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TELECOMMUNICATION SERVICES

Background Note by the Secretariat

INTRODUCTION

This note has been prepared in the context of the information exchange programme currently conducted by the Council for Trade in Services in preparation for the forthcoming further round of negotiations on services. It is not a full or exhaustive account of the telecommunication services sector, which has already been extensively studied by Members. Following this introduction, Part II deals with the definition of the sector, Part III with its economic importance, Part IV with an analysis of GATS commitments and Part V with the trade and regulatory environment.

The telecommunications industry is in a process of rapid structural change and dramatic economic growth. The national monopolies which have dominated the industry in almost all countries until very recently are now facing competition and in many countries are being privatised. Under the stimulus of competition and changing technologies new services are constantly being developed. This process was reflected and stimulated by the commitments made in the GATS negotiations on basic telecommunications which came into force in February 1998. The most recent edition of *Telegeography* confirms that as of July 1998, over 1,000 facilities-based international carriers were operational worldwide, compared with less than 500 just two years earlier. In the European Union, where for many States liberalization came into full effect for the first time in January 1998, a tide of new competitors is evident, the first of whom are most commonly providing services through resale means and thus able to start up ahead of new facilities-based providers. However, many firms are in the process of building facilities that should permit them to begin facilities-based competition against incumbent operators within the coming year.

In these and other markets of liberalized industrialized and emerging¹ economies, demand for and issues of licenses have increased dramatically. Competitors are prompting sharp reductions in prices of international and national long distance services. In emerging economies where commitments on wire-based infrastructure and public voice services are often to be phased in later, new providers of liberalized wireless services are increasing the pace of entry into local service markets, supplying service to consumers who have been waiting for fixed lines to be installed. The competition now in effect in more than forty, countries is already showing benefits not only for customers and new international telecom carriers, who have managed to gain over 11 per cent of the world market, but also for a few incumbent operators who, by slashing prices to face competition, have registered impressive growth.² Moreover, the new competitors have also to come to figure among the incumbent operators' major customers.

The clear prospect of competition has also further accelerated the pace of innovation, leading to new services that may have been difficult to foresee less than two years ago when the WTO negotiations concluded. New equipment technologies and deregulation are contributing to a rapid

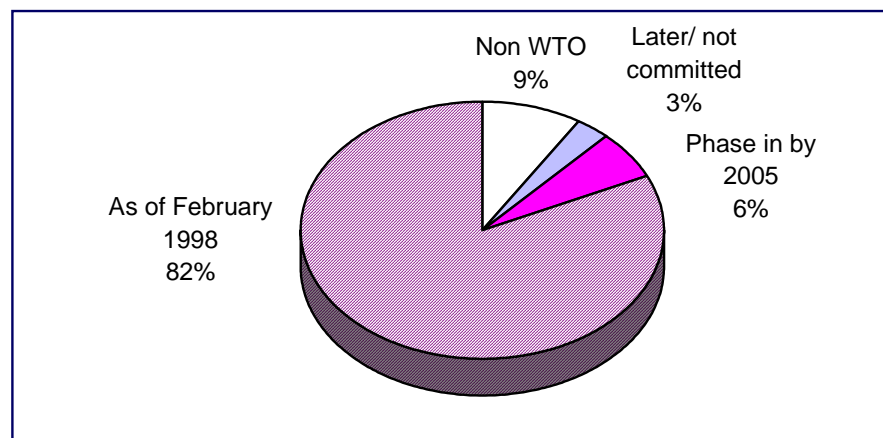
¹ The phrase "emerging economies" has been used in this paper to note developing countries and economies in transition.

² Gregory C. Staple, quoted in a press release of *Telegeography*, Inc. of 28 October 1998 announcing issuance of the report, *Telegeography 1999*.

breakdown of service segmentation. Suppliers are now seeking to combine, for example, fixed and mobile services into an integrated service. Handsets which convert between the two will shortly be available. New and traditional operators are hastening to integrate internet-style backbones into their network infrastructure. The technical feasibility of providing facsimile and voice-telephone services over internet has made great strides. Wholesale capacity services, and even "exchanges" for the trading of capacity or "minutes", have emerged. And with new satellite services such as Global Mobile Personal Communications by Satellite (GMPCS) just beginning to come on line, still further advances in satellite-based services with full multimedia capabilities -- the so-called third generation technologies -- are expected to become operational well within four to five years.

As of 5 February 1998, with the entry into force of the Fourth Protocol of the GATS and its attached commitments on basic telecommunications, the vast bulk of the world market, measured in revenue terms, is subject to open markets for the supply of basic telecom services whether on the basis of simple resale or over a supplier's own infrastructure. Figure 1 illustrates that governments representing about 82 per cent of world revenue committed to ensure competition as of February 1998 and another 6 per cent have committed to introduce competition on or before 2005. This scenario has dramatic implications for the way the telecom industry will be structured and the way telecom services will be provided in the future.

Figure 1. World telecom revenue covered by Members with commitments to full competition



Source: 1996 Data, ITU

The role of telecommunications as essential to the facilitation of international trade, economic development, and the enrichment of citizens' lives has become widely accepted. Modern means of telecommunications, enhanced by competition, will enable all countries to participate more fully in international trade, particularly if complemented by increased liberalization of cross-border supply of many electronically deliverable services. Innovation in telecommunications will be essential to ensuring that the anticipated growth of electronic commerce can be fully realized. Many emerging economy governments which joined in making GATS commitments on basic telecommunications had come to view inadequate telecommunications networks and services as an impediment to achieving their full economic potential. Moreover, increased accessibility and added variety of telecommunications services will be the foundation of successful national and global information society initiatives and the social benefits these initiatives will bestow.

DEFINITION OF THE SECTOR

The GATS Services Sectoral Classification List (MTN.GNS/W/120) breaks down telecommunications into 14 sub-sectors (a.- n.) and an "other" category (o.) (spelled out in annex Figure A1). For the purposes of the negotiations on basic telecommunications, sub-sectors a. through g. of this list, as well as a variety of "other" services, including mobile communications, providing real-time transmission of customer supplied information (usually listed under sub-sector o.), were generally considered basic telecommunication services. Subsectors h. through n. and any "other" services, not supplied on a real-time basis or which transform the form or content of customer's information, were considered value-added telecommunication services. It is in this sense that references to basic and value-added services will be used throughout this Note. It is recognized, however, that this breakdown does not necessarily reflect and does not need to correspond to any particular government's national practice with respect to classifying services as basic or value added. For example, it is not uncommon for mobile telephony, paging, or data transmission (whether or not real-time) to be designated as value-added services in national regimes. Increasingly, in liberalized markets any distinction between basic and value-added services may have little importance, except possibly in relation to defining public or universal service objectives. In partially liberalized markets, however, the distinction may continue to have some bearing on defining the scope of services which are to remain under exclusivity and of those which will not.

Annex Figure A1 also shows the items of the U.N. Provisional Central Product Classification (UNCPC) which are cross-referenced in the GATS Sectoral Classification as corresponding to its telecommunications services sub-sectors. The correspondence is far from perfect, as indicated by the frequent use of double asterisks, which mean that the GATS sub-sector concerned relates only to some parts of the UNCPC item description. Moreover, the correspondence can be misleading to governments and other interested parties who may resort to the UNCPC for definitions of the GATS sub-sectors. First, where there is partial correspondence there is no way of being certain which portion of a UNCPC description is intended to be relevant and, second, certain elements of the UNCPC descriptions used are either out of date or superseded by understandings developed in the negotiations on basic telecommunications. For example, the GATS sub-sector 2.C.a. listing "voice telephone services" is cross-referenced to UNCPC item 7521 which refers to "public telephone services". During the negotiations on basic telecommunications, however, it was understood that commitments on voice telephone services would extend to cover the supply of both public and non-public voice, unless the commitment specified otherwise.

Another difficulty with the GATS list of telecom services is that the distinction between many of its subsectors has blurred with the adoption of new transmission technologies, the enhanced ability to integrate different technologies, and the advent of service suppliers who distinguish themselves not by specializing in particular telecom services, but rather by the market segments they seek to serve. Voice, data, fax, and a full range of value-added telecom services can and are being carried indiscriminately as digitalized information flows over telephony networks or leased lines of just about any supplier. Even distinctions between fixed and mobile telephony are crumbling as some suppliers can now offer both as an integrated package, can arrange to re-route calls to a customer's fixed telephone to its mobile telephone upon demand, and will soon be able to offer a wireless handset that converts itself from fixed service to mobile service if carried out of range of the fixed handset base. Market forces are giving rise to telecom service suppliers that may more accurately break down into categories characterized as wholesale versus retail, infrastructure owners versus resellers, or international versus national service providers than into categories based on supply of voice versus data, for example.

Rapid changes in the sector mean not only that that the existing GATS classification of telecom services is inadequate, but also that any other list that might be devised could become quickly out of date. The use of categories of service that were developed during the negotiations on basic telecommunications have been crucial to bridging this gap. These categories consisted of four groups: a) geographic distinctions - local, domestic long distance, and international; b) means of technology -

wire-based (or fixed infrastructure) and wireless (or radio-based); c) means of delivery - on a resale basis or facilities-based; and d) clientele - for public use, for non-public use (e.g. services sold to closed user groups). For partially liberalized regimes, the clarity of commitments has been enhanced by use of the categories, as necessary, to define the scope of a commitment or to indicate different levels of commitments depending on the category concerned. For fully liberalized regimes or services, the absence of category indications has been used to signify that the commitment encompasses all possible categories, consistently with the understanding of the technological neutrality of commitments.³

The development of the categories, and the fundamental understanding on how to use them, did much to clarify the intended nature and scope of the commitments made on basic telecommunications. The same approach might also help to clarify commitments on value-added services. Moreover, it offers wide scope for the simplification of schedules. The primary shortcoming of the approach is that critical information on the scope, as well as on the exact services covered by, a given commitment, is often implicit. A degree of uncertainty that may sometimes result, therefore, could be compounded in the future, as convergence of broadcast, telecommunications, and computer technologies and services continues to take hold. For example, many traditional and non-traditional telecommunications operators are now conducting the technological and market research to begin offering video on demand over internet. It will be particularly important to be clear in specifying the coverage of new commitments in these areas.

ECONOMIC IMPORTANCE OF THE SECTOR

In 1997, world telecommunications revenue stood at US\$ 644 billion and global investment in telecommunications totalled US\$ 170 billion (see table 1). The sector employed nearly 5.4 million staff worldwide. The Americas ranked highest among regions in share of revenue. The region accounted for US\$ 245 billion, or 38 per cent of world revenue. Europe accounted for US\$ 204 billion or nearly 32 per cent, Asia for US\$168 billion (26 per cent), Oceania for US\$ 17 billion (2.6 per cent) and Africa for about US\$ 10 billion (1.5 per cent). In contrast, Asia led in world telecommunications investment. In Asia, investment reached almost US\$ 74 billion (43.5 per cent of the total), followed by Europe at about US\$ 48 billion (28 per cent), the Americas with US\$ 40 billion (23.5 per cent), Oceania with US\$ 4 billion (2.4 per cent) and Africa, with nearly US\$ 3 billion (nearly 2 per cent). However, in revenue as a share of GDP and investment as a share of gross fixed capital investment, Oceania was substantially ahead of other regions. Its telecom revenue represented 3.4 per cent of GDP, followed by the Americas with revenue at 2.3 per cent of GDP. In investment, expenditures by the Oceania region represented 5.3 per cent of gross capital formation, followed by Africa (3.2 per cent) and then by Asia (2.9 per cent). Levels of employment in telecommunications remained fairly stable between 1995 and 1997 in most regions except the Americas, where it decreased slightly, and in Oceania, where employment increased by an average of nearly 4 per cent per year.

In 1997 world telecommunications networks comprised 792 million main lines and 214 million cellular subscribers (see table 2). The rate of growth in cellular subscribers, averaging 52.5 per cent per annum from 1990 to 1997, far outpaced that of main lines, which averaged only 6.5 per cent average annual growth over the same period. The numbers of main lines and cellular subscribers per inhabitant are highest in the Oceania region at about 39.5 per 100 and nearly 19 per 100, respectively, followed by Europe and the Americas region. Main line penetration in Europe, at nearly 36 per 100 inhabitants, is slightly higher than in the Americas, which averages nearly 32 per 100, while the reverse is true for cellular use: the Americas records slightly higher cellular

³ See S/GBT/W/2/Rev.1, "Notes for Scheduling Basic Telecom Services Commitments," which was attached to the Report of the Group on Basic Telecommunications (S/GBT/4), adopted on 15 February 1997.

Table 1. World telecommunications revenue, investment and employment

	Revenue Total 1997 (US\$ b)	As % of GDP 1996	Investment 1997 (US\$ b)	As % of Gross Fixed Capital Formation 1996	Staff 1997 (000s)	CAGR 1995-97
Africa	10	1.7%	3	3.2%	261	0.2%
Americas	245	2.3%	40	2.2%	1'307	-0.4%
Asia	168	2.0%	74	2.9%	1'819	0.8%
Europe	204	2.1%	48	2.5%	1'874	0.0%
Oceania	17	3.4%	4	5.3%	99	3.8%
WORLD	644	2.1%	170	2.7%	5'359	0.2%

Source: ITU

penetration, at about 9 subscribers per 100 inhabitants, than Europe, where it is just below 8 per 100. However, the rate of expansion of both fixed and cellular networks was highest in Asia and Africa, where penetration levels are substantially lower than in other regions.

Table 2. World telecommunications network development: Fixed and cellular

	Main lines 1997(m)	CAGR 1990-1997	Main lines/ 100 Inhabitants	Cellular subscribers 1997 (m)	CAGR 1990-1997	Cellular subscribers/ 100 inhabitants
Africa	15	11.0%	1.99	2	102.1%	0.26
Americas	250	5.1%	31.69	72	42.6%	9.04
Asia	230	11.6%	6.59	74	74.4%	2.14
Europe	285	3.8%	35.81	61	50.8%	7.68
Oceania	12	2.2%	39.58	5	56.4%	18.72
WORLD	792	6.5%	13.49	214	52.5%	3.66

Source: ITU

The world's leading telecom companies continue, for the most part, to be incumbent operators, largely from industrialized countries. Nevertheless, a number of emerging economy operators and a few new entrants are making important inroads. (See annex tables A4 through A7.) In 1997, the 20 top public telecom operators in terms of revenue accounted for nearly US\$ 477 billion or 74 per cent of total 1997 world revenues. They also accounted for nearly 2.4 million employees, or about 44 per cent of total world employment in the sector. Telebras of Brazil and DGT of China ranked among these. The world's top 20 fixed line operators, ranked by number of main lines, accounted for nearly 530 main lines, or nearly 67 per cent of all main lines in operation in 1997. Local service revenue for these operators totalled about US\$ 114 billion. Several emerging economy operators figured among these, including operators from China, Korea, Brazil, India, and Taiwan.

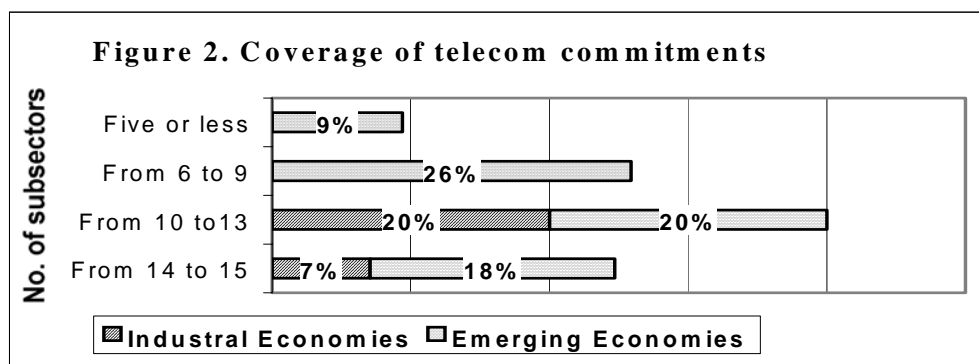
Similar patterns are evident with regard to the key players in markets for international and cellular services. In terms of international service revenues, the top 20 operators earned an estimated US\$ 115.3 billion from international traffic in 1997. Operators from China, Singapore and Mexico were represented among these, both in terms of their volume of traffic (international outgoing minutes) and revenue. India's international operator also ranked among the top 20 revenue earners from international service. In a list which includes the top 25 earners of international service revenue, four more emerging economy operators meet the ranking. Revenue of the top 20 suppliers of cellular service (in number of subscribers) in 1997 reached US\$ 73 billion. Among this group, the number of subscribers increased by an average of 34 per cent over 1996, with average mobile revenues increasing by 25 per cent. Cellular operators from China, Korea and Brazil made great strides in 1997: China's operator ranked second in the world (in number of cellular subscribers) in 1997, compared with fifth

in 1996; Korea's SK Telecom ranked seventh, up from fifteenth in 1996; and Brazil's operator moved to twelfth place, up from twenty-first in the previous year.

ANALYSIS OF GATS COMMITMENTS

As of November 1998, 89 WTO Members have included telecommunications services in their schedules of commitments. The number is likely to rise as additional governments complete the process of accession to the WTO in the coming months. All industrialized countries have taken commitments on basic telecommunications and on most value added telecommunications services. At present, 52 emerging economies have made commitments on basic telecommunications; while many of these have also made commitments on value-added services, a few have not. Also, some emerging economies that did not participate in the negotiations on basic telecommunications had undertaken commitments on value-added services in the Uruguay Round or upon WTO accession.

In terms of breadth of coverage of telecom service subsectors, the services sectoral classifications list contains a total of 15 subsectors into which commitments can be organized. As illustrated in figure 2, approximately one-fourth of all Members that committed on telecommunications have listed 14 or more of these sub-sectors. Another 40 per cent committed on between 10 and 13 of the sub-sectors. Just over one-fourth committed on 6 to 9 sub-sectors, while those Members committing on 5 or less sub-sectors represented slightly less than one-tenth of all who have telecom commitments.



Basic telecommunications are included in the commitments of 83 WTO Members. This figure comprises the 69 participants in the Fourth Protocol on basic telecommunications, the 4 Members who have subsequently submitted schedules on basic telecoms, 2 recently acceded countries whose commitments resemble those in the Fourth Protocol, and 8 Members that included some basic services in their Uruguay Round schedules. In some cases, commitments by the latter, Uruguay Round group, which could not benefit from interpretative notes and schedule drafting techniques developed during the basic telecom negotiations, may lack clarity in the light of this fact.

On value-added telecoms, a total of 70 Members have made commitments. This predominantly reflects commitments taken in the Uruguay Round, but also includes some value-added commitments made in accessions, in the Fourth Protocol and in late submissions on basic telecommunications. The technology neutral approach to scheduling commitments was developed in the negotiations on basic telecommunications conducted after the close of the Uruguay Round. As a result, in some cases it would be misleading to assume that this approach transposes to value-added services commitments. For example, commitments made in the Uruguay Round are silent on whether firms may build, own or operate their own network facilities for the supply of the value-added services upon which commitments are taken. This aside, the simple fact that fewer governments have taken commitments on value-added services than on basic telecom services should not be taken as a reflection of the

regulatory situation as it currently stands. National regulatory regimes are in general more liberal for value-added than for basic services: the greater number of commitments for the latter is essentially a product of the extended negotiations.

There are 75 WTO governments which made telecom commitments during or after the negotiations on basic telecoms, and thus were in a position to consider making additional commitments on regulatory principles. Sixty-eight, or 9 out of 10 such governments, committed on some or all aspects of the Reference Paper. This represents half of the total WTO membership. Sixty-two of the governments committed the Reference Paper in its entirety or with only minor modifications. Fifty-two emerging economies count among the group of 75. Of these, 45, or 87 per cent, included additional commitments on regulatory matters. All but 6 of the 45 emerging economies scheduled the Reference Paper with few, if any, modifications. It is interesting to note that this means that regulatory commitments were included in more schedules of emerging economy governments than was any single subsector of basic telecom service except for data transmission

Level of commitments by modes of supply

In terms of the extent of market access commitments under the different modes of supply, there were fairly marked differences when basic services (sub-sectors a. through g.) are compared with value-added services (sub-sectors h. through n.). Generally, table A1 shows that fewer limitations were listed with respect to value-added services for all modes of supply. For cross-border supply of various value-added services, between 31 and 37 per cent of governments committing listed no limitations, whereas for the basic services only 12 to 20 per cent committed fully with no limitations. With respect to consumption abroad, value-added services were listed with no limitations by between 44 and 51 per cent of committing governments, while the corresponding figure for basic services ranged between 31 and 49 per cent. Likewise, commercial presence for value-added services was fully liberalized without limitation in 17 to 21 per cent of commitments, but only in 9 to 11 per cent of commitments on basic telecommunications. However, fewer governments refrained from commitments (i.e. by entering "unbound") with respect to commercial presence than for any other of the modes of supply; this was true for both basic and value added services.

The pattern of commitments by industrialized economies with respect to market-access for the modes of supply differed somewhat from the overall picture presented above. Industrialized economies were two to three times more likely than the norm to commit to unlimited market access for cross border supply for basic telecom services; between 36 to 43 per cent of them did so. Moreover, they were about twice as likely to make unrestricted commitments on the supply of basic telecom services via the other two modes of supply, at between 64 to 70 per cent for consumption abroad and 14 per cent for commercial presence. Finally, all industrialized countries committed either fully or partially on all basic services, there being no cases of "unbound" entries listed for any of the services or modes of supply. This means that all incidences of "unbound" entries on basic services with respect to particular modes of supply are accounted for by emerging economies, and this was more often done in respect to cross-border and consumption abroad, than in respect to commercial presence.

The above analysis indicates that priorities in respect to modes appear to differ between industrialized and emerging economies. For industrialized economies, cross border and consumption abroad are much more open than commercial presence. Whereas emerging economies, although they also record fewer limitations on cross border supply and consumption abroad, have recorded a higher incidence of commitments, overall, on commercial presence, when both full and partial commitments are taken into account. New technologies involving satellites and simple resale techniques will make it possible for supply of telecom services through cross-border supply and consumption abroad to assume much more importance than in the past. However, the economic benefits of this trend can only be realized in the most liberalized markets. Commercial presence in one form or another will nevertheless remain important to many service suppliers, and it appears will still remain an important prerequisite for service suppliers who wish to participate in emerging markets. Their commitments

illustrate the importance they have attached to foreign direct investment as a means of improving and extending national telecom networks and universal access.

Types of limitations maintained

Overall, three types of market access limitations are most commonly listed in telecom commitments. These are: limitations on the number of suppliers, restrictions on type of legal entity and, a related measure, limits on the participation of foreign capital. A variety of "other" limitations, or measures not fitting neatly into the six categories of market access restrictions defined in GATS Article XVI, are also listed. As implied above, the limitations are, by far, most often associated with commitments on commercial presence for basic services.

Again, significant differences are evident when commitments of developing and industrialized countries are compared. Overall, emerging economies are about five times more likely than industrialized countries to have maintained limitations on the number suppliers and are almost four times more likely to require that particular types of legal entity be established to provide service. They are nearly three times more likely to have listed "other" measures. Such "other" measures often include restrictions on bypass of, or requirements to use, monopoly network facilities, restrictions on resale of excess capacity of leased circuits, or prohibitions against interconnection with other leased circuits by the suppliers concerned. However, limits on foreign equity participation are not much more frequent for emerging than for industrialized economies.

TRADE AND REGULATORY ENVIRONMENT

Competition and market structure

As market forces gain a foothold in the telecommunications sector, they are fundamentally transforming the structure of the sector and the way the services are traded. A market characterized by monopoly national fixed-network operators, supplying basic telecommunications in their respective territories and obliged to pass off international traffic to one another, is being replaced by one where competing companies are free to choose what they will provide, to whom, and how they will provide it. For the vast majority of the world market, this transformation is already leading to the replacement of a simple, straightforward market structure with an exceedingly complex structure with a wide array of service suppliers operating at various levels of domestic and international markets. It is not yet possible to predict with certainty exactly how the market will develop. Figure 3 represents at least one scenario, which, although perhaps simplified and incomplete, illustrates the kinds of complexities that telecom providers and regulators are likely to confront.

In addition, technologies and service practices that were once considered marginal are becoming mainstream, legitimate, and increasingly significant components of trade in telecommunications. Services based on mobile technologies are growing at such rates that their economic importance may soon rival fixed-network services. As prices of mobile service fall, some citizens of emerging economies will experience their first access to telecommunications through mobile telephony rather than fixed networks. Internet-based services are undergoing similarly dramatic growth. Also, satellite transport capacity will probably become nearly as important as land-based capacity within the next decade. Practices such as domestic and international simple resale, call-back (perhaps in new, more sophisticated forms), telephony based on internet protocols, and international traffic refile and hubbing are no longer grey-area, quasi-legal alternatives. Such practices are now deregulated, permissible activities in all but a very few industrialized economies and in a number of emerging markets. They will soon become normal business practices.

Figure 3. Suppliers of telecommunications services: Trends in market structure

INFRASTRUCTURE OWNERS ⇒	Retailers ⇒	Full service ⇒		National ⇒	Long distance
					Regional
		International			
		Business only ⇒		National ⇒	Long Distance
	Regional				
	International				
	Wholesalers⇒	International ⇒		Fixed ⇒	Submarine
					Dry
		Satellite			
		National ⇒			
				Regional	
				City	
RESELLERS ⇒	Switched resellers ⇒	Arbitragers ⇒		Call back	
				Aggregators	
				IP Telephony	
		Service Providers ⇒	Wholesalers⇒	Value-added messaging	
				Virtual private networks	
			Retailers ⇒	Calling cards	
				Internet service providers	
				Calling cards	
			Value-added Messaging ⇒	IP-based	
			Non IP-based		
	Switchless resellers ⇒	Arbitragers ⇒		Aggregators	
				Call back	
Service providers ⇒		Special numbers ⇒		Premium services	
		Location services ⇒		Freephone	
				Messaging	
		"Follow me" services			

Source: *CommunicationsWeek International*, 29 June 1998.

One way telecom providers are attempting to cope with upheaval in the sector is through a multitude of corporate mergers and acquisitions. Both traditional telecom providers and new entrants are acquiring not only other telecom companies but also other kinds of businesses in an effort to prepare for the broader, multidimensional communications markets of the future. According to an article in *Telecommunications* magazine, in the first half of 1998 the value of telecom transactions world wide increased almost seven-fold from US\$ 24 billion to US\$ 165.4 billion. It noted that this equates to about 10 per cent of the value of the global telecoms market changing hands in the first six months of the year. This does not, suggests the article, represent the much-feared advent of a handful of mega-companies set to dominate the telecom industry, but while "a relatively small number of colossal deals are inflating overall deal value, there is a much larger number of smaller, discrete transactions whose significance goes well beyond their apparent scale. These smaller deals are fueled by the advent of new technologies, which have reduced infrastructure requirements in certain sectors, and which are enabling relatively small businesses to gain strong positions in certain segments of the market" Moreover, the article stressed that even the large deals "are not exclusively about traditional consolidation. In many senses they are about staking and maintaining a position against the backdrop of a large number of industry changes ... Emerging technologies present risks to even the most gargantuan of companies" ⁴

The 1997 *Communications Outlook* of the OECD also asserts that a combination of deregulation and a diversity of corporate aims are inspiring the high levels of merger and acquisition activities in the telecom industry. Such aims, says the OECD report, include the desire to attain economies of scale in the face of large competitors, to offer global one-stop shopping opportunities, to draw upon complementarities to offer integrated services, and to be able to offer a wider range of services to

⁴ Marco Fasoli, "M&A: Rewriting Telecoms," *Telecommunications*, Sept. 1998.

customers. For example, the opening of local networks to competition is an important contributor to mergers and acquisitions. And as new technologies make alternative routes of access to customers possible, significant activity has involved telecom and cable television companies, giving them a head start into multimedia with the capacity to provide both TV and telephone services. In addition, operators seeking to extend their abilities and customer base are acquiring new competitive resale-based firms with specialized assets in distribution and customer service and/or computer processing and software. Both traditional and new operators are engaging heavily in acquisitions of internet service providers and other data communications or computer service/software providers to help capture portions of the growing customer demand for voice over data networks, data communications, and information technology services, generally.

Regulatory issues

The ability of new entrants to arrive on the scene is only part of the picture. It has proved, and continues to be, exceedingly difficult for new entrants to gain significant market share, particularly in relation to access to the final customer and the provision of fixed local service generally. In the face what may be continuing dominance over essential infrastructure and the local loop for a considerable period of time, effective regulatory safeguards, especially in relation to competition and interconnection, will be indispensable. Moreover, in the future the importance of competition policy and interconnection guarantees might not be limited to concerns over the control of fixed, wireline infrastructures. As cellular network operators assume larger market shares, it is possible that other service suppliers may find that access to a major cellular operator's network, to terminate customers' communications, to be inordinately costly, potentially as a result of the operator's market position rather than competitive forces. Also, as the Internet matures, larger internet access providers are buying smaller ones and large incumbent telecom operators are acquiring internet access providers to supply these services. There is a prospect that the largest Internet access providers may dispense with the mutual fee-less peering arrangements devised when Internet was more a non-profit endeavour rather than a commercial activity. In this, there is a risk that that large access providers could gain a market position permitting them to dictate terms, conditions and prices of access by smaller providers. Finally, as more telecom providers become global companies, it is increasingly likely that some of their activities may fall outside the jurisdiction of any single national competition body or other relevant government authority. In such situations, enhanced bilateral and multilateral cooperation on competition policy may have an important role to play.

Other important functions of telecom regulation remain important but will need to be recast to complement a competitive environment. A host of obligations typically required of telecom licensees, to help satisfy various social and regulatory objectives, include public service obligations, obligations to service specific groups or areas, quality of service targets, tariff controls, treatment of customers, competitive behaviour, and obligations to publish selected information. Finding new mechanisms to meet universal service objectives, whose impact on the many competitors in a market is even-handed, will require creativity and the flexibility to constantly reassess on the basis of results. Also, many licensing practices and procedures that are a holdover from the past may need to be streamlined, at a minimum, if not wholly rethought. For example, for services in which governments have committed to dispense with limits on the number of suppliers, except perhaps involving use of radio spectrum, the practice of requiring suppliers to await the issue of tenders for licenses may no longer be suitable. Instead, suppliers themselves may be the best judge of emerging market opportunities that they believe they can serve and should be able to self-initiate applications accordingly. Finally, regulators and operators everywhere are struggling with the development of costing methodologies appropriate to the new environment. Improved data collection and new methods of cost calculation are necessary for regulators' efforts to safeguard competition and for operators' ability to make sound business decisions. Equally important, they will also reveal information that is essential to determining on the true cost of promoting universal access.

A transparent and fair regulatory framework will be vital to the investment decisions of new operators and providers of new services of all kinds, but particularly for satellite and other wireless

services. One important issue in relation to spectrum is exactly how much competition will be possible; spectrum managers' decisions will determine how many suppliers will be able to enter new service markets. Also critical are the types of qualification criteria that will determine who is eligible for licenses and the nature of other conditions associated with the licensing processes. The cost of licenses and spectrum are important issues for new services and service suppliers; it is not uncommon for licenses and spectrum assignment auctions or fees to be important sources of revenue in both industrialized and emerging markets. And with the dramatic growth of wireless services of all kinds, yet another concern will be the availability of spectrum more generally; how it will be organized and allotted, for example, to meet the many competing new demands in the not-too-distant future.

As convergence leads telecom service providers to offer a wider range of multimedia services, regulatory considerations may become further complicated. For example, unbundled interconnection to essential infrastructure controlled by a dominant supplier is seen as necessary to achieve effective market access for basic telecom suppliers. But is it any less crucial for the supply of video over internet services, when access to the local loop, i.e. the final customer, can only be obtained from a "major supplier" who also happens to supply this service? Convergence will also pose a significant challenge to governments to try to ensure that regulations applied across different segments of the multimedia industry are broadly consistent. This is particularly true as the different components of multimedia -- broadcast or audio-visual, computer or information technology services, and telecommunication services -- come out of vastly different market structures and regulatory environments.

POINTS OF CONTACT AND SOURCES OF STATISTICS

International Telecommunication Union
(ITU)
UN Plaza
Geneva, Switzerland
<http://www.itu.int>

Organization for Economic Cooperation and
Development (OECD)
Telecoms and Information Services
<http://www.oecd.org/dsti/sti/it/cm/index.htm>

The World Bank
Telecommunications and Informatics
Division
Industry and Energy Department
<http://www.worldbank.org/html/fpd/ienti/ienti.html>

Aia-Pacific Telecommunity (APT)
<http://www.inet.co.th/org/apt/>

APEC
Telecom Working Group
<http://www.apecsec.org.sg/workgroup/telecom.html>

Caribbean Telecommunications Union
E-mail: Ctunion@tstt.net.tt

Comision Interamericana de
Telecomunicaciones (CITEL)
<http://www.oas.org/SP/PINFO/CITEL.htm>

Pacific Telecommunications Council
International Telecommunications Society
<http://itp-www.colorado.edu/its/>

Telegeography Inc.
<http://www.telegeography.com/>

Financial Times
FT Media & Telecoms
<http://www.ftmedia.com/>

Total Telecom
<http://www.totaltele.com/>

International Telecommunications Users
Group (INTUG)
6 rue St Jean,
B-5000 Namur, Belgium
Tel: +32 81 26 05 16
Fax: +32 81 26 05 17
E-mail: intug@mail.interpac.be

[Australian Telecommunications Users
Group](#) (ATUG)
Arbeitsgemeinschaft fuer Datenverarbeitung
(ADV), Austria

Belgian Telecommunications Users Group
(BELTUG)

[Canadian Business Telecommunications
Alliance](#) (CBTA)

Danish Data Association (DDA)

Central Chamber of Commerce (CCC),
Finland

European Council of Telecommunications
Users Associations (ECTUA)

Association Française des Utilisateurs du
Téléphone et des Télécommunications
(AFUTT)

[Hong Kong Telecommunications Users
Group](#) (HKTUG)

Hungarian Telecommunications Users
Group (TE3)

[Associazione Nazionale Utenti Italiani di
Telecomunicazioni](#) (ANUIT)

[Netherlands Association of Business
Telecommunications Users](#) (BTG)

[Telecommunications Users Association of
New Zealand](#) (TUANZ)

Norwegian Telecommunications Users
Group (NORTIB)

[Spanish Association of Telecommunication
Users](#) (AUTEL)

Swedish Telecommunications Users Group
(NTK)

Associaton Suisse d'Usagers de
Telecommunicatons (ASUT)

[International Press Telecommunications
Council](#) (IPTC), UK
Telecom eV (Germany)

[Telecommunications Managers Association](#)
(TMA), UK
International Communications Association
(ICA), USA
Tele-Communications Association (TCA),
USA

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ANNEX

Figure A1. Telecommunications service classification

MTN.GNS/W/120	UNCPC*
<p>C. <u>Telecommunication services</u> a. Voice telephone services 7521</p>	<p>7521 Public telephone services 75211 <u>Public local telephone services</u> - Switching and transmission services necessary to establish and maintain communications within a local calling area. This service is primarily designed (used) to establish voice communications, but may serve other applications such as text communication (facsimile or teletex) and is generally provided for a flat monthly fee independently of the number of calls made by the subscriber. <u>Exclusions:</u> Private line services and rental services of terminal equipment are classified in class 7522 (Business network services) and 7541 (Equipment rental services), respectively. 75212 <u>Public long distance telephone services</u> - Switching and transmission services necessary to establish and maintain communications between local calling areas. This service is primarily designed (used) to establish voice communications, but may serve other applications such as text communication (facsimile or teletex) and may be provided on a toll or flat rate basis. This service provides the customer with access to the supplier's and connecting carrier's entire telephone network or, in some instances, to a limited number of exchange areas (WATS service).</p>
<p>b. Packet-switched data transmission services 7523** c. Circuit-switched data transmission services 7523** d. Telex services 7523**</p>	<p>7523 Data and message transmission services 75231 <u>Data network services</u> - Network services necessary to transmit data between equipment using the same or different protocols. This service can be provided via a public or dedicated data network (i.e. via a network dedicated to the customer's use). 75232 <u>Electronic message and information services</u> - Network and related services (hardware and software) necessary to send and receive electronic messages (telegraph and telex/TWX services) and/or to access and manipulate information in databases (so-called value-added network services).</p>
<p>e. Telegraph services 7522</p>	<p>7522 (see below)</p>
<p>f. Facsimile services 7521** and 7529**</p>	<p>7521 (see above) 7529 Other telecommunications services 75291 <u>Paging services</u> - The summoning of a person to the telephone through the use of an electronic pager. This subclass includes tone, voice and digital display paging services. 75292 <u>Teleconferencing services</u> - Network and related services necessary to hold a one-way or two-way fully interactive video conference. 75299 <u>Other telecommunications services n.e.c.</u> - Telecommunications services, not elsewhere classified. This class includes mobile maritime and air-to-ground communications services.</p>
<p>g. Private leased circuit services 7522** and 7523**</p>	<p>7523 (see above) 7522 Business network services 75221 <u>Shared network services</u> - Network services necessary to establish telephone communications between selected (point-to-point or multi-point) locations (terminals) via a public (shared) network. This type of service is primarily used to establish long distance voice communications but some versions can also accommodate facsimile and data transmission. It is provided on a pay-as-you-use basis at discount rates over regular long distance telephone charges. 75222 <u>Dedicated network services</u> - Network services necessary to establish telephone communications between selected (point-to-point or multi-point) locations (terminals) via private line(s). This type of service is primarily used to establish voice communications between distant PBX's (tie line), between a distant location and a PBX (off premises extension), between a PBX and a distant exchange area (foreign exchange) or between</p>

MTN.GNS/W/120	UNCPC*
	designated telephone sets, but may also accommodate data transmission. It is provided on a lease basis.
h. Electronic mail 7323** i. Voice mail 7323** j. On-line information and data base retrieval 7323** k. electronic data interchange (EDI) 7323** l. enhanced/value-added facsimile services, incl. Store and forward, store and retrieve 7323**	7523 (see above)
m. code and protocol conversion	n.a.
n. on-line information and/or data processing (incl.transaction processing) 843**	843 Data processing services 8431 84310 <u>Input preparation services</u> - Data recording services such as key punching, optical scanning or other methods for data entry. 8432 84320 <u>Data-processing and tabulation services</u> - Services such as data processing and tabulation services, computer calculating services, and rental services of computer time. 8433 84330 <u>Time-sharing services</u> - This seems to be the same type of services as 84320. Computer time is bought; if it is bought from the customer's premises, telecommunications services are also bought. Data processing or tabulation services may also be bought from a service bureau. In both cases the services might be time sharing processed. Thus, there is no clear distinction between 84320 and 84330.
o. other	n.a.

* United Nations Provisional Central Product Classification, Statistical Papers, Series M, No. 77, 1991.

** Indicates that the service specified constitutes only a part of the total range of activities covered by the CPC concordance (e.g. voice mail is only a component of CPC item 7523).

Table A1. Level of commitments by sector and mode of supply¹

2.C Telecommunication Services	No. Listed	Cross border			Consumption abroad			Commercial presence		
		In per cent of listed sub-sectors								
MARKET ACCESS		Full	Partial	None	Full	Partial	None	Full	Partial	None
a. Voice Telephone Services	65	12	78	9	31	58	11	11	88	2
b. Packet-Switched Data Transmission Services	59	19	75	7	42	51	7	10	90	0
c. Circuit-Switched Data Transmission Services	60	18	73	8	42	50	8	10	88	2
d. Telex Services	59	20	75	5	47	45	7	11	89	0
e. Telegraph Services	43	19	72	9	49	42	9	9	91	0
f. Facsimile Services	55	18	75	7	44	49	7	11	87	2
g. Private Leased Circuit Services	55	16	80	4	42	55	4	11	89	0
h. Electronic Mail	52	35	60	6	46	42	12	17	79	4
i. Voice Mail	48	35	58	6	44	48	8	17	81	2
j. On-line Information and Data Base Retrieval	54	31	61	7	44	43	13	17	78	6
k. Electronic Data Interchange (EDI)	45	36	58	7	51	42	7	20	76	4
l. Enhanced/Value-Added Facsimile Services	43	37	56	7	49	40	12	21	74	5
m. Code and Protocol Conversion	42	31	60	10	48	48	5	19	79	2
n. On-line Information and/or data processing	40	33	55	13	50	35	15	18	80	3
o. Other, Terrestrial-based Mobile	61	8	79	13	30	61	10	13	87	0
o. Other, Satellite-based Mobile	23	9	87	4	28	68	4	8	92	0
o. Other, other	42	5	86	10	10	81	10	2	93	5
NATIONAL TREATMENT		Full	Partial	None	Full	Partial	None	Full	Partial	None
a. Voice Telephone Services	65	23	65	12	26	63	11	17	77	6
b. Packet-Switched Data Transmission Services	59	37	53	10	39	54	7	34	63	3
c. Circuit-Switched Data Transmission Services	60	37	52	12	40	50	10	30	65	5
d. Telex Services	59	40	55	5	44	47	9	31	65	4
e. Telegraph Services	43	40	51	9	42	47	12	33	65	2
f. Facsimile Services	55	40	55	5	44	49	7	31	64	5
g. Private Leased Circuit Services	55	36	56	7	40	55	5	27	65	7
h. Electronic Mail	52	50	44	6	44	40	15	48	46	6
i. Voice Mail	48	46	48	6	46	42	13	42	54	4
j. On-line Information and Data Base Retrieval	54	52	41	7	48	35	17	48	44	7
k. Electronic Data Interchange (EDI)	45	56	38	7	53	36	11	49	42	9
l. Enhanced/Value-Added Facsimile Services	43	56	37	7	51	33	16	51	42	7
m. Code and Protocol Conversion	42	50	40	10	50	40	10	48	45	7
n. On-line Information and/or data processing	40	55	33	13	53	28	20	55	38	8
o. Other, Terrestrial-based Mobile	61	21	66	13	25	64	11	20	74	7
o. Other, Satellite-based Mobile	23	19	74	8	21	74	6	15	79	6
o. Other, other	42	7	83	10	10	80	10	7	88	5

Source: WTO

Legend: FULL = No limitations listed, Partial = Limitations listed None = No commitments taken on this mode

¹ Data in this table does not take into account horizontal measures listed in schedules. As such, Mode 4, movement of natural persons is not included in this table because commitments on this mode are essentially determined by the horizontal measures.

Table A2. Market access, types of limitations by sector and mode of supply listed¹,

2.C Telecommunication services	Mode	Market access limitations					
		a	c	d	e	f	g
a. Voice Telephone Services	CB	5			4	1	11
	CA	1			4	1	8
	CP	38	1		22	23	38
b. Packet-Switched Data Transmission Services	CB	5			4	1	8
	CA	2			4	1	6
	CP	24	1		22	17	32
c. Circuit-Switched Data Transmission Services	CB	3			4	2	8
	CA	2			4	1	6
	CP	23	1		19	18	31
d. Telex Services	CB	2			3	2	7
	CA	1			3	1	5
	CP	22	1		20	17	27
e. Telegraph Services	CB	2			3	1	6
	CA	1			3	1	5
	CP	18	1		18	13	24
f. Facsimile Services	CB	2			2	2	7
	CA	1			2	1	4
	CP	16	1		17	15	28
g. Private Leased Circuit Services	CB	2			4	2	8
	CA	1			4	1	6
	CP	20	1		18	16	31
h. Electronic Mail	CB	3					7
	CA	1					1
	CP	14	1		8	7	19
i. Voice Mail	CB	3					4
	CA	1					1
	CP	13	1		7	8	16
j. On-line Information and Data Base Retrieval	CB	3					5
	CA	1					2
	CP	12	1		8	9	18
k. Electronic Data Interchange (EDI)	CB	2					4
	CA	1					1
	CP	9	1		4	5	14
l. Enhanced/Value-Added Facsimile Services	CB	2					4
	CA						1
	CP	10	1		5	6	16
m. Code and Protocol Conversion	CB	2					3
	CA	1					1
	CP	9	1		3	5	13
n. On-line Information and/or data processing	CB	3					5
	CA	1					1
	CP	10	1		6	4	13
o. Other - Terrestrial-based Mobile	CB	4			4	2	11
	CA	1			4	1	8
	CP	30	1		20	21	33
- Satellite-based Mobile	CB	2			4	2	9
	CA	1			4	1	6
	CP	24	1		20	18	31

Source: WTO

Legend: CB - Cross border supply
CA - Consumption abroad
CP - Commercial presence

a) Number of suppliers
c) Number of operations
d) Number of natural persons
e) Types of legal entity
f) Participation of foreign capital
g) Other measures

¹ Data in this table does not take into account horizontal measures listed in schedules. As such, Mode 4, movement of natural persons is not included in this table because commitments on this mode are essentially determined by the horizontal measures.

Table A3. National treatment, types of measures by sector and mode of supply¹

2.C. Telecommunication Services	Mode	National treatment limitations						
		a	d	e	f	g	h	i
a. Voice Telephone Services	CB	1	6	4			4	4
	CA		6	4			4	4
	CP	1	12	5	3	1	5	5
b. Packet-Switched Data Transmission Services	CB	1	6	4			4	4
	CA		6	4			4	4
	CP	1	10	5	2	1	5	5
c. Circuit-Switched Data Transmission Services	CB	1	7	4			4	4
	CA		6	4			4	4
	CP	1	11	5	2	1	5	5
d. Telex Services	CB	1	7	4			4	4
	CA		6	4			4	4
	CP	1	13	4	1	1	5	5
e. Telegraph Services	CB	1	6	4			4	4
	CA		6	4			4	4
	CP	1	11	4	1	1	5	5
f. Facsimile Services	CB	1	7	4			4	4
	CA		6	4			4	4
	CP	1	12	4	1	1	4	5
g. Private Leased Circuit Services	CB	1	7	4			4	4
	CA		6	4			4	4
	CP	1	10	4	1	1	4	5
h. Electronic Mail	CB		1		1			
	CA		1		1			
	CP		4		1			1
i. Voice Mail	CB		1		1			
	CA		1		1			
	CP		5		1			1
j. On-line Information and Data Base Retrieval	CB		1		1			
	CA		1		1			
	CP		5		1			
k. Electronic Data Interchange (EDI)	CB		1		1			
	CA		1		1			
	CP		4		1			
l. Enhanced/Value-Added Facsimile Services	CB		1		1			
	CA		1		1			
	CP		4		1			1
m. Code and Protocol Conversion	CB				1			
	CA				1			
	CP		3		1			
n. On-line Information and/or data processing	CB				1			
	CA				1			
	CP		2		1			
o. Other - Terrestrial-based Mobile	CB	1	7	4			4	4
	CA		6	4			4	4
	CP	1	12	5	3	1	6	4
- Satellite-based Mobile	CB	1	7	4			4	4
	CA		6	4			4	4
	CP	1	9	4	1	1	5	4

Source: WTO

Legend:

CB – Cross border supply
CA – Consumption abroad
CP – Commercial presence

a) Tax measures
d) Nationality requirements
e) Residency requirements
f) Licensing, standards, qualifications
g) Registration requirements
h) Authorization requirements
i) Ownership of property/land

¹ Data in this table does not take into account horizontal measures listed in schedules. As such, Mode 4, movement of natural persons is not included in this table because commitments on this mode are essentially determined by the horizontal measures.

Table A4. Top 20 public telecommunication operators, ranked by 1997 revenue

Rank		Operator (Country)	Telecom revenue		Net income			Employees		
97	96		Total (US\$ million)	Change (96-97)	Total (US\$ million)	Change (96-97)	Total (000s)	Change (96-97)		
1	1	NTT (Japan) a	71'591	7.1%	2'196	15.3%	230.0	*	-0.4%	
2	2	AT&T (United States)	51'319	1.5%	4'638	-21.5%	127.8		0.9%	
3	3	Deutsche Telekom (Germ.)	37'694	7.1%	1'843	87.9%	216.0		-5.9%	
4	16	Bell Atlantic (United States) b	30'194	3.6%	2'455	-27.8%	62.6		1.3%	
5	5	BT (United Kingdom) a	26'277	4.7%	2'908	-17.6%	124.7		-2.2%	
6	4	France Télécom (France)	26'174	3.6%	2'482	605.4%	165.0		0.2%	
7	14	SBC (United States) c	24'856	6.0%	1'474	-55.0%	118.3		7.7%	
8	7	Telecom Italia (Italy)	24'204	9.9%	1'949	12.5%	126.1		-0.2%	
9	6	GTE (United States)	23'260	9.0%	2'794	-0.1%	114.0		11.8%	
10	8	BellSouth (United States)	20'561	8.0%	3'261	13.9%	81.0		-0.3%	
11	9	MCI (United States)	19'653	6.3%	149	-87.6%	60.0		8.5%	
12	12	DGT (China)	17'154	1.5%	467.7		-2.8%	
13	11	Ameritech (United States)	15'998	7.2%	2'296	7.6%	74.4		12.4%	
14	10	Telefónica (Spain)	15'577	17.8%	1'253	18.6%	92.2		0.0%	
15	17	US West (United States)	15'235	18.0%	697	-40.8%	67.5		-2.6%	
16	13	Sprint (United States)	14'874	5.9%	953	-19.5%	49.0		2.1%	
17	18	Telebras (Brazil)	14'158	23.7%	3'493	42.1%	87.3		-2.5%	
18	19	Telstra (Australia) d	11'915	4.9%	1'205	-29.8%	66.1		-13.6%	
19	22	DDI (Japan) a	8'190	*	-211	*	‡	...	*	...
20	23	KPN (Netherlands)	7'671	8.4%	962	9.4%	32.7		1.3%	
		TOP 20	476'554	6.9%	36'798	-4.0%	2'362.4		-0.4%	

Note:

United States dollar values are obtained by using operator supplied exchange rate or ending period exchange rate. Net income is after tax. Change in revenue and net income based on local currency. * 1996 data. † Net Income was negative in 1996 and/or 1997. ... not available. ‡ Year beginning 1 April. ^b Merged with Nynex in August 1997. ^c Merged with Pacific Telesis in April 1997. ^d Year ending 30 June.

Source: International Telecommunication Union, PTO Database.

Table A5. Top 25 international carriers, ranked by international telecommunications revenue

Rank 1997	Company	International revenue (\$m)	Outgoing MiTT (m. minutes)	Change in MiTT (1996-97)	Total Revenues (\$m 1997)	Profit/loss before tax (\$m 1997)	Number of employees	Employee change (1996-97)	Revenue per employee (US\$)	State ownership
1	AT&T	¹ 8,200	² 10,290	9%	51,319	6,968	128,000	-2%	400,930	0%
2	Deutsche Telekom	¹ 5,200	5,333	5%	37,529	3,998	191,034	-5%	196,451	74%
3	Cable & Wireless	4,993	² 2,065	N.A.	11,668	3,640	46,550	20%	250,662	0%
4	MCI	¹ 3,400	² 5,907	10%	19,653	299	60,409	8%	325,332	0%
5	BT	2,588	3,735	20%	26,067	5,367	124,700	-2%	209,035	0%
6	China Telecom	2,355	² 1,632	14%	15,821	-	970,000	-24%	16,311	100%
7	France Telecom	2,106	3,200	6%	26,122	3,313	165,042	0%	158,274	75%
8	KDD	1,864	1,196	3%	2,708	67	5,275	-2%	513,334	0%
9	Sprint	1,636	² 2,759	11%	14,873	952	47,500	-1%	313,116	0%
10	Telecom Italia	¹ 1,605	2,381	12%	16,721	2,483	82,317	-5%	203,129	5%
11	Telmex	1,432	1,184	6%	7,534	2,679	54,758	-1%	137,592	0%
12	Stentor	¹ 1,391	² 1,778	8%	9,939	1,320	77,000	-9%	129,074	3%
13	Swisscom	¹ 1,386	2,093	9%	6,931	-61	22,170	1%	312,622	100%
14	Singapore Telecom	1,263	753	22%	3,051	1,576	10,793	4%	282,648	80%
15	WorldCom	¹ 1,249	² 1,400	65%	7,351	799	14,700	25%	500,068	0%
16	Teleglobe	1,050	² 1,112	22%	1,400	211	1,204	-56%	1,162,557	0%
17	KPN Telecom	1,031	488	6%	7,622	1,722	32,709	1%	233,030	44%
18	Telstra	914	705	1%	11,458	2,959	57,122	-16%	200,593	66%
19	Telefonica de Espana	882	1,566	32%	10,509	1,013	62,666	-7%	167,694	0%
20	VSNL	778	428	11%	1,630	362	2,861	0%	569,663	65%
21	Korea Telecom	686	657	27%	4,834	76	59,753	-1%	80,903	71%
22	Chunghwa Telecom	684	826	11%	5,272	1,355	34,748	-3%	151,727	100%
23	Telia Group	675	² 747	6%	5,827	506	33,930	0%	171,746	100%
24	Telintar	646	183	3%	646	150	700	1%	922,351	0%
25	Telkom	585	306	5%	4,024	707	57,813	0%	69,603	70%

Source: *CommunicationsWeek International*, 23 November 1998

Figures are for the 1997 financial year. Figures for the United Kingdom, Japan, New Zealand, Singapore, India, South Africa, Malaysia and Ireland are for year ending 31 March 1998. Figures for Telintar are for year ending September. Figures are converted to US dollars at company financial year-end. Domestic operators are excluded.

Notes:

¹Yankee Group estimates

²Figures from TeleGeography Inc., Washington DC

N.A.= Not available

Table A6. Top 20 fixed telephone line operators, ranked by 1997 main telephone lines

Rank		Operator (Country)	Main telephone lines		Local telephone service revenue		
97	96		Total (000s) 1997	Change (96-97)	Total (US\$ million) 1997	Change (96-97)	As % of revenue 1997
1	2	DGT (China)	70'310	28.0%	\$ 6'491*	48.8%	37.1%
2	1	NTT (Japan) a	60'380	-1.8%	\$ 15'382*	5.4%	21.6%
3	3	Deutsche Telekom (Germany)	45'200	2.3%	\$ 6'696	7.8%	17.8%
4	8	Bell Atlantic (United States)	39'714	3.7%	\$ 13'113	4.4%	43.4%
5	4	France Télécom (France)	33'700	1.5%	\$ 4'326	20.3%	16.5%
6	16	SBC (United States)	33'440	5.0%	\$ 9'568	9.3%	38.5%
7	5	BT (United Kingdom) a	27'651	0.4%	\$ 4'968	5.2%	18.9%
8	6	Telecom Italia (Italy)	25'698	1.7%	\$ 5'579	10.0%	33.3%
9	7	BellSouth (United States)	23'201	4.8%	\$ 8'499	5.2%	41.3%
10	9	GTE (United States)	21'539	7.7%	\$ 5'531	7.6%	26.7%
11	10	Ameritech (United States)	20'544	4.3%	\$ 6'413	5.7%	40.1%
12	11	KT (Korea (Rep.))	20'422	4.2%	\$ 2'132	4.5%	46.0%
13	15	US West (United States)	16'033	3.9%	\$ 5'021	5.3%	49.8%
14	14	Telefónica (Spain)	15'854	2.9%	\$ 6'644	6.3%	62.8%
15	17	Türk Telekom (Turkey)	15'744	10.2%	\$ 1'435*	169.5%	74.0%
16	18	Telebras (Brazil)	15'407	14.1%	\$ 7'492	98.7%	40.4%
17	19	DOT (India) a	14'395	24.8%	...*
18	20	Bell Canada (Canada)	10'607	3.3%	\$ 3'026	10.1%	46.8%
19	21	Chungwa Telecom (Taiwan-China) b	10'429	8.9%	\$ 784*	9.1%	13.7%
20	22	Telstra (Australia) b	9'350	2.0%	\$ 1'297	0.8%	11.3%
		TOP 20	529'619	6.5%	114'397	11.4%	30.3%

Note: Equity-based domestic subscribers and revenue. United States dollar values are obtained by using operator supplied exchange rate or ending period exchange rate. Change in revenue based on local currency. The definition of local telephone service revenue differs among operators (e.g., subscription charges only, subscription and local call charges, etc.) * 1996 data. ... not available. a Year beginning 1 April. b Year ending 30 June.

Source: International Telecommunication Union.

Table A7. Top 20 mobile cellular operators, ranked by 1997 subscribers

Rank		Operator (Country)	Cellular subscribers		Mobile revenue		
97	96		(000s) 1997	Change (96-97)	(US\$ million) 1997	Change (96-97)	As % of revenue 1997
1	1	NTT (Japan) a	19'240*	14.5%	16'403*	59.8%	23%
2	5	DGT (China)	13'229	93.1%	3'334*	81.9%	23%
3	3	TIM (Italy)	9'278	62.6%	5'345	28.7%	100%
4	2	AT&T (United States)	6'000	15.4%	4'337	10.3%	8%
5	4	SBC (United States)	5'493	23.9%	3'034	15.1%	12%
6	6	BANM (United States)	5'356	21.5%	2'859	17.2%	100%
7	15	SK Telecom (Korea (Rep.))	4'571	58.1%	2'090	31.2%	100%
8	7	GTE (United States)	4'487	19.7%	2'742	10.5%	12%
9	13	DDI (Japan) a	4'329	26.4%	4'296*	56.1%	52%
10	11	AirTouch (United States)	4'309	26.6%	2'363	19.1%	100%
11	8	BellSouth (United States)	4'193	15.1%	3'555	27.0%	17%
12	21	Telebras (Brazil)	4'023	64.1%	3'762	62.8%	20%
13	12	Deutsche Telekom (Germany)	3'752	39.6%	2'776	19.0%	7%
14	18	Mannesmann (Germany)	3'542	54.0%	3'118	32.8%	100%
15	9	Vodafone (United Kingdom) a	3'400	18.6%	2'977	13.5%	100%
16	24	Telefónica (Spain)	3'187	35.9%	2'395	40.3%	15%
17	14	Ameritech (United States)	3'177	26.5%	1'760	31.0%	11%
18	10	BT (United Kingdom) a b	3'077	14.0%	1'830	14.8%	7%
19	23	France Télécom (France)	3'000	92.3%	2'851	52.0%	11%
20	16	Telstra (Australia) c	2'777	21.6%	1'477	16.2%	12%
		TOP 20	110'420	34.3%	73'304	25.0%	19%

Note: Equity-based domestic subscribers and revenue. United States dollar values are obtained by using operator supplied exchange rate or ending period exchange rate. Change in revenue based on local currency. The definition of mobile revenue differs among operators (e.g., cellular only, cellular and paging, cellular and equipment sales, etc.) * 1996 data. ^a Year beginning 1 April. ^b BT owns 60% of Cellnet. The total number of Cellnet subscribers is shown while the revenue shown is for BT only. ^c Year ending 30 June.

Source: International Telecommunication Union.

	a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.	l.	m.	n.	01.	02.	03
Saint Kitts & Nevis								X	X					X			
Senegal	X	X	X	X		X	X	X					X		X	X	X
Singapore	X	X	X				X	X	X	X	X			X	X	X	
Slovak Republic	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Slovenia								X	X	X		X	X				
South Africa	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	
Sri Lanka	X	X	X			X									X	X	
Suriname	X	X	X	X		X	X								X	X	X
Sweden	X	X	X	X	X	X	X	X	X	X	X		X		X	X	
Switzerland	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Thailand	X			X	X	X	X			X				X			X
Trinidad and Tobago	X	X	X	X	X		X			X	X	X	X	X	X	X	X
Tunisia	X	X		X											X	X	X
Turkey	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Uganda**	X	X	X	X	X	X	X								X	X	X
USA	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Venezuela	X	X	X				X								X	X	X
Zimbabwe		X	X			X		X	X	X	X	X	X	X			X
Total	69	63	64	59	47	59	59	55	51	57	48	46	45	43	65	57	46

Source: WTO

* Entry into force subject to acceptance, which is pending.

** Entry into force anticipated on 24 December 1998.

Note: The GATS services commitments database does not yet include the schedules of Latvia and Krygyz Republic or the basic telecom commitments of Barbados and Uganda. These have been manually inserted into this table but are not reflected in Tables A1 – A3.

Key:

- a. Voice Telephone Services
- b. Packet-Switched Data Transmission Services
- c. Circuit-Switched Data Transmission Services
- d. Telex Services
- e. Telegraph Services
- f. Facsimile Services
- g. Private Leased Circuit Services
- h. Electronic Mail
- i. Voice Mail
- j. On-line Information and Data Base Retrieval
- k. Electronic Data Interchange (EDI)
- l. Enhanced/Value-Added Facsimile Services
- m. Code and Protocol Conversion
- n. On-line Information and/or data processing
- 01. Terrestrial- based mobile
- 02. Satellite-based mobile
- 03. Other, other.