intelsat VI series, beginning in 1989, with a nominal capacity of 24,000 voice circuits or up to 120,000 voice paths using voice multiplexing equipment.

Second, the 1980s saw the authorization of two competing sets of trans-oceanic cables. One set was owned largely by established carriers, primarily AT&T and national Post, Telephone and Telegraph (PTT) authorities (TAT-8 for the Atlantic; TPC-3 for the Pacific). The other set was owned privately, although common carriers and PTTs also have ownership interests in these cables (P-TAT for the Atlantic; North Pacific Cable (NPC) for the Pacific).

These new cables, all employing fibre optic technologies, added enormous new capacity to the market (TAT - 8, operational in 1988, has a capacity of about 37,000 voice paths; P-TAT, operational in 1989, provides over 60,000 voice paths).

The unprecedented capacity of these new systems reordered carrier and user priorities. Supply concerns receded from view; the business and regulatory agenda became demand-driven. The principle issues accordingly came to revolve around matters of network access.

Questions of circuit liberalization, interconnection, and facilities resale began to gain regulatory attention as the market sought to make effective use of burgeoning capacity. The new lobby of value-added service providers, for whom telecom circuits are an essential means of market access, also pushed these issues forward on the regulatory agenda.

Industry debates in the 1990 - 1995 period thus are, with some notable exceptions, likely to move beyond the questions of liberalization that preoccupied the 1980s. There is now substantial agreement that liberal interconnection to the network by value-added service providers is in the public interest. Future objections are more likely to focus on procedure (place, time) rather than substance.

In view of these developments, in the 1990s the international regulatory agenda may begin to focus on the price of network access. And on competition for basic services. This is especially true, as discussed below (See Section IV.), so long as the gap between service costs and tariffs remains substantially above the norm for domestic services.

This issue is discussed further in Part IV.

B. Changing Sources Of Demand

Rising demand for international telecom services is chiefly driven by basic economic factors. Of key importance are continuing rises in: per capita income; the installed base of telephones; the volume of trade and investment flows between countries; growth in international tourism and (slowly) declining tariff levels.

These fundamental factors -- economic growth and the addition of new access lines -will continue to boost the demand for cross-border telecom traffic in the 1990s. (One need only look to the new markets in the Asia-Pacific to see what a difference one decade can make.) For these reasons, fluctuations in the general business cycle in countries which originate significant traffic streams will also have a decided effect upon future demand.

Most traffic forecasting models already take into account the foregoing factors, and we do not seek to fine-tune them here.⁸ Rather our interest is in speculating briefly about emerging influences on the demand for international telecommunication services in the 1990s.

Were there factors that led the market to become substantially more bullish during the last few years? If so, what are they? And what are the implications of these new demands for the future? We concentrate here on: (a) networked production; and (b) new media (eg, facsimile).

1. Networked Production

During the 1980s, as national economies become more telecom intensive, the organization of production and markets began to change. These changes, in turn, tended to build up new demands for telecommunication services.

Networked relationships typify the emerging structure of economic organization. In this new environment, it is the network, rather than particular capital or labor inputs, which is crucial in creating economic value and competitive advantage. This trend -- part reflection, part driver of globalization -- can be observed in both service

and manufacturing industries.

In the networked economy (a concept developed most fully by Albert Bressand and colleagues at Promethée in Paris), factory and market are no longer primarily physical locales, but a set of electronic networks.⁹ Witness the financial sector. The 24-hour global market for foreign exchange (FX) and government securities is now an inescapable fact for every central banker and corporate treasurer. The trading of securities has likewise moved from the floor of a handful of city-specific stock exchanges to tens of thousands of dispersed brokerage screens which, in turn, are linked by telephone to millions of retail clients.

Less well understood, perhaps because less visible, is the role which networked intelligence is having on other businesses. It can be seen, however, in the new ubiquity of on-line computer and communication services in the chain of production and distribution. A purchase may involve a new car or a concert ticket; ordering clothes from a mail-order catalog or arranging over-night delivery of a package; choosing a health insurance policy or an air ticket. But, the electronic linkage of widely separated sales offices, order processors, data-bases, product designers, assembly sites, subcontractors, shippers, finance agencies, professional advisers and company executives may be strikingly similar.¹⁰

Networks And Markets

The new information technologies, computers and communications (C&C), which have fostered the rise of the networked economy also favor market forms of economic organization in place of hierarchies for managing production and distribution.¹¹ There are several reasons why C&C makes markets comparatively more efficient.

First, the planned introduction of C&C generally reduces the transactions costs of coordination in information intensive areas (eg, contracting, budgeting, accounting). Second, as the costs of coordination decrease, the economic advantages of markets or quasi-markets (over bureaucratic or command forms of resource allocation) tend to increase.

For example, so long as the search and contracting costs are relatively low, it is generally advantageous for a company to seek a competitive bid for a loan or for subcontracting work or an insurance policy. Computer-based markets for these services, linking potential buyers and sellers <u>via</u> telephone lines and desk-top terminals, can in many cases keep the search and contracting costs competitive. This is especially so if the buyer's alternative is to make a sufficient investment of staff time and company resources to ensure that like services are available in-house or from "captive" suppliers. As C&C costs fall, therefore, various kinds of electronic markets and networks for Electronic Data Interchange (EDI) have begun to proliferate. A widening number of firms have also begun to use their core business (banking, air travel, insurance) to become electronic market makers for other industry participants; other firms have seen the advantages from providing interconnections to these new electronic nets. In each case, telecommunication circuits provide the umbilical cords to tie the networks together.

Networked Traffic

The rise of the networked economy and the attractiveness of market forms of coordination to industry is not easy to quantify at the international level. But, the size and scope of the demand for cross-border telecommunication services in the late 1980s tends to support the observations of the business analysts discussed above.

First, in the late 1980s, most large carriers experienced a demand for cross-border private lines, the medium of choice for business networks, which was equal to or greater than the growth rate for basic international voice service. Further, in most industrialized countries, the growth of domestic private lines was substantially higher than average growth rates for domestic voice traffic as a whole.

Second, as documented below, the late 1980s saw exceptional growth in bilateral flows to and from the G-7 countries which in 1985 already accounted for approximately 60% of cross-border telecommunication traffic. This pattern is consistent with the economic trends described above; new electronic networks have developed first primarily in the wealthiest countries which have invested most heavily in C&C facilities. The continuing growth in the demand for public cross-border telecommunications services in the G-7 also confirms one of the key findings of our earlier work; rapid market growth is possible even from a high base.

In sum, the growth of cross-border electronic networks is likely to broaden and deepen the international telecoms market as a whole, even as its various parts become more specialized.

2. New Media: The Fax Boom

Today's international telecoms boom is also being stimulated by new media, of which facsimile or "fax" is by far the most important. Electronic mail has also played a role and is likely to become more significant by mid-decade as standard protocols are adopted for interconnecting different systems across national borders.

Fax traffic is of special interest, however. Its impact on the international services market has been dramatic. In 1990, fax messages will probably account for the majority of new cross-border traffic on many routes. This is especially so on trans-Pacific routes where differences in language and the limited overlap of working hours give this medium distinct advantages over Plain Old Telephone Service (POTS). As such, the current fax boom may be a valuable talisman of future media trends.

The Electronic Butterfly

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The telephone is going through a metamorphosis. The black bakelite chrysalis is becoming an electronic butterfly. But what kind of a butterfly will it be? Where will it fly? And how will it affect network traffic patterns? Could it be that fax has given us a glimpse of what lies ahead?

If so, current traffic volumes, large as they are by comparison with the early 1980s, may quickly be eclipsed by the day-to-day cross-border traffic from networks of multimedia terminals. Just over the horizon may be a world where millions of people routinely pass photos, drawings, work-station displays and other kinds of electronically stored documents through cross-border telecom circuits -- all with no more effort than dropping a letter into a mail box.

We are not there yet, and won't be until the mid-1990s (the advertised presence of ISDN (Integrated Services Digital Network) capabilities notwithstanding). But, from a traffic standpoint, the fax is almost certainly pointing the way. That way lies somewhere along a path in which the "telephone" terminal is used, on average, 10 to 20 minutes a day, to a world more like that of the television, which is "on" 4 or more hours a day in many countries.

In this context, the biggest question which the telecoms industry faces is how long the average "telephone" terminal will be "on" in the year 2000. And how many terminals will there be? If we are right in suggesting that fax is really only an evolutionary technology then the impact on future international traffic volumes may be far larger than commonly forecast.

We offer the following anecdotal evidence for the rather bullish view presented above.

It's A Fax World

The current and projected base of fax machines (in millions) in selected countries is as follows:

	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1993</u>
United States	.7	1.4	2.5	8.5
European Community	.5	.9	1.7	7.0
Japan	.8	1.9	3.1	9.5

Sources: Fax Focus, Tsushin Kikai Kogyoukai, Dataquest, Industry interviews

The data in the foregoing table is approximate and is probably conservative. Data on equipment sales vary significantly and are hard to reconcile with manufacturing output (eg, Japanese manufacturers report production of 4.7 million fax terminals in the fiscal year to March 1989, a 26% increase on the prior year's output). Growing sales of "fax boards" for personal computers further complicates the calculation of aggregate figures. The advent of multi-task ISDN terminals with fax capabilities will only add to the problem.

What is important for the present report is the rough order of magnitude of the installed base of fax machines in each country in relation to (a) the installed base of telephones; and (b) traffic volumes. Making these comparisons suggests the following.

At the end of 1989 the base of fax machines was less than 5% of the telephone base in most countries and perhaps 6-7% in Japan. (See Table 4). On average, industry surveys suggest that fax machines send about 10-15 pages a day; transmission time, about 2.5 - 4 minutes. On these figures, the total traffic volume generated by fax is quite small in comparison to the traffic generated by the installed base of telephones which, in most industrialized countries are used, on average, at least 15 minutes a day.

In view of the foregoing, the fact that KDD and other major trans-Pacific carriers report that 50-60% of their international traffic is now fax traffic is truly striking. It suggests that fax is increasingly preferred to the telephone (and telex) for inter-

continental communication. In fact, if the present evidence is substantiated over time, it would probably pay international carriers to underwrite the sale of fax machines in large volumes (eg, with cheap credit or service rebates) to prime international customers.

In Japan's case, for example, it appears that in 1989, about 3 million fax machines generated as much international traffic as 49 million telephones. Partial evidence from other countries in the region suggests Japan's experience is not unique.

The number of fax machines in Singapore doubled in the year to March, 1989; total outbound traffic increased 42%. In Hong Kong, outgoing traffic on dedicated fax lines alone doubled from March, 1987 to March, 1988 and grew by 50% again to March, 1989; total outbound traffic from Hong Kong in this period grew by 39%. Unfortunately, the overall mix of outgoing fax and voice traffic for these locations is unavailable.

It may be too early to draw conclusions. But, the trend seems clear; fax machines and their progeny may be the most exciting prospect for the international telecommunication industry since satellites. This augurs well for international revenues and, as a result, is likely to further fuel the present debate about regulatory boundaries and competition.

Is international facsimile service a basic (reserved) service or a value added service (subject to competition)? What about a service (facility) which stores and forwards faxes? What about a service which carries the traffic from multi-function terminals with voice and fax capabilities?

III. Business Implications

The previous section looked at the origins of today's international traffic boom and the new potential for cross-border telecommunication in the 1990s. This section draws upon a unique 16 country survey of cross-border traffic statistics to examine which carriers and markets are likely to lead the way forward in the next five years.

The analysis builds upon the 1986-1987 traffic data in the IIC's 1989 report.¹² Those statistics showed, among other things, that:

** The market for international telecommunication is highly concentrated; 5 carriers -- AT&T, Deutsche Bundespost, British Telecom, France Telecom, and Telecom Canada -- account for approximately 50% of outgoing traffic; 10 carriers account for almost 70% of outgoing traffic.

** North America is a primary target for telecom service providers because it has by far the largest base of telephones (approximately 135 million access lines, excluding Mexico) and these telephones are used more, on average, than telephones in most other countries (the volume of MiTT per access line is 2 or 3 times European and Japanese norms);

** U.S. international markets are moving West. And South. In the 1990s, we advised that Taiwan, South Korea and the Dominican Republic, for example, would be more important than France and Italy for some U.S. based service providers.

** The U.K. international market also looks West (in 1986, 25% of outbound traffic went to the U.S.) and to the Far East (Hong Kong and Japan). By contrast, the international markets of Germany, France and Italy are Euro-centric (in 1986 outbound traffic to the U.S. averaged only about 7%). As yet, the impact of 1992 on these traffic patterns remains unclear.

** Japan's international telecom providers look first to the Asian market (principally the "Four Tigers": Hong Kong, Singapore, South Korea, Taiwan) and then to the U.S. (accounting for about 25% of Japanese outbound traffic in 1986). We therefore advised that Japan's overseas carriers were likely to focus their attention on Asia's fast-growing economies and on Europe which, as a result of growing tourism and inward investment, seems likely to experience more rapid growth in the 1990s.

A. Carriers and Market Shares

Tables 2 and 3a, which follow this page, rank the world's top 25 international carriers by the volume of public telecommunication traffic carried in 1988.

1. AT&T continues to be the world's number 1 international public carrier with roughly twice the global traffic base of the number 2 carrier, DBP Telekom of West Germany. But, competition from new U.S. based carriers is eroding AT&T's market share. U.S. Sprint, now a partner with Cable & Wireless (C&W) in the trans-Atlantic market, has experienced the sharpest growth since 1986. See Table 3b below.

2. Cross-border traffic carried by C&W companies based in the U.K. and Hong Kong has also grown dramatically since 1986, advancing C&W briskly among its peers. C&W is now at least the 11th largest international carrier (up from 20th place in 1986) and is likely to climb further in the ranks during the 1990s.

Mercury's outgoing traffic is still growing by about 30-40% annually (on a base of 8-9% of U.K. outgoing traffic). Traffic from Hong Kong has shown a similarly high growth rate. C&W's 18% interest in International Digital Communications Inc. (IDC), a new Type I (facilities-based) carrier in Japan, will further strengthen its traffic base in the mid 1990s.

3. IDC and International Telecom Japan (ITJ), Japan's other new international Type I carrier, have limited operating experience. These carriers only began leased circuit service in Spring 1989 and public switched voice service in October 1989. Even so, their record has been exceptional.

As of April 1990, industry sources reveal that, taken together, ITJ and IDC have gained about 15% of total outgoing traffic. This market share, achieved after only 6 months, is greater than that won by competitive carriers in the U.K. and the U.S. after almost 5 years! Compare Table 3b.

How did ITJ and IDC do it? There are several reasons, most unique to the Japanese market. First, Japan's outgoing traffic is highly concentrated: 3 routes account for about 50% of traffic; 8 routes for about 75%. See Table 14. Further, approximately 90% of outgoing international traffic is generated by businesses. This makes it relatively easier for new carriers to gain market share.

Second, in contrast to the U.S. and U.K., users can easily route their calls <u>via</u> KDD, IDC or ITJ without pre-subscription. Digital switches permit a customer to choose a carrier merely by adding 1 number to the established 3 number international access code.



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Table 3a

GROWTH OF THE WORLD'S TOP 25 PUBLIC INTERNATIONAL CARRIERS (1986 - 1989)

Rank	Carrier	Country	1988 Outgoing MiTT in Millions	1986 Outgoing MiTT in Millions	Growth 1986- 1988
1	ΔΤ&Τ	United States	4778	3833	24 7%
2	DRP Telekom	W Germany	2470	1077	27.7%
3	British Telecom	United Kingdom	1654	1310	20.4%
4	France Telecom	France	1570	1095	20.078 13 1%
5	Telecom Canada*	Canada	1054	041	12 0%
5	reiccom danada	Vanada	1004	3-1	12.0%
6	Swiss PTT	Switzerland	1014	802	26.4%
7	Italcable/ASST	Italv	785	609	28.9%
8	Netherlands PTT	Netherlands	706	575	22.8%
9	Belgian PTT	Belaium	561	452	24.1%
10	KDD	Japan	529	319	65.8%
11	Cable & Wireless*	United Kingdom	516	204	152.9%
12	Saudi Com. Min.	Saudi Arabia	510		
13	Televerket	Sweden	485	381	27.3%
14	OTC	Australia	415	239	73.6%
15	Austrian PTT	Austria	401	321	24.9%
16	Teleglobe Canada	Canada	358	223	60.5%
17	Telefonica	Spain	330		
18	Danish PTT	Denmark	296	241	22.8%
19	MCI	United States	262	163	60,7%
20	Nor. Telecom Auth.	Norway	246	204	20.6%
21	DGT, Mexico	Mexico	211		
22	China, PR - PTT	PRC	190		
23	Hellenic Telecom	Greece	179	152	17.8%
24	DGT	Taiwan (R.O.C.)	162		
25	UAE Com. Ministry	United Arab Emir.	155	120	29.2%

Note: MITT is Minutes of Telecommunication Traffic. Data are for international public voice circuits only. BT, KDD, C&W and OTC data are for 1988 fiscal year (April 1988 to March 1989); DGT Taiwan data are for 1989 fiscal year (July 1988 to June 1989).

 Telecom Canada total includes U.S. and Maxico traffic originated by nine provincial telephone companies and Telesat Canada; Cable and Wireless total includes only traffic originated by Hong Kong Telephone and, in the United Kingdom, Mercury Communications.

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Table 3b

Market Share of Competing U.K. and U.S. International Carriers: Percent of Outgoing Voice Circuit MiTT (1986-1989)

	AT&T	MCI	US Sprint
1986	94.3	4.0	1.6
1987	93.0	4.7	2.3
1988	89.1	7.0	3.5
1989*	85.5	9.0	5.0
nited Kingdom			
_	BT	Mercury	
1986/87 (FY)	99.8	0.2	
1987/88 (FY)	98.5	1.5	
1988/89 (FY)	95.5	4.5	

Sources: US: 1986-1988 FCC; 1989 Industry Sources. UK: Oftel and Industry Sources.

*Estimated market share.

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Third, ITJ and IDC are, in large measure, user-owned companies. The numerous corporate investors in these companies provided IDC and ITJ with a substantial customer base, in effect giving them a jump-start in the market. This advantage, coupled with the aggressive use of commission agents, allowed the companies to rapidly win a solid base of big and small-business customers alike.

What will happen next? The international telecom market in Japan is now the most competitive in the world. And it is likely to remain so. Japan's international carriers are all stand-alone companies; their pricing strategies are not constrained by domestic service costs.

KDD's market share may well fall to 65% or below before it stabilizes, despite the fact that KDD has begun to match its competitors' prices. (Since 1988, KDD has lowered its voice tariffs three times (21.8% in September 1988; 16% in November 1989; and 7% in April 1990)). This has made public telephone tariffs from Japan to many points in Europe and to the United States equal to or lower than the in-bound tariffs.

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The unexpectedly strong price competition among Japanese carriers is likely to have significant spill-over effects on traffic and tariffs in other markets. Could Japan's carriers become the driving wedge of global competition in the 1990s? We comment further on this in Part IV. C.

4. Carriers to watch: Just below the top 25 carriers in Table 3a are those from Singapore, Brazil, South Korea, Indonesia and the Philippines. (Note: Singapore does not appear in Table 3a because official statistics do not include cross-border traffic to Malaysia. See Table 18.) These carriers are all growing rapidly and in the 1990s are likely-to have traffic bases in excess of the smaller European states now in the top 25.

And what of the U.S.S.R.? It has approximately 35 million telephone exchange lines, but generates less international traffic than many carriers with less than 3 million lines. A major reason is the very limited number of dedicated international circuits. New international exchanges proposed for the early 1990s will help to ease this bottleneck. So may two major cross-border fibre-optic cables: the proposed Trans-Soviet Line (TSL) to Japan and the Central Strecke to Germany. Hence, as the Soviet Union becomes integrated with market economies East and West, the growth in crossborder traffic volumes for the USSR will bear close watching.

B. Cross-Border Markets And Trends

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Table 4 provides a statistical overview (population, GNP, telephone lines <u>per capita</u>) of the world's major telecom powers. Tables 5 - 20 summarize the volume of incoming and outgoing voice circuit traffic for 16 countries in three major regions: North America, Europe and Asia.

To facilitate review, the tables are presented together, beginning on the following page. Our analysis begins again on page 43 with the North American market.

The Economies of the World's Major Telecom Powers: A Statistical Overview

	(1)	(2) Estimated	(3) 1987	(4) 1987	(5) 1988	(6)
	1988	1987 s	Main	Main	Outaoin	a Outaoin
	Pop.	GNP per	Lines	Lines	MiTT*	MiTT* Pé
Country	(Mill.)	Capita	(Mill.)	Per 1000	(Mill.)	1000 Pop
Linited States	246.3	18560	126.7	520	5370	21820
Canada	240.0	15160	120.7	520	1/, 1/,	Z1009
Maviaa	20.0	19100	10.4	524	1414	002920
INIEXICO	02.1	1020	4.1	50	211	2938
West Germany	61.2	14480	27.6	451	2479	40507
France	55.9	12790	24.5	440	1570	28086
Italy	57.4	10360	19.1	333	785	13676
United Kingdom	57.1	10430	23.3	409	1778	31138
Netherlands	14.8	13350	6.2	425	706	47703
Japan	122.4	15760	49.2	403	529	4332
Taiwan	20.3	5075	5.1	262	123	6059
South Korea	42.0	2690	8.8	209	118	2810
Singapore	2.7	7940	0.9	340	152	56296
Hong Kong	5.6	8260	2.0	360	441	78750
Thailand	54.5	840	0.9	17	43	780
Australia	16.5	11150	7.1	436	415	25152

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THE UNITED STATES AND ITS MAJOR TELECOMMUNICATION CORRESPONDENTS (1988)

Destination	Outgoing MiTT in Millions*	Market Share %
Canada	1075	20.2
U.K.	485	<u> </u>
Mexico	470	88
W. Germany	367	6.9
Japan	232	4.3
France	145	2.7
Italy	128	2.4
S. Korea	122	2.3
Dominican Republic	119	2.2
Colombia	108	2.0
Philippines	106	2.0
Taiwan (R.O.C.)	86	1.6
Israel	77	1.4
Jamaica	73	1.4
Brazil	72	1.3
Australia	69	1.3
Hong Kong	64	1.2
Switzerland	61	1.1
El Salvador	54	1.0
Netherlands	53	1.0
Spain	49	0.9
Greece	48	0.9
Ireland	44	0.8
Poland	42	0.8
Ecuador	41	. 0.8
Total Above	4190	78.7
Total U.S.	5325	100.0
Тор 5	49.3	
Top 10	61.0	
Top 15	68.8	
Top 20	74.5	•
Top 25	78.7	

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Table 6

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CANADA AND ITS MAJOR TELECOMMUNICATION CORRESPONDENTS (1988)

Destination	Outgoing MiTT in Millions*	Market Share %
United States	1049.0	74.2%
U.K.	76.4	5.4%
W. Germany	24.7	1.7%
France	21.5	1.5%
Italy	21.4	1.5%
Hong Kong	16.0	1.1%
Australia	10.4	0.7%
Japan	9.4	0.7%
Greece	8.6	0.6%
Netherlands	8.2	0.6%
Jamaica	7.5	0.5%
Trinidad	7.3	0.5%
Switzerland	7.2	0.5%
Mexico	6.1	0.4%
Israel	5.3	0.4%
Total Above	1279.0	90.4%
Total Canada	1414.0	100.0%



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Destination	Outgoing Mitt in Millions*	Market Share %
United States	192.4	91.3%
Canada	3.1	1.5%
Spain	2.3	1.1%
U.K.	1.2	0.6%
Colombia	1.1	0.5%
France	1.1	0.5%
W. Germany	1.0	0.5%
Italy	.9	0.4%
Japan	.8	0.4%
Argentina	.7	0.3%
Brazil	.7	0.3%
Venezuela	.7	0.3%
Panama	.5	0.2%
Guatemala	.5	0.2%
Switzerland	.4	0.2%
lotal Above	207.4	Q8 / %
Total Mexico	210.7	100. 4 76

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Та	Table 8a		
THE UNITED KINGDOM AND ITS MAJOR TELECOMMUNICATION CORRESPONDENTS (1988)			
	Market		
	Share		
Destination	%		
United States	21.9%		
W. Germany	10.4%		
France	9.3%		
Netherlands	4.8%		
Italy	4.4%		
Canada	3.8%		
Spain	3.6%		
Australia	3.5%		
Switzerland	3.5%		
Belgium	2.7%		
Sweden	2.1%		
Japan	1.9%		
Denmark	1.7%		
Norway	1.5%		
South Africa	1.4%		
Hong Kong	1.3%		
Greece	1.2%		
India	1.0%		
Portugal	1.0%		
Turkey	0.8%		
Total Above	81.8%		
Τορ 5	50.8%		
Tòp 10	67.9%		
Top 15	76.5%		
Top 20	81.8%		

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Table 9

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FRANCE AND ITS MAJOR TELECOMMUNICATION CORRESPONDENTS (1988)

98 12.6 70 10.8 55 9.9 29 8.2 07 6.8 05 6.7 01 6.4 77 4.9 54 3.4 44 2.8 38 2.4 32 2.0 19 1.2 16 1.0	9% 9% 9% 9% 9% 9% 9% 9% 9%
36 12.0 70 10.8 55 9.9 29 8.2 07 6.8 05 6.7 01 6.4 77 4.9 54 3.4 44 2.8 38 2.4 32 2.0 19 1.2 16 1.0	1776 1976 1976 1976 1976 1976 1976 1976
70 10.0 55 9.9 29 8.2 007 6.8 05 6.7 01 6.4 77 4.9 54 3.4 44 2.8 38 2.4 32 2.0 19 1.2 16 1.0	176 19% 19% 19% 19% 19% 19%
355 9.9 29 8.2 307 6.8 05 6.7 01 6.4 77 4.9 54 3.4 44 2.8 38 2.4 32 2.0 19 1.2 16 1.0	1% 1% 1% 1% 1% 1%
23 6.2 07 6.8 05 6.7 01 6.4 77 4.9 54 3.4 44 2.8 38 2.4 32 2.0 19 1.2 16 1.0	- 76 1% 1% 1% 1% 1%
05 6.7 01 6.4 77 4.9 54 3.4 44 2.8 38 2.4 32 2.0 19 1.2 16 1.0	9 % 9% 9% 9% 9% 9%
05 6.7 01 6.4 77 4.9 54 3.4 44 2.8 38 2.4 32 2.0 19 1.2 16 1.0	% % % % %
01 6.4 77 4.9 54 3.4 44 2.8 38 2.4 32 2.0 19 1.2 16 1.0	% 9% 9% 9% 9%
77 4.9 54 3.4 44 2.8 38 2.4 32 2.0 19 1.2 16 1.0	9% 9% 9% 9%
54 3.4 44 2.8 38 2.4 32 2.0 19 1.2 16 1.0	% % !%
44 2.8 38 2.4 32 2.0 19 1.2 16 1.0	1% % 1%
38 2.4 32 2.0 19 1.2 16 1.0	:%)%
32 2.0 19 1.2 16 1.0	9%
19 1.2 16 1.0	
16 1.0	.%
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9 06	1%
8 05	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
6 0.4	%
5 0.3	%
5 0.3	%
288 82.0	%
570 100.0	1%
W. Germany (12.6%) United Kin Haly (9.9 Belgium (8.2%)	igdom (10.8%) 1%)
	-Beigium (8.2%) Spain (6.8%) emational public voice circuits only. Communications 1990

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WEST GERMANY AND ITS MAJOR TELECOMMUNICATION CORRESPONDENTS 1988

Destination	Outgoing MiTT in Millions*	Market Share %
Austria	230.1	9.3%
United Kingdom	216.7	8.7%
Italy	215.8	8.7%
France	207.8	8.4%
Switzerland	198.5	8.0%
United States	165.6	6.7%
Netherlands	157.4	6.3%
Turkey	156.5	6.3%
East Germany	153.0	6.2%
Yugoslavia	123.9	5.0%
Canada	17.3	0.7%
Japan	16.7	0.7%
Total Above	1859.0	75.0%
Total West Germany	2478.7	100.0%
	_	Austria (9.3%)
Other (26.4%) -		-United Kingdom (8.7%)
		-italy (8.7%)
Representation	/////////////////////////////////////	
rugoslavia (5.0%)		
East Germany (6.2%)		
Turkey (6 201)		Switzerland (8.0%)
Notherlande (6	3%]	inited States (6.7%)

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ITALY AND ITS MAJOR TELECOMMUNICATION CORRESPONDENTS (1988)

Destination	Outgoing MiTT in Millions*	Market Share
		/0
W. Germany	143	18.2%
France	130	16.6%
Switzerland	103	13.1%
United Kingdom	75	9.6%
United States	75	9.6%
Spain	28	3.6%
Belgium	27	3.4%
Austria	24	3.1%
Netherlands	19	2.4%
Yugoslavia	16	2.0%
Greece	13	1.6%
Canada	12	1.5%
Sweden	8	1.0%
Brazil	7	0.9%
Denmark	5	0.7%
Total Above	685	87.1%
Total Italy	785	100.0%
Other (18.5%) Yugoslavia (2.0%) etherlands (2.4%) Austria (3.1%) Belgium (3.4%) Spain (3.6%) United States (9.6%) United Kingdom (9.6%)	W. Gern W. Gern Switzerl	many (18.2%) France (16.6%) and (13.1%)
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THE NETHERLANDS AND ITS MAJOR TELECOMMUNICATION CORRESPONDENTS (1988)

Destination	Outgoing MiTT in	Market Share
	Millions*	%
West Germany	179.4	25.4%
Belgium	120.6	17.1%
United Kingdom	98.1	13.9%
France	55.0	7.8%
United States	43.3	6.1%
Switzerland	25.4	3.6%
Italy	21.7	3.1%
Spain	17.6	2.5%
Turkey	14.0	2.0%
Sweden	11.6	1.7%
Austria	11.3	1.6%
Denmark	10.7	1.5%
Canada	7.9	1.1%
Norway	6.8	1.0%
Greece	4.9	0.7%
Surinam	4.9	0.7%
Yugoslavia	4.3	0.6%
Ireland	4.3	0.6%
Portugal	4.1	0.6%
Neth. Antilles	3.9	0.6%
Luxembourg	3.8	0.5%
Japan	3.5	0.5%
Morocco	3.4	0.5%
Finland	3.2	0.5%
Australia	3.2	0.5%
Total Above	667.2	94.5%
Total Netherlands	706.0	100.0%
Тор 5	70.3%	
Top 10	83.1%	
Top 15	89.0%	
Тор 20	921%	
Top 25	94.5%	

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Table 13

SWITZERLAND AND ITS **MAJOR TELECOMMUNICATION CORRESPONDENTS (1988)**

Destination	Outgoing MiTT in Millions*	Market Share %	
W. Germany	248	24.5%	
France	173	17.1%	
Italy	169	16.7%	
United Kingdom	63	6.2%	
Austria	49	4.8%	
United States	44	4.3%	
Spain	39	3.8%	
Yugoslavia	30	3.0%	
Belgium	28	2.8%	
Netherlands	18	1.8%	
Total Above	864	85.2%	
Total Switzerland	1014	100.0%	

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Table 14		
JAPAN AND ITS MAJOR TELECOMMUNICATION CORRESPONDENTS (1988)		
Destination	Outgoing MiTT in Millions*	Market Share %
United States	144.8	27 4%
South Korea	72 4	137%
Taiwan	55 5	10.7%
Hong Kong	42.3	8.0%
United Kingdom	32.7	6.2%
West Germany	174	3 304
Australia	15 Q	3.0%
Singapore	15.5	2 0%
France	10.0	1 0%
Thailand	8.0	1.5%
Canada	73	1 494
Italy	6.3	1.2%
Total Above Total Japan	428.1 528.6	80.1% 100.0%
Thailand (1 Other (21.6%) France (1.9%) Singapore (2.9%) Australia (3.0%) W. Germany (3.3%) United Kingdom (6.2%) Hong Kong (8.0%)	1.5%)	United States (27.4%) South Korea (13.7%)
MITT is Minutes of Telecommunication Traffic. Da affic for 1988 fiscal year (April 1988 to March 198	ata are for international public voice ci 9).	rcuits only and cover KDD
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TAIWAN (R.O.C.) AND ITS MAJOR TELECOMMUNICATION CORRESPONDENTS (1989)

Destination	1989 Outgoing MiTT in Millions*	Market Share %
United States	44.0	27 1%
Japan	38.7	23.8%
Hong Kong	31.2	19.2%
Singapore	6.3	3.9%
Thailand	3.5	2.2%
Malaysia	3.4	2.1%
W. Germany	3.4	2.1%
Philippines	3.2	2.0%
Australia	3.1	1.9%
South Korea	3.0	1.8%
Canada	- 3.0	1.8%
Indonesia	2.6	1.6%
U.K.	2.6	1.6%
France	1.6	1.0%
Italy	1.1	0.7%
Total Above	150.7	92.9%
Total Taiwan	162.3	100.0%

* MITT is Minutes of Telecommunication Traffic. Data are for international public voice circuits only and cover fiscal year 1989 (July 1988 to June 1989).

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Table 16 SOUTH KOREA AND ITS MAJOR TELECOMMUNICATION CORRESPONDENTS (1988)		
United States	54.0	41.2%
Japan	40.1	30.6%
lona Kona	6.6	5.0%
Vest Germany	3.4	2.6%
Inited Kingdom	3.1	2.4%
Taiwan (R.O.C.)	2.7	2.1%
Canada	1.9	1.5%
Singapore	1.9	1.5%
France	1.8	1.4%
Saudi Arabia	0.8	0.6%
Total Above	116.3	88.7%
Total South Korea	131.1	100.0%

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Table	17
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AUSTRALIA AND AND ITS MAJOR TELECOMMUNICATION CORRESPONDENTS (1988)

Destination	Outgoing MiTT in Millions*	Market Share %
United Kingdom	72.7	17.5%
United States	64.4	15.5%
New Zealand	64.1	15.5%
Japan	18. 9	4.5%
Hong Kong	16.7	4.0%
Italy	11.5	2.8%
West Germany	11.1	2.7%
Singapore	10. 9	2.6%
Canada	102	2.5%
PNG	6.4	1.6%
Total Above	286.9	69.2%
Total Australia	414.6	100.0%

* MITT is Minutes of Telecommunication Traffic. Data are for international public voice circuits only and cover the 1988 fiscal year (April 1988 to March 1989).

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SINGAPORE AND ITS MAJOR TELECOMMUNICATION CORRESPONDENTS (1988)

Destination	Outgoing MiTT in Millions*	Market Share %	
Indonesia	20.5	13.5%	
Japan	19.7	13.0%	
United States	19.7	13.0%	
Hong Kong	19.4	12.8%	
Taiwan (R.O.C.)	10.6	7.0%	
United Kingdom	10.3	6.8%	
Australia	10.2	6.7%	
Thailand	7.1	4.7%	
India	6.9	4.5%	
Philippines	4.1	2.7%	
Total Above	128.5	84.7%	
Total Singapore	151.8	100.0%	

* MITT is Minutes of Telecommunication Traffic. Data are for international public voice circuits only. Excludes traffic to Malaysia.

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Table 19

HONG KONG AND AND ITS MAJOR TELECOMMUNICATION CORRESPONDENTS (1988)

Destination	Outgoing Mitt in Millions*	Market Share %
China (P.R.)	141	32%
United States	44	10%
Taiwan (R.O.C.)	40	9%
Japan	35	8%
United Kingdom	26	6%
Canada	22	5%
Macao	22	5%
Australia	18	4%
Total Above	348	79%
Total Hong Kong	441	100.0%

* MiTT is Minutes of Telecommunication Traffic. Data are for international public voice circuits only and cover fiscal year 1988 (April 1988 to March 1989).

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	Table 20			
THAILAND AND ITS MAJOR TELECOMMUNICATION CORRESPONDENTS (1988)				
Destination	Outgoing MiTT in Millions*	Market Share %		
Japan	6.4	15.0%		
Singapore	6.0	14.1%		
United States	5.7	13.4%		
Hong Kong	5.6	13.2%		
Malaysia	4.9	11.5%		
Taiwan (R.O.C)	2.6	6.1%		
United Kingdom	2.4	5.6%		
West Germany	1.3	3.0%		
italy	1.1	2.5%		
Australia	1.17	2.5%		
Total Above	37.1	87.3%		
Total Thailand	42.5	100.0%		

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* MiTT is Minutes of Telecommunication Traffic. Data are for international public voice circuits only. Excludes traffic to Cambodia, Laos and Vietnam.

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1. North America

(a) Two-way traffic between Canada, the United States and Mexico accounts for over 2.9 billion MiTT annually, approximately 10% of the world's total international traffic. The size of the market and the long borders which the United States shares with its neighbors have prompted repeated calls for competitive crossborder access by new service providers and users. Movement in this direction was gradual in the 1980s. But, there are now signs that a North American common market for telecommunications is developing through regulatory convergence -- a process which is likely to accelerate in the 1990s.

The Mexican carrier, Telefonos de Mexico, has recently agreed to interconnect with MCI and US Sprint (AT&T previously was the sole correspondent). Long-distance rates in Mexico (the major cost-component of most calls between the U.S. and Mexico) have also been reduced by about 40% in 1990.

The pressures for deregulation of the U.S.-Canada cross-border market are discussed in Part IV.C. below.

(b) Telecom markets for North American carriers continue to grow most rapidly West and South. Since 1986 traffic to the following markets has increased by at least 200-300%: South Korea, the Dominican Republic, the Philippines, Taiwan (Republic of China) and El Salvador. These patterns reflect the origins of America's new immigrants and work force as much as trade. A similar pattern is evident in Canada's small but growing traffic to Jamaica and Trinidad.

(c) The U.S. aside, Mexico's traffic base is quite broad. See Table 7. The U.K. and Colombia have roughly equal weight; so do Guatemala and Switzerland. Japan's growing weight is perhaps most striking; it is now a more important correspondent for Mexico than Argentina, Brazil or Venezuela. Mexico accordingly appears to be well placed to participate in the expansion of global traffic during the 1990s, even as the trade benefits of its large bilateral traffic surplus with the U.S. (worth over \$500 million in 1989!) begin to level off.

2. Europe

(a) West Germany is the junction state for international telecommunication in Europe; it is the most frequently called country for almost all other states in the region. The Federal Republic's central role in East-West telecommunication has made the Deutsche Bundespost, now DBP Telekom, the largest international telecom power on the Continent. The reunification of Germany, integrating DBP Telekom with the GDR's PTT, and the rise of market economies in Eastern Europe will enhance Telekom's role in the 1990s.

(b) The 1988-1989 data confirm the Euro-centric traffic patterns of Germany, France, Italy and the Netherlands. These countries, on average, send only about 8-9% of their traffic to North America; 55-60% is delivered to their EC partners. This contrasts with the U.K.. Approximately 26% of U.K. outgoing traffic is directed to the U.S. and Canada; about 40% to its partners in the EC.

(c) The U.K.'s duopoly policy has now borne fruit. In roughly five years, Mercury will have won approximately 10% of the U.K. outbound market. And, Mercury's market share on some key routes (ie, to the U.S.) is 15% or more. The big question is how long Mercury and BT can continue to have the market to themselves. The U.K. government will review its duopoly policy in 1991. And, as discussed in Part IV.C., the resale of international leased lines on the U.S.-U.K. route is likely by 1992.

(d) The European cross-border telecoms market is the largest in the world. It provides the core traffic for 7 of the world's top 10 carriers and accounts for approximately 20-25% of total global cross-border traffic. As services liberalization proceeds in the 1990s, new pressures for competitive provision of basic services seems inevitable.

This will probably occur in stages. The first stage will see the development of pan-European Value Added Networks (VANs) and mobile radio services. Once these networks begin to carry a substantial volume of cross-border traffic (perhaps by middecade), a second stage, which expands the service opportunities of these new networks (and invites others), may follow.

3. Asia

(a) Current telecom traffic patterns in this region suggest the importance of the triangular relationship between Japan, HongKong/China and the Newly Industrialized Countries (NICs).

Japan is a junction state for traffic from Asia's NICs (South Korea, Taiwan, Thailand, Singapore, Hong Kong). In turn, Hong Kong is the telecommunication entrepot for the Peoples Republic. During the mid-1980s, China's modernization program stimulated international traffic growth of 40-50% annually and boosted the Chinese PTT into the ranks of the world's top 25 international carriers (see Table 3a). A substantial part of this new international traffic is directed toward Hong Kong which correspondingly sends over 30% of its outbound traffic to China.

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Direct telecommunication traffic between Japan and China is now quite small; less than 1% of outbound Japanese traffic goes to China but approximately 8% is directed to Hong Kong. Will 1997 lead to a restructuring of China's international communication gateways? It is probably too early to say, but the total volume of outbound traffic involved by the mid-1990s could rapidly make China a major international telecommunications power.

In 1990, outgoing traffic from Hong Kong and China (excluding cross-border traffic) will total over 500 million MiTT (approximately 60% of Japan's outgoing market). That is why the competitive stakes for China and the other international carriers based in the region are now of real consequence.

(b) Carriers based in the Asia-Pacific have, as a group, experienced the highest growth rates in international traffic during the 1980s. Annual growth of 30-50% has been common. Japan, the most mature market, has experienced a growth in outbound traffic of over 30% since 1987. Likewise, OTC Australia has seen growth in excess of 30% on bilateral routes in the Pacific as compared to 20% plus on traffic to and from European markets. These growth rates have been fueled primarily by rapid economic expansion in the region and, more recently, by facsimile traffic.

The substantial international traffic volumes now generated by many states in the Asia-Pacific and the significant percentage of traffic which most of these countries exchange with competitive markets (the U.S., Japan and the U.K.) will make pressure for competitive access to home markets of continuing concern in the 1990s. This pressure is likely to be most acute for Taiwan, South Korea, and Australia, whose telecom service markets are most closely tied to Japan, the U.S. and the U.K. Recent proposals for comprehensive telecom sector reforms by both South Korea and Taiwan are, in part, a reflection of these linkages.

(c) The 1990s is also likely to see more rapid growth of traffic between Western Europe and Japan. Europe now accounts for about 15% of outgoing Japanese traffic but European countries, excepting the U.K., send less than 1% of their outbound traffic to Japan. The rising facsimile base in Europe; the steady growth of inward Japanese investment and tourism; and competitive service offerings of Japan's overseas carriers all suggest that the growth of traffic on the Europe-Japan route will accelerate.

(d) The potential growth of the market for international traffic to and from Japan is also underscored by the relatively low <u>per capita</u> flow of outbound Japanese traffic in 1988-89. In the U.S. about 1 % of total telephone calls is international; in U.K about 2%; in Japan about .15%.

Similarly, although Japan is often viewed as comparatively advanced in its use of electronic information systems, written media are still of singular importance for

international communications. For example, in FY 1988, the Ministry of Posts and Telecommunications (MPT) reported that the ratio of outgoing international letters to international telephone calls (including fax transmissions) was about 2 to 1. By comparison, in the United States, in 1988, government statistics show that outbound international telephone calls exceeded outbound mail for the first time.

This post/telecommunication ratio may provide a useful indicator of the ability of Japan and its major correspondents to adapt the electronic technologies now available for routine cross-border contact.

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IV. Regulatory Implications

The next section of this report examines some of the regulatory implications of the bull market reviewed in Part III and the changing structure of telecoms demand discussed in Part II. The focus is on (1) tariff and accounting rates for switched telephone services and (2) the terms governing the provision of private or leased lines.¹³

These two matters often have been addressed separately by industry and government. However, the growing demand for cross-border services has begun to disclose the economic linkages between them. These linkages are complex. But, in the main, monopoly tariffs and rigid accounting rates (the basis for settling accounts between connecting carriers), just like unreasonable restrictions upon leased lines, inhibit demand and help to maintain supra-competitive margins.

The bull market of the 1980s accordingly has placed pressure on these arrangements. Rising demand and new technologies (eg, fibre-optic cables) have driven down industry costs and provided new opportunities for competition, discount prices and service expansion. Cross-border tariff levels and leased line regulations have thus become a joint subject of debate by telecom executives as well as government officials concerned with trade and economic policy.

A brief digression on the current structure of cross-border tariffs may be helpful at this point.

The Two-Tiered Structure

Let us first consider the matter of tariffs for public international telephone service. The vast majority of residential and small business customers use this service. It is generally tariffed on a volume sensitive or pay-as-you-go basis.

The tariff or collection charge received by the telephone company where the call originates is split with the foreign telephone company which completes the call, typically on a 50/50 basis. The split is not based upon the public tariff in either country but on the basis of an accounting rate negotiated by the connecting carriers for a given route.

For example, if the accounting rate for the international call is \$2.00 a minute, the originating and terminating company would each be entitled to \$1.00. This accounting rate may or may not reflect current public tariffs (eg. in the foregoing example, the tariff may be \$3.00 or \$4.00 or more). Indeed, as discussed below, because a carrier

has no obligation to reduce the bilateral accounting rate in response to cost reductions or to a tariff reduction made by a carrier with whom it interconnects, accounting rates in many countries now diverge sharply from both costs and tariffs.

We turn next to international private lines. These facilities are generally leased by large business customers on an end-to-end basis for a flat monthly charge, although some usage sensitive surcharges do exist. The telephone companies likewise compensate each other for connecting leased line facilities at a fixed monthly or annual rate. The traditional settlement practices (ie, 50/50 division of accounting rates) do not apply.

One consequence of these two different tariffing regimes is that the per minute (or call) cost of international private line service has become, on average, far cheaper than publicly tariffed service for residential users. This is not wholly the result of the different tariff regimes; the per unit cost of carrying large traffic volumes on a point-to-point basis is also lower. Nevertheless, the difference in settlement practices is a contributing factor because flat-rate circuit charges tend to encourage traffic growth by users and facilities innovation by carriers.

The greater the gap between cross-border public tariffs, on the one hand, and leased line tariffs, on the other, the greater is the pressure for liberal access to leased lines. (See Table 22 below with regard to the gap for trans-Atlantic services.) A wide gap also provides a continuing incentive to resell leased lines to the public. Conversely, the more that public tariffs for cross-border service begin to fall into line with private line tariffs, the less compelling is the economic rationale for liberalization and, correspondingly, for resale.

(This is not to suggest that user objections to restrictions on the use of leased lines is solely economic; freedom-of-action is of equal concern, cost notwithstanding.)

We discuss these issues further below.

A. Traffic Growth and the Pressures On Tariffs

The regulatory reforms of the 1980s typically sought to bring telecommunication tariffs more closely into line with costs. Adoption of cost-based tariffs was considered to be essential to efficient utilization of national telephone networks and the introduction of competitive and value-added service offerings. At the beginning of the 1990s, however, there is strong evidence that, even where competition exists, movement toward costbased tariffs for international services has lagged behind rebalancing of local and domestic long-distance rates. Generalizations in this area are difficult. But, rates on trans-continental routes, particularly for calls originating in North America, currently appear to be more costbased than many cross-border tariffs, especially within Europe and Asia. Even so, the published reports of major carriers confirm that international tariffs still generate profits well in excess of those earned on domestic ones.¹⁴

Overall, we estimate that industry profits constitute one-third to one-half of total industry revenues for international telecommunication services. The market for public international telecommunication services in 1990 will total about 30 billion MiTT.¹⁵ Data gathered by the FCC and the European Commission suggest that average revenues are on the order of \$1.00 per minute.¹⁶ On these figures, 1990 industry profits will approximate \$10 - \$15 billion.

The bull market of the late 1980s accordingly has made the gap between carrier tariffs and costs a source of mounting regulatory concern and market instability. There are several reasons.

Unit Costs

First, annual growth in international traffic significantly reduces unit costs. Assuming a 20% annual growth rate, the cost reduction is probably at least 5 - 10% a year (after inflation) on major routes.¹⁷ The foregoing likely underestimates the impact of traffic growth on unit costs for the most heavily trafficked trans-oceanic routes. On these routes, order of magnitude cost reductions may occur when new facilities become operational. (eg, on quite conservative assumptions, the per minute cost of a voice path on TAT-9, operational in 1992, will be US\$.02; on TAT-8, opened in 1989, it is \$.04; on TAT-7, opened in 1983, about \$.11)¹⁸

Price Elasticity of Demand

Second, although rapid traffic growth exerts a downward pressure on unit costs, it also provides a growing incentive for carriers to maintain existing tariff levels. The profit maximizing behavior for a particular carrier cannot be determined without a careful analysis of the price elasticity of demand.

If demand is elastic (ie, the absolute value is greater than 1) then, holding other factors constant, any given price decrease should generate a disproportionate increase in consumption, making a bigger international telecom "pie" to be shared. But, if demand is inelastic (the absolute value is less than 1), then a price decrease will stimulate consumption, but not enough to prevent a decline in total international revenues.

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Agreement on the price elasticity of demand for international telecom services over time has proven to be elusive. A recent survey of the literature in North America concluded that the price elasticity is between -.6 and -1.2. A U.K. economist recently stated that the evidence showed price elasticity to be between -0.1 to -0.9. However, a comprehensive review of the North Atlantic market by two economists working in the U.S. found that the demand for U.S. calls had an elasticity of about 1 from 1983-1986; demand elasticities of greater than 1 have been assumed in recent work by two Australian economists in their own industry models.¹⁹

In sum, so long as this area remains uncertain, absent competitive necessity, most carriers will be reluctant to take the initiative on price reform.

Accounting Rates

Third, the current structure of settlements between interconnecting carriers tends to penalize carriers which reduce their collection rates to reflect falling real costs. For many carriers, accounting rates have accordingly moved far out of line with costs. Carriers which have sought to reduce their prices in line with costs have seen a progressive rise in their payment of accounting rates as a proportion of tariff charges.

The reason, as discussed above, is that a carrier's total revenues for a given crossborder call is equal to its own tariff (collection rate) minus one-half of the accounting rate agreed between it and the carrier terminating the call. Not all international calls lead to settlements between carriers. Payments are made only when the traffic is not balanced, eg., when one carrier has a net traffic deficit with a correspondent carrier, that is, the foreign carrier terminated more calls.

In that case, the deficit country (the country originating the most calls and terminating the least) makes a settlement to the surplus country equal to one-half the accounting rate times the surplus number of call minutes.

Thus, just as rapid traffic growth accentuates the benefits of above-cost tariffs, it also inflates the value of maintaining above-cost accounting rates for countries with net traffic surpluses and no competitive suppliers. For any given surplus (additional calls terminated), the higher the accounting rate for that route, the higher is the surplus country's share of the total bilateral traffic revenues.

The financial impact of these settlements or out-payments for a country with a major traffic deficit, such as the United States or Australia, can be quite substantial. In 1989, for example, the U.S. deficit for telecom services rose to approximately \$2.5 billion.

New Service Providers

Fourth, current industry tariffing practices and high traffic growth rates have attracted new service providers into the international market. So long as new entrants face a set of artificially high price signals, however, there is a significant risk of uneconomic new entry. Major facilities based entrants will have the market base and financial resources to survive the tariff realignments that will come by the mid-1990s. But, the longer that reform is delayed, the more likely it is that the market will see a new round of wouldbe competitors who, once in business, will seek to exploit the shortcomings of the present regulatory regime to stay profitable.

The current situation is thus inherently unstable. Every day's growth in traffic invites, on the one hand, abuse of monopoly power, and on the other hand, uneconomic new entrants and predatory price cuts which may threaten long-run industry investment.

B. A New Deal On International Settlements?

The causes of tariff rigidity and its consequences are being discussed in several arenas. The D Series recommendations regarding the use of cross-border leased lines are under review by Study Group 3 of the ITU International Telephone and Telegraph Consultative Committee (CCITT) in Geneva; international tariffs and costs are being examined by the Working Party On Telecommunication and Information Service Policies of the OECD in Paris. Unrestricted access to cross-border telecommunication services and publicly accountable tariff procedures have also been addressed in the General Agreement on Tariff and Trade (GATT) negotiations on services.²⁰

The purpose of this section is to show briefly how traffic statistics may contribute to discussions in these and other venues and to monitoring the impact of industry changes in the 1990s.

Measuring Trade Balances

As discussed above, financial settlements between interconnecting carriers are based upon net traffic balances. Annual statistics on incoming and outgoing traffic volumes, by service, thus provide an essential starting point for evaluating the financial balance of trade for any carrier/administration <u>vis-a-vis</u> its main correspondents.²¹ Traffic statistics do not tell the whole story, of course. Data on tariffs, accounting rates and exchange rates generally are required to calculate the financial surplus or deficit of a particular entity. But, other things being equal, the direction of traffic balances between one carrier and its chief correspondents will generally accord with the balance of trade.

The balance of traffic in 1988 for the world's leading telecom powers is shown in Table 21 below.

	Tab	le 21		
National Trade Balance for Telecommunication Services Public Voice Circuit MiTT in Millions* - 1988				
Country	Outgoing	Incoming	Balance	(Deficit) / Surplus as % of Total Traffic
United States	5325	3155	(2,170)	(25.6%)
West Germany	2479	2080	(399)	(8.8%)
United Kingdom	1729	1814	85	2.4%
France	1570	1690	120	3.7%
Switzerland	1014	851	(163)	(8.7%)
Italy	785	1075	290	15.6%
Netherlands	706	577	(129)	(10.0%)
Japan	529	553	24	2.2%
Australia	415	331	(84)	(11.3%)
Canada	358	250	(108)	(17.8%)
Mexico	211	504	(293)	40.9%
Singapore	152	126	(26)	(9.3%)
South Korea	131	230	99	27.4%

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(b) Reform: A Multi-Dimensional Puzzle

The foregoing table suggests that the coalition for reform may be broadening. A majority of G-7 countries probably now have a traffic deficit with the rest of the world; they originate more cross-border traffic than they receive. (Japan's small surplus in FY 1988 will almost certainly become a deficit by FY 1990).

This does not mean that the particulars of reform will be easier to agree. Most countries with traffic deficits (excepting largely the U.S. and Canada) do have traffic surpluses (and balance of payments surpluses) on some routes, without which their net position would be even worse.

For example, West Germany's surplus with the United States now helps to offset deficits with Turkey and Yugoslavia; the U.K.'s surpluses with the U.S., West Germany and Nigeria help to offset deficits with Pakistan, Israel, Japan, India and Egypt; likewise Japan's surplus with the U.S almost exactly offsets deficits with other Asia-Pacific countries; Australia's surplus to the U.S. is used to offset deficits to most other destinations.

The foregoing facts and the multiplicity of actors involved leads us to be sanguine about the near-term prospects for multilateral reform of accounting rates. As discussed below (See Section IV. C.), reforms are most likely to occur on a more <u>ad</u> <u>hoc</u> basis, largely as a result of bilateral initiatives and through competitive service offerings.

The desire for countries to seek a positive balance for trade in telecommunication services is also likely to be tempered by the knowledge that a balance of trade in this sector alone may or may not enhance a country's overall trading position. That ultimately depends upon whether more outgoing calls (and a rising traffic deficit) tend to generate off-setting earnings in other sectors of the economy (eg, the foreign calls arise from servicing inward investment or lodging more foreign tourists). That calculation cannot be made from traffic statistics alone, nor from considering the telecom service sector in isolation from the rest of the economy.

C. Regulatory Developments To Watch

We have contended above that the bull market for international telecom services will push international tariffs, settlement arrangements and leased line policies to the top of the regulatory agenda in the 1990s. In this concluding section, we wish to offer some observations about the road ahead. How is the "weight of traffic" likely to change the regulatory <u>status quo</u> in the 1990 - 1995 period?

[...]

The following areas bear watching.

<u>Caveat</u>: The developments included here draw largely on international markets served by U.S. and U.K. based carriers. Events in these markets strongly influence business conditions for other major markets. But, within the last 6 months, it appears that competition between Japan's new Type I international carriers may prove to be a major new engine of price reform, not only on Trans-Pacific routes but on routes between Europe and Asia as well.

1. The U.S.-Canada Cross-Border Market: Accounting Rate Bypass?

The very large volume of cross-border traffic between the U.S. and Canada (over 2 billion MiTT in 1990; See Tables 5 and 6) provides a continuing incentive for competitive carriers on both sides of the border to try and provide low cost telecom bridges. Most recently, certain U.S. carriers (MCI, US Sprint) have begun offering their Canadian customers direct access to their U.S. networks via cross-border private lines.

Under this arrangement, the Canadian customer of the U.S. carrier only pays the U.S. carrier's domestic rate for calling to America plus the cost of the international private line. Because private line services are not subject to traditional settlement practices, the Canadian customer and the carrier providing the service need not pay accounting rates in connection with the inbound traffic which is involved.

In 1987, the Canadian Radio and Television Commission (CRTC) declined to interfere with these arrangements, finding that any decrease in revenue to Canadian carriers would be insignificant. However, the FCC has now been asked to rule that such cross-border telecom bridges (ie., "private line + domestic service") unlawfully bypass traditional international settlement arrangements.²²

A principal concern of AT&T, which sought the ruling, is that this kind of "accounting rate by-pass" is one-way. American customers allegedly cannot access the Canadian market on similar terms. Moreover, if the formula of "private line + domestic service" is found to be acceptable here, AT&T suggests that competitive carriers may apply these arrangements to other inbound streams of U.S. traffic. The U.S. share of inbound accounting rate revenues will decline accordingly, while U.S. carriers (and users) continue to pay accounting rate charges in connection with outbound traffic.

AT&T's major competitors are equally concerned about the potential for one-way "accounting-rate bypass." They too depend upon current international settlement arrangements, especially for inbound U.S. traffic, and might be seriously hurt if the FCC signalled its willingness to allow an unlimited number of private line bridges to the U.S. for incoming voice traffic without reciprocity.

At the same time, the U.S.-Canada border is seen to be unique. The market for crossborder private lines is competitive and U.S. users already have several means of direct-access to the Canadian market which bypass traditional settlement arrangements. These include so-called FX lines and Software Defined Networks(SDN) which span the border. Moreover, resale of domestic private lines will soon be legal on both sides of the border and the CRTC is likely to permit inter-exchange competition for basic telephone service within two years.

In short, the competitive carriers argue, the U.S.-Canadian market is unique; reciprocal cross-border arrangements do exist now and more will follow. Cross-border private lines are not illegal <u>per se</u> and provide real benefits to users. The question of accounting rate bypass should not be at issue here.

The U.S. Dilemma

The "private line + domestic service" case presents the FCC with something of a dilemma. The U.S. has long championed the deregulation of international private lines; it favors international resale, both for the benefits it may offer users and for the price discipline it provides to the market.²³

Concurrently, U.S. national interests have led the FCC to adopt a Uniform Settlements Policy(USP). The USP requires all carriers to settle their accounts for international traffic on like terms. It aims to prevent multiple carriers in a competitive market, such as the U.S., from being "whipsawed" by a foreign monopoly carrier seeking a progressively more favorable share of accounting rates and/or traffic in exchange for interconnecting. The USP thus also ensures that U.S. receives its fair share of accounting revenues for inbound traffic.

Against this background, the FCC cannot afford to permit inbound international private lines to effect an <u>ad hoc</u> repeal of the USP. It must work for reciprocal arrangements, without ignoring the cost burdens which significantly above-cost accounting rates place upon international telephone users.

The current dispute regarding the Canada-U.S. private line offerings consequently is probably the first of several cases in the 1990s which will evolve a new set of crossborder settlement arrangements. These arrangements are likely to leave the USP in place in principle, but permit flexibility where that is of reciprocal benefit to users in both countries.

The impact of this evolutionary approach will almost surely be felt in Europe. Whether or not the U.S.- Canada market provides a model for new arrangements within the Community, as the liberalization of leased lines proceeds within the EC, the dilemmas faced by American regulators are likely to face their European counterparts with equal force.

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Which brings us to the next issue.

2. Resale and Shared Use of International Private Lines

As noted above, since at least 1985, the United States has favored the resale of international facilities, including private lines, for the provision of enhanced and basic switched voice services. This policy extended U.S. domestic policy, which relied upon resale, as much as facilities competition, to bring long-distance tariffs more into line with costs.

To date, U.S. policy on international resale has had a limited impact. Several countries have liberalized the provision of cross-border private lines so long as these lines are used only for (a) intra-corporate networks (ie, closed user groups) and (b) for value-added services. But, in keeping with the CCITT's existing D Series recommendations, no major U.S. correspondent has permitted international leased lines to be freely shared by multiple users or to be resold to provide low-cost switched voice services.

There are now signs that market pressures may break down this barrier on the key U.S.- U.K. route (and perhaps elsewhere) within 2 years. If so, and depending upon the regulatory conditions applied, a variety of new competitors may begin to service the North Atlantic market. Downward pressure on tariffs would almost certainly follow.

What are the reasons for change?

First, in 1989 the U.K. agreed to permit domestic leased lines to be freely resold for the provision of switched voice services. At the same time the government said that it would look at requests for international resale on a case-by-case basis. Following these announcements by the Department of Trade and Industry (DTI), the U.K. Office of Telecommunications (Oftel) announced a wider review of the potential benefits of international resale; it also hinted that, in the interim, some individual applications might be approved.

Second, it appears that a number of companies are quietly moving to take advantage of a relaxed U.K. policy on international resale. The first step for new (and old) competitors is likely to be shared use of trans-Atlantic leased lines for voice and data traffic. (For example, one company, the Financial Services Network, has announced plans for a new leased-line network to meet the needs of large trans-Atlantic financial service organizations.) The next step is likely to be a form of limited resale, with direct connection to the public switched voice service, at least for a pre-subscribing group of users. The third reason why private-line resale is now more likely on the U.K.-U.S. route is that the gap between leased line and common carrier tariffs is beginning to close. As this happens, resale becomes more politically viable because liberalization would be unlikely to trigger wholesale migration of customers from the public network. Thus, within the context of the 1990 -1991 review of the BT/C&W duopoly, international voice resale may come to be seen as a satisfactory competitive alternative to licensing a third (partly foreign owned) facilities-based carrier.

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At this writing, however, the gap between private line rates and common carrier tariffs for switched telephone services remains significant. International resale on trans-Atlantic routes might, at least in the short run, prove to be a profitable business. See Table 22.

Table 22

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	Bandwidth	Voice Circuit Cost Per Minute	Voice Path Cost Per Minute
Public Tariff			
AT&T Standard/ World Plan		.85/.70	
MCI Call Europe		.61	••
BT		.99	••
Mercury		.99	
Leased Lines			
AT&T			
	64 kbps 1.544 Mbps	.55 .23	.09 .04
US Sprint	64 kbps	.54	.09
	1.544 Mbps	.19	.03
ВТ	64 kbps	.76	.13
	2 Mbps	.30	.05
Mercury	64 kbps	.61	.06
	2 Mbps	.26	.04

Public and Leased Line Costs For Trans-Atlantic Telecommunication Services (March, 1990)

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NOTES: Public tariffs are based on the average per minute cost of a 3 minute call during economy (off-peak) periods. For U.S. carriers, tariff is Eastern U.S. - London with special monthly plan charges included; for U.K. carriers, tariff is for London - Eastern U.S. Private line costs are based on annual tariffs for costs between international gateways, excluding installation charges. Circuits are assumed to be in use 3 hours a day; costs per voice path assume each voice circuit can carry 6 voice paths using standard low-bandwidth voice multiplexing technologies. Sterling conversion at £1 = \$1.65. All tariffs available from Lynx Technologies, Montclair, N.J.

3. Competitive Carriers and Tariffs

Pending the resale of international leased lines, MCI's Call Europe plan, launched in January 1990, may provide an example of what lies ahead for residential and small business consumers. The plan offers MCI customers a flat rate of \$.59 per minute for calls between the U.S. and Western Europe (including Scandinavia) during off-peak periods (3pm to 8am Mon.-Fri. and at any time on weekends). Customers are also required to pay a \$3.00 monthly administration charge.

This discount calling plan -- at collection charges below existing accounting rates for some countries -- places downward pressure on current settlement arrangements. Further, because MCI is likely to make money on the Call Europe plan chiefly by attracting a larger share of return traffic, the plan puts new pressure on European correspondents to support the proportional traffic return policies now enforced by regulators on both sides of the Atlantic. This policy limits the negotiating flexibility of carriers, but tends to encourage competitive players like MCI (and Mercury) who in theory must be routed a share of return traffic proportionate to that which they deliver to a foreign carrier. Discount tariffs therefore may be used to build market share and, as market share grows, as a base for further tariff cuts.

Of course, discounts may also trigger a competitive response. Japan provides a dramatic example. There, as described in Part III. A., the established carrier, KDD, has thrice cut its rates to meet competition. This has brought out-bound tariffs in Japan below that for inbound tariffs for many inter-continental calls.

In the 1990s, therefore, discount tariff offerings in the Atlantic and Pacific may have a self reinforcing impact. The greater the number of countries to which competitive carriers provide service, the greater is likely to be the pressure for reciprocal adjustment of accounting rates. This in turn may provide the basis for further tariff reductions. And, as tariffs and accounting rates fall in countries which originate the bulk of the world's traffic, trade pressures will begin to bite on countries to which this traffic is delivered but which persist in maintaining substantially above-cost accounting rates.

Competition, as much as accounting rate negotiations, thus is likely to be an important engine of regulatory change in the international arena in the 1990s, just as it has been domestically during the 1980s.

Traffic Wants To Connect

The example provided above are but three signs that the weight of traffic is driving the international regulatory agenda toward a new deal on tariffs, settlements and leased lines. Traffic wants to connect as inexpensively as possible.

The strategies are many: competitive tariffs, cross-border leased lines plus, shared use of private circuits, outright resale, enhanced services, IVAN agreements, software defined networks, "leaky" PBXs. The rationale driving most of these service strategies is the margin between tariffs and costs; so long as this margin remains exceptional, tariffs and settlement practices will remain at the forefront of the international regulatory agenda.

V. CONCLUSION

As telecommunication services move from the periphery to the center of the global economy, the need for baseline statistics on the industry's major product -- network traffic or connectivity -- will continue to grow. This is only natural. The industry's new importance can not help but attract scrutiny by both investors and regulators alike.

"It is not hard to make policy based on old numbers," advises FCC Chairman Alfred Sikes. "But it is very difficult to make good policy."

The statistics compiled here show just how fast and how deep the world telenet has brought economies together and linked their common development. Yet one of the major messages of these statistics is that international traffic today is but a fraction of the volumes we might expect over the next decade. As the telephone and its electronic siblings are plugged into the global network for longer and longer each day, international demand will remain robust.

That is why the prospects for further liberalization, tariff realignment and new service options deserve our attention. The great majority of users still pay a significant price penalty for buying cross-border telecom services. The burden which this penalty places on business and society will almost certainly be unacceptable when traffic volumes double or triple in the mid-1990s.

The time to prepare for that day is now.

Institutional reform is necessary not only to take advantage of further opportunities for traffic growth and service expansion. As Henry Ergas and Paul Paterson have stated, absent concerted action, there is a real risk that "the present global network will fragment into two." One part will be "an efficiently priced, high quality and capacity system serving those countries which have accepted the change process." Countries unwilling to accept reforms will "progressively find that their access to networks and usage [is] constrained."²⁴

The consequences of the issues discussed here thus extend far beyond the telecom sector. Cross-border telecommunication channels are the oil pipelines of the modern economy. Keeping them open, widening them and ensuring broad public access to the connectivity they provide at reasonable prices is essential to international prosperity. And to every country which desires to have a share in it.

Moreover, international telecommunication is now much more than business and trade. It is equally about preserving the bonds between families and friends; about access to international health care and research organizations; about contact with public officials and aid groups; about the search for political harmony and scientific cooperation.

The realization that the international telecom network now implicates such a broad spectrum of human interests may be the most lasting legacy of today's bull market. It may also be our best hope for releasing the network's full potential in the years ahead.

-- E N D --
METHODOLOGY AND SOURCES

The telecommunication traffic statistics in this report are primarily derived from traffic data furnished to the International Institute of Communications (IIC) by service providers.

In a few cases, the data have been estimated based upon annual reports, government publications and industry interviews. The following publications were also consulted: the <u>Yearbook of Statistics</u> (ITU, Geneva, 1989); <u>International Fernsprechstatistik</u> (Siemens, Munich, 1989) and; <u>The World's Telephones</u> January 1987 - 88, (AT&T, Indianapolis, IN., 1989).

A common accounting unit known as MiTT -- Minutes of Telecommunication Traffic -- has been used throughout the report. Unless otherwise stated, MiTT refers to paid minutes of public voice circuit traffic. Depending upon national conditions, therefore, MiTT may include voice and non-voice (eg., facsimile, slow speed data) traffic.

Unless otherwise stated, carrier traffic statistics do not include traffic from foreign subsidiaries or investments. Calendar year data have been used wherever possible; fiscal year data are used elsewhere (cg., the U.K., Japan, Taiwan, Australia).

Traffic data compiled in calls or pulses for certain countries and service providers have been converted to MiTT based upon average pulse and call lengths, exchange lines in service and national calling patterns. For a further discussion of the basis for deriving MiTT from call data, see Appendix A to <u>Global</u> <u>Telecommunication Traffic Flows And Market Structures</u> (IIC, London, 1989).

The following additional matters may be of interest to readers who wish to use the current report in connection with the aforementioned 1989 IIC report:

<u>Mexico</u> -- The Mexican data in Tables 3a, 5a and 6 reflect official statistics of Telefonos de Mexico (TelMcx). This data differs from traffic data furnished to the United States Federal Communication Commission (FCC) by U.S. based international carriers. For example, unpublished FCC data show that in 1988, cross-border MiTT from Mexico to the United States was 239 million; traffic to Mexico from the U.S. was 562 million MiTT. We do not know the reason for these discrepancies and, pending clarification, have used the more conservative Mexican figures. FCC data were used in the 1989 report.

Saudi Arabia -- The data reported in Tables 2 and 3a reflect revised estimates; the Saudia Arabia data reported in the IIC's 1989 report is incorrect.

<u>Spain</u> -- The data reported for Telefonica in Table 3a reflect revised estimates; the Spanish data reported in the IIC's 1989 report is incorrect.

<u>South Korea</u> -- The Korean data in Table 16 reflect official statistics of the Korean Telecommunication Authority (KTA). The data differ, with respect to the United States, from traffic data furnished by U.S. carriers to the FCC. In 1988, the FCC reported that U.S. carriers terminated about 31.9 million MiTT. We do not know the reason for this discrepancy. FCC data for Korea were used in the 1989 report.

<u>United States</u> -- Table 5b of the current report, showing trends in incoming traffic to the U.S., is not directly comparable with Table 5b of the 1989 report. The 1989 table focussed on the fastest growing streams of incoming traffic; the 1990 table is based upon the absolute size of the incoming traffic stream.

ENDNOTES

1. Gregory C. Staple is a Washington D.C. communications lawyer and consultant in private practice. He was formerly Director of Projects at the IIC in London and has served as Director of the IIC Telecommunications Forum since 1987. Mr. Staple's work has appeared in various publications, including the <u>American Journal of</u> <u>International Law, Telecommunications Policy, Communications Week International</u> and Japan's <u>Overseas</u> <u>Communications Journal</u>.

The author wishes to acknowledge the thoughtful comments of Mark Mullins who reviewed a draft of this report. Gregory Hystad contributed his desk-top publishing skills to the preparation of the tables.

2. See eg., John Naisbitt and Patricia Aburdene, <u>Megatrends 2000 Ten New Directions For The 1990s</u> (William Morris & Co., New York, 1990) p.12.

3. See "Glued To The Tube," <u>Time</u>, January 8, 1990, p.46; "Mandela, 'Faceless Man With a Fax,' Negotiates His and Country's Future," <u>The New York Times</u>, January 30, 1990, pA3. See also "Piercing the Chinese Wall: All The News That's Fit To Fax," <u>Business Week</u>, December 4, 1989, p.114.

4. Gregory C. Staple and Mark Mullins, "Global Telecommunication Traffic Flows and Market Structures," (IIC, London, 1989); G. Staple and M. Mullins, "Telecom Traffic Statistics - MiTT Matter," <u>Telecommunications</u> <u>Policy</u>, Vol. 14, No. 2, June 1989, pp. 105 - 128. See also "Economic Growth: Please Try Later," <u>Financial Times</u>, July 6, 1989, p.27.

5. G. Staple and M. Mullins, "Telecom Traffic Statistics-MiTT Matter," supra, note 4.

6. Telecommunication traffic may also have the potential to provide a common analytic framework for studying both the macrocosm of the economy and the microcosm of the integrated circuit. The term "microcosm" is borrowed from George Gilder's provocative new history of the micro-clectronics industry: <u>Microcosm The Quantum Revolution in Economics and Technology</u> (Simon & Schuster, New York, 1989).

Macrocosm and microcosm are often thought of separately. But, each world faces similar challenges in transporting vast amounts of electronic information; both share a concern with traffic.

In the macrocosm, engineers commonly measure throughput as Bits Per Second (BPS) or, at the service level, as Minutes of Telecommunication Traffic (MiTT). In the microcosm, where information flows are several orders of magnitude greater, traffic flows are typically measured in MIPS (Millions of Instructions Per Second).

MIPS and MiTT meet in the marketplace; in the world of new technologies and products. The enormous traffic volumes transiting the public international system would not be possible but for the advances of digital switching

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technologies. Nor would private networks have their appeal, but for the instantaneous protocol conversion and data processing capabilities made possible through microelectronics. Similarly, the availability of cheap and powerful chips has transformed the traffic generating capacity of customer premises equipment (CPE); the facsimile machine is but one example.

Telecom traffic volumes will continue to be affected by advances in the information storage and processing capabilities of integrated circuits. The development of a general theory of telecom traffic -- bridging microcosm and macrocosm, and of utility to economists as well as engineers -- is thus of growing importance.

7. Sara Spengler, "Network Switching Systems Quantitative Analysis of the Value-Added Network Market," International Data Corporation (Framingham Ma. 1989).

8. Readers interested in traffic forecasting models might consult Lester D.Taylor, <u>Telecommunication Demand</u>: <u>A Survey and Critique</u>, (Ballinger, Cambridge, 1989). See also the references in Jan Paul Acton and Ingo Vogelsang, "Telephone Demand Over The Atlantic Evidence From Country-Pair Data," (RAND, Santa Monica, CA. 1990).

9. See eg., Albert Bressand, Catherine Distler and Kalypso Nicolaidis, "Networks at the Heart of The Service Economy" in Bressand and Nicolaidis ed., <u>Strategic Trends in Services An Inquiry Into The Global Services Economy</u>, (Harper & Row, New York, 1989).

10. This point is brought home in the 1990 biannual survey of telecommunication markets by <u>The Economist</u>: See "Netting The Future," <u>The Economist</u>, March 10, 1990. See also Robert R. Bruce, Jeffrey P. Cunard and Mark D. Director, <u>The Telecom Mosaic Assembling The New International Structure</u>, (Butterworth Scientific, London, 1988) pp. 183 - 269.

11. See Thomas W. Malone, Joanne Yates and Robert I. Benjamin "Electronic Markets and Electronic Hierarchies," <u>Communications of the ACM</u>, Vol. 30, No.6 (June 1987) pp. 484 - 497. See also Charles P. Jonscher, "Information Resources and Productivity," <u>Information Economics and Policy</u>, Vol.1, No.1, pp.13-35.

12. G. Staple and M. Mullins, "Global Telecommunication Traffic Flows and Market Structures," supra, note 2.

13. These concerns have been highlighted in a series of articles by Hugo Dixon in the <u>Financial Times</u>, beginning in April, 1990. See "Telephone users overcharged by world cartel operation," <u>Financial Times</u>, April 3, 1990, p.1 and "Reconnecting charges with costs" at p.18. Succeeding articles appeared on April 4 (at p.4); April 5 (at p.4; also Letters to the Editor at p.17); April 17 (Editorial at p.17); April 23 (pp. 1 and 7); April 30 (p.1) and May 1 (at p.1). All page references are to the U.S. edition of the <u>Financial Times</u>.

14. See eg., "British Telecom profits likely to spark prices row," <u>Financial Times</u>, April 23, 1990, p.1.; "International Accounting Rates and The Balance of Payments Deficit in Telecommunications Services," Common Carrier Bureau, Federal Communications Commission, December 12, 1988. 15. The IIC's 1989 report (see note 2, <u>supra</u>) estimated global cross-border traffic in 1986 at approximately 17.5 billion MiTT. The 1990 estimate updates this figure based upon an analysis of annual traffic growth in the intervening years.

16. See eg, "International Message Telephone Service Between The United States And Selected Countries, 1975-1989, "Industry Analysis Division, Common Carrier Bureau, Federal Communications Commission, Washington D.C., November 1989.

17. This estimate assumes a 5% (after inflation) across-the-board productivity gain for carrier facilities plus an additional 5 - 8% gain from unit cost reductions on the international portion (gateway switches plus cable or satellite channels plus direct overheads). The latter figure obviously depends, inter alia, on the proportion of end-to-end costs attributable to international facilities.

18. See "International Accounting Rates and The Balance of Payments Deficit in Telecommunications Services," supra, note 14.

19. See "Competition In Public Long-Distance Telephone Service in Canada [The Sherman Report]," (Minister of Supply and Services, Canada, 1988) pp. 112 -114; K. Cheong, "Telephone tariff cuts and traffic volumes," <u>Financial Times</u>, April 24, 1990, p.23; Acton and Vogelsang, "Telephone Demand Over The Atlantic," <u>supra</u>, note 8; Henry Ergas and Paul Paterson, "The Joint Provision of International Telecommunication Services: An Economic Analysis Of Alternative Settlement Arrangements" ITS International Conference, Venice, March 1990.

20. CCITT Study Group 3 is charged with reviewing the D Series recommendations which were last revised at the CCITT IXth Plenary Assembly in Melbourne in November 1988. See CCITT Blue Book, Volume II - Fascicle II.I (ITU, Geneva, 1989). The OECD's draft report, "Trade In Telecommunication Network-Based Services: International Charging Practices And Procedures", was released in June, 1989.

A new draft treaty (known as a framework agreement) for trade in services, including telecommunication services, was adopted by GATT negotiators in December, 1989. "Elements For A Draft Which Would Permit Negotiations To Take Place For The Completion Of All Parts Of The Multilateral Framework" MTN.GNS/28 (18 December 1989). In March, 1990 a more detailed draft agreement covering market access to cross-border telecommunication services (known as a sectoral annex) was circulated to GATT members by the United States. "Annex: Access To And Use Of Services of Public Telecommunications Transport Services," MTN.GNS/w/97 (23 March 1990).

21. See Ken Cheong and Mark Mullins, "International Telephone Service Imbalances, Accounting Rates And Regulatory Policy," NERA Working Paper, London, 1990.

22. See "Petition For Expedited Declaratory Ruling," filed by AT&T in FCC Common Carrier Docket No. 86-494, February 5, 1990.

23. For enhanced services, see <u>Computer II International</u>, 91 FCC 2d 232 (1982); on reconsideration, 100 FCC 2d 776 (1985); for switched voice services, see <u>International Competitive Carrier Policies</u>, 100 FCC 2d 812 (1985).

24. Henry Ergas and Paul Paterson, "International Telecommunication Accounting Arrangements: An Unsustainable Inheritance?", France Telecom Conference, Villefranche-sur-Mer, France, June 1989.

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