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THE EUROPEAN TELECOMMUNICATIONS EQUIPMENT INDUSTRY

THE STATE OF PLAY, ISSUES AT STAKE AND PROPOSALS FOR ACTION

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I INTRODUCTION

1. To ensure that European industry has the advantages of first class, efficient and forward-looking information and communications infrastructures, the European Commission has taken initiatives to harmonize telecommunications policies in all Member States, to create the conditions for a Community-wide market for equipment and services, in particular through their liberalization, to promote Community-wide interoperability of networks, and to stimulate the development of the necessary technologies, systems, standards and services through co-operative research and technology development.

The Green Paper on the Development of the Common Market for Telecommunications Services and Equipment ¹ set the background for the opening of procurement procedures and the liberalisation of telecommunications equipment and service markets. It has also contributed to reinforcing the rapid development of standards and specifications at national and European level, to achieving a European research and technology community, and to strengthening regional development. These events are part of the process of completion of the European single market. They have been driven by a belief that liberalisation, combined with harmonisation, will benefit users by reducing charges and expanding the range of services on offer.

2. However it is essential that this work is fully and effectively carried out. Further work is necessary to ensure full interoperability of networks. The introduction of competition in telecommunications markets has to date focused on the removal of all special or exclusive rights other than those on the network and on voice telephony services ²; a review of this situation is taking place during 1992.

Open public procurement for telecommunications network equipment will only apply from 1st January 1993 ³. These changes which are vital for the achievement of the goals set out above,

¹ Commission of the European Communities, COM(87) 290 final, Brussels, 30 June 1987.

² Commission Directive of 16th May 1988 on competition in the markets in telecommunications terminal equipment (88/301/EEC, OJ L 131/73); Commission Directive of 28th June 1990 on competition in the markets for telecommunications services (90/388/EEC, OJ L 192/10).

³ Council Directive 90/531/EEC of 17th September 1990 on the procurement procedures of entities operating in the water, energy, transport and telecommunications sectors (OJ L 297 29/10/90 P1).

will take time both to introduce and have their impact on the telecommunications services industry.

3. Whilst the main focus of the present paper is on telecommunications equipment, with telecommunications services being dealt with separately by the initiatives described above, the two sectors are intimately linked. Service providers are main customers of equipment producers. Studies have shown that the introduction of competition into services along with the measures to ensure the interoperability of networks will not only increase significantly and in a permanent way the demand for services from both residential and business customers but this will also increase demand for telecommunications equipment. The introduction of liberalisation and increased competition in the EC telecommunications equipment market should strongly contribute to create a dynamic equipment industry capable of competing in wider world markets.

II BACKGROUND

4. In November 1990, the Commission published a Communication on Industrial Policy⁴ which has been further approved by the Council. In this Communication, the Commission indicates that, while placing the main responsibility for improving industrial competitiveness on companies, it is up to public authorities to provide them with a clear and predictable framework and outlook for their activities, while respecting Community competition rules.

It emphasizes the opportunity given to industry by the Single Market within the increasingly global economy and the world market competition, stressing the importance of nondiscriminatory access to third country markets. The industrial policy paper comes out in favour of pursuing positive adjustment policies, including a technological development policy.

5. A first application of this open, horizontal and pro-active approach has been the Community's electronics and information technology industries, which are facing severe structural adjustment problems at present. On the 3rd April of 1991, the Commission adopted a Communication

⁴ Commission Communication on industrial policy in a open and competitive environment (COM(90) 556 final of 16.11.1990).

devoted to these important industries: "the European electronics and information technology industry: state of play, issues at stake and proposals for action" SEC(91) 565 final.

Received with great interest by the Council, this Communication contributes to the examination of the relative industrial and technological conditions of these industries in the world context. The Communication sets out a consistent package of measures aimed at helping firms through the adjustment process, without taking artificial measures to support them. Those proposed measures apply to five domains of actions: demand, technology, training, external relations and the business environment. Following this Communication, the Council adopted a Resolution on 18th November 1991⁵.

This Communication covers those industries which provide three main categories of products and services - ~~components, computers and consumer electronics~~ - and mentions other high-growth high-technology allied industries such as telecommunications equipment.

6. While discussing the Communication on the European Electronics and Information Technology Industry, the Council requested the Commission to investigate and assess the situation of the European Telecommunications Equipment Industry with a view to present a Communication on this matter.

The present Communication is the Commission's response to the request by the Council. It addresses the situation and prospects of the European telecommunications equipment manufacturers. The telecommunications equipment industry is in fact only a part of the much broader telecommunication industry domain.

Several different groups of actors are involved in this domain: licensed operators, service providers and equipment manufacturers. Their respective sectors are all closely interdependent.

7. The overall Community market, made up of 360 million consumers, will become the largest homogeneous consumer market in the world: completion of the internal market will be a major asset for the Community. The EC market for telecommunications equipment is valued at 26 billion ECU (1990), with an annual growth rate of 7-8% over the last 5 years. This market is driven essentially by the much larger telecommunications service sector, whose turnover amounted to 90 billion ECU in 1990.

Council Resolution of 18 November 1991 concerning electronics, information and communication technologies.

8. Telecommunications equipment manufacturers produce two main categories of products:

- network equipment: mainly switching and transmission equipment;
- terminal equipment, which includes all types of terminals, from telephone sets to telefax, and from networked PCs to terrestrial satellite stations. It is obvious that the telecommunication terminal equipment sector coincides in many parts with the computer and consumer electronics sectors.

In addition, it has to be underlined that the telecommunications equipment sector is heavily dependent upon the availability of the electronic components which are today the key to the design and production of any competitive telecommunications equipment, and at the same time is one of the major customers of the components and software industry.

9. It is therefore vital that the Community, as a matter of priority, adopts the remaining measures designed to ensure the completion of the internal market in these sectors and verifies that existing and these yet to be adopted measures are effectively applied.

10. Even when the internal market for telecommunications equipment is completed and the measures applied in practice, it will take some time for competition between the different EC equipment producers to become fully effective and the markets to be fully open. Telecommunications operators (TOs) have traditionally been supplied by certain EC network equipment producers and as a result, have a large installed base of equipment from these traditional suppliers. In the short run even when competition is fully opened up traditional suppliers will continue to dominate in the network equipment market because of the advantages they gained in providing maintenance, upgrading and extension to the installed base. Experience of markets where competition has been opened in the network equipment market shows that it takes some years for the advantages to the traditional supplier created by the installed base to be challenged by the potential advantages of competitive offers. The rapid completion of the internal market will favour an early introduction of this balance of advantages.

11. Furthermore, and in addition to the stimulus in demand that will come from the completion of the internal market and the opening up of competition in telecommunications equipment and services, the completion of the internal market in all sectors should considerably increase demand for telecommunications services between Member States as wider trade opportunities

are created. Therefore, the completion of the internal market should create new trans-European requirements for the exchange of information, which could be satisfied only by the enhancement and further development of telecommunication means.

The overall service sector is fully dependent on telecommunication networks and equipment manufacturing, and the efficiency of the European economy relies upon efficient and cheap means for information exchange.

The telecommunication networks and services are increasingly becoming the nerve system of all organisations: they are the key as well to advanced logistics and marketing of the private sector as to the Single Market management by those administrations dealing with Community affairs.

Thus, in addition to its economic importance, the telecommunications equipment sector has a strategic impact in the information society which is currently building up in Europe and in the other post-industrial regions of the world.

12. In addition to demand side considerations, because the telecommunications industry as a whole (service providers, operators, and manufacturers) is also driven by technology, a strong competitive and innovative manufacturing industry is needed in the Community in order to generate new technology, to satisfy the growing demand and to ensure long term world-wide competitiveness.
13. The underlying basis for advance should therefore be threefold: the growth and development of the telecommunications services sector via the completion of the internal market and the introduction of competition; their capability to offer pan-European access via harmonisation; and the installation of the best possible infrastructure, including a Community-wide software platform for easy creation of new services.
14. In order to realise this potential, a major condition is to improve the performance of the infrastructures at the Community level.

The creation of trans-European networks, with their demand-creating effect for applications in the telecommunications and information technology sectors, is a central action line in this global approach.

In this respect, the fragmentation of infrastructures and the way in which they are managed on national lines hampers the cross-frontier provision of telecommunications and telematics services, and therefore prevents the manufacturing sector from building upon the substantial market opportunities which genuine trans-European networks would generate.

The emergence of trans-European networks is now a priority ⁶, and efforts are being developed to make it possible for the various networks in the Community to link up with each other beyond national frontiers and for them to be operated so that they offer a coherent and satisfactory service at a reasonable cost to the user.

15. However, the development of such large-scale long-term projects often carries such levels of uncertainty and risk as to make them unattractive to many investors, or is simply not possible in the current regulatory and policy framework.

The Community can address this problem by helping to improve regulatory, fiscal and business environments, both in the single market and globally, which permit both the entry of new operators and the possibility for new and existing operators to extend their planning horizons, thereby creating the conditions necessary to meet the anticipated demand.

Firstly, through the publication of its Green Paper on the development of European Standardization, the Commission has launched an important debate. Conclusions of this debate have been formulated in a second Communication on Standardization in the European Economy. It is expected that efficiency and quality of output of European standardization will increase. The review of competition in telecommunications services and remaining exclusive or special rights already taking place should consider ways of relieving the impediments to communications in the Community. The conclusions of these reviews will shortly be made public.

The critical importance of separating the regulatory and operating functions of telecommunications in Member States cannot be over-stressed. It is also important to ensure as far as possible continuity and predictability in regulation.

Secondly, as noted in the Communication "Industrial Policy in an Open and Competitive Environment" (COM(90) 556), the Commission has noted the importance to industry of access to finance under competitive conditions. Following this, action is under way to evaluate the

⁶ Treaty on European Union, Title XII; Council Resolution of 22 January 1990 concerning trans-European networks (90/C 27/05).

fiscal and financial environment in the single market with the intention of making proposals for improvement.

Thirdly, shortcomings in business environment are being tackled through the creation of the single market and by increasing competition in it by way of a number of important measures, notably the directive on procurement procedures and those relating to terminal equipment, satellite operation among others. In an industry which is skill- R & D- and capital-intensive, horizontal measures are required to remedy structural deficiencies such as the need for greater investment in training, or the need to master efficiently the diffusion of technological innovation.

Finally, the Community, through the Treaty on European Union, offers new actions to promote Trans-European networks. This new possibility, linked with the optimal use of its other financial instruments such as the Structural Funds, the Community budget, the Community loan instruments, and the PHARE action, can also contribute to addressing this issue by playing the role of a "pump-primer" with a view to support the network interconnection.

III THE MAJOR CURRENT MARKET FACTORS

16. The total world telecommunications equipment market is valued at nearly 110 billion ECU in 1990, of which the Community market accounts for 26 billion ECU or nearly one quarter. The telecommunications equipment industry represents half a per cent when expressed as a proportion of Community GDP.
17. Industry demand is dominated by the three regions of the world with large and well-developed telecommunications networks: North America, Japan and Western Europe. These three geographical markets together account for approximately three-quarters of world equipment demand, with North America comprising over a third, (*Figure 1*).

The Asian-Pacific region is quickly becoming the world's second-largest market, with telephone networks expanding at an annual rate of 6-7%, ahead of Europe (4-5%) and North America (2-3%). Within Europe, Central and Eastern European countries, where there are just seven to eighteen telephone lines for each 100 people (9.7 in USSR), offer tremendous market opportunities.

18. The purchases made by the telecommunications operators, which undertake the major part of the investment in the network and provide the majority of public services, today represent the bulk of the telecommunications equipment markets, particularly in Europe. Consequently, the health of the industry is closely related to their investment capacity. Total annual investments in the Community by the TOs amounted to about 30 billion ECU in 1990 or about one third of TOs' annual turnover. Just over a half of this investment comprises telecommunications equipment; TO investment thus accounts for just over 60 per cent of the Community's telecommunications equipment market.

19. Transmission and public switching equipment account for just over 40 per cent of the market. Terminal equipment accounts for a further 20 per cent, with the market still dominated by purchases of the TOs.

The other important categories are private switching or PBXs, (13 per cent of the market), equipment related to data communications, (10 per cent) and the fast-growing category of mobile communications, (5 per cent), encompassing both network equipment and handsets, (*Figure 1*).

20. The recent period has seen a substantial growth in world equipment markets, including the Community. The traditional markets of network and terminal equipment have grown steadily, with a significant boost from new segments such as mobile communications, data communications and satellite equipment. Average growth in the second half of the 1980s was nearly 7 per cent per annum in real terms with markets for mobile and data communications equipment growing in excess of 15 per cent per year, (*Figure 2*).

21. Market growth during this period has been driven by the shift of public and private networks from analogue to digital systems, (in both transmission and switching) and by the rapid expansion of mobile and data communications markets. At the same time, there has been a substantial decline in unit prices for equipment as a result of technological advance and increased competition in major markets where liberalisation and de-regulation are under way.

Such liberalisation, where fully and effectively applied, has had two major effects. Firstly, it has led to major growth markets for customer premises equipment, mobile and satellite equipment

and equipment associated with adding "intelligence"⁷ to the network. Secondly, it has increased the trend in many countries toward multisourced switching and transmission equipment and diminished the reliance on national suppliers.

However, the relative inertia of behaviour and procurement practices of public or private service providers tends to slow down the introduction of new services and the related equipment, on the one hand, and to limit multisourcing, on the other hand.

22. A major factor governing market conditions in Europe is that the process of liberalisation has begun only recently, so that the Community market has not and will not for some time have the same degree of homogeneity as the markets in North America and Japan in terms of technical requirements and local conditions of competition.

It is market development which will provide the opportunities for European equipment suppliers. At the same time, network extension and expansion, as well as network modernisation, continues to take place in Western Europe where potential demand growth is still substantial. In fact, if the internal market is successfully completed and the trend of competition being introduced into currently regulated services markets is continued, then growth for services and therefore equipment is likely to accelerate.

IV THE SITUATION OF EUROPEAN SUPPLIERS : STRENGTHS AND WEAKNESSES

23. Presently, European telecommunications equipment suppliers are well represented amongst the leading companies, in a market where the top ten suppliers account for about 50 per cent of the world market.

Five of the top ten equipment suppliers ranked by telecommunications equipment turnover are European, (compared to three North American and two Japanese companies), and a further six appear in the top twenty, (*Figure 3*).

⁷ The addition of intelligent software and related equipment to the network can provide some of the features that are already common place via PBXs in the office (toll-free calling, virtual private networking, centrex facilities, etc.).

Strengths

24. European suppliers, particularly the larger ones such as Alcatel and Siemens, tend to be broad-based general suppliers with strengths in the main product segments such as public and private switching, transmission, and telephone sets.

These strengths have been built on the development of competitive products and sales volumes in the major public network product segments of telephone switching and transmission as well as some categories of private equipment such as PBXs.

The relative European strengths in these traditional market segments have the potential to extend to newer markets such as ISDN, intelligent features and broadband communications.

25. The large European equipment suppliers enjoy a strong world-wide presence, particularly in a broad range of developing countries and now in Central and Eastern Europe.

European equipment manufacturers have been stepping up their efforts to develop local presence in global markets through direct investment and joint venture agreements.

However, in spite of the considerable efforts undertaken by European companies to enter markets where business opportunities are particularly high (e.g. North America, Japan, Korea), much remains to be done to improve the effective access to the network equipment market. By contrast, inward investment in Europe both in switching equipment and in services has been rapidly increasing over the last few years as part of a determined effort to penetrate the European telecommunications markets where growing opportunities exist in relation to the completion of the internal market and the developments in Central and Eastern Europe.

26. During the 1980s, the European telecommunications equipment suppliers managed efficiently a significant process of offensive restructuring which must still be regarded as not finished.

Major restructuring has taken place with Alcatel's acquisition in 1987 of ITT's telecommunication interests and with Siemens' acquisition of the majority of GTE's telecommunications equipment business (1986) and of a significant part of GPT (1989), which itself resulted from a merger of GEC's and Plessey's telecommunications businesses in the UK (1987).

Within France, Alcatel had already (1983) taken over Thomson's telecommunication interests and in Switzerland, two major telecommunications equipment manufacturers had been

regrouped into Ascom (1987). More recently, Alcatel and Telettra have consolidated the telecommunications business of their parents Alcatel-Alsthom and Fiat respectively.

As a result, where there were 11 major equipment suppliers in the European market in the early 1980s, there are now only six (Alcatel, Siemens, Ericsson, Bosch, Philips and Italtel) with the first two accounting for about half the total European market.

In mobile communications, the new pan-European digital systems proposed by the Commission have led, for the first time, to the creation of true international consortia who from the start have developed and marketed products for the Community as a whole.

This restructuring has been motivated by the need to capture scale economies in R & D and production, and also to assist access to different geographical markets. Indeed, by the mid-eighties, as switching systems were increasingly dependent upon software, with their high development costs, the need to increase market share drastically and therefore to look for growth internationally became critical. Now, the industry is experiencing a similar adjustment in the transmission business.

27. The pooling of resources in R & D is also exemplified by the large number of European telecommunications equipment companies participating in the Community's RACE programme.

These companies together with telecommunications operators and the leading-edge users are directly involved in the development of innovative technologies concerning for instance, low-cost integrated broadband communications equipment and software, optical communications, advanced processing techniques for all functional areas, end-user systems, and the usability of equipment and services.

Weaknesses

28. In spite of progress towards a unified telecommunications market, the EC equipment market still suffers substantially from the market fragmentation and focus on national markets which has been inherited from the past.

This is still felt by companies in the procurement practices of TOs and in the area of standards as EC legislation has not come into force yet. Many markets are still subject to special or exclusive rights such that the potential of competition to stimulate demand is not fully realised.

The limits of domestic markets and the associated duplication of resources are still serious obstacles to the ability of European companies to fully exploit the scale economies accorded to their competitors in North America and Japan.

29. This fragmentation is a major problem because spiralling research and development costs need to be spread across ever larger numbers of users if they are to be amortized. For example, it was estimated that annual sales of approximately 12-14 billion ECU were needed in the 1980s to amortize the R & D and investment costs incurred to support the first generation of digital switching equipment (between 500 million ECU and 1 billion ECU at then price levels). This was far larger than any national market in Europe and resulted in increased concentration of the industry. The next generation of digital public switching systems will require even much higher R & D costs (1 to 2 billion ECU).

30. From the late 1970s onwards, European manufacturers have developed seven families of digital public switches: AXE (Ericsson), E10 (Alcatel), BWS (Siemens), MT (Thomson, then Alcatel), Proteo UT (Italtel and Telettra), System 12 (ITT, then Alcatel), and System X (GEC and Plessey). Compared with the U.S. (two), Canada (one), and Japan (one single NTT standard although supplied by four different companies), this dispersion is a weak point considering the necessary development and enhancement costs, and the difficulty to rationalize production. Despite the importance of consolidation and restructuring which took place in the context of increasingly global equipment markets, some major European companies are still having to cope with the rationalisation of different product lines in their core business. Through mergers, in addition to their own system, Alcatel has inherited two major public switching systems and Siemens three.

31. In some important and growing market segments, European suppliers are in a relatively weak position. In contrast to the network equipment market where European companies have a fairly strong technological and market position, including on export markets, the telecommunication terminal equipment market suffers from major weaknesses which, as a consequence, makes it the main source of the large and growing telecommunications trade deficit between the Community and Japan.

This situation is largely due to the weaknesses of the European industry in certain basic technologies and in the manufacture of some key electronic components.

Moreover, the convergence between the telecommunications, data processing, and broadcasting equipment industries raises new challenges for terminal manufacturers as it is already changing and will further affect the structure of the terminal market segment including some of the key factors which govern competition. In particular, it offers opportunities for new players to enter this segment, notably office automation manufacturers and consumer electronics manufacturers. For its part, the European consumer electronics industry is fairly competitive on global markets which could help it gain a sustainable advantage in competing in the mass, fast-developing, market segments of the telecommunications equipment industry.

32. There is a growing risk that European terminal manufacturers could progressively drift into a situation of losing design leadership capability for terminal equipment - at least in the non-voice area - and would become totally dependent upon imported technology. It is revealing that an increasing number of European equipment manufacturers limit their activities to the simple assembly of terminals, or even forsake completely any terminal production.

As this situation continues to deteriorate, the feasibility of strategic moves capable to meeting the challenges set by the Community industrial partners, are dwindling rapidly. The introduction of the measures described in this paper which will increase demand also provide some of the right conditions for the terminal equipment producers to become competitive at a world level.

33. Japanese manufacturers are physically present in the Community with development and manufacturing facilities. Companies like Ricoh, Sony and Toshiba follow closely the European market. For example, Ricoh participates in the ETSI facsimile standardisation activities and is in a position to anticipate the adaptations the market will require from the products they manufacture.

Sony is present almost everywhere in the visiophone sector and has a strong development team established in Europe.

Modular design and flexible manufacturing techniques such as those currently employed by the Japanese companies are likely to become key factors of success in the supply of terminals for facsimile machines and mobile systems. The clear and sustainable competitive advantage which Japanese firms possess in the terminal market is also fuelled by the changing market pattern of this segment, which assumes more and more the characteristics of the consumer electronics market.

Moreover, some of the products that will benefit from the EC market opening, in particular terminal equipment, will originate from non-European countries.

Users must have access to the widest possible choice of terminal equipment in order to obtain the competitively priced and technically advanced equipment they in turn need to remain competitive in global markets. However, in view of their proximity and close contacts with users and their knowledge of local markets, EC producers will be in a good position to compete.

34. Common technical specifications are provided by European standards. However, it occurs that some of the standards prepared by ETSI for telecommunication services and equipment still contain ambiguities, which does not ensure inter-operability. It is even more important to stress that, once common standards have been adopted, it happens too often that neither operators nor manufacturers could agree on which parts of the standards they are going to implement. These factors prevent European industry from benefiting fully from the size of the single market.

This lack of coordination is mainly due to a long history of operating within closed markets, which did not prepare European industry to co-operate at the European level.

35. The telecommunications equipment sector is the third largest buyer of semiconductors and integrated circuits after the computer and consumer electronics sectors.

Since semiconductor technology is one of the critical components and underlying forces for price and performance improvement in telecommunications equipment, (from fax machines to subscriber line interface cards for telephone switches), quick access at competitive prices to advanced technology related to the design, development and production of sophisticated integrated circuits is a clear necessity for the European telecommunications equipment suppliers.

However, these suppliers remain largely dependent on non-EC sources for certain major sector specific electronic components. Therefore, increased co-operation should be sought through Community R & D programmes and international alliances in compliance with Community competition rules, with a view to improving technological availability in Europe for critical semiconductor products such as mixed-signal application specific integrated circuits and optoelectronic devices.

- Moreover, the absence of an extensive component supply sector consisting of small and medium sized enterprises (SMEs) underlines the need for creating conditions favourable to the birth, growth and development of these companies in Europe.
36. The problems facing terminal equipment producers and semiconductor suppliers were analyzed in the April 1991 Communication from the Commission on "The European electronics and information technology industry", and policy recommendations were made. Therefore the specific problems are not dealt with here in detail.

V THE INTERNATIONAL CONTEXT AND COMPARISON WITH EC RULES

The Trade Situation

37. The Community telecommunications equipment industry has traditionally had a positive external trade balance. In 1990, this amounted to 296 million ECU. Exports totalled 4558 million ECU; imports totalled 4262 million ECU.

The largest purchases of telecommunications equipment are in Japan, the United States and the Community, (*Figure 4*). The Community's principal partners in telecommunications trade were, in order of importance, the EFTA countries, the United States, and Japan, (*Figure 5*).

38. The Community enjoyed a trade surplus with several countries, but had a trade deficit with each of its three principal telecommunications trading partners and with the newly industrialized nations of Asia - Hong Kong, South Korea, Singapore, and Taiwan. However, it should be noted that much of this deficit is for terminal equipment, in particular fax machines.
39. In 1990, the trade surplus with countries other than EFTA, Japan, the United States, and the newly industrialized countries of Asia amounted to 2060 million ECU, on exports of 2591 million ECU and imports of 532 million ECU. This surplus consists principally of a 1001 million ECU export surplus for terminal equipment other than fax machines. It is worth noting that the Community's trade with developing nations included exports facilitated by soft loans or grants.

40. The EFTA nations are the Community's largest purchasers and second largest suppliers of telecommunications equipment, and continue to be the Community's largest telecoms trading partners.

There has been a tendency for the small EC surplus to decline due, in large degree, to increased imports by the Community of terminal equipment parts.

41. The Community continues to run a trade deficit with the United States. In 1990, the trade deficit totalled 439 million ECU, on imports of 1001 million ECU and exports of 563 million ECU. This deficit is caused mainly by imports of both terminal and transmission equipment.

42. The Community continues to run a large trade deficit with Japan. In 1990, it totalled 1134 million ECU, with imports of 1204 million ECU and exports of only 70 million ECU. The annual trade imbalance has grown in all but one year in the last decade. Nearly three-quarters of the Community's imports from Japan consist of terminal equipment with over half of the imports being accounted for by fax machines and parts, (*Figure 6*).

43. EC has a negative telecommunications trade balance with Hong Kong, South Korea, Singapore, and Taiwan: exports of 261 million ECU and imports of 441 million ECU in 1990. The deficit results principally from EC imports of handsets and additional types of terminal equipment other than fax machines.

44. The global nature of the telecommunications industry poses particular competitive challenges for the industry's leading companies in Europe, North America, and Japan.

These particular challenges have to be faced taking into account some major characteristics of the industry:

- The strong financial interdependence between telecommunications equipment manufacturers and their chief customers, telecommunications service providers, principally entities enjoying special or exclusive rights with respect to provision of infrastructure and/or services.

- The similar interdependence between telecommunications equipment manufacturers and electronic component producers, on which equipment manufacturers heavily depend.
- Leading manufacturers have traditionally enjoyed important shares of their home markets, which provide a base of operations in other geographic markets - but this is changing where public procurement rules are liberalised.
- The industry has recently seen an increase of co-operation and concentration, in the face of rising R & D costs and in order to gain access to new markets.
- Several factors including the rapidity of technological change, the technological convergence between the data processing, telecommunications and broadcasting equipment industries, and liberalization tend to increase the market uncertainties. In consequence, telecommunications equipment manufacturers are induced to adopt appropriate strategies aimed at further improving the efficiency of their operation and structure. These strategies, the choice of which depends notably on the firm's size, objectives and "value chain", may include differentiation of product offerings ⁸, diversification into the services business, and focus on high quality niche market segments.
- The structure of manufacturers (including the degree of vertical integration) and the scope of manufacturers' activities vary widely among different regions.

In the face of these challenges global competition must take place on a level playing field. The possibility to respond to the increase in demand generated by the liberalization of services must be open to all the competitors involved.

Access to Telecommunications Markets in North America and Japan

45. Competition in communications services and equipment markets is a relatively recent phenomenon and the extent of liberalization has been uneven world-wide.

In the past decade, the United States, Japan and the European Community have radically reformed their regulatory structures and begun to liberalize their communications markets. These regulatory changes have both provided firms with new opportunities in foreign markets

⁸ In an attempt to maintain coverage of the whole manufacturing sector, the major actors have proposed a variety of umbrella concepts based on interoperability and use of standards, e.g. 1000 Series (Alcatel), Net 2000 (AT & T), C&C (NEC), FiberWorld (Northern Telecom).

and subjected them to new competition from foreign firms in their traditional domestic markets. However, factors such as government regulation, installed equipment base, trade policies, procurement, and standards in various countries, influence the ability of producers to compete in global markets for telecommunications equipment.

Since the Community has opened up procurement in Member States, is about to complete the liberalization of its communications markets, and continues a firm and nondiscriminatory competition policy, it expects that legal and structural barriers which may still exist in the United States and in Japan will rapidly be lifted so as to allow EC companies to compete in these telecommunications markets on an equal footing.

The United States

46. In order to assess the degree of openness of the U.S. market to EC suppliers of telecommunications network equipment, the EC and U.S. financed jointly an independent study of the U.S. central office switching market, the largest segment by value of the U.S. network equipment market⁹. The study underscores E.C. concerns with respect to three aspects of the U.S. telecommunications market:

- the local/regional market, in particular the activities of the Regional Bell Operating Companies;
- the long-distance market, in particular the activities of AT & T; and
- the regulatory environment in the United States.

RBOCs

The Regional Bell Operating Companies (RBOCs) are telecommunications operators that enjoy exclusive rights to provide local/regional telecommunications services. Under current law, RBOCs are prohibited from having vertical links with respect to the production of telecommunications equipment.

The RBOCs purchase approximately 80 percent of all telecommunications network equipment sold in the United States. Their historical relationship with AT & T and their large installed base of AT & T products have made it difficult for suppliers other than AT & T to break into the U.S. market for extensions and upgradings. Moreover, despite their exclusive rights, the

⁹ Northern Business Information (NBI), "Central Office Equipment Purchases", A report prepared for The Office of the U.S. Trade Representative Executive Office of the President, Mc Graw Hill, March 20, 1992.

RBOCs are not subject to open procurement disciplines. The result, according to the independent study referenced above, is that AT & T and Northern Telecom supplied respectively 48 % and 41 % of the switching requirements of the RBOCs in 1990.

Thus, the AT & T divestiture has not resulted in a substantial opening of the telecommunications network equipment market to third-country suppliers, other than Northern Telecom, a U.S. subsidiary of Bell Canada Enterprises.

Long-distance market

The 1984 Modified Final Judgment (MFJ) divested AT & T of its regional/local activities, which are now performed by the RBOCs. AT & T retained the right to offer long-distance telecommunications services, although in competition with other carriers. AT & T is still the largest U.S. long-distance carrier, providing over 60 % of U.S. long-distance services. It is not subject to open procurement rules and buys all of its central office equipment, representing about 8% of the total U.S. market, from its own manufacturing subsidiary.

AT & T's strong position as a network operator combined with its size as an equipment manufacturer gives it a major structural advantage over many foreign firms. This vertical integration gives AT & T experience in operating and maintaining a telecommunications network in addition to designing and manufacturing equipment. Because no other manufacturers of comparable size operate networks, this is a competitive advantage. Vertical integration also entails the possibility of cross-subsidization, which has a number of negative effects including lack of long-term competitiveness for those companies which are competitors in the subsidized activity, in this case telecommunications equipment manufacturing. Thus, in order to prevent such cross-subsidization, it is necessary to ensure that the network operator is under effective competitive pressure.

It is instructive to contrast AT & T's position with that of companies in the more dynamic segments of the U.S. telecommunication market, where EC suppliers are afforded a fair opportunity to compete. In those dynamic market segments, for example the supply of switches, mobile communications, and transmission products to the U.S. independent telephone companies, EC suppliers have been more successful in obtaining orders. Nonetheless, taking the U.S. switch market as a whole, the recent independent study demonstrates that two North American companies, AT & T and Northern Telecom, supplied respectively 44 % and 40 % of the U.S. central office switching market in 1990 and that virtually all switches sold in the U.S. are manufactured in North America.

Regulatory environment

The process for adapting products to the particular U.S. standards and of gaining "type approval" for equipment in combination with the tendering process makes securing orders difficult. ~~Regulation by both the FCC and state regulators~~ has failed to remove all barriers to effective competition in the U.S. marketplace.

With respect to the future direction of U.S. regulatory policy, it is hoped that effective regulatory safeguards will be defined in order to ensure fair competition and transparent practices. ~~Without such sufficient safeguards, the proposals which are being considered by Congress,~~ for example to allow the RBOCs into equipment manufacturing (Hollings Bill), might result in a further de facto closure of the U.S. market to foreign firms.

Finally, it must be noted that the U.S. has recently threatened the Community once again with unilateral trade sanctions, this time under the Buy American's section of the 1988 Trade Act. The U.S. objects to the 3 % preference for EC-origin goods that is contained in the EC's utilities directive, a preference that the EC has offered to waive if it receives comparable, lasting, and effective access to the U.S. marketplace. Moreover, the U.S. sanctions threat comes despite a U.S. preference of 6 % imposed to make U.S. entities "Buy American". The threat disregards the U.S. large and growing telecommunications trade surplus with the Community, which is the result, in large measure, of the small share of the U.S. telecommunications network equipment market that is held by E.C. companies and the uncertainties in the U.S. regulatory environment that are chronicled above.

Canada

47. Bell Canada, Canada's largest telecommunications local service monopoly with 52% of the Canadian carriers revenues, is a fully owned subsidiary of BCE, which owns 53% of Northern Telecom, from which Bell Canada purchases about 80% of its equipment needs. Thus Northern Telecom enjoys similar advantages to AT & T, i.e., having close relationships with a major service provider.

Bell Canada's continued dominance in both long distance and local communications services in Canada's largest Provinces may provide Northern Telecom with possibly even greater protection in its home market than that enjoyed by AT & T.

A written agreement between Northern Telecom and Bell Canada permits the latter to purchase equipment from an alternative supplier, only if Northern Telecom cannot or will not supply the equipment.

In considering the closed nature of the Canadian market, it is worth noting that the telecommunications sector is excluded from the scope of the U.S.-Canadian Free Trade Agreement. As a result, each nation has provided that the other may retain its existing market arrangements, without challenge by firms from across their shared border.

Japan

48. NTT, the Japanese telecommunications operator, which represents 84% of all TOs revenues in Japan, had 1990 revenue of \$44.2 billion, making it the largest such operator in the world. The market has recently been liberalised, and NTT is excluded from international services and faces competition for domestic services.

However, it remains the dominant purchaser of equipment and provider of services, a situation likely to continue for some time. To date, it is difficult to enter the Japanese switch market without tendering into a research contract with NTT; since its creation in 1952, NTT has maintained a close relationship with selected suppliers, most notably Hitachi, NEC, Oki and Fujitsu.

These four companies, commonly referred to as the "NTT family", account for more than 60% of the Japanese domestic production of telecommunications equipment.

NTT's procurement from foreign suppliers during fiscal year 1991 remained at a low level (US\$ 603 million), although liberalisation of the products listed in the GATT Agreement on government procurement could have been expected to lead to a more open procurement policy. Also NTT's purchases of telecommunications equipment as such are not covered by the GATT Agreement. The impact of liberalisation on effective market access for European suppliers has been negligible so far.

It is also difficult to enter the non-NTT market for telecommunications equipment, because the new common carriers depend greatly on interconnection to the NTT network to provide service and therefore tend to procure most critical network equipment from Japanese suppliers most familiar with NTT's network.

Where some non-Japanese suppliers have gained orders it sometimes appears to be a response to external political pressure.

It is worthwhile to note that despite the NTT Procurement Agreement ¹⁰, the MOSS Agreements ¹¹ and most recently, the Structural Impediments Initiative (SI), U.S. firms have had only limited success in penetrating the Japanese market.

Some European companies have decided to leave the market altogether, whilst others are concentrating their attention on supplying specialized state of the art non-network equipment not yet available from Japanese producers.

However, if the future entails broadband ISDN and next-generation portable mobile communications, new demand will be created and new market opportunities will develop for European companies.

Trade Issues with Other Regions

EFTA

49. The European Free Trade Agreement (EFTA) countries already enjoy close co-operation with the Community in telecommunications. They are all members of CEPT and ETSI, and, as a result, collaborate closely in the field of standards.

In addition, the Community and the EFTA member states have decided to create a "European Economic Area" with conditions similar to those of a single market among the 19 countries involved. The EEA will provide trade, market access and competition rules for telecommunications equipment producers similar to those these enjoy in the internal EC market.

CENTRAL AND EASTERN EUROPE

50. The PHARE action will be a force in integrating Central and Eastern Europe with Western Europe and in furthering the region's economic transformation. This program should allow for

¹⁰ The so-called NTT Procurement Agreement, which was negotiated by the United States and Japan in 1981, was renewed three times, and is currently in effect until December 1992. It aims essentially at facilitating equipment bids from foreign suppliers.

¹¹ In 1986, the United States concluded the Market Oriented Sector Selective (MOSS) telecommunications negotiations with Japan, with the primary goal of ensuring that the Japanese regulatory process did not discriminate against foreign firms' products and services.

the creation of new commercial opportunities in the field of telecommunications considering its contribution to the completion of pan-European telecommunication infrastructures.

In a longer term perspective, the need for and possibility of close co-operation between the Community and Central and Eastern Europe in the field of precompetitive and prenormative R & D should be further investigated.

The commercial results of this closer integration with Central and Eastern Europe should be significant for EC companies.

However, in the absence of a level playing field at the international level, vertically integrated companies have a competitive advantage in the Central and Eastern European countries, being able to enter such markets with the combination of network operation, service provision and equipment manufacturing.

An important aspect in the context of the further integration of Europe concerns the extension to Central and Eastern Europe of the Community's GSM standard for digital mobile telephones and its concomitant encryption equipment.

In order to sustain the efforts of Central and Eastern European countries towards restructuring their telephone systems, the Community should promote the use of the GSM standard. In this context, the total removal of the digital telephony equipment from the COCOM list of controlled dual use products, might be appropriate. This would prevent new hurdles from thwarting on-going European harmonization in the field of telecommunications.

Comparison with EC Situation

51. The regulatory situation of public procurement rules and competition policy inside the EC for telecommunications equipment producers applies or will shortly apply to EC and non-EC producers on a nondiscriminatory basis.

52. As regards public procurement, the Council has adopted in September 1990 a Directive extending the rules already in application for public procurement to sectors previously excluded, particularly telecommunications.

It provides essentially that in respect of supply contracts above 600 000 ECUs sufficient publicity should be given through publication of a tender notice in the Official Journal of the European Communities and that the contracts should be attributed according to transparent criteria

normally to the most economically advantageous or lowest priced tender. The Directive which will come into force on 1st January 1993, aims at ensuring that there will be no discrimination in favour of domestic companies and that a real Community market for network equipment will be established.

The Community should ensure that multilateral rules under GATT give similar access to EC producers in third country markets, which should at the end exhibit the same transparency as it will be the case for the Community market.

53. In the EC, competition rules including the merger Regulation are applied in a nondiscriminatory manner to ensure that competition is not distorted. They prevent anti-competitive agreements and the creation or abuse of a dominant position.
54. In a merger or joint venture or other co-operative arrangement involving vertical link-ups between service providers and equipment producers the Commission will normally not raise any objections as long as there is effective competition in both the services and equipment involved. Thus, although each operation will have to be decided on a case by case basis, the entry of equipment producers into services which are liberalized and subject to effective competition and open entry would not normally create problems. On the other hand, where the link-up was with a service operator enjoying special or exclusive rights or not otherwise subject to effective competition, there is a risk of extending or strengthening a dominant position. Such link-ups will not be permitted or will be subject to stringent conditions.

In any event, any proposed restructuring co-operation between major European telecommunications operators and leading European equipment manufacturers, when permitted, will be subject to obligations of non discrimination and no cross-subsidization.

Where a service operator enjoying special or exclusive rights, and not therefore subject to effective competition, has a presence in the equipment market there is a danger that such vertical integration increases the risk of cross-subsidization, predatory pricing or other forms of discrimination which could be contrary to the rules of competition, in particular an abuse of a dominant position. The Commission will be vigilant in examining cases involving vertically integrated operators in whatever market a dominant position may be found, where such behaviour has an impact in the Community.

The Commission realises that there can be efficiency enhancing synergies that can stem from vertical links between service operators and equipment producers. Such link-ups can therefore be increasingly expected in EC markets. The key to these being accepted under EC competition rules is for a real opening of public procurement rules and liberalisation of services such that, because effective competition is introduced and maintained, there is no possibility of strengthening or extending a dominant position.

Moreover, a restructuring would be more likely to be accepted in a European single market than in a national market, especially if this latter is isolated by high barriers. In assessing this matter the Commission would take into account the evolution of the EC national markets towards integration.

55. The Community is concerned about the imbalance between, on the one hand, its open and nondiscriminatory approach to market access for telecommunications products, technologies and investments, and, on the other hand, the structural difficulties which may limit market openness in other major world markets.

Historically, EC markets have been relatively closed due to market fragmentation and the regulatory environment.

However, the EC has started an on-going process of creating an open internal market and service liberalization, which is designed to achieve the objectives of greater efficiency and economies of scale, lower network equipment costs, and higher quality services at more reasonable prices. At the same time, the Community has a parallel objective, which is to ensure that Community industry is globally competitive and able to operate under conditions of fair competition in other parts of the world.

Access to other markets is necessary not only in terms of sale opportunities, but also in terms of the advantages gained by close contact with leading industries, particularly in the United States and Japan.

It is also necessary that the structural operation of the world's major industries are not distorted by cross-subsidization of equipment by services within vertically integrated producers or by the free or concessionary transfer of R & D developed by the in-house research facilities of major telecommunications operators to their equipment suppliers.

The search for a "level playing field" should therefore be of paramount importance in Community efforts to achieve open and fair competition in world markets. The Community

intends to use all means at its disposal, including EC competition laws, bilateral negotiations, and multilateral fora to continue its push for fair trade in world markets.

In particular any anti-competitive practices implemented in the EC market wherever they take place will be subject to the application of the EC rules of competition.

VI LOOKING FORWARD

The Market Trends.

56. Overall growth in world equipment markets over the next two decades is expected to average between 5 and 6 per cent per year in real terms, (*Figure 2*), higher than the underlying growth of the economy but less than the rate of the growth of the telecommunications service sector, as the intensity of equipment use increases and as unit prices continue to fall in real terms. It is expected that the markets for mobile and data communications equipment will continue to grow at above average rates.
57. A significant change in the present geographical balance of world equipment markets is not expected.

The expansion of new and improved services, as manifested in mobile and data communications and in the addition of intelligent features to networks, will take place overwhelmingly in the major industrialised regions of North America, Japan and Europe, provided the current liberalisation of markets continues in Europe. There will, however, be some shift in market share towards the rest of the world for basic transmission and switching equipment.

58. The main market changes in the most important equipment product segments are expected to be as follows:

Public switching markets will show slower growth, particularly in revenue terms due to the maturity of the technology and substantial existing capacity.

Public transmission, on the other hand, will grow faster in the next decade than it has in the recent past. This growth will be spurred by the deployment of Synchronous Digital Hierarchy, (SDH and also known in the U.S. as SONET or Synchronous Optical network), and by the

development of fibre in the local loop, as broadband technologies begin to penetrate the market. This will be fostered by the growth of LANs and MANs ¹².

Cable markets will show declining growth in revenue terms due to the impact of high capacity fibre optic cable.

Satellite equipment will show substantial growth in Europe due to the deployment of VSAT systems following liberalisation in this area. Here, the European market is as yet relatively under-developed.

Mobile communications equipment, the fastest-growing sector of the 1980s, will become one of the most important segments, accounting for 10 per cent of all equipment expenditure in 1994. It is also possible that this market will keep growing significantly into the next century as wireless displaces some cable-based services.

Data communications equipment will continue to be one of the fastest-growing market segments despite a significant decline in unit costs. One important area of expansion will be wireless-based data products.

The markets for private voice-switching, (PBXs and key telephone systems), will face price competition from new Far Eastern suppliers. Larger, computer-controlled PBXs, taking full advantage of ISDN ¹³ features, will show healthier growth than smaller products.

Customer premises equipment markets will continue to grow but traditional suppliers will face stiff competition from consumer products suppliers. Given the competition from the Far East, this will threaten to effect Europe's trade balance.

The new intelligent network and other software-intensive network markets will be the subject of competition between traditional switch manufacturers, niche telecommunications equipment suppliers and computer manufacturers. This is a market that will account for a resurgence of spending at the turn of the century.

¹² LANs, Local Area Networks and MANs, Metropolitan Area Networks offering wider area LANs and the inter-connection of LANs.

¹³ ISDN, Integrated Services Digital Network, offering a further development of the digital telephone network, enabling combination of voice, data and images.

59. Such market developments will mean that switching and transmission continue to be the bulk markets, but that the high growth markets will be in mobile, data communications, and intelligence features in the network and satellites.

The Industry Challenge

60. The relative strengths of the European sector that can be highlighted are threefold.

The first is the high level of visibility that the large European equipment suppliers have in world markets, including their significant installed equipment bases, customer relationships and international experience.

The second is the rationalisation and re-structuring that is taking place in the context of a more unified, liberalized and globally integrated European market.

The third is the benefit stemming from the Community R & D programmes to support telecommunications development.

61. At the same time, European equipment suppliers demonstrate five major potential weaknesses.

The first is that most European telecommunications equipment manufacturers, particularly in the switching and transmission businesses, still have to adapt their organisation, structure and strategies to meet successfully the challenges created by global competition, the coming creation of a real internal market and the further liberalization of services.

The second potential weakness to be countered is that European companies face stiff competition from companies based in other markets such as North America and Japan where earlier liberalisation of the terminal equipment market and some services has led to a stimulated market growth, particularly for telecommunications terminal equipment.

The third is that the relatively long-term nature of shared European research programmes obscures the fact that short-term objectives may need to be set to influence market positions, for example to bring to market in Europe digital mobile handsets.

The efforts of European manufacturers to develop with users and service providers the means to enter new product fields and applications should be facilitated and encouraged, in particular by

ensuring the appropriate liberalised regulatory framework, standards and network interconnection possibilities.

Fourthly, the problems of fair, transparent, nondiscriminatory conditions of access to high-growth market segments in other areas of the world, particularly Far Eastern markets and the United States, due to existing structural and regulatory barriers, needs to be examined in detail.

Lastly, the continued requirement by the governments of several European nations that their TOs contribute to other public activities and services, combined with other factors limiting the productivity of the TOs, inevitably reduces their capability of investing in network equipment and systems evolution and forces them into a situation where their internal cash generation is insufficient to finance the investments, compared with their international competitors.

62. A major factor for future success will be whether companies can take on the challenges they face while expanding into new markets.

The underlying trend in traditional telecommunications equipment markets, such as switching, is for a shift from hardware to software-based activities. This will lead to a fundamental change in the revenue structure of companies.

A second major challenge is involved in moving into new consumer markets. Serving these markets means addressing a completely new customer base, with which many European companies do not yet have extensive experience. They will need to develop both traditional marketing methods and new skills orientated to mass consumer markets.

A third and related challenge will be to develop new distribution channels. This means moving from the relatively targeted contacts with a number of TOs to competing with distribution channels built up by companies serving the consumer electronics market.

The ability to tackle these three challenges will be a critical factor for success, particularly for small- and medium-sized companies in the supply industry.

63. Vertical integration or other forms of co-operation such as joint ventures and strategic alliances may be necessary in certain fields between service providers and equipment manufacturing to exploit the full potential of available synergies. This potential is likely to grow as the value added and software content of services increases relative to that of hardware. It is important that the regulatory environment can facilitate such pro-competitive co-operation and distinguish

it from that designed merely to define or extend monopoly or exclusive rights or operate predatory pricing/cross-subsidization.

VII. CONCLUSIONS AND PROPOSALS

64. The European industries in the telecommunications sector enjoy, as we have already noted, a favourable overall situation.

However, they must address both insufficiencies in certain leading segments of the market and potential threats ~~resulting from imperfect conditions of competition in the world.~~

Actions need to be taken in order to restore their competitiveness and to remedy the structural problems they face. **These actions are in the first place the responsibility of the industries themselves.**

An important strategic angle for them involves the realisation of those changes which will allow them to make maximum use of the new opportunities offered by the setting up of the internal market - the would-be base from which these industries will strengthen their presence in the world market.

These changes which must respect Community competition laws, should include efforts in technological development, ~~increased productivity, improved and enlarged distribution channels, and expanded alliances in Europe and around the world.~~

The Community and the Member States should take initiatives to ensure industry a favourable business environment, while respecting the principle of subsidiarity.

65. Community action regarding the different areas of the sector should aim at four fundamental objectives:

- **The establishment of a real internal market** as a base for the development of the telecommunications industry and to stimulate in a permanent and sustainable way dynamic demand conditions.
- **The support of technological development** essential in a sector where technical progress is very rapid and which should aim at putting advanced services at the disposal of the

European economy as well as allowing industry to remain strongly competitive on the world market.

- The improvement of the industry's position in the terminal equipment sector, a growing segment of the telecommunications equipment market.
- The search for level playing conditions of competition in the world market allowing European industry access to any third country markets especially where difficulties are currently experienced: this is of vital importance for its development to enjoy the full advantages of economies of scope and scale.

The Establishment of the Internal Market

66. In the context of the establishment of the internal market, the follow-up and acceleration of the implementation of the Green Paper programme regarding the creation of a unified telecommunications market should therefore supply the base for progress. This programme, taking into account the follow-up of actions being carried out in the current sectors, should now aim at perfecting the operation of the internal market as a level playing field for all economic operators and emphasize expansion, by liberalisation and harmonization, of new segments of the market (for example mobile communications, satellite communications, the development of intelligent networks and the supply of advanced services).

The Liberalization Aspect

67. Competition, promoted by active competition policy, is central to the creation of the conditions necessary for economic growth because it provides the spur to firms to undertake R & D and to invest. In this respect, guidelines have been recently defined to advise the various actors about the general legal and economic principles which have been and are being followed by the Commission in the application of competition rules to undertakings in the telecommunications sector ¹⁴.

In addition, the Commission will ensure that distortion of competition is avoided by applying its policy set out in the "Community framework for State aids for research and development" (OJ No. C 83 of 11 April 1986): aspects of the problem to be dealt with include the transfer to industry, free of charge or for a charge lower than the true cost of the service, of research and

¹⁴ "Guidelines on the Application of EEC Competition Rules in the Telecommunications Sector", 91/C 233/02, OJ No C 233/2, 6.9.1991.

development results from State-supported institutions, without prejudice to any other direct or indirect means used towards the same end.

A dynamic market in telecommunications services is the key element for a healthy market in telecommunications equipment.

The continuous expansion of the services market, further promoted by the liberalization process, combined with an improved investment force of those network operators which continue to be the largest buyers of equipment, should form the basis of the growth in the equipment sector. EC procurement rules will be vigorously applied in order to ensure that procurement is open and nondiscriminatory.

This scenario, in turn, depends on the opportunity given to any service provider to compete freely on the market for telecommunications services.

Indeed, competitiveness will be jeopardized if telecommunications organizations can maintain tariffs at a high, non cost-oriented, level through abuse of their monopoly / dominant position in creating and operating the networks and, when applicable, in providing telecommunications services.

The Harmonization Aspect

68. If the liberalization of services constitutes a condition for their rapid development, harmonization of both services and equipment is of importance to allow the unification of the present market, fragmented by the existence of technical differences, and the setting up of pan-European services.

The backbone of this harmonization is the availability of a coherent and dynamic European system of standardization and of certification. The creation of ETSI, adding to the already existing standardization organisations (CEN and CENELEC), has become a major asset in to the telecommunications sector in Europe. The Community legislation already adopted, especially regarding terminals, established the bases for an efficient application of standards prepared by ETSI and CEN-CENELEC.

Community efforts should now concentrate on four aspects:

- The pursuit of an active policy regarding the rapid creation of standards by supporting the work of standardization organisations especially by contributing to their resources when found necessary, and, by active participation in solving problems of principle which are created by standardization, for example, the question of intellectual property rights, the coherence between services, terminals and ONP standards, stimulation of application of standards outside of the regulatory context.

The support that will be allowed in the context of Title XII of the Treaty of European Union to the development of Trans-European Networks will have a significant effect in the promotion of the use of Community standards: the actions envisaged in the field of transborder interconnection of ISDN, broadband communications and for the telematic networks between Administrations will in fact draw the best from the Community standardisation work, at the same time as they will foster the development of the internal market and of the European economy as a whole.

- Initiatives, especially in the area of organisation, aiming to ensure the best possible synergy between the European standardisation bodies to achieve greater coherence and to make the standard setting process fully transparent and accessible to users.

This requires to further rationalize this system, as proposed by the Green Paper on standardization and to put in place rapidly an efficient system of Community certification.

- The necessary preparation to ensure that the Directive ¹⁵ governing the placing on the market of terminal equipment shall produce its effects at the time when it comes into force in November 1992.
- The activities of ETSI will of course be examined under Articles 85 and 86 in the normal course of events.

Support to Research and Technological Development

69. In a sector in rapid technological evolution and where the costs of R & D weigh more and more heavily on the costs of the market, the co-operation in R & D remains an essential element of the Community policy of the sector, as long as the strategy followed by the actors in the sector leads them to immediate exploitation of results from R & D efforts carried out on a common level.

¹⁵ Council Directive 91/263 EEC of 29 April 1991 (OJ L 128 of May 23rd, 1991).

Such a strategy should push network operators and services providers to stimulate the take off of the market by the rapid offer of advanced services, based on technologies which European industry will learn to master in the framework of common research programmes.

Such an approach by the European service providers would be at the advantage of the European industry since it would allow the latter to put to the test at an early stage the operational solutions which it could then exploit with success on the world markets, including those of our advanced commercial partners. In this context, the use of the RACE programme results would be accentuated.

The Community effort in R & D should be enlarged to take into account the needs of the markets presently in growth, especially mobile communications, the VSAT and terminals which will influence more and more the Community commercial position.

On the other hand, pre-competitive research should not limit itself to long term aspects of the market, but should also reinforce the effect of research and technological development investments on industrial competitiveness. Priority technology projects as mentioned in the Commission's recent Communication on research after Maastricht ¹⁶, should contribute to this objective by ensuring the availability of generic technologies for the support of industrial research projects spontaneously emerging from enterprises. The research carried out under these priority technology activities could also help the re-orientation of industries towards the new requirements created by technical and regulatory evolution of the sector, supporting, for example, the development of new common products with advanced users.

In order to draw the best from the potential, especially in R & D, of the European telecommunications industry, it is necessary to fully exploit the synergy between the telecommunications equipment sector and that of the European electronics industry. The general lines of action presented in the "Communication on the Electronics and Information Technology Industry" equally concern deeply the European Telecommunications Equipment Industry.

The Terminal Equipment Market

70. The terminal market represents an important segment of the telecommunications equipment market (nearly 10 billion ECU/year) and European industry shows a real weakness in this

¹⁶ "Research after Maastricht: An Assessment, a Strategy", Communication from the Commission to the Council and the European Parliament, SEC(92) 682, 9 April 1992.

sector. The Commission proposes to carry out, in compliance with Community competition rules, a series of consultations with the objective of supporting industrial efforts to emerge as competitive players in the new market segments.

This would imply, of course, maintaining of the present policy of terminals liberalisation, and of competition between firms with regard to basic engineering, production, distribution and services. These consultations would concern the upstream stage of the industry process, and would bring together the manufacturing industry, the service providers and the users.

This would equally imply co-operation in R & D in those basic technologies required for the realisation of identified terminals, in line with the approach set out in the Commission's recent communication on research after Maastricht ¹⁷.

Improving the Conditions of Competition in the World Market

71. The global nature of the telecommunications equipment business requires particular attention to the external aspects of the sector.

It requires action so that, on the world level, the conditions of competition are balanced and that European suppliers of equipment benefit from nondiscriminatory access to markets of third countries, just as firms from these countries will benefit from nondiscriminatory access in the Community.

The search for a "level playing field" for the telecommunications industry on the world level, could be reached by the use of two means, combined or not:

- The elimination of those unsatisfactory access conditions which prevail in markets outside the Community.
- The setting of appropriate rules of competition at world level.

The actions required come mainly from two Community instruments: commercial policy and competition policy. They will be supported by the "Centralized Point of Information" ¹⁸ which

¹⁷ SEC(92) 682, op.cit.

¹⁸ Requested by the Council in its Resolution of 18 November 1991 concerning electronics, information and communication technologies.

the Commission is currently establishing with a view to monitoring marketing, market access and competitive practices throughout the main industrial areas in the world.

Commercial Policy

72. The Community has long sought fair access to the market of its principal business partners (USA, Japan, Canada, EFTA) that is comparable with the openness available to foreign companies in the EC. This objective has been sought both in multilateral fora, such as the GATT and OECD, and in bilateral negotiations.

In this context, a first priority is, of course, the successful outcome of the Uruguay Round negotiations on market access and on renewal of the GATT Government Procurement Code. In both of these negotiations, the Community is offering full, nondiscriminatory access to the EC market in return for removal of the legal or structural barriers in foreign markets that are discussed above. It is noteworthy in this regard that the EC has offered to subject its telecommunications operators to the disciplines of the Government Procurement Code, in return for comparable, effective, and lasting access to the markets of its principal partners. The Community encourages its principal trading partners to make the same commitment to submit telecommunications procurement to effective international disciplines.

These EC concerns are all the more pressing because they come at a time when foreign firms are increasing their efforts to gain shares of the increasingly open EC telecommunications market. As a result, it becomes a matter of primary concern that EC firms be given comparable, effective, and lasting access to third country markets.

Competition Policy

73. Even in the case of a positive conclusion in GATT, the problem of balanced access conditions will not be entirely resolved, given the unbalance of strategic advantages resulting from the anti-competitive practices that may be found in certain regions in the absence of appropriate safeguards.

This applies in particular to the transfer to industry, free of charge or for a charge lower than the true cost of the service, of research and development results by telecommunications operators.

As a consequence, the Community will in parallel have recourse to competition policy in the regions (North America, Japan, Europe), to the extent required to ensure those modifications which would guarantee equivalent conditions of competition, the "level playing field".

The Commission will ask the U.S. authorities to intervene, under the recent bilateral EC/U.S. Anti-trust Agreement, where there is reason to believe that illegal behaviour is practiced by U.S. companies, which has an adverse impact on EC companies operating in the United States. The Commission will investigate allegations of anti-competitive practices by foreign vertically integrated telecommunications companies that do not practice open procurement and are able to cross-subsidise exports.

In an industry where technological progress is moving rapidly, where strategic alliances are vital but fluid and often short-lived, and where there is a premium on being first in the market, it is essential that Community competition rules are transparent and that a rapid reaction can be given.

It should also take external measures, by using the actual and potential application of competition policy to support the political process by which third countries (notably the United States and Japan) can be brought to liberalise and provide access to their markets.

74. Meanwhile, industry should benefit also from Community action in the following areas:

- Standardization

Given the global importance of telecommunications, and the importance of standards in the telecommunications domain, the Community should promote the development of international standards and endeavour that these take Community interests into account. In particular, the Community should continue to encourage its major trading partners to increase their use of international standards in order to ensure comparable access to their telecommunications markets.

The Community has already insisted upon acceleration of the work on standardization within the ITU, where it has an observer status.

It is necessary to increase Community effort in this area, so that, with the help of Member States, Community developments in the field of standardization and of conformity specifications are introduced into international work.

Particular attention should be paid to the availability of intellectual property rights with respect to international standards on a nondiscriminatory basis and under reasonable conditions.

- Mutual recognition of approvals of terminals

The legislation to ensure an open market for terminals in the Community is in place, but their placing on the market remains subject to approval procedures. The access of European terminals to third countries' markets, and vice-versa, would be facilitated if agreements of mutual recognition of conformity tests or of approvals existed between the Community and third countries.

A negotiating mandate in the area of mutual recognition of terminal equipment type approval has recently been adopted by the Commission and is now being examined in the Council.

- Training and retraining

In its Communication COM(92) 2000 "From the Single Act to Maastricht and beyond: the means to match our ambitions", the Commission stated that human capital is now one of the decisive factors in competitiveness.

The new Article 123 of the Treaty introduces very wide terms of reference for human resources policy, including the possibility of using the Social Fund to make it easier for workers to adapt to industrial changes and to changes in production systems, in particular through vocational training and retraining. The Commission therefore envisages a re-
definition of Objectives 3 and 4 of the Structural Funds. In the context of these objectives, a major effort will be devoted throughout the Community to vocational training and retraining in anticipation of industrial and technological changes.

In view of the preceding analysis of the strengths and weaknesses of the telecommunications equipment industry, programs to improve the skills of the SME-supplier base and to accelerate the introduction, maintenance and operation of flexible manufacturing systems should be of particular benefit to this industry.

However, what the Commission has in mind is an horizontal approach which can be applied to the whole industry without drawing any distinction between the sector, location or size of the company involved.

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75. This communication is intended to serve as background for a debate with the Member States, the European Parliament, the Economic and Social Committee as well as the industries, manufacturers and users concerned, in order to analyse the situation as perceived by the Commission and discuss the action to be taken.

This should enable the Commission to enter into fruitful dialogue with the main actors involved including the equipment and service industries, operators and users, in order to assess the situation in greater depth from a dynamic perspective and to discuss in particular rules and mechanisms needed to support the Community's pledge to free and fair international trade and competition for both telecommunications products and technologies, while respecting the roles of the parties concerned.

ANNEXES

Figure 1 World Telecoms Equipment Market, 1990

Figure 2 World Telecommunications Expenditure, by Type of Equipment 1984-2010

Figure 3 World Ranking of Telecommunications Equipment Manufacturers in 1990

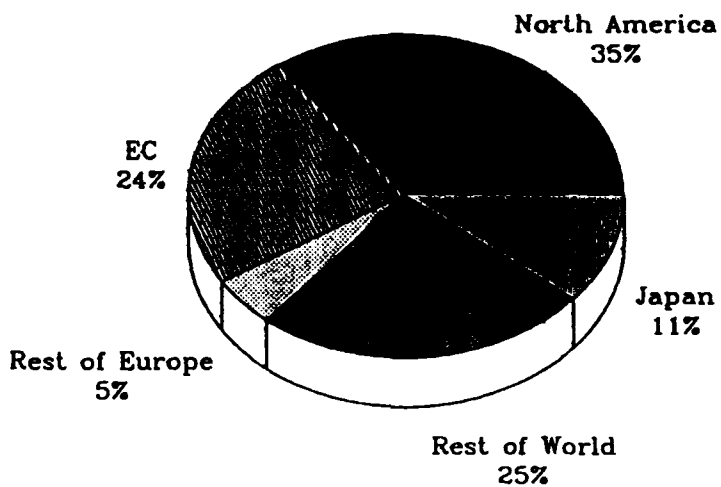
Figure 4 The Largest Buyers of Telecommunications Equipment, 1990

Figure 5 Telecommunications Equipment Trade 1980-1990

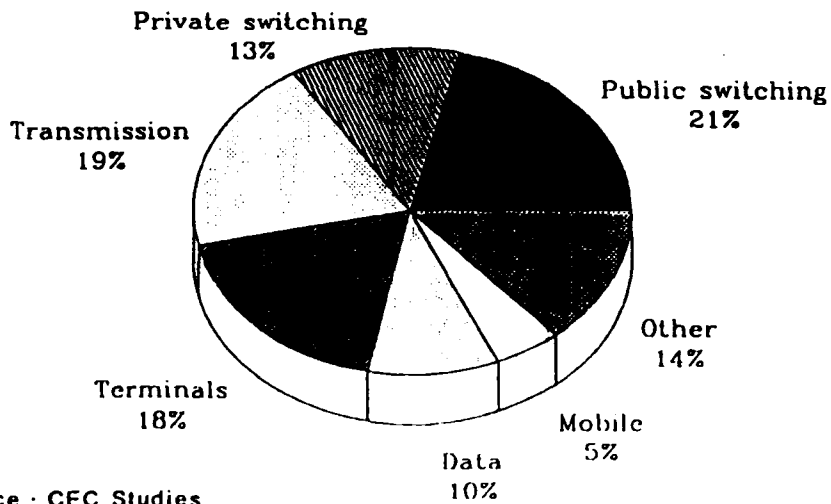
Figure 6 Telecommunications Equipment Trade 1990 by Type of Equipment

Figure 1. World Telecommunications Equipment Market - 1990
Total is ECU 110 Billion

by Geographical Area



by Product Category



Source : CEC Studies

Figure 2 World Telecommunications Expenditure, by Type of Equipment, 1984-2010

Type of Equipment	1984-1989		Growth per year 1984-1989	1990-2010			Growth %/year 1990-2000 2000-2010	
	1984	1989		1990	2000	2010	1990-2000	2000-2010
Public Switching	17.8	23.2	5.5	28	41	58	3.7	3.7
Transmission	14.7	18.2	4.3	22	36	49	5.0	2.9
Cable	5.8	7.5	5.2	9	13	16	3.0	3.0
Satellite	2.0	2.9	7.2	3	5	6	2.9	3.4
Mobile/Personal Communication	3.4	8.0	18.6	10	28	65	11.0	8.9
Data Communication	4.3	8.9	15.5	10	25	49	9.0	6.6
PBX and Key Systems	4.9	7.5	8.9	9	15	27	5.6	5.6
Customer Premises Equipment	6.1	7.9	5.2	9	16	29	5.9	6.3
Other	5.3	5.7	1.2	7	10	17	4.2	5.9
World Total	64.3	89.8	6.8	109	189	315	5.7	5.1

Source: CEC Studies

**Figure 3 World Ranking of Telecommunications Equipment Manufacturers
(World Telecoms Equipment Turnover in million ECU, 1990)**

Rank	Company	Country of Origin	Turnover
1	AT & T	United States	9,581
2	Alcatel NV	EC	9,412
3	Siemens	EC	6,756
4	Ericsson	Sweden	5,872
5	NEC	Japan	5,780
6	Northern Telecom	Canada	5,316
7	Motorola	United States	2,796
8	GTE	United States	2,662
9	Bosch	EC	2,576
10	Fujitsu	Japan	2,456
11	IBM	United States	2,317
12	GEC	EC	1,818
13	Hitachi	Japan	1,716
14	Ascom	Switzerland	1,673
15	Italtel	EC	1,541
16	Philips	EC	1,516
17	Racal	EC	1,450
18	Telettra	EC	1,121
19	Nokia	Finland	1,048
20	Oki	Japan	1,033
21	Matsushita	Japan	933
22	Matra Communication	EC	781
23	Ricoh	Japan	781
24	Sagem	EC	769
25	STC	EC	754

Source: IDATE, 1991
(ECU1 = \$1.27343)

Figure 4. World Ranking of the Largest Buyers of Telecommunications Equipment according to their Revenue from Telecommunications Services in billion ECU, 1990

Rank	Telecommunications Operator	Country of Origin	Revenue
1	NTT	Japan	34.7
2	DBP Telekom	EC	19.7
3	AT & T	USA	19.7
4	BT	EC	19.1
5	France Telecom	EC	16.6
6	BellSouth	USA	11.3
7	SIP	EC	11.0
8	Nynex	USA	10.7
9	GTE	USA	10.0
10	Bell Atlantic	USA	9.7
11	Ameritech	USA	8.4
12	US West	USA	7.8
13	Pacific Telesis	USA	7.6
14	Southwestern Bell	USA	7.2
15	Telefonica	EC	6.6

Source : IDATE, 1991
(ECU1 = \$1.27343)

Figure 5. EC Telecommunications Equipment Trade (Million ECU)

Imports	USA	Japan	HK/K/S/T	EFTA	ROW	Total
1980	487	192	90	377	131	1277
1981	526	236	102	373	224	1461
1982	612	262	116	411	270	1671
1983	705	301	132	476	331	1945
1984	1003	459	207	589	401	2659
1985	1242	575	240	736	407	3200
1986	989	730	265	700	379	3063
1987	910	984	357	906	429	3586
1988	820	1223	343	951	359	3696
1989	1037	1453	409	1138	515	4552
1990	1001	1204	441	1084	532	4262
Exports	USA	Japan	HK/K/S/T	EFTA	ROW	Total
1980	106	14	241	485	1873	2719
1981	137	17	222	536	2241	3153
1982	195	16	186	620	2505	3522
1983	256	21	138	613	2767	3795
1984	361	29	198	777	3039	4404
1985	444	39	200	980	3107	4770
1986	368	39	198	956	2743	4304
1987	417	40	192	1105	2861	4615
1988	412	51	186	1038	2100	3787
1989	716	65	259	1130	2493	4663
1990	563	70	261	1073	2591	4558
Balance	USA	Japan	HK/K/S/T	EFTA	ROW	Total
1980	-381	-178	151	108	1742	1442
1981	-390	-219	120	163	2018	1692
1982	-417	-246	70	209	2235	1851
1983	-449	-280	6	138	2436	1851
1984	-642	-431	-9	188	2639	1745
1985	-798	-536	-40	244	2700	1570
1986	-620	-692	-68	256	2365	1241
1987	-494	-944	-165	199	2433	1029
1988	-408	-1172	-157	88	1740	91
1989	-321	-1388	-150	-8	1977	110
1990	-439	-1134	-180	-11	2060	296

Source: Eurostat - COMEXT, based on DGXIII trade aggregates

Notes:

All figures are nominal.

Figures for the years 1980-1987 cannot be compared directly with figures for 1988-1990 because of changes in trade classifications.

Satellite equipment is not included in the trade figures.

HK/K/S/T: Hong Kong, South-Korea, Singapore and Taiwan.

Figure 6. EC Telecommunications Equipment Trade 1990 (Million ECU)

Imports	USA	Japan	HK/K/S/T	EFTA	ROW	Total
Switching Equipment	121	118	50	167	116	572
Transmission Equipment	352	80	91	147	80	750
Radio/radio related Equipment	42	45	5	52	10	154
Telecommunications Components	53	97	6	137	45	338
All Terminals	432	864	289	580	283	2448
<i>Facsimile Terminals</i>	122	651	42	21	25	861
<i>Other Terminals</i>	311	213	247	559	257	1587
All Equipment	1001	1204	441	1084	532	4262
Exports	USA	Japan	HK/K/S/T	EFTA	ROW	Total
Switching Equipment	93	5	42	111	456	707
Transmission Equipment	199	33	81	464	539	1316
Radio/radio related Equipment	25	2	7	35	162	231
Telecommunications Components	66	8	28	117	154	373
All Terminals	180	21	103	345	1282	1931
<i>Facsimile Terminals</i>	15	3	14	53	120	205
<i>Other Terminals</i>	164	18	89	292	1163	1726
All Equipment	563	70	261	1073	2591	4558
Balance	USA	Japan	HK/K/S/T	EFTA	ROW	Total
Switching Equipment	-29	-113	-8	-56	340	134
Transmission Equipment	-153	-47	-10	317	460	567
Radio/radio related Equipment	-17	-43	2	-17	152	77
Telecommunications Components	13	-88	22	-20	109	36
All Terminals	-253	-843	-186	-236	1001	-517
<i>Facsimile Terminals</i>	-106	-648	-29	31	96	-656
<i>Other Terminals</i>	-146	-195	-158	-267	905	139
All Equipment	-439	-1134	-180	-11	2060	296

Source: Eurostat - COMEXT, based on DGXIII trade aggregates

Notes:

All figures are nominal.

Satellite equipment is not included in the trade figures.

HK/K/S/T : Hong Kong, South-Korea, Singapore and Taiwan.