Session 2: Tariffs

A review of tariff comparison methodologies and solutions for defining appropriate comparisons in an age of increasing tariff differentiation.

"The OECD Tariff Models"
Yuji Kato, OECD

"Tariff comparisons and monitoring"
Andrew Dickson, BT

Tuesday
19 March

INTERNATIONAL TELECOMMUNICATION UNION

TELECOMMUNICATION DEVELOPMENT BUREAU

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World Telecommunication Indicators Meeting
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SOURCE: OECD, Yuji Kato

TITLE: TELECOMMUNICATION PRICING INDICATORS BY THE OECD

Telecommunication Pricing Indicator by the OECD

Yuji KATO / OECD

ITU World Telecommunication Performance Indicators Meeting

19th, March

ITU, Geneva

Introducing the OECD tariff baskets and time series

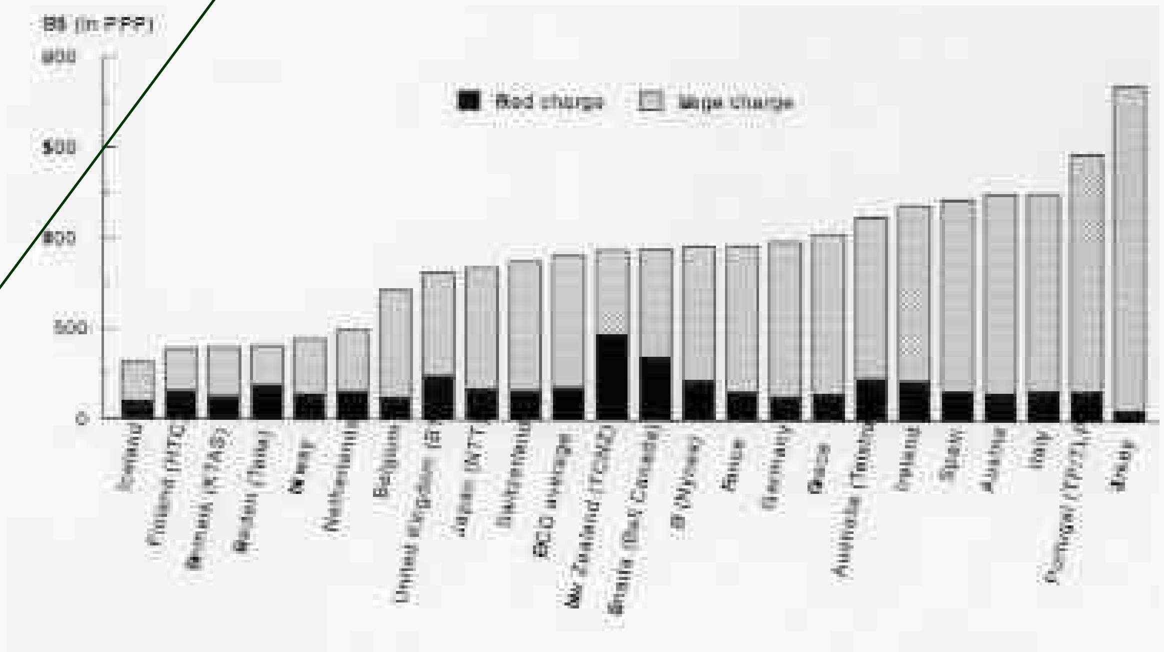
Telecommunication services in 25 OECD countries from 1990 to 1995

- PSTN (Business and Residential)
- International (Business and Residential)
- Leased line (56/64 kbits/s, 1.5/2 Mbits/s)
- Mobile (Business)
- Packet switched Network (X.25)

How the models constructed?

- INPUT
- In past data on annual basis
  - » Installation
  - » Monthly rental
  - » Usage
- Assumptions
  - » Call distribution
  - » Usage volume, etc...

- OUTPUT
  - » Indicator
  - » (Tariff baskets)



How the models designed?

- Data (Tariff itself)
  - » Yearly questionnaire by the OECD
  - » Quarterly data collection by EURODATA
- Assumptions
  - » Reviewed in the Biennial Workshop on Telecommunications Performance Indicators
    - – Last meeting, September 1995
      - Tariff Comparisons in the competitive markets
      - Indicators for mobile telecommunications
      - Indicators for information infrastructure, etc.

Problems

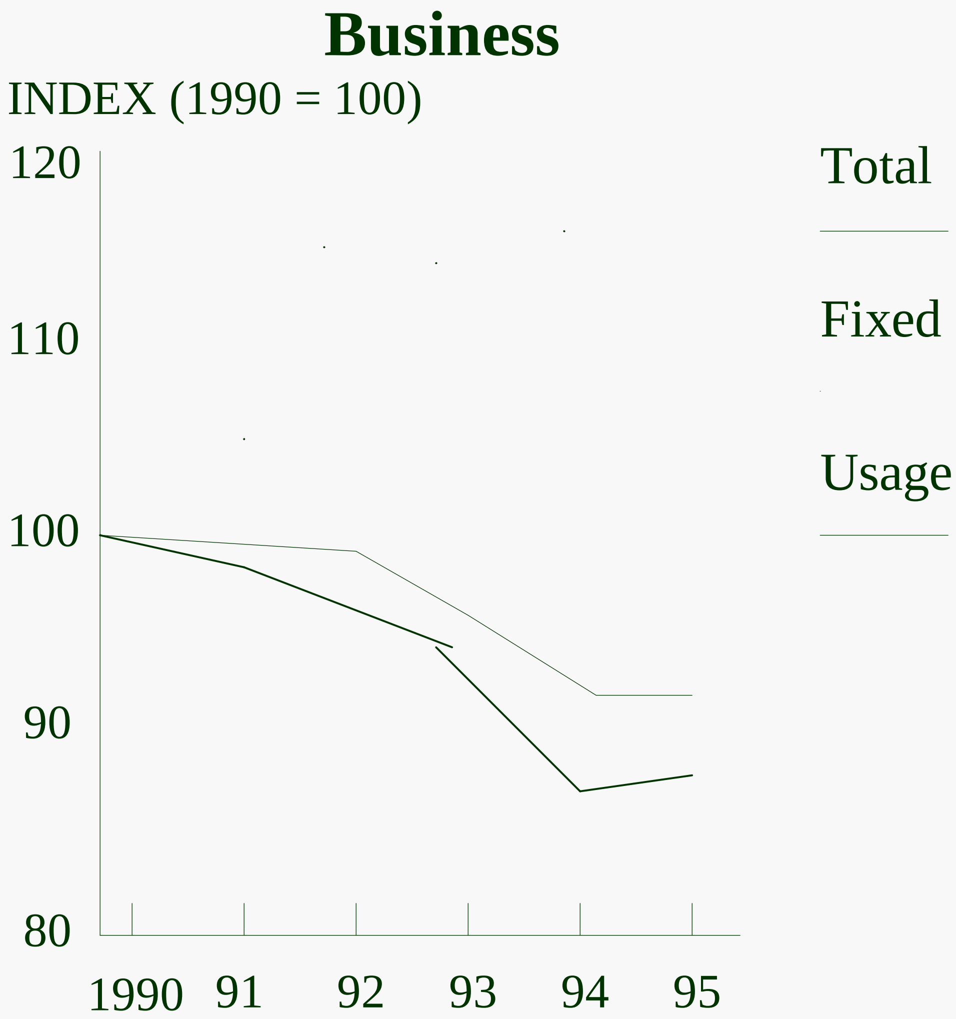
- Data (Tariff itself)
  - » Getting complicated with the sophisticated tariff options, especially in competitive market
- Assumptions
  - » How could they be changed while keeping the consistency for time series data?

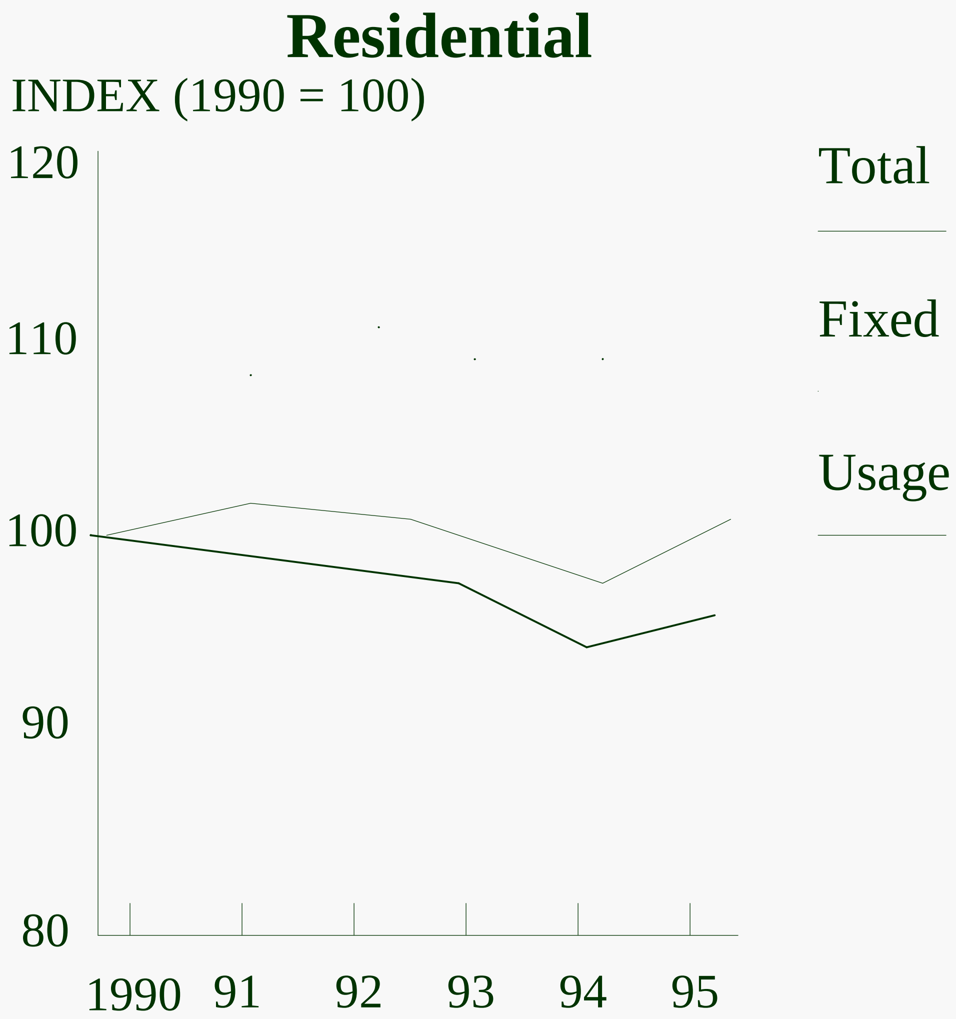
Tariff Time Series

Monitoring Tariff Trends in the OECD

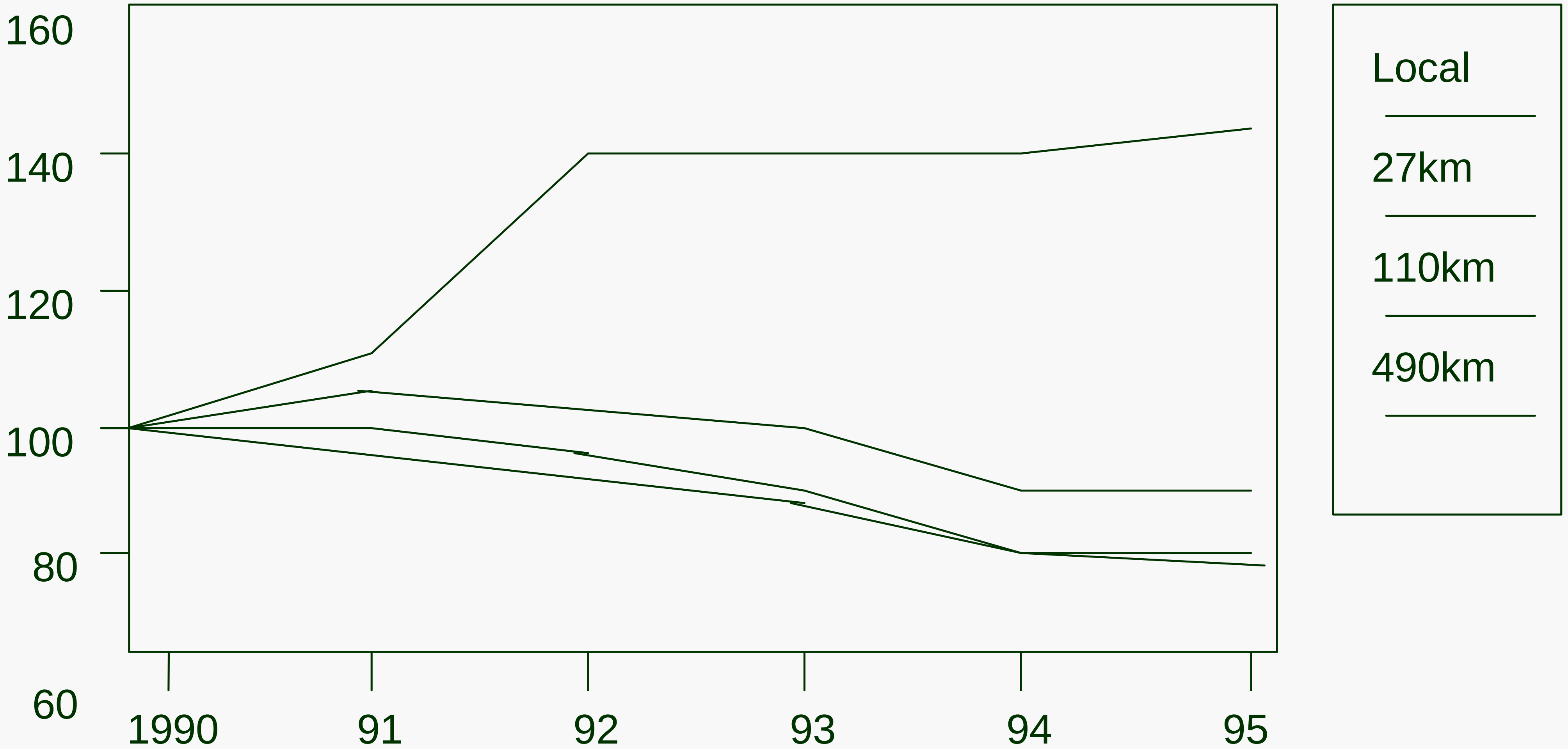
- Time series of **Fixed**, **Usage Charges** and **Total Charge**
- Time series of Calls over different Distances
  - » **Distance Rebalancing**
    - – 3 Km (Local); 27 km; 110 km; 490 km
- Index approach to give all countries the same weight
  - » Base Year: **1990 = 100**

Monitoring OECD Tariff Trends





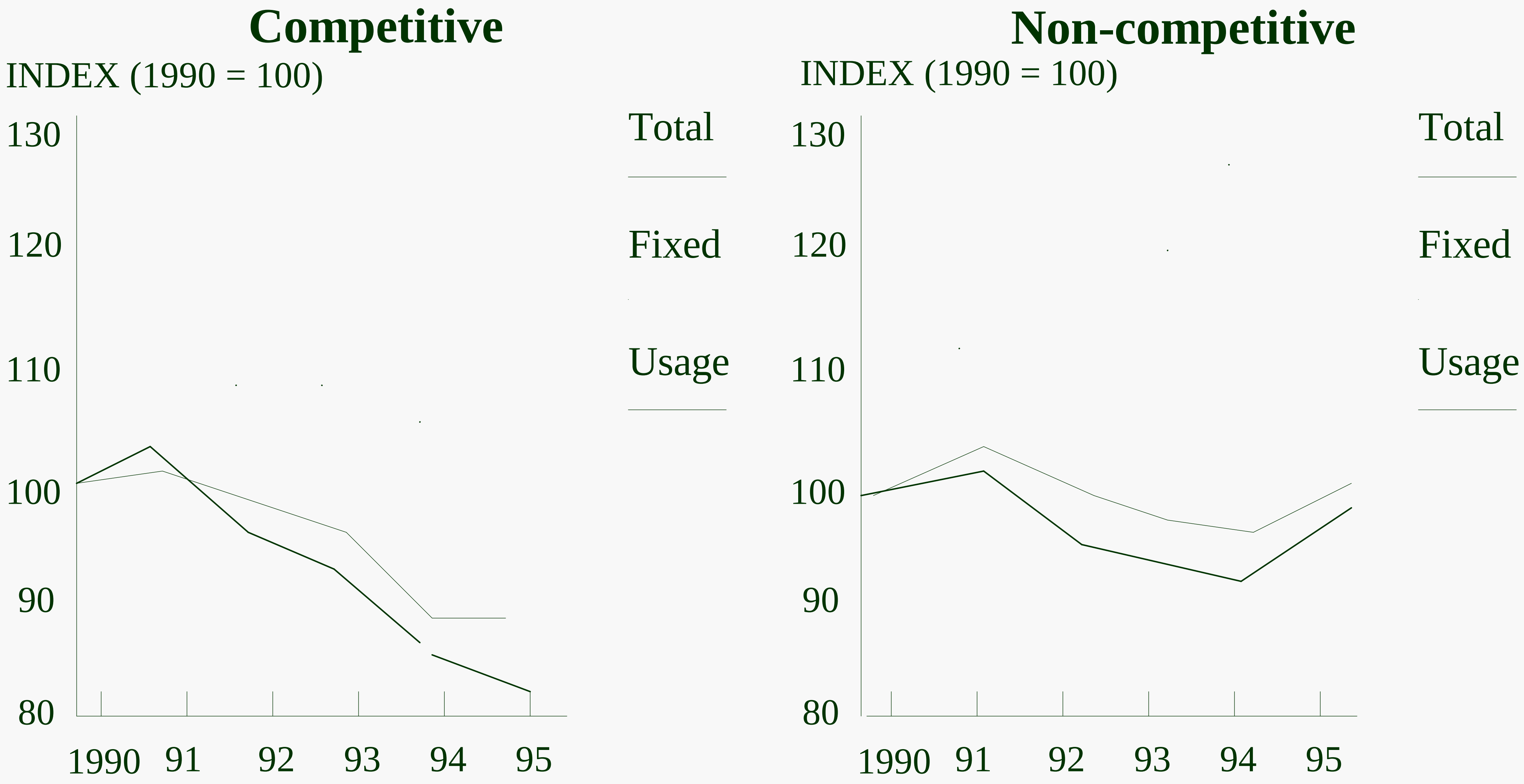
Monitoring Tariff Rebalancing by Distance



Comparative Policy Performance

- Tariff Trends in Markets with Infrastructure **Competition** and **PSTN Monopolies** in terms of the **Total Basket Cost**
- Comparative rebalancing between **Fixed** and **Usage Charges**
- Comparative rebalancing between Usage Charges **(Local -- Long Distance)**

Example: Business Basket Pricing Trends

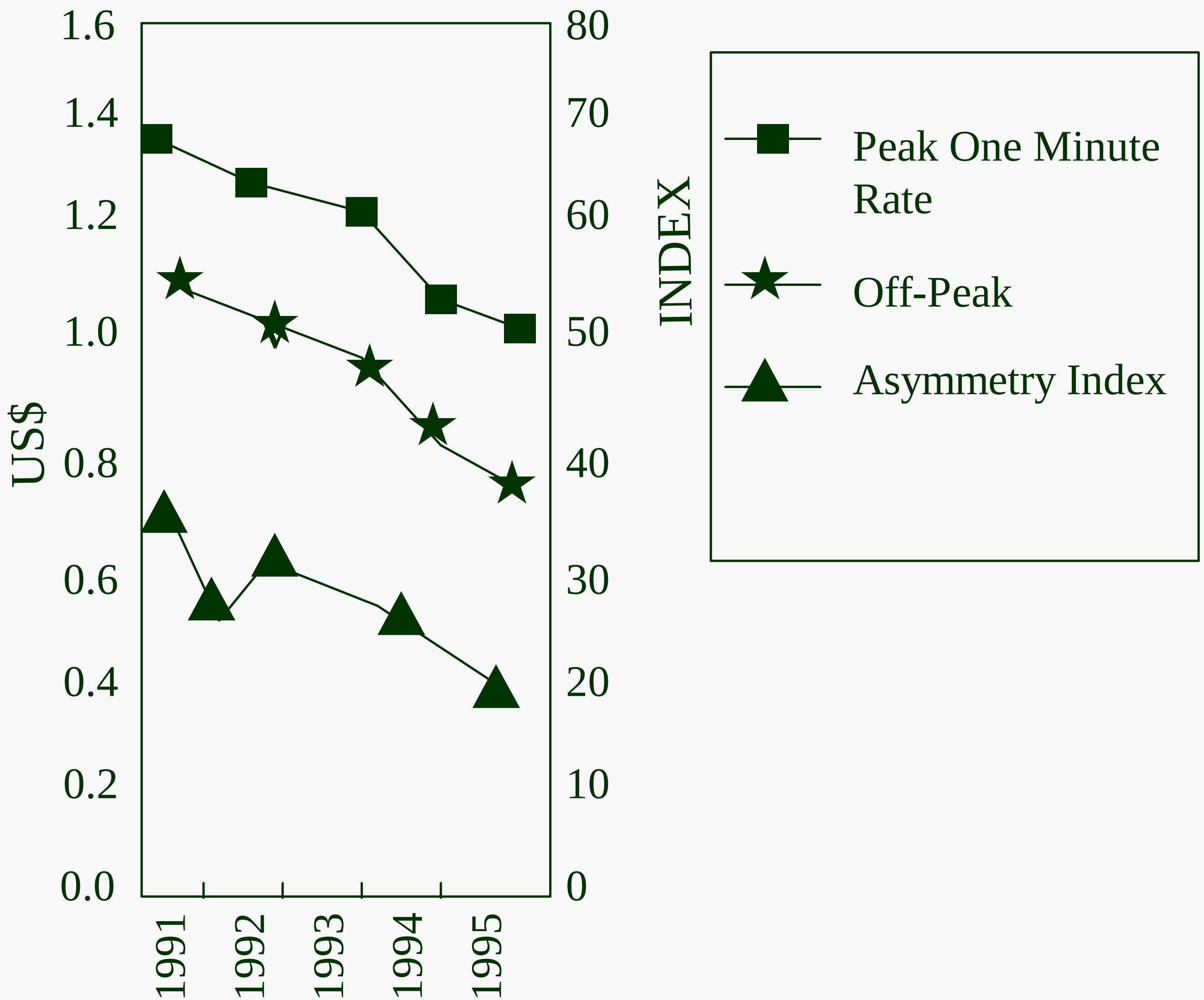


Comparative Distance Rebalancing

Other Tariff Trends Analysis

- International tariff trend
- Accounting rate trend
- Leased Line (56/64 Kbits/s & 1.5/2 Mbits/s)

Trend in International Tariff (1991 - 1995)



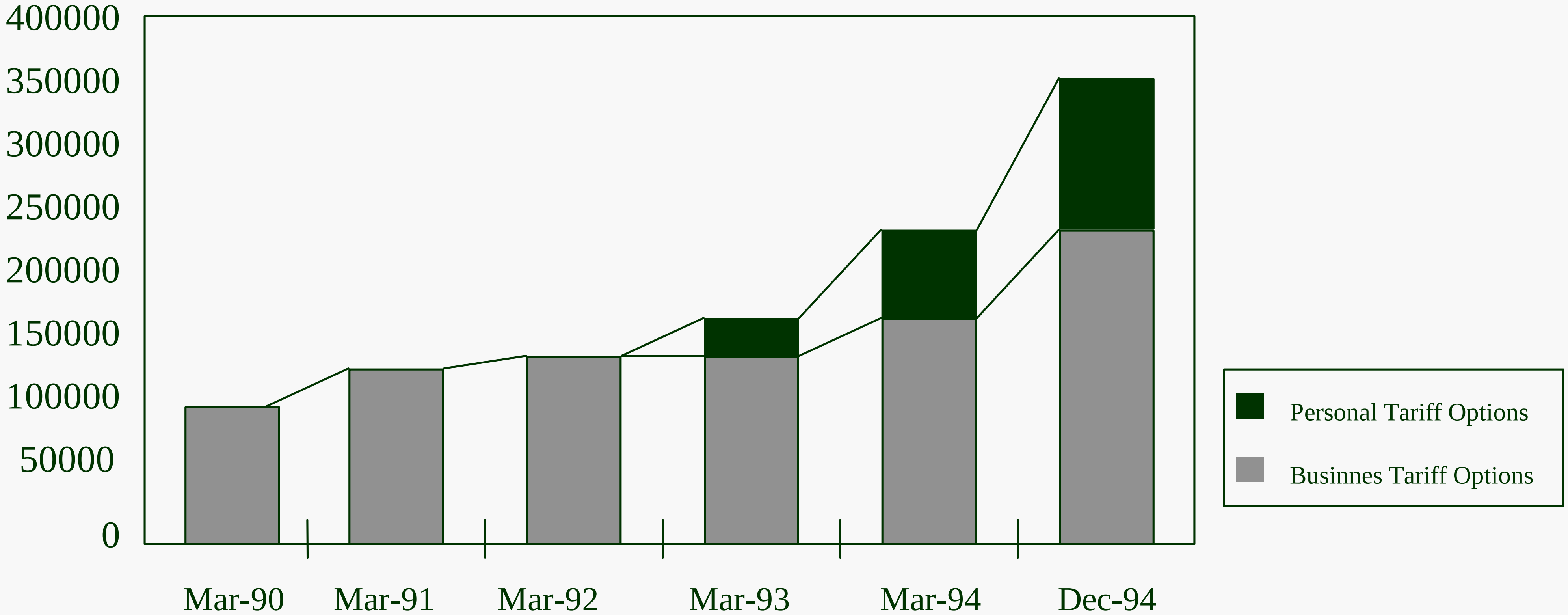
- Downward Trends in Collection Charge
- Decreasing Price Asymmetry
- Discount which is not shown in standard tariff

Questions

- Competitive markets
  - » Diversified tariff options
  - » How we can adjust the models?
- New Services
  - » Do we need new price indicators for information age?

Mobile Communication
Personal tariff option

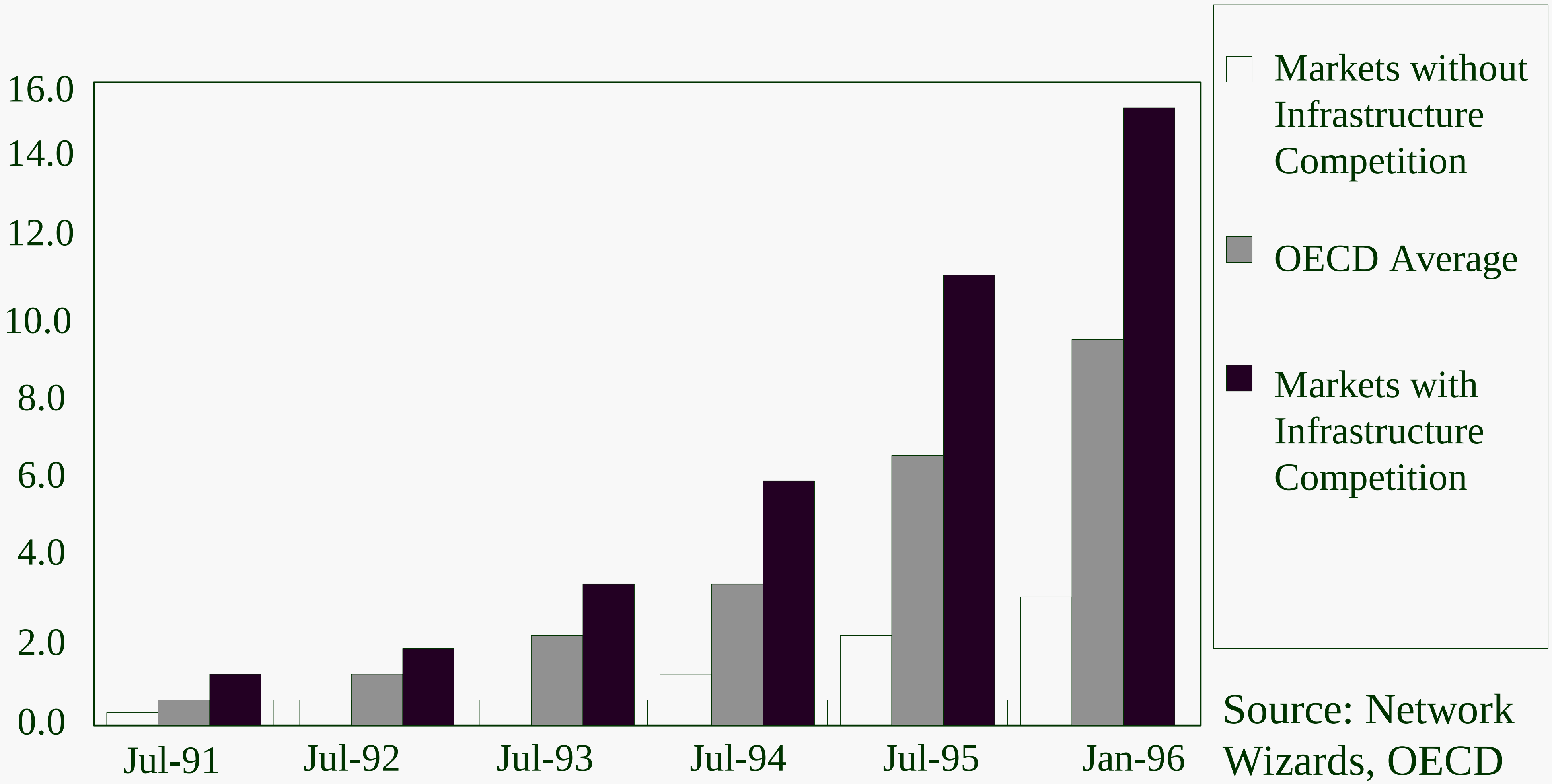
Tariff Diversification and Subscriber Growth in the UK



New Comparisons

- Access to the Internet
  - » Leased Line Access
  - » “Dial-up” Access
- ISDN Basket
- Cable - Television / Telephony

Internet Growth and Market Structure

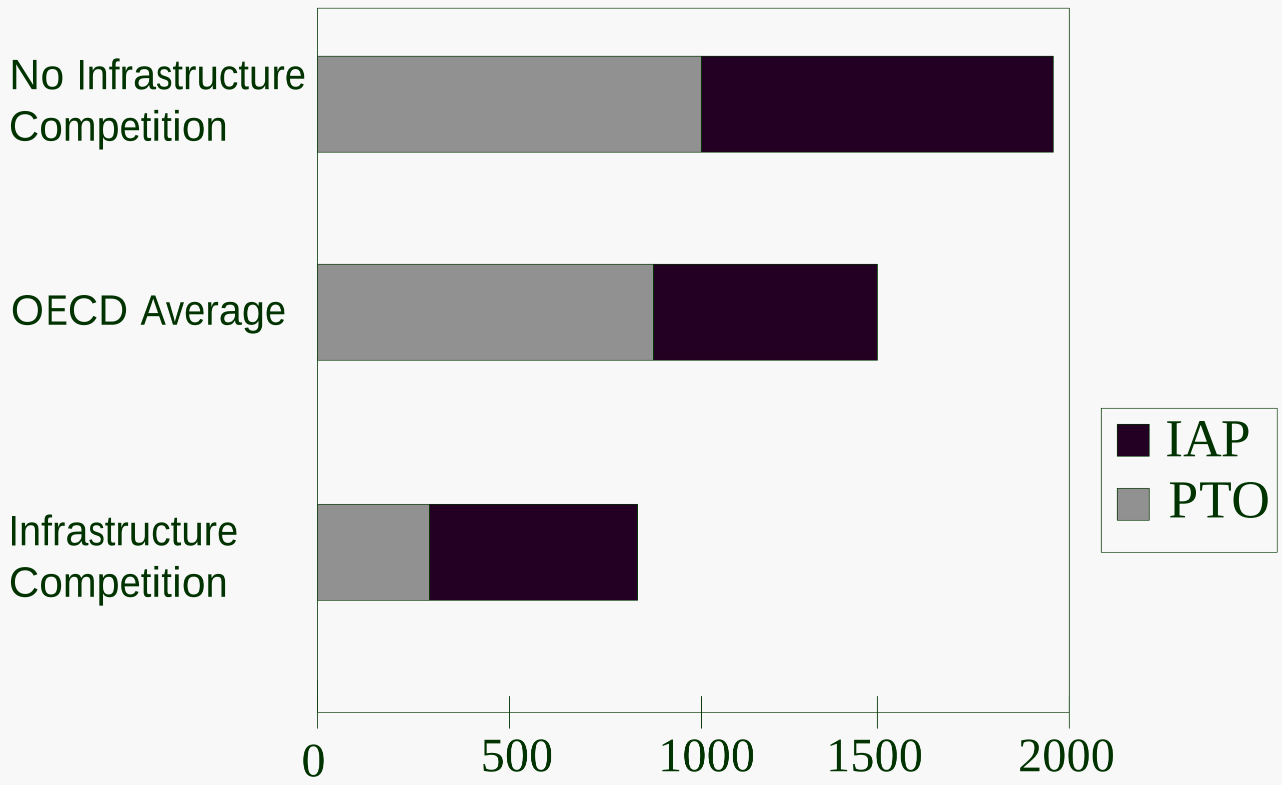


Source: Network Wizards, OECD

Internet Baskets (Dial-Up)

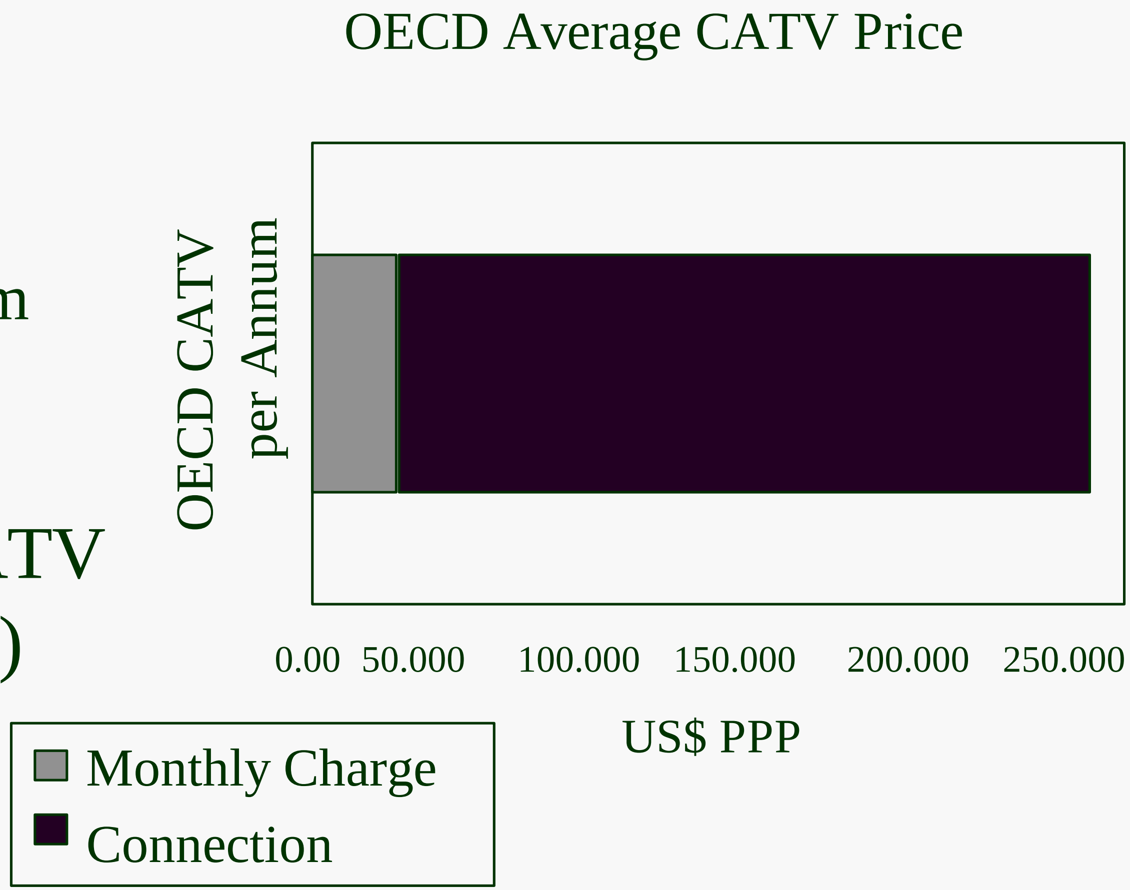
- Includes 20 & 30 Hours per Month
  - » PTO Local Call Rates
  - » Connection/Rental
  - » Peak/off-peak
  - » IAP Access Charges
- Output: Internet Basket 240 &360 hours

Internet Access via "Dial-up": 240 Hours of Local Call @ Peak rates per annum, August 1995



Measuring Cable Television Pricing

- CATV Basket
  - » Connection (Spread over 5 years)
  - » Monthly Charge (Basic or Minimum Service)
  - » Data Collected for Premium Service (e.g. Pay Movie Channel) but excluded
- Add New Service (e.g. CATV telephony, Internet Access)



Summary

- New demand
  - » New usage pattern - ex. Internet Access traffic
    - ⇨Continual effort by the Workshop
- Competition
  - » Complex discount Scheme ⟶ ?
- New Services
  - » Internet Access Price
  - » ISDN
  - » Cable-TV/Telephony

Further Information and Update

- Please refer to OECD WWW home page; http://www.oecd.org/dsti/tisp.html
- Forthcoming;

  OECD Communications Outlook 1997

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TITLE: TARIFF COMPARISONS AND MONITORING

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Tariff Comparisons and Monitoring

A presentation to 19-21 March 1996 ITU Meeting, Geneva
by
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Overview

- Uses of internation tariff comparisons
- Competition in the UK
- National Competitive Comparisons
- Problems posed by competitive comparisons
- Methods of competitive comparisons
- Price Perceptions

International tariff comparisons

- subset of wide range of comparisons
- aid to regulation
- source of pressure upon regulated companies
- performance indicators
- not for detailed national price monitoring

1984 Analysis

- Price Control of newly privatised BT, set by DTI and later taken over by Oftel
- analysis of international tariffs for calls and rental trends
- trend comparison with 19 countries 1967-82

1984 Analysis (cont)

- domestic rentals, UK 5 out of 9
- UK worst for local calls
- long distance calls, UK 4 out of 7
- UK, 1,5% below inflation, average 2.5%

Sequence of BT price caps

- RPI-3% 1984 - 88 covering 39% of revenue
- RPI-4.5%. 1989 - 90 covering 49%
- RPI-6.25, 1991 - 92 covering 57%
- RPI-7.5%, 1993 - 96 covering 59%

1996 Analysis

- Undertaken by ANALYSIS consultancy
- Using BT basket average BT residential customer fourth out seventeen
- Using BT basket average BT business cutomer second out seventeen
- Relative improvement in 1986 and 1989 position with a BT basket

Current UK competition

- Basic split between direct and indirect competition
- Direct competition providing lines and calls
- Indirect competition for national and international calls
- Mobile growth continues rapid growth

Current UK competition (cont)

- Main indirect supplier is Mercury - 10 years
- smaller national calls competitiors e.g. Energis, Scottish Telecom
- wide range of resellers both for national and international calls
- Mercury residential and business focused
- Other indirect competitors mainly business focused

Current UK competition (cont)

- Main direct suppliers are BT, cable companies, Mercury plus some operators in urban areas
- all direct suppliers except BT are geographically restricted either by franchise or rate of investment
- cable companies can bundle TV/entertainment with telephony and report rapid growth in take up of service

UK Competition Summary

- wide range of competitors both direct and indirect
- most cutomers have a choice of least one supplier
- customers beginning to place more value on qualiity of service, features and relationships
- industry widely regarded as most competitive in world

Competitive comparison issues in UK

- obligation to publish tariffs
- lack of tariff structure consistency
- less cooperation between partie
- dual-sourcing leading to sampling difficulties

Competitive comparison issues in UK (cont)

- operators geographically restricted
- calling plans aimed at special customer groups
- niche operators only providing some service
- cable companies bundling TV and telephony

Competitive comparison issues in UK (cont)

- use of advertising and sales materials to influence perception
- relation of perception to reality
- legal intervention and advertising control
- value of non-price features, e.g. call waiting
- mixtures of technology

Price perception

- recent NOP study for BT
- 600 company directors, senior managers and owners interviewed
- 90% claimed to be well informed about business costs and prices and 85% cited this as reason for business failure
- … but estimated national calls at twice cost
- … and USA calls at almost three times cost

Other price perception discoveries

- call costs were more baffling than other products’prices
- aware that call prices were coming down
- on a lighter not 90% knew price of beer but only 10% knew Ban of England base rate

Competitive comparison methods

- baskets (carrier based, national, local)
- own customer data
- individual customer data
- summarised customer data, segmented by spend or site size
- services, e.g. sample calls, access

Recent Published Studies

- Residential customers study in November 1994 quality assured by Coopers and Lybrand
- Business study in November 1995 by Touche Ross Tlhmatsu International
- resulting from the earlier discussion the studies covered Mercury where they offer a national published tariff

Competitive Studies

- summary resutls aimed at customers not experts
- “ Am I better off with BT or company X?”
- sufficient detail to support a technical case
- independent acceptance of assumptions
- work carried out independently

Competitive Studies (cont)

- influence price perception
- segmented analysis
- large calls samples summarised into segments

Residential Study

- Sample of 500,000 customers for period of 1 month
- various segments >£60/qtr calls
- apply best discounts where applicable
- sensitivities to etect any bias

Business study

- Review of 28000 customer sites and almost 20 million calls from 1 month
- again focus on BT call spend over £60/qtr
- apply discounts where possible and compare to all competitors avilable tariffs
- sensitivities to detedt bias

Residential Study Results

Typical Customer Spend on Calls per quater	£60-80	£80-100	£100-150	£150-300	£300+
% amount by which BT Cheaper	2.0%	2.6%	1.8%	1.3%	1.3%

Business Study Results

Typical Customer Spend on Calls per quater	£60-100	£250-500	£500-750	£1000-2500	£2500 5000
% amount by which BT Cheaper	5.1%	2.3%	2.0%	1.0%	0.7%

Conclusions

- International tariff benchmarking still important to BT
- Competitive comparison presents different problems; long way from resolution
- BT becoming more interested in competitive comparisons than international comparisons
- UK focus shifting from international benchmarking to competition and customer choice

Session 3: Traffic

Traffic statistics are an important indicator of telecommunication usage. They also provide insightful economic and social perspectives. How are alternative calling procedures and technological changes affecting traffic measurement? What is the best unit for measuring traffic (calls, pulses, minutes, megabytes, erlangs)? How can confidentiality concerns be balanced against the crucial importance of traffic statistics? Are current statistics sufficient or is greater diversification needed (e.g., usage by subscriber, usage by service). What happens when a growing amount of communications traffic is data and not voice?

"The New Demand for Telecoms Traffic Data: From MiTTs to Maps."
Greg Staple, Editor, TeleGeography

"International Traffic Modelling"
Philip Laidler, CSMG, UK

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SOURCE: TELEGEOGRAPHY (USA), Gregory Staple

TITLE: THE NEW DEMAND FOR TELECOMS TRAFFIC DATA: FROM MITTS TO MAPS

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Traffic Flows Are Shaping The Information Economy As Much As Policy

A. Introduction

B. Past Challenge

C. Current Issues

D. Future Agenda

Past Challenges

A. No data - telecoms is a "black hole" for traffic statistics

B. Definitions - the origin of MiTT: Minutes of Telecommunications Traffic

C. The birth of TeleGeography

Current Issues

A. What proportion of network traffic is still voice communications as compared to data, text and video?

B. What proportion of traffic is carried by the public wireline network as compared to other networks?

C. When will the Internet become a "public" telephone network?

D. How can traffic data and other telecoms indicators be more widely used?

Future Agenda

A. National Traffic Statistics

B. Survey Research

C. The Internet

D. Mapping MiTTs

The New Demand For Telecoms Traffic Data: From MiTTs to Maps

By Gregory C. Staple

The structure of the world information economy is being determined by traffic rather than policy ..."

Stewart Brand'

Ten years ago the American writer, Stewart Brand, expressed the unconventional view that traffic rather than policy would have the upper hand in defining the emerging information economy. Brand's insight was drawn from recent events in the financial markets. Since the 1'970s, national monetary authorities had fought a losing battle trying to peg currency values as larger and larger waves of money washed over the world's foreign exchange (FX) markets. By the mid-1 980s FX trading volumes worldwide often topped $200 billion daily -- more than the annual GDP of many countries.

At that time the telecommunications industry seemed to be sheltered from these powerful currents. Governments still owned most of the world's carriers and market entry by newcomers was strictly licensed. The Internet was largely a chat line for academics and IBM was king of the computer business.

What a difference a decade makes. Lest anyone doubt the power of traffic today, one need only lock to the Internet. While the world's carriers and governments debated how to bring multi-media to the market, the exponential growth of traffic on the Internet tipped the balance. Five years ago, the World Wide Web did not exist. Today Web traffic is the largest stream on the Internet and has swept aside the pet industrial policies of governments and corporations alike.

The power of the Internet to trump government policy is but one example of the rise of telegeography: satellites and telecom cables need no boundaries, but governments are defined by the boundaries they keep. This makes cross-border traffic flows much more than just another industry statistic. Traffic provides a seismograph of the pressures along a central fault line of our age. On one side is the indiscriminate geographic power of electronic communications networks and, on the other, the geographic particularity upon which all countries are founded.

Traffic statistics are also of vital importance to the telecommunications industry itself, of course. The greatest demand for traffic data in the next few years, however, is likely to be at the local rather than at the global level. Local competition is now squarely on the agenda in North America, Europe and Asia. For new market entrants -- whether wireline or wireless -interconnection charges are paramount.

Gregory C. Staple is the Editor of TeleGeography, the annual review of international telecommunications traffic and markets published by TeleGeography, Inc. He is also a partner in the Washington, D.C. communications law firm of Koteen & Naftalin, L.L.P.

How much should new carriers pay to terminate traffic on the incumbent's network? How much should incumbents pay for terminating traffic on the newcomers' networks? The answer to these questions, at least in the longer run, is likely to be traffic sensitive. Bill and keep or sender keep all (SKA) arrangements may be popular to "jump start" competitions But, if regulators truly want newcomers and incumbents to play on a level field, SKA arrangements must eventually yield to volume-based interconnect charges, at least in part. And that means traffic statistics.

Before looking more closely at this new demand for traffic data in the 1'990s, it may be helpful to see whence we have come.

A. Looking Back - Yesterday's

In 1987 when I first began to review the published data on telecommunication traffic, the industry was on the cusp of a new era. Since the 1 9th century, access to telecommunication services, and especially international services, had been limited by supply constraints. Progress was measured primarily by locking at statistics on facilities traffic (e.g., by data on telephone access lines, phones per capita, telephone cable miles. But by the mid-1'980s, very high capacity transmission facilities -- satellites and fiber optic cables -- and new digital switches had begun to shift the focus from supply to demand. Competition and market liberalization accelerated this shift, although the change was most marked for domestic long distance and international services. Thus, whereas the old environment favored the collection and dissemination of statistics on supply, the new age put a premium on information about demand and price -- on the volume and direction of telephone traffic, and on the composition of demand (e.g., the breakdown between long distance voice, fax and data traffic).

When one looked for national data about the volume of long distance traffic, however, or statistics on how much traffic was sent by one country to another, little information existed.3 In 1987 international telecom traffic was more or less a statistical "black hole." Although most carriers were enjoying a series of boom years, almost no coherent data escaped the industry's strong gravity fields. The problem was twofold: First, even where rudimentary statistics did exist, there was no common unit of account. Traffic was largely measured in calls, erlangs, billing units and pulses. This was not really surprising; most statistics were compiled for purposes of network planning (for engineers) or for internal accounting reasons (for tariffing). Traffic statistics were not intended for popular consumption, which points to the second problem.

Although telecommunication services already played a fundamental role in the economy, unlike other service industries, such as tourism, finance or transportation, only a handful of countries regularly published baseline statistics on the sector's principal output -- traffic. International reference sources, including the International Telecommunication Union (ITU) statistical yearbook, now defunct, mirrored these national deficits. Private publications, such as AT&T's The World's Telephones and the Siemens' International Fernsprechstatistik, were also inadequate. Data was often two years in arrears; there were serious omissions even for the richer countries; and there was no common unit of account.

Over the last decade, the collection and dissemination of statistics on long distance traffic has improved significantly, although much more needs to be done. A common unit of account, known as MiTT (Minutes of Telecommunication Traffic) is now used to compile most traffic statistics. This is particularly true for international traffic. The ITU, the Organization for Economic Cooperation and Development (OECD) and TeleGeography, Inc. (TGI), follow this convention in their industry yearbooks and related reports. This has greatly facilitated cross country comparison of traffic patterns over time. For example, route-by-route MiTT for over 60 countries are published in TGI's annual yearbook, TeleGeography.4 In addition, every two years, the ITU and TGI jointly publish an expanded compilation of route-by-route statistics.5 The next edition will be available in June 1996.

Second, the growing economic and social importance of telecommunications has lead more countries to publish rudimentary national traffic data. Typically the data includes the number of minutes or calls handled by a given carrier annually. Sometimes there is also a breakdown between "local exchange" and "long distance" traffic. Even such basic data, however, still is only available for carriers in approximately 30 to 40 countries. Consequently, today we know much more about the pattern of telecommunication flows between one country and another than we do about the direction and composition of most countries' domestic traffic. This statistical shortfall is likely to be less and less acceptable as we enter the age of local competition, and I shall return to this issue again later on.

B. Current Traffic Issues

The rudimentary statistical questions which we sought to answer only five years ago are rapidly being eclipsed by a number of more complex issues. Yesterday's traffic questions began with "How much?" and Where?" And while these questions are but partially answered, other questions now seem more urgent. They include the following:

1. *What proportion of network traffic is still voice communications as compared to data, text and video?*

Adopting a common unit of account for measuring traffic, such as MiTT, has always involved a risk. MiTTs are useful precisely because they are inclusive -- they are not service specific. A minute of fax traffic is treated just the same as a minute of conversation. So long as traffic on public telephone networks was reasonably homogeneous (i.e., voice calls) and other networks were primarily used for data traffic, such a broad definition made sense.

Today, however, one of the most pressing issues facing public telecommunication operators is the extent to which their networks are becoming heterogenous conduits. A key question now for carriers (and regulators) is often "what kind of traffic" not "how much traffic" traverses a particular network. The fact that voice, text and video traffic may use a common digital metric has, paradoxically, made the question more, not less important. This is because data traffic -- once the only kind digitized -- is now deregulated almost everywhere; market entry is unlimited and pricing is left to the market. Thus, as digital encoding and transmission technologies shift more traffic from the "basic" (regulated) to the "enhanced" (deregulated) category, the economics of telecommunication networks may be radically changed.

2. What proportion of traffic is carried by the public wireline network as compared to others?

The challenge of sorting out the composition of telecoms traffic in a digital world has been compounded by the rise of competing network infrastructures. Almost twenty countries permit competition among facilities-based telephone carriers and many more allow competition between wireline and wireless service providers. Private or leased line networks may also carry very large volumes of traffic in many countries. As a result, a public network which was once reasonably centralized and under common ownership has given way to an increasingly plural network infrastructure which has a multiplicity of owners. Some portions are vertically integrated -- others not; some carriers prefer to bundle local and long distance service or wireline and wireless service -- others do not or may not.

These developments have made the task of gathering uniform traffic statistics, by whatever metric, much more complex. Which carriers must file reports with the national regulators? How do you avoid double counting when a large proportion of each carrier's revenue (and traffic) consists of transfer payments to another carrier? How should traffic on leased lines be measured?

Some of these questions may be particularly difficult to answer in the international arena. Internationa simple resale (ISR) is a case in point. ISR involves the resale of international private line circuits fo switched traffic and has been favored by some countries in order to foster more cost-based internationa service. ISR traffic bypasses the existing accounting rate regime and is not subject to settlements o proportional return arrangements. There is anecdotal evidence that ISR has led to a significant decline ir both wholesale (settlement) and retail rates. But how much traffic is necessary to tip the balance? We may never know. To date, only the U.S. has required ISR carriers to file rudimentary traffic reports and as yet, few carriers have done so.

Industry and government have a similar interest in determining the extent to which cellular telephone and other wireless services, such as the new personal communication service (PCS), provides a substitute rather than a stimulus for wireline service. Yet, to my knowledge, no country, including the U.S., publishes even rudimentary comparative statistics on wireline and wireless traffic by local service area or subscriber class (residential/business). Thus, we also know very little about the extent to which year-on-year growth in network traffic is the cause or the consequence of the introduction of mobile services.

Nor do we really know how network switching patterns may change as the network becomes increasingly unwired. These issues are far from academic as Israel found out last Autumn when the unexpectedly large growth of mobile traffic, partly stimulated by the entry of a new cellular operator, overloaded the country's switching capacity. In Tel Aviv, many Israelis found themselves without a dial tone -- wireless or wired -- for the better part of a day.

3. When will the Internet become a "publics telephone network?

Gauging the future of the Internet combines the most difficult bits of the last two questions: How do you determine the volume and composition of Hoff-net" digital traffic? Until April

1995, it was possible to provide order of magnitude answers regarding Internet traffic by locking at the bitstreams transiting the main Internet backbone facilities in the United States which were government owned.6 Since then, however, the Internet's backbone networks have been privatized and a growing number of competing facilities have come on line so that there is no simple way to measure either the volume or the mix of Internet traffic.

Again, for telephone carriers and regulators this is much more than an academic issue: The rapid introduction of new software may make yesterday's e-mail medium tomorrow's conduit of choice for voice telephony. If that happens, a large portion of the circuit switched network may become "stranded investment", as economists say, Netscape Communications, which produces the leading internet browsing software, has announced that it will make audio conferencing capabilities a standard version of later releases. IBM has also announced that by the end of 1996, the companies personal computers will be pro-loaded with Internet voice conferencing software.

Baseline measurements of the voice traffic carried by the Internet and other packet switched data networks is also important for public policy. For example, in many countries the cost of providing telephone services to rural and low income users is underwritten by the local access or contribution charges paid by interexchange telephone carriers. These charges are frequently based upon the minutes of basic traffic which the interexchange carrier delivers to the local network. However, these per minute charges typically do not apply to access lines which are used for "enhanced" (e.g., Internet) services. In these circumstances, if the Internet begins to carry a significant volume of voice traffic, the existing charging mechanisms for recouping the fixed costs of the local exchange network and for universal service may become less and less tenable. Rudimentary Internet traffic statistics could provide an early warning system.

4. How can traffic data and other telecoms indicators be main-streamed?

In a world awash with talk about information superhighways and digital media, it is ironic that MiTT -- like many other telecom indicators -- is still part of a statistical back-water. Apart from a few industry consultants, business journalists and sector regulators, few people outside of the telecoms business are aware of the available data on telecoms traffic or of its potential applications.

The absence of traffic data in general interest publications can be explained, in part, by the way in which national statistics are compiled and disseminated. **Traffic data** is usually gathered (if at all) by regulators rather than by national economic or statistical agencies. Further, despite considerable efforts by some multinational groups (notably the OECD and APEC)7 country-by-country data on domestic traffic is hard to compare (local vs. toll calling areas may not be well defined) and rarely aggregated.

Likewise, publications on domestic traffic patterns are not easily obtained. The relevant regulatory documents have a limited national distribution and foreign circulation is de minimus. One obvious remedy is to distribute the core data in electronic fashion over the Internet and some regulators, such as the FCC and Oftel, have made significant strides in this direction.8 (So too has the IITU, which now publishes almost all of its indicator products on the Internet.)9 Let us hope that other countries follow suit.

Telecom traffic and other indicators also are more likely to reach potential users if they are published in an electronic format which is compatible with popular software in other business and scientific fields. For example, the ITU's indicator products (including the biennial report on international traffic data published with TGI) are now available on computer diskettes based on the World Bank's STARS program. STARS is compatible with the Lotus 1-2-3 spreadsheet program. Again, it would be helpful if national statistical agencies took similar steps.

Finally, the growing popularity of Geographical Information Systems (GIS) -- that is, computer based mapping programs -- offer an important new vehicle for bringing traffic and other telecoms data to a wider audience. The application of GIS to the telecoms industry is discussed further below.

C. Looking Forward: Where Do We Go From Here?

Meeting the statistical challenges outlined above will require a concerted effort by many different organizations -- public and private. Where should our priorities lie? I have four main suggestions:

1. National Traffic Statistics. It is time we shifted our statistical focus from the global to the local level. We know much more today about cross-border traffic flows than we do about the volume and mix of traffic within those borders. Yet the need for national traffic statistics arguably has never been greater. There is now a rough consensus that telephone and other communication services should be provided by competing operators and that both the long distance and local markets should be opened to competition. But there is also a rough consensus that the transition from a monopoly to a competitive market should not occur at the expense of the isolated, the poor or the handicapped in our populations. Indeed, many people see the transition to a competitive market as the best way to provide universal service and to expand consumer access to advanced services (e.g., by providing a data or video dialtone).

Neither competition nor universal service, however defined, will be possible without a complex new set of arrangements for interconnection and division of revenues. In some ways, countryby-country, we must invent the type of settlement arrangements which have long existed at the international level where, until very recently, foreign calls always involved at least two national operators. I do not mean to suggest, however, that the international accounting rate regime provides a model for local interconnection. On the contrary, a 50/50 split of wholesale rates and proportional return is neither desirable nor workable at the local level.

Nevertheless, just as the existing accounting rate regime could not function without detailed statistics on the net traffic balances between carriers, the administration and oversight of domestic interconnection arrangements are also likely to require baseline traffic statistics. Until circuit capacity and bandwidth become virtually free, the terms on which one local carrier (wireline or wireless) will pick up and deliver traffic sent to it by another carrier are likely to be traffic sensitive.

As mentioned earlier, to "jump start" competition regulators in the U.S. and elsewhere have proposed that new mobile operators interconnect with the fixed network on a bill and keep or sender keep all (SKA) basis.'° Similar terms are also being considered for competing local wireline carriers. In the international telecom industry, we have learned that SKA arrangements are economically attractive primarily where the traffic volumes are reasonably balanced in both directions. That is manifestly not the case when it comes to local exchange markets.

For example, even after five years of rapid growth by the cellular telephone industry, one of the major U.S. wireline carriers still terminates 94% of the overall traffic stream in its local service area." In these circumstances, incumbent carriers are likely to have a keen interest in developing traffic benchmarks to test the economics of any SKA regime and to devise more equitable long term arrangements for reciprocal (i.e., traffic sensitive) compensation.

Similarly, so long as regulators view long distance users as the primary source for subsidizing local exchange service in remote or high cost areas, the size of the subsidy and the basis for its collection are likely to be tied to traffic. But how much traffic will be required to provide a given subsidy? Should lines devoted to data traffic (Internet access) also be included? How will traffic be allocated to carriers serving rural or poor users when their is more than one carrier of last resort? How will these arrangements be monitored? Again, without an adequate set of traffic statistics, public policy on these and related universal service issues will almost certainly be compromised.

2. Survey Research. Many of the gaps in our current statistical knowledge are unlikely to be filled without extensive survey research. This is especially so for "off-net" traffic, such as the flows on international private lines and data networks. (More on that below.) Simply put, we cannot and should not reply exclusively on regulators and carriers to provide us with the traffic data we seek. We must get users and particularly groups of business users involved as well.

One might start with international private lines. They have proliferated since the late 1'980s. But except for some order of magnitude estimates about the number of circuits currently in use on major routes, I am unaware of any global data on the volume of MiTTs now carried by IPLs.

Survey research is also needed at the national level. Again, priority should be given to gathering longitudinal data on the changing mix of traffic originated on the public switched network. To do so, the telecoms industry might well borrow from their cousins in the television field by sponsoring telephone or modem diaries. Ideally, one would want to have diaries for every electronic terminal attached to a telephone or cable TV line at a given household or business. The data from a few thousand such diaries in a dozen or more countries would go a very long way toward answering some of the most important consumer and regulatory issues of the day.

3. The Internet. While Internet telephony is still in its infancy, within five years the Net may offer millions of people a practical alternative for low cost voice communications. At the same time, traffic on the public switched telephone network is likely to become more and more heterogeneous. The co-evolution of the Internet and the Public Switched Network (PSN) is now inevitable. In the circumstances, the need for baseline traffic statistics on Internet telephony and other services which compete directly with the PSN is obvious.

Compiling the necessary statistics, howeer, will not be easy. Because the Internet is based upon a packet-switched rather than a circuit-switched architecture, there is no one carrier and no single circuit used for an end-to-end transmission. The common unit of account is a packet of bits sent from one server to another not a minute of connect time. And, as mentioned earlier, while there was once a relatively finite number of backbone networks transiting almost all the bits sent from one continent to another, there are now numerous facilities.

Most of the large Internet providers currently accept bits from sister networks on a "peering" basis; no money **changes hands** and each Internet access provider is compensated by the monthly charges which it receives from its local subscribers. This system has worked rather well to date. But if the Internet is used for more and more real time voice traffic, the network probably will need to be partitioned on a de facto basis to accommodate it and today's peering arrangements are likely to evolve to a more market oriented set of relationships.

In managing the transition, rudimentary traffic statistics are likely to be essential for Internet and PSN operators alike. Few Internet networks will wish to carry all of their peers' voice traffic for free or to deliver very high volumes of bits to subscribers which pay only a small monthly fee. Similarly, as Internet telephony grows, PSN operators will need to adopt their wholesale (leased line) and retail offerings accordingly -- to decide where they wish to bid for Internet traffic themselves and where they merely wish to supply the underlying facilities. These circumstances provide an excellent opportunity for joint statistical venture.

4. Mapping MiTTs. The revolution in geographical information systems (GIS) for business probably offers the best chance yet to put telecom indicators on tomorrow's economic maps. The visual display of quantitative information -- to lift a phrase from Edward Tufted -- is almost essential for reaching a larger audience. And GIS is rapidly becoming the leading medium.

Maps are not necessarily preferable to graphs or charts in presenting locational information.'4 Rather it is the methodology behind GIS products that is becoming irresistible: GIS offers a common computer-based platform for integrating and displaying locationally specific data from diverse sources. In addition, unlike many other charting techniques, GIS software typically enables users to make sophisticated "what if" queries regarding the data set; to account for missing pieces; to test gee-demographic relationships; and to model scenarios.

The traffic data discussed here, like many of the other telecoms indicators addressed at this conference, have a very strong geographical connection. Most of the indicators the ITU and TGI publish are about nations or networks. These statistics do not exist in a vacuum. They reflect the demographic, economic and political realities of particular locales. Thus, the statistical appendix at the end of the ITU's annual development report begins not with telephone lines but with population and **GNP per** capita. GIS offers the ability to integrate this economic and demographic data with telecommunications.

Let me close by providing an example of how the U.S. telecom industry is already beginning to use GIS products to bring these kinds of data sets together. With the introduction of the new Personal Communications Service (PCS) in the U.S., many local wireless markets will have at least six or seven mobile service competitors -- two cellular telephone providers, three or four PCS licensees and two or more trunked mobile service operators. Competition will be fierce and marketing skills will be in demand as never before.

To help its members navigate this new terrain, the U.S. Cellular Telecommunications Industry Association (CTIA) has turned to GIS. Using a standard GIS software package (the ArcView platform) the CTIA has created a set of "Wireless SourceDisks" which permit users to analyze the demographic and economic characteristics of their current and potential markets service area by service area.'5 This wireless data base can be combined with other telecom data sets (e.g., on wireline networks) to create a fairly comprehensive view of the overall telecoms marketplace.

As yet, traffic data is markedly absent from the CTIA's Wireless SourceDisks and from the wireline data sets distributed by other vendors. But, as the competition for local exchange service brings more and more traffic data into the public domain, this shortfall is likely to be cured.

* * *

In sum, whether it be local competition or ISR, the rise of the Internet, or mobile services, the demands for traffic data in the 1'990s will plainly outstrip the demands of the 1'980s. The real question is no longer whether MiTT matter but whether the supply of MiTT products will be adequate -- service-by-service and country-by-country -- to meet the demand.

-- END --

Endnotes

1. Stuart Brand, The Media Lab, (Viking Peguin, London 1988), page 249.

2. The FCC has tentatively concluded that, at least for an interim period, interconnection rates paid by competing wireless telephone companies for local wireline switching facilities and connections to end users should be priced on a bill and keep and basis (i.e., bath the local wireline carrier and wireless provider should be charged nothing for terminating traffic). See Notice of Proposed Rulemakina, FCC 95-505, Common Carrier Docket No. 95-185, released January 11, 1996

3. See Gregory C. Staple and Mark Mullins, "Telecom Traffic Statistics -- MiTT Matter Improving Economic Forecasting and Regulatory Policy," Telecommunications Policv, June 1989, pp.105 128.

4. See, e.g., TeleGeocraDhv 1995 (TeleGeography, Inc., Washington, D.C. 1995).

5. See Direction of Traffic International Telecommunication Traffic Statistics (1983-1992) (International Telecommunication Unlon\TeleGeography, Inc., Geneva 1994).

6. See e.g., "NSF Traffic Growth, 1991-95" in TeleGeouraohv 1995, supra, page 64. Internet backbone data is also available at FTP: //nic.merit.edu/nsfnet/statistics/history.reports.

7. See e.g., Communications Outlook 1995, OECD, Paris 1995.

8. See the FCC's Web Site at http://www.fcc.gov/ for Oftel see http://www.open.gov.ukk/oftel/oftelwww/oftelhm.htm.

9. See also http://www.itu.ch/ for ITU's Web Site.

1O. See Notice of Proposed Rulemaking, supra note 2.

11. According to Pacific Telesis, 94% of wireline-cellular telephone exchange traffic terminates on its wireline network in California and 6% terminates on cellular telephone networks even though cellular traffic has grown at 20% annually in the 1'990s. Notice of Proposed Rulemaking, supra 40, note 60.

12. See e.g., Nathan Muller, "Dial 1-800-lnternet" Byte Magazine, February 1996, pp. 83-88; Jerry Michalski, "The Economics of Connectivity», Release 1.0, 31 December 1995. See also Jeff Mackie-Mason's Web site at the University of Michigan (http://gopher.econ.lsa.umich.edu/Econinternet/AIISubjects.html.)

13. See Edward R. Tufte The Visual Display of Quantitative Information (Graphics Press, Chesire, CT, 1984) and Envisioning Information (Graphics Press, Chesire, CT 1990). These two books are already classics in the field.

14. For an ingenious presentation of local calling data in a non-geographic format, see Steven G. Eick and Daniel E. Fyock, "Visualizing Corporate Data", AT&T Technical Journal, January February 1996, Vol. 75, No. 1., pp. 74-85.

15. For further information on the CTIA's "Wireless SourceDisks," contact catalog@ctia.org.

INTERNATIONAL TELECOMMUNICATION UNION

TELECOMMUNICATION DEVELOPMENT BUREAU

INFORMATION SYSTEMS UNIT

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(Geneva, 19 - 21 March 1996)

SOURCE: CSMG (UK), Philip Laidler

TITLE: INTERNATIONAL TRAFFIC MODELLING

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INTERNATIONAL TRAFFIC MODELLING

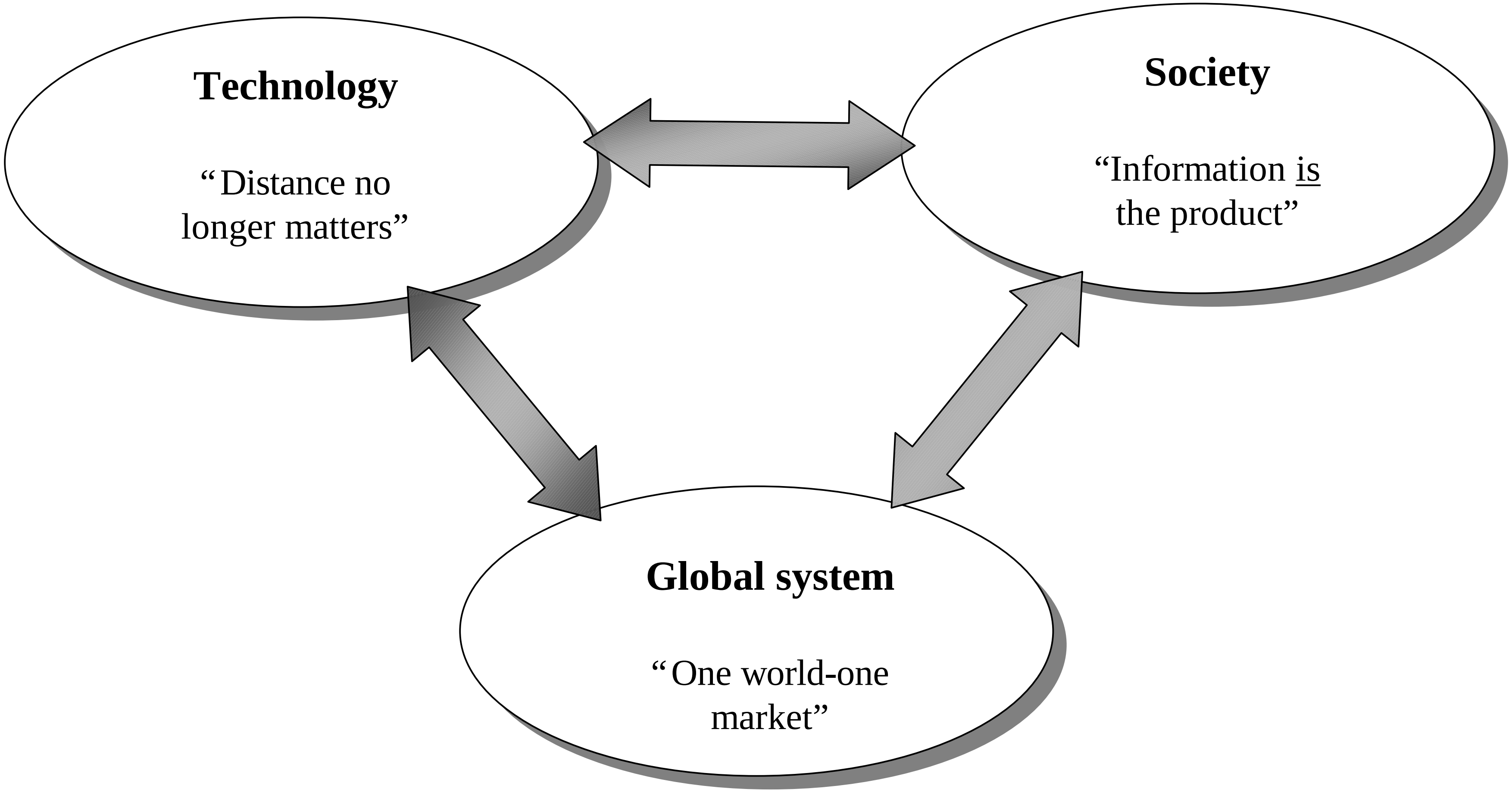
ITU WORLD TELECOMMUNICATION INDICATORS MEETING

Presented by Philip Laidler, Cambridge Strategic Management Group

Geneva 19 March 1996

CHANGES IN INTERNATIONAL TELECOMS

A number of forces are radically reshaping international telecoms



CHANGES IN INTERNATIONAL TELECOMS

These forces are re-writing the rules under which telecoms has operated for decades

Characteristic	Old System	Emerging Situation
Franchise	Monopoly	Competition
Key cost driver	Distance	Access
Pricing	Social/Political	Cost-based
Intercarrier relations	Contractual Accounting rate agreements	Stategic Market-based/refile and hubbing
Product	Switched voice transport	Multimedia Transport + Service
Industry consolidation	Vertical	Horizontal
Perceived role	Expensive luxury used sparingly and mainly by big business	The “glue” of the global village

REWRITING THE RULES

Operators, regulators, equipment suppliers are grappling with questions about their role in the emerging global communications fabric

- What services?
- Where to?
- To whom?
- How?
- With whom?

Increasing pressure to look beyond traditional services to and from traditional territories. All players need to look at all services, globally

FORECASTING TRAFFIC

Once a solid base of current international traffic patterns have been established, we can begin to forecast future flows

Today's Presentation

- Current international traffic
- Forecasting traffic
- Using the results of modelling international traffic

TODAY’S PRESENTATION

Today’s presentation will seek to raise issues concerning the nature and volumes of traffic throughout the world. The presentation is divided into three sections

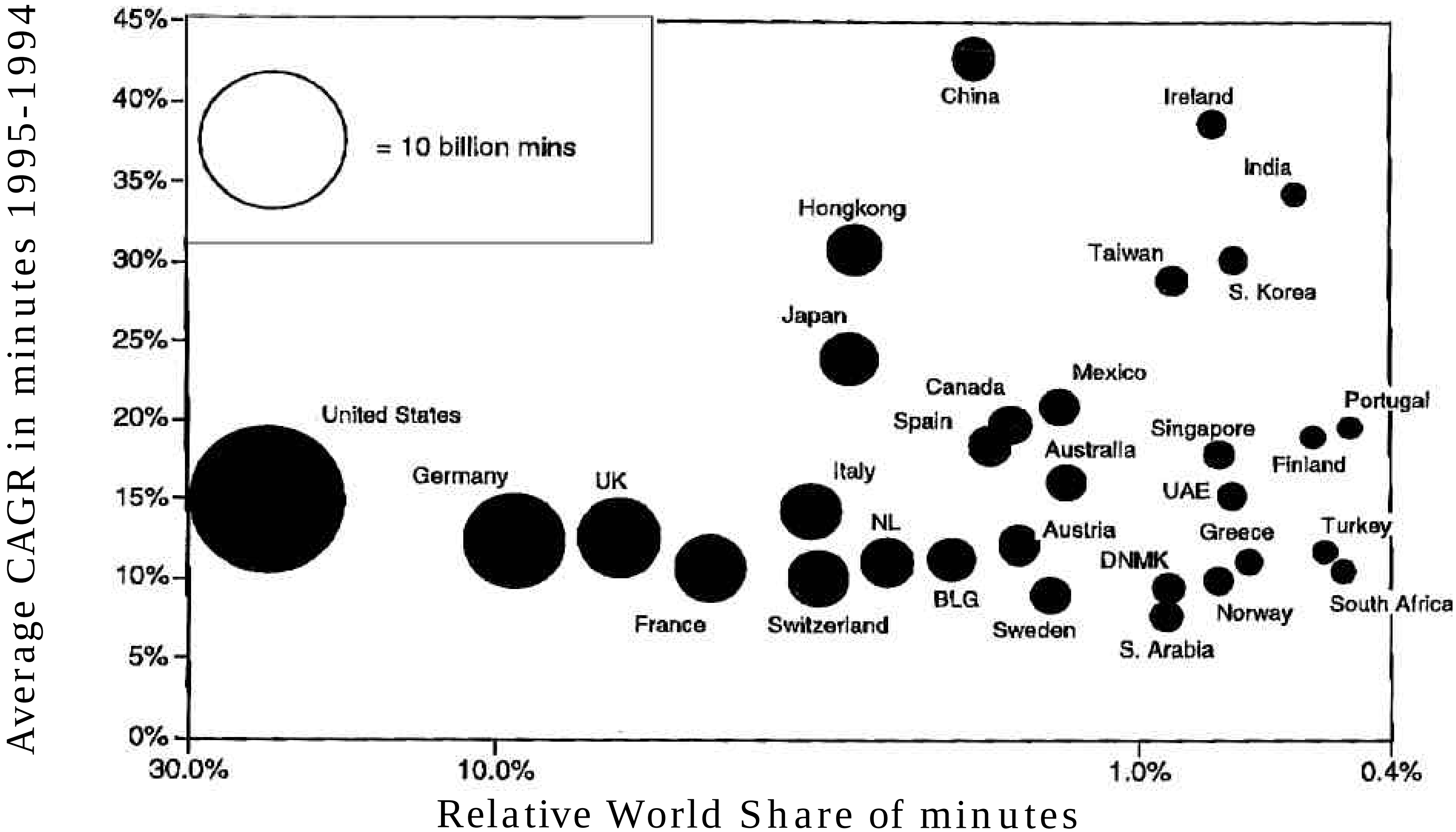
Today’s Presentation

- Current international traffic
- Forecasting traffic
- Using the results of modelling international traffic

The presentation draws on CSMG’s experience in conducting analysis and building forecasts of international traffic over the last eight years

CURRENT INTERNATIONAL TRAFFIC

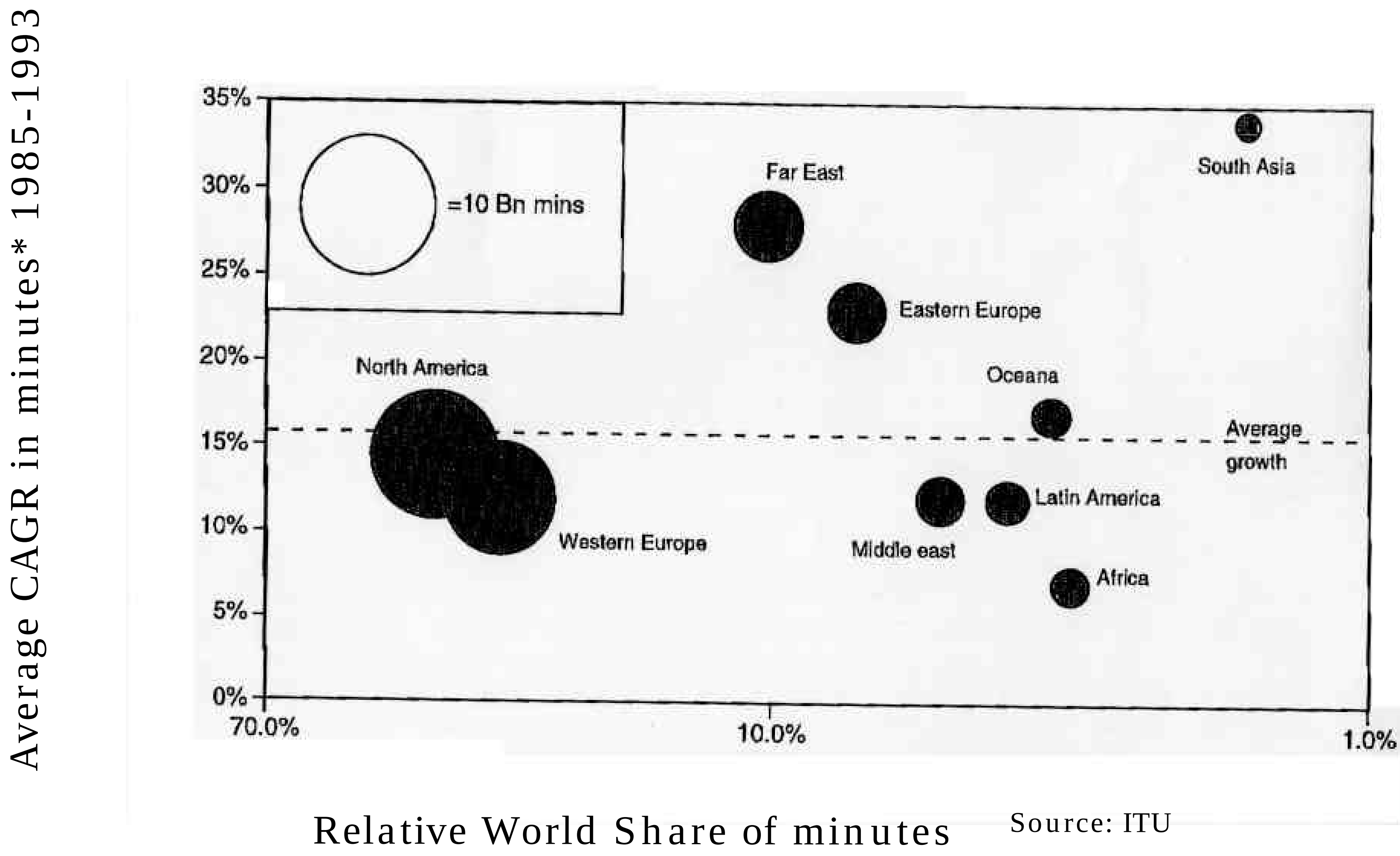
GLOBAL OUTGOING SWITCHED TRAFFIC 1985 - 1993



Source= ITU, CSMG analysis

CURRENT INTERNATIONAL TRAFFIC

TOTAL OUT-OF-REGION SWITCHED TRAFFIC 1985-1994

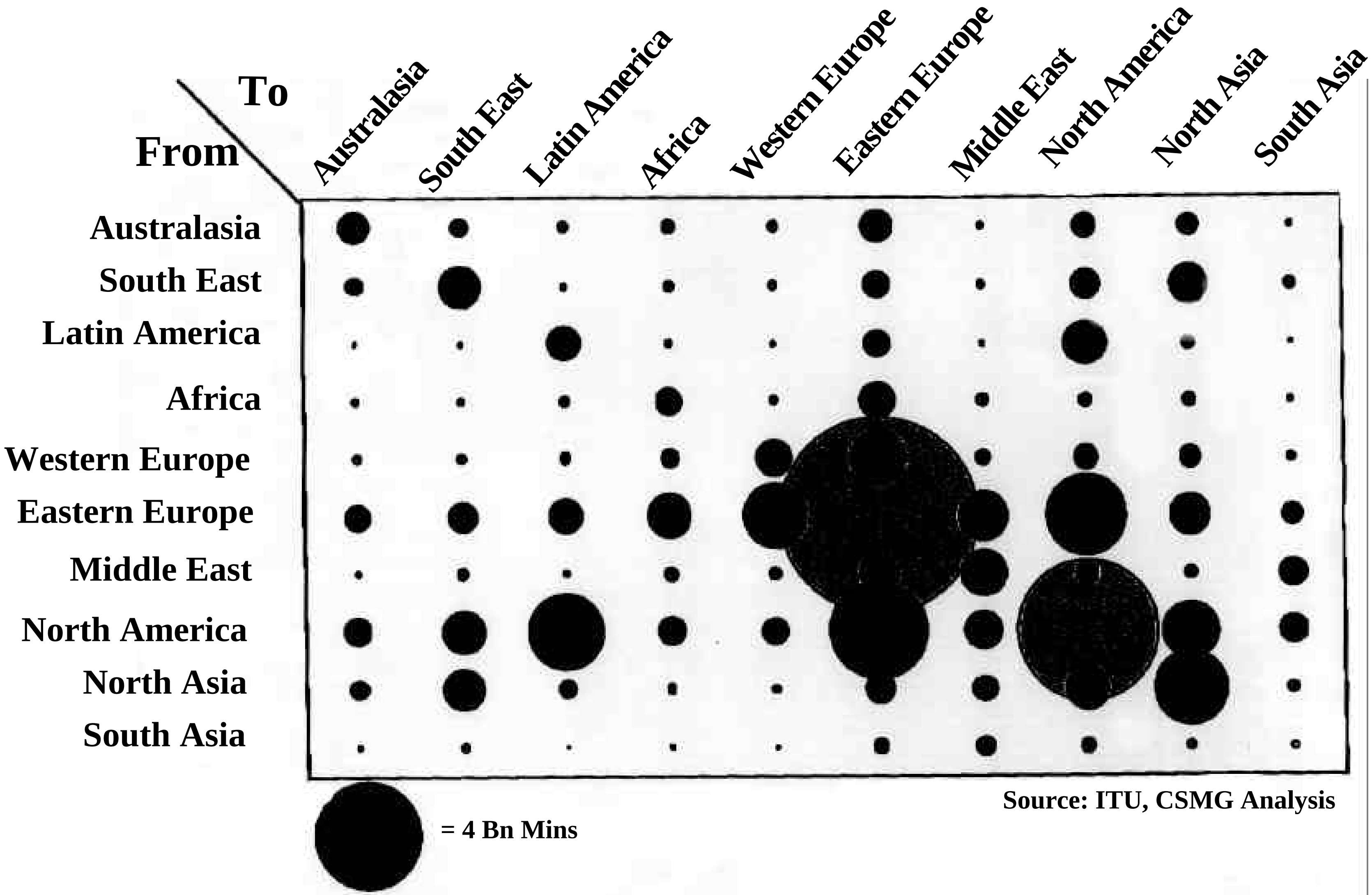


Source: ITU

*Includes in -region traffic growth

CURRENT INTERNATIONAL TRAFFIC

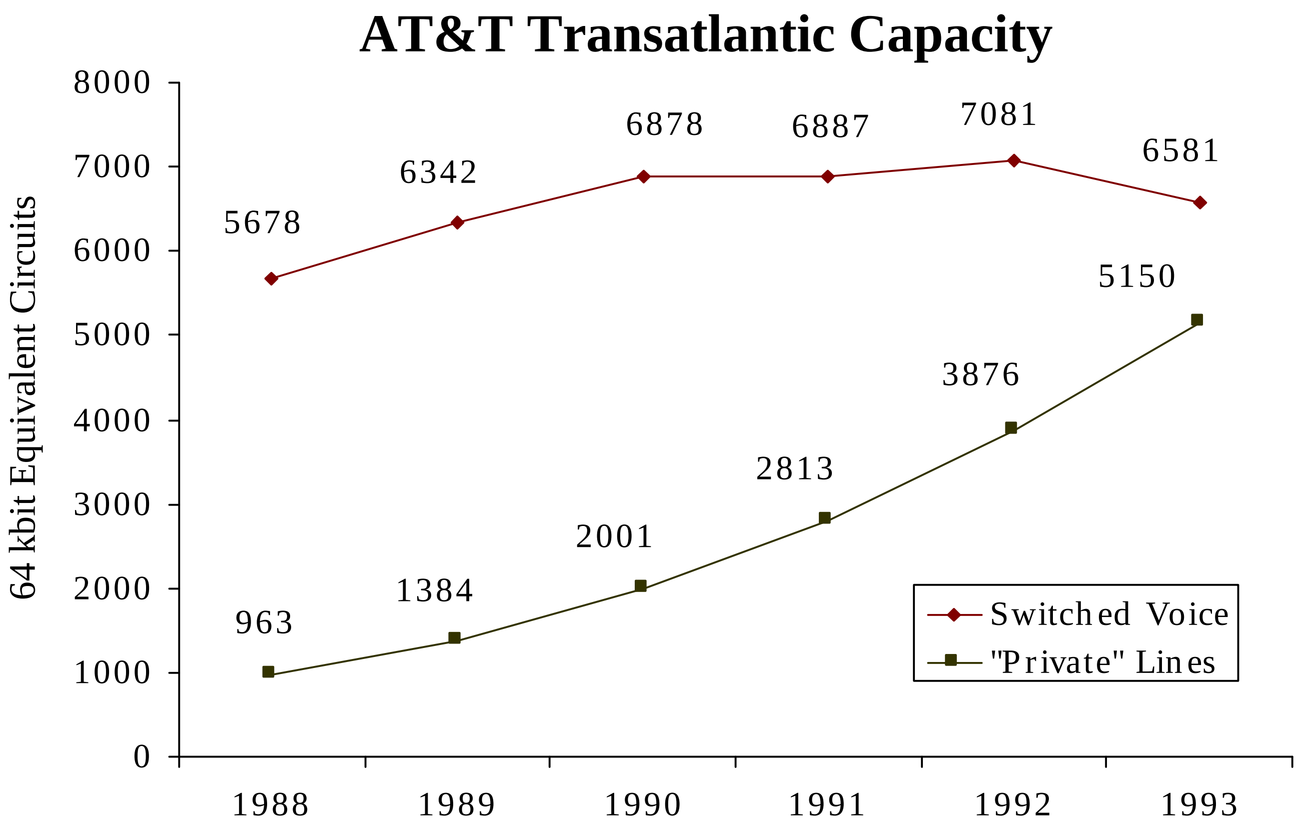
GLOBAL OUTGOING SWITCHED TRAFFIC 1994



Source: ITU, CSMG Analysis

CURRENT INTERNATIONAL TRAFFIC
WHAT IS MISSING?

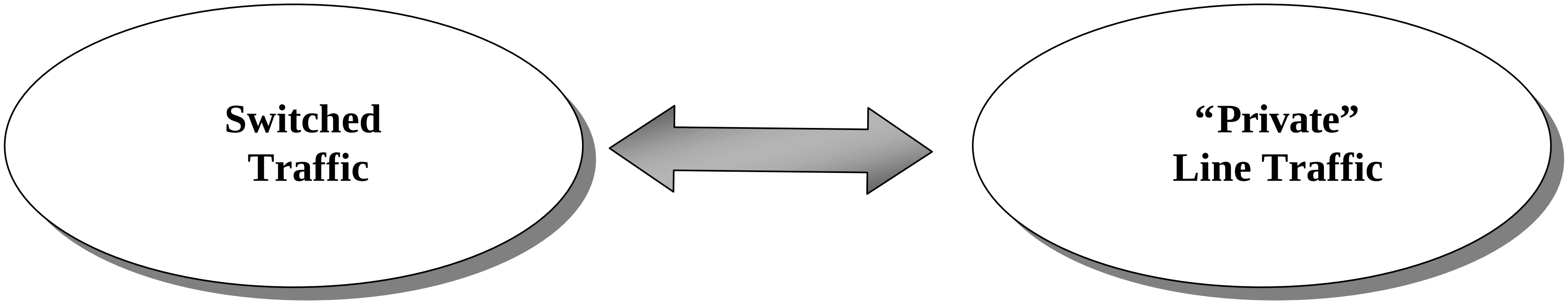
Given AT&T's relative market shares in private line (30%) and switched voice (70%), CSMG estimate that private circuits accounted for 65% of transatlantic capacity by 1993



Source: FCC, Brattle Group

CURRENT INTERNATIONAL TRAFFIC
PUBLIC OR PRIVATE?

Much of the "private" line traffic is not private at all but addresses demand that is met also met by public switched services



The two groups are often close substitutes and they share similar fundamental drivers. It is therefore not possible to ignore one when considering the other

CURRENT INTERNATIONAL TRAFFIC
THE PROBLEM OF PRIVATE LINE TRAFFIC

In terms of modelling, the increasing importance of private line traffic presents us with a dilemma

- Statistical data on switched traffic is both readily available and reasonably consistent
  - Where data is missing, good estimates can be made

HOWEVER

- There is very little information on the amount of traffic being carried over private lines

The most interesting and fastest-growing segment of international telecomms is the one we know least about

CURRENT INTERNATIONAL TRAFFIC

DATA COLLECTION AND ESTIMATION FOR SWITCHED TRAFFIC

CSMG has found publicly available data on switched traffic is plentiful and once anomalies are corrected, it is fairly accurate

Albania Algeria Angola → Zimbabwe

Albania
Algeria
Angola
↓
Zimbabwe

- **A total of over 8117 country pairs filled**
- **92% of world's switched traffic allocated**

In order to allocate the remaining 8% of traffic, a set of estimates can be generated using trade, airline traffic, and GDP data

CURRENT INTERNATIONAL TRAFFIC
PRIVATE LINE TRAFFIC

With Telex and telegraphy now obsolete and only a small amount of packet switched data or video traffic, private circuits carry the bulk of traffic that is not carried over the public switched network

What is private line traffic

- Corporate networks
  - Voice/video
  - Data
- Global network services
  - Value added networks
  - Virtual private networks
  - Public on-line services
- Resale servcies
  - International simple resale
  - Single-ended resale
- Internet

CURRENT INTERNATIONAL TRAFFIC

PRIVATE LINE TRAFFIC

The best indication of traffic levels comes from international capacity dedicated to private lines

- With some notable exceptions (USA), good information on private line capacity is not readily available
  - Most operators will not tell, many do not know

FURTHERMORE

- Since many private networks (corporate networks, VANs, ISRs, IVPNs etc…) hub traffic, the number of circuits between two points is not indicative of the underlying demand for capacity between those two countries
  - Much of the traffic may originate or terminate in a third country

CURRENT INTERNATIONAL TRAFFIC

DETERMINING PRIVATE LINE TRAFFIC

CSMG's approach to estimating private line traffic focuses on leveraging as much as possible on known data points. Qualitative information and indicators are then used to complete the picture

Indicators

- % US carrier revenue private line
- Circuit loading reports
- National private line penetration
- ISR permitted
- MNC presence

Interviews

- Network service providers
- Users
- Telecoms operators

Categorisation

- Route-by-route
- Between every country

Known datapoints

- Operators
- FCC/OFTEL
- Service providers

International Private wire traffic matrix

FORECASTING TRAFFIC

Traditionally, carriers have been relatively unsophisticated in forecasting. Forecasting has mainly been for network planning and <u>not</u> business strategy

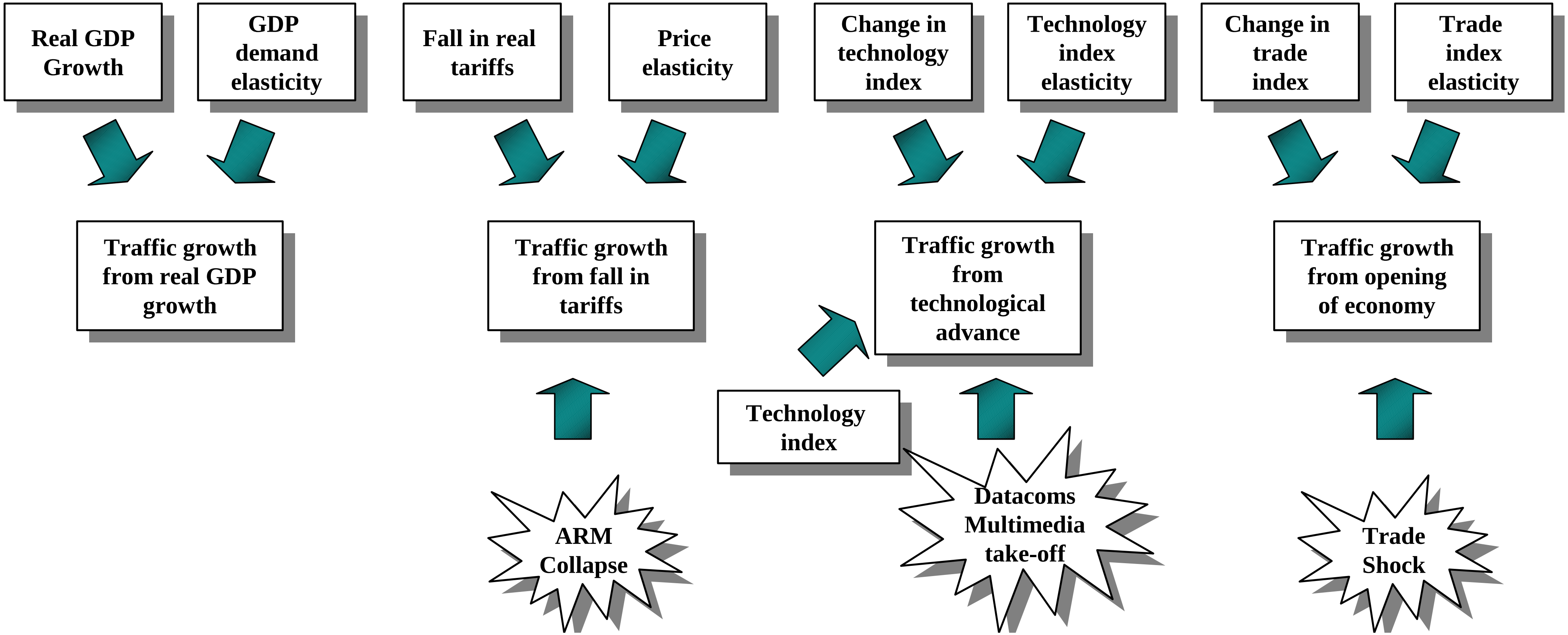
- Most common approach is to extend historic trends forwards
  - Usually set annual traffic increments to historic trends forwards
  - Implies that growth falls over time
- More developed approaches provide greater insight
  - Exponential smoothing puts greater emphasis on recent years
  - Linear regressions on Long of traffic provide constant growth forecasts

As a rule, forecasts tend to be backwards looking rather than forwards looking

- Generate ‘pessimistic’ scenarios
- Repeatedly fall short of “actuals”

FORECASTING TRAFFIC

Many forecasts do not attempt to link demand with any fundamental driver. CSMG's approach uses four main drivers that encompass a range of smaller variables



FORECASTING TRAFFIC
DEVELOPING SCENARIOS

The approach described allows users to separate-out the effects of different sets of assumptions and more effectively 'explain' forecasts

Scenarios must be:

- Internally consistent
- Supported by external events
- Acceptable to those concerned
- Easily understood
- Easily modified by returning to original assumptions

Building scenarios requires accumulating a vast database of country specific information on expected future trends in GDP, Trade, Technology and Telecoms Regulation

USING THE RESULTS OF MODELLING INTERNATIONAL TRAFFIC

If modelling is to be anything more than an academic exercise, it must provide a valuable contribution to addressing problems

Today's Presentation

- Current international traffic
- Forecasting traffic
- Using the results of modelling international traffic

Extracting insight from modelling is often as complex as the modelling itself

USING THE RESULTS OF MODELLING INTERNATIONAL TRAFFIC

Using the methodology outlined today, CSMG has developed a model called SMITH (Simulation Model of International Telecoms Horizons). It has helped tackle a range of issues for players with a range of objectives:

- Manufacturers
- Operators
- Regulators

The following are some concrete examples on how some of our clients have used traffic modelling

USING THE RESULTS OF MODELLING INTERNATIONAL TRAFFIC

Alliance/partner strategy

- What synergies exists in terms of hubbing and co-ordinating traffic planning
- How much traffic could a new operator potentially send to me?

Cable system evaluation

- Where are the best opportunities for building new systems?
- What do we need to ensure to achieve viability?
- Landing site selection
- Pricing issues

Competitor analysis

- What would specific competitor actions mean for us?
  - Alliances
  - New systems
- How could we reduce potential threats to entering our market?

Network Planning

- Where should we build a hub?
  - Accounting rages
- What sort of capacity should we plan for?

Tactical responses

- What would a breakdown in the mechanism mean for us?
- What does a single European Market in 1998 mean for us?

Negotiations

- With potential partners
- With potential hub customers/providers
- Accounting rates
- With financial backers

COMMUNICATING FINDINGS

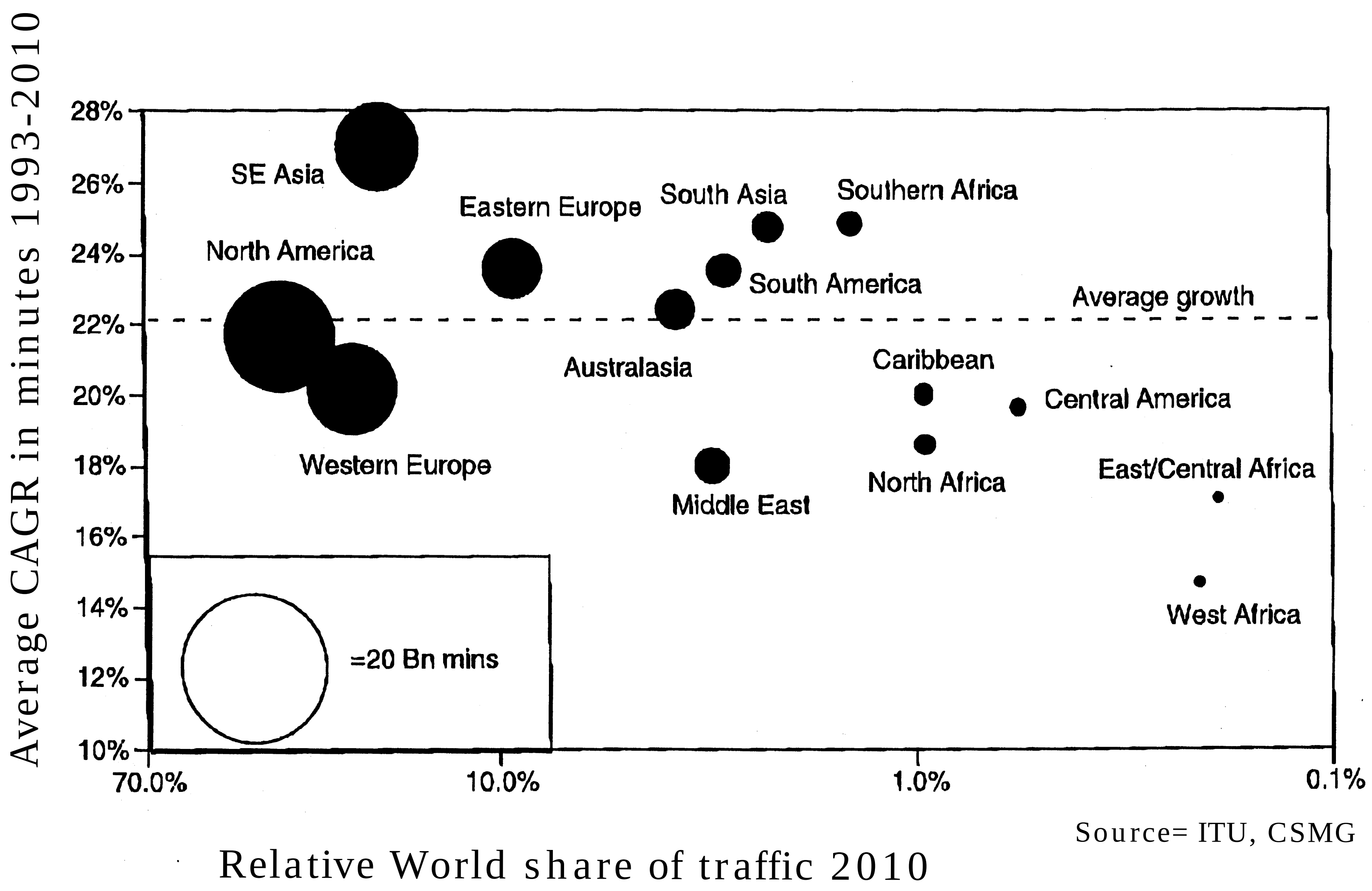
GSMG has also developed a range of powerful reporting tools that can communicate findings efficiently the

- These tools should be customised to support specific analysis and emphasise key points

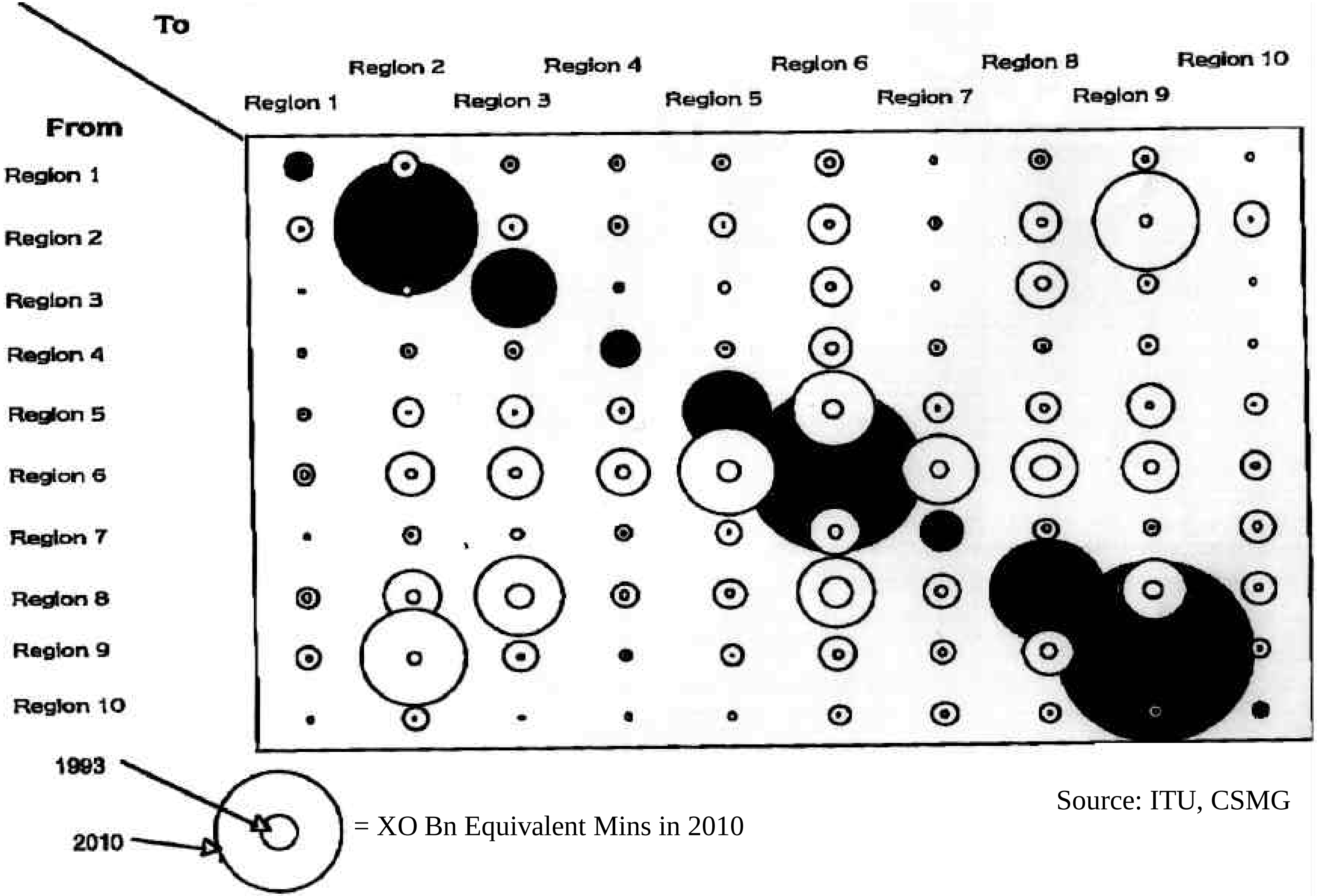
- When using traffic forecasts for strategic planning, output should prompt questions and provide insight. Lists of numbers are good for network planning but inappropriate for exploring other business issues

In our experience, traffic information is often very rich and detailled. Good graphical representations allow key findings to be communicated clearly to senior management without losing the full granularity of data

GLOBAL TRAFFIC 1993-2010



GLOBAL TRAFFIC 1993-2010



= XO Bn Equivalent Mins in 2010

Source: ITU, CSMG

CONCLUSION

Those planning to join in the global telecoms revolution should guard against complacency or else they risk being left in the slow lane of the information superhighway

Key lessons

- **Do it all**
  - **Be <u>complete</u>**
  - **Be <u>detailled</u>**
- **Keep it simple**
- **Above all… establish your objective. Build a model that delivers answ answer t analysis**

Having a good map in the jungle of global communications does not guarantee you can find your way through. But, falling to even choose a direction will get you nowhere.