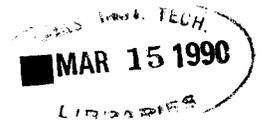


COMMUNICATIONS  
FORUM

DEWEY



1992: IMPLICATIONS FOR U.S. COMMUNICATIONS  
INDUSTRIES AND SERVICES

November 30, 1989

Seminar Notes

**MASSACHUSETTS INSTITUTE OF TECHNOLOGY  
COMMUNICATIONS FORUM**

**1992: IMPLICATIONS FOR U.S. COMMUNICATIONS  
INDUSTRIES AND SERVICES**

**November 30, 1989**

**Seminar Notes**

**Kenneth L. Phillips, CCTU**

**Michael Tyler, Booz, Allen & Hamilton**

**David Webster, The Annenberg Washington Program**

**Suzanne Neil, MIT, Organizer**

**Antonio J. J. Botelho, Rapporteur**

This session of the MIT Communications Forum presented an overview of the communications industry aspects of the European Single Market Act and then offered an in depth analyses of broadcast and large users interests. The discussion focused but was not limited to the impact of "1992" on the U.S. communications industries and services.

The overview was presented by Michael Tyler, Vice-President, Booz, Allen & Hamilton, in charge of the information industries practice and former CEO of CSP International. There has been a lot of hype in the media about 1992, as well as some volatility in opinion. While the press has been emphasizing the importance of 1992 there is a contrary view represented by Alain Minc's La Grande Illusion, which argues that EEC's 1992 is a bit of an illusion.

Tyler began by saying that it is important that the EC Commission has belatedly recognized the crucial economic role of telecommunications for a pan-European economy. The EC's mission of creating a single European economy has to some extent been achieved in a number of manufacturing industries. There is little doubt that the European GNP has risen and the consumers can buy white goods cheaper than would have been the case in the absence of EEC. Why has the EEC been so late to come to grips with telecommunications sector? First, there is a political reason. The telecommunications and mass media sectors were perceived as being part of the fundamental political core of national sovereignty. Secondly, the economic significance was not really grasped. Last but not least it was known to be an area of very powerful entrenchment of national interests. Furthermore, it had not traditionally been on the agenda of GATT and hardly anyone in the economics profession knew anything about it. In fact, an EEC official once described the sector as the pursuit of the intangible by the unintelligible.

That was the situation until relatively recently. What changed? First it became apparent that telecommunications was more important to the economy than previously thought. It is quite big, about 3 percent of the GDP, and has an impact on the productivity and competitiveness of other industries. In the past, for the PTTs the EEC did not exist. Intra-EC international telephone rates are more than triple US long-distance rates. Second, the US, UK, and Japanese experiences started to show that you can in fact create competition, even in basic telecommunications. Thirdly, it became clear that competition in television can have large potential economic gains. Finally, the impact of the television industry on the formation of public opinion and the creation of political community again became an important political issue, and the formation of a EC television environment open to EC members became a political imperative.

Tyler argued that these changes led to "the ten commandments", embodied in the EC's 1987 Green Paper, which represent a series of intentions and a rather dramatic move in the direction of a competitive model (Exhibit 1). The exception to the competitive model was the reservation of basic telephone services to national monopolies.

Since 1987 the situation has evolved. The Commission has become more aggressive in some areas and less aggressive in others. It has pushed through a directive (Article 90

initiative) which in fact liberalizes the market for telephone sets and terminal equipment. That has been challenged by several states, notably France. A June 1989, further directive on value added services, scheduled to come in force in April 1990, would also deregulate plain old data transmission services, provided the deregulated operator does not operate the underlying transmission facilities itself. In fact the directive requires PTOs to lease lines to independent operators for their use in providing data services to third parties. Finally, there is a draft of the Open Network Provision (ONP), similar to the U.S. Open Network Architecture, under consideration. This directive if implemented would ensure that providers of services other than the PTTs or PTOs could interconnect on equitable basis with the dominant telecom operator. Again, France leads the opposition to the ONP directive. France may agree to ONP directive if Commission backs down on non-value added data services in June 1989 directive.

In terms of broadcasting, the two television commandments are first that member-states of the EC may not exclude program services or advertisers from other member states that meet EC-defined standards. Secondly, advertising standards must be met for any program service that has this "right of access." In addition, one key element is that EC's content guideline should be met by services covered by the Directive "where practicable."

In his concluding remarks, Tyler argued that although the ten commandments include harmonization of public procurement, their intention is to restrict it to EC member-states. This is a sign of the formation of a fortress Europe. Overall the whole question of fortress Europe is up for grabs. It is all a question of negotiating reciprocity through a variety of methods. Tyler also signaled the importance of standard setting for creating harmonization within Europe and potential barriers to outsiders. Relating these issues to developments taking place in Eastern Europe, Tyler once more referred to Minc's La Grande Illusion, which argues that the EC was really a piece of organizational superstructure wrapped around old-fashioned power politics (the Franco-German "entente"). Now, Tyler argues, the fundamental economic interest of West Germany has changed because of the radical events taking place in Eastern Europe. To put these two sides in perspective there is a mass media dimension to these questions alongside the telecommunications dimension. We have learned in the past few years that telecommunication has a very large impact on economic performance, and second, that how much difference it makes depends on how much it is directed to a market economy as opposed to a centrally planned economy. To make the transition from the latter to the former it is better that the public telecommunications network works. Eastern European countries' governments, notably Hungary, are recognizing this and doing something about will be one of the major areas of industrial opportunity and therefore an important share of trade.

The next speaker was Kenneth L. Phillips, Chairman, Legislative Affairs, Committee of Corporate Telecommunications Users (CCTU). Phillips stated that his observations were made from the perspective of the large user. The Committee of Corporate Telecommunications Users is a not for profit corporation which represents some thirty of the nation's largest telecommunications users before Congress, the FCC, and State Public Utility Commissions. Work in the international arena is more limited.

Phillips began by reminding the audience that the stake holders in the telecommunications

aspects of EC 1992 are equipment manufacturers, PTTs, and users, and that much more is at risk than the fiscal future of these players. Without a lengthy discussion of what is generally called the geopolitics of information and its "technopolitical" implications, suffice to say that as the electronic transfer of bits and bytes takes place globally the free world shifts on to the information standard. Two dynamics emerge from this. The first shifts national economic viability onto a function of its ability to effect social changes which accompany this basic shift to the information economy. The second deals with the ability for creative competition, creative because as we employ increasingly advanced technologies of telecommunications, we make the game of transporting, analyzing, and packaging information enormously more competitive from the standpoint of product differentiation by service providers.

Europe says that it shall cut its economic losses by joining its forces. Barbara Tuchman reminds us that not only does this assertion fly directly in the face of European tradition, but that no such effort has succeeded in the European theatre since the Hanseatic League - and that was a success of very limited duration.

Phillips then remarked that today there is not a clue of there being any Common Market in telecommunications in Europe. From a user perspective, the notion of Siemens switches being sold on the Rue de Rivoli is as unlikely as it was twenty years ago. However, the 1987 EC Green Paper aims in this direction. The eight major topic areas addressed are: Standardization, Terminal Equipment Liberalization, Public Procurement, Service Liberalization, Open Network Provision (ONP), Terminal Equipment Type Approval, Competitive Guidelines, and Satellite Services. Before liberalization in all these areas happens, a number of changes has to occur: complete separation of the postal and telecommunications functions within the PTTs, disconnection of the regulatory functions from the operational management functions; evolution of the uniform type approval process leading to a complete opening of the Customer Premises Equipment (CPE) marketplace to competition; and the offer of telecommunications services other than POTS on a competitive basis.

Phillips noted that the Green Paper in fact proposes a set of transition principles to be implemented in accordance with the Open Network Provision (ONP) doctrine. While many cite the similarity of ONP in Europe to Open Network Architecture (ONA) in the United States, the history leading to these doctrines in the two regions has hardly anything in common. Indeed, in the U.S. one should not talk of ONA without also including its sister doctrine of Comparably Efficient Interconnection, which given North American network architecture, has ramifications totally unheard of in Europe in the long haul transmission marketplace. He also remarked that ONA and CEI were instituted as regulatory quid quo pros for the powers granted in Part 8(c) of the MFJ, permitting RBOCs into non-telecommunications lines of business. ONA and CEI do though have two common goals: promotion of competition in both the private and ongoing regulated sectors and control and imposition of safety checks against anti-competitive behavior by dominant service providers (Anti-trust in the U.S.). These goals, in turn, have several important features: equal access to network; uniformity of ONP offerings among member states; unbundling of network infrastructure. This is critically important to operators of large corporate networks (These are fairly large networks. Citicorp's network alone if operated by an independent

telephone company would be the fifth largest in the country). Failure to unbundle can and often does lead to increased bypassing of the public switched networks, which causes the economic nightmare of network abandonment to become a self-fulfilling reality. Not addressed in either the U.S. or EC arenas is the issue of co-location on the operational side, or the implications of coordinated EC activity for matters of privacy and intellectual property, and the status of meta-information (e.g., the information held by a library concerning the lending history of a book or patron) stemming from basic technologies: information about information.

Phillips turned his attention to the Green Paper from the large user perspective. There are several reasons for why users are seriously beginning to question why, how soon, or even whether the EC effort in the service of "progressively introducing competition into the telecommunications market" will ever reap tangible benefits.

The first one is standardization. The European Telecommunications Standard Institute (ETSI), the EC's standard setting body for the area, started operating only in March 1989 and is currently developing specifications of technologies ranging from ISDN to pan-European digital cellular service. Vendors of equipment as well as users were skeptical that ETSI's charter and operating procedures would be heavily skewed toward CEPT administrations. This is a diminishing issue since the membership base is broadening considerably and the election of a user as Vice Chairman of the General Assembly and Technical Committee on Business Telecommunications. Now there is lots of optimism that ETSI will be favorable to users.

The next point is terminal equipment liberalization. A Directive for the liberalization of terminal equipment was adopted by the EC Commission on May 16, 1988 and provides for the following implementation schedule: December 31, 1988 -- users must have free access to new public network termination points, while access to existing points must be given within a reasonable time after that date; and July 1, 1989 -- technical specifications and type approval procedures for terminal equipment must be granted by an independent body. Judgment of France's challenge to the Directive (mentioned above by Tyler) based on the claim that the Commission exceeded its authority will be handed down in early 1990 and if against the Commission could severely undercut the 1992 program. Thus many observers believe that the action will be sustained. The Directive is an important step in creating an entirely open market for connection and maintenance of terminal equipment, since by the end of 1990 Administrations will cease to have exclusive powers over the supply of terminal equipment. According to the International Telecommunications User Group the results for users can be substantial, because they can purchase terminal equipment on a standardized, Europe-wide basis and in volume.

A third point is public procurement in telecommunications. There has been a lot of criticism of this draft Directive by member governments. The Directive has been redrafted into a much broader Directive which includes sectors not covered by earlier Directives liberalizing public procurement: water, energy, transport; and the implementation schedule has been pushed to January 1992 (pending consensus on final draft released July 1989). Local content has emerged as a controversial issue from the viewpoint of governments outside the EC.

On the services liberalization front, the Commission also adopted a Directive. Under strong pressure from several governments, however, the Commission agreed not to put it in effect until April 1990, giving the Council of Ministers time to reach a preliminary agreement on adoption of the ONP principles. The two Directives are interlinked, and the services Directive actually should follow the ONP Directive. This infighting between the Commission and several member states over the services Directive is partly over procedure (Article 90) but far more involves substantive issues, in particular requirements imposed on Administrations and power given to the Commission to enforce harmonization practices. The Directive removes virtually all restrictions in the provision of services. The only restrictions on provisions of service permitted by the Directive would be conditions of safety of use and network integrity, with regard to the connection of terminals to the network. Packet or circuit-switched data services available to the general public may be subject to certain limitations. The Commission has indicated such services will be on a slower timetable than for value-added and other non-reserved services. A licensing procedure can be set up only on the basis of objective, non discriminatory and transparent criteria. Albeit the rather fuzzy language, the Commission will be in a position to monitor compliance and correct wayward practices.

A regulatory body independent of network operators in each country will be charged with granting licenses, controlling type-approval, allocating frequencies and surveying usage conditions. Most of the countries, with the exception perhaps of the UK will have to effect substantial changes and necessitate oversight by the Commission.

Phillips cited that International Telecommunications Users Group (INTUG) believes there should be many positive impacts of 1992 on business. Decisions on network architectures could be made with less deference to Administration-imposed or other regulatory conditions. Competition in such services on a cross-border basis is likely to improve the performance of Administration, which may become more customer-oriented. Finally, such competition may well ensure realistic prices for circuits in Europe, through the removal of cross-subsidies, largely borne by business users.

Next, Phillips commented upon Open Network Provision (ONP), the framework directive to establish progressively harmonized conditions for open access to and use of public telecom network infrastructure and services. ONP will address three main areas: (1) technical access, (2) usage conditions; and (3) tariff principles. Priority areas for ONP conditions included leased lines, data networks and ISDN. Phillips added that it is unclear how soon the final directive will be issued by the Commission, perhaps not before Spring 1990.

Discussing Terminal Equipment Type Approval Phillips argued that this is of key importance to large users, especially large American corporations that hope to ship equipment abroad. The implementation deadline for this Directive was January 1, 1990, and the Competition Guidelines for telecom section of the Green Paper will be under the Competition Directorate (DG-IV). However, given the controversy surrounding the approval of ONP Directives, it is unlikely that this Directive will be released before the end of 1990.

Phillips noted that the Commission is preparing a Blue Paper (a information document) on satellite communication that will not be released until at least March 1990. This document label represents a retreat (originally it was expected this would be a Green Paper - a policy statement) from confronting highly controversial issues permitting two-way satellite links for private users. Of interest to the large user community as well as to the financial community are a number of projects contemplating VSAT devices, which are being considered terminal equipment. Bypass and hubbing of traffic are the central fears of the Administrations that must be addressed in any future Directive on that subject.

Finally, Phillips remarked, not only is it possible to see that the effort to keep the Green Paper initiatives moving has fallen considerably behind schedule, but an entire body of issues stemming from technology advances will have to be addressed. On the other hand, Phillips noted that there are some excellent signs around: for example, the Commission has thus far not buckled to the enormous pressure to dilute users' concerns, and the Competition Directorate has upheld the use of Article 90 by the Commission.

Implementation at the national level will nonetheless be key to the Directives effectiveness. Except for the UK and Holland, other nations are only partly complying with the Terminal Equipment Directive, and many would even question UK's compliance. For example, in the areas of private satellite and cellular systems, British Telecom continues to play an extensive mandatory role in all user deployment, on many different levels. In addition, users are playing an important role is being played by users through the European Telecom Users Association (ECTUA) and INTUG.

Phillips noted that a number of issues of enormous complexity and even political ramifications have not yet been addressed, namely: compliance, enforcement, intellectual property of information distributed over broadband networks from remote nodes, customer usage data, CPNI, and transaction related information privacy.

In relation to these last issues, Phillips referred to his testimony before Judge Greene's in the "Case of the Hot Socks." In this hypothetical case involving a department store that wishes to market a pair of socks that cost \$ 50, the store seeks to obtain from the telephone company a list of subscribers who have called a toll-free number associated with a very expensive resort, knowing that this would be an excellent list of prospects. Information obtained in connection with that testimony revealed that list brokers would spend as much as \$ 3 per name for such information and that in the United States, AT&T could provide as many as 100,000 names per day from toll tapes associated with "800 numbers." While this may seem innocuous on the surface, it raises several fundamental issues, not the least of which is the existence of an implied contract between the telecommunications provider and the subscriber for privacy. Phillips reminded the audience that the origin of the data protection laws in Europe stem from the fact that Churchill discovered at the end of the Second World War that the Nazis had routinely rounded up their victims by going to telephone exchanges and looking at long-distance toll tickets. That is in part why even up to this day in Europe it is almost impossible to get a detailed telephone bill.

Phillips wrapped up saying that large users on both sides of the Atlantic are beginning to

evidence considerable edginess and skepticism over the lack of tangible evidence that the precepts of the Green Paper are actually being put into action. This doubt is understandable. Until now, telecommunications reforms endorsed by the Commission have been making deliberate headway. There is some slippage, but this is to be expected given the uncharted waters, the centuries-old base of traditions of extreme nationalism, and most recently the events of Eastern Europe.

However, the realization by all EC players that telecommunications is the pivotal point around which trade in services must revolve gives good cause for pause and encourages reflection. For example, Glasnost and Perestroika are the inevitable consequences of telecommunications technologies on governments that have traditionally attempted to maintain closed societies and lie to their populations. As Mr. Gorbachev found out not too long ago, there is not much use for a thirty foot wall in Berlin when a Landsat-D imaging satellite at 13,000 to 24,000 miles up is transmitting detailed infrared images of a self destructing nuclear plant in the middle of Russia to the rest of the world. It is only surprising that it takes politicians so long to realize these things and act on those realizations.

The final speaker was David Webster, Senior Fellow, The Annenberg Washington Program; former member of the board of management of the British Broadcasting Corporation (BBC); and Chairman of the Transatlantic Dialogue on European Broadcasting; spoke about Europe 1992 in relation to television broadcasting (TV).

Webster opened with the comment that there is an unbreakable link between the business of telecommunications and the broadcasting business. He added to Tyler's remarks about the slowness of European governments to deal with problems of telecommunications and broadcasting that he is not surprised because governments are not very good at it. European governments assign broadcasting a too high political value associating broadcasting with the manipulation of society for proper social ends. Broadcasters tend not to agree with this.

The reasons for change in broadcasting and why governments have to do something about it are two-fold. One has to do with an ideological shift which says that the market can deliver. A second is technological: the nature of satellite communications and its interaction with cable. The effect of these is that national governments can no longer control the development of their own communications systems with the nation. Since technologically it was going to be impossible to control broadcasting within the nation state, politicians thought that maybe they could create a regulatory structure across Europe. That created a problem for some governments. Thatcher believes in the market forces but cannot stand some TV programs the market forces deliver. One of the political reasons for the European Broadcasting Directive and for the Council's convention is that the British government wants to stop pornography coming into Britain by satellite.

Webster went on to remark that American officials only lately have awakened to the issue of television quotas in Europe. To no avail. On October 3rd, the Foreign Ministers of Europe passed the Directive on Broadcasting. The critical text, that of clause 4 on quotas, was unchanged from the text that existed in March 1989, prior to any American

intervention. The Directive actually consists of more than the clause the American have been battling. Rather than stopping things it encourages things to happen. The main point is to lay down the minimum requirement under which a broadcast may not be denied access or retransmission in another member state. It encourages growth and a bigger market. Member states remain free to set up stricter rules for TV broadcasts under their own jurisdiction, particularly on the basis of language. This Directive covers more countries and has greater enforcing power than the parallel agreement of the Council of Europe Convention on transborder broadcasting. There are also program standards in the Directive aimed at issues such as pornography, advertisement interruption of programming, and sponsorship of programs and advertising. Most restrictions are not new but only represent an harmonization of national restrictions. Another aspect is the right of reply, which may not be very effective in practice. What would happen when an European takes offense about a news items in an American news transmission in Europe?

Webster remarked that aspect that has bothered American officials and Congress is contained in Article 4 about quotas for European broadcasting production, or the so-called "European works." A further special cause of concern may be the interpretation of a clause in Article 6 to mean that even if a production is 51 percent American financed it remains an American production, even if the majority of authors and workers involved reside in the member state. Webster stated that in principle all quotas may be wrong, but he believes the loose quotas of the Directive are reasonable and a small price to pay for the Directive as a whole. Americans should not underestimate the fear that exists among some European leaders that European television may be actually swamped by American television. This is not only a trade issue but a cultural issue, and a cultural issue if inflamed, soon becomes a political issue. It might have been a mistake to allow this argument to be framed as one between the United States and Europe. It is an argument within Europe for few broadcasters wish to be legally restrained from buying 100 episodes of American situation comedy if they so wish.

Webster's belief is that the United States will do better with the directive of loose quotas than with no directive at all. The argument that the directive may create a precedent is mistaken, because this is more than a simple trade issue but rather is a deeply complex regional cultural and ethnic issue. Moreover, the American heavy handed style of intervention was certainly counterproductive.

In fact, the matter was not handled with imagination or skill either by the Americans or by the Europeans. The Europeans have been negligent and ineffective in creating understanding in the U.S. and the Americans have been simplistic and heavy-handed.

#### Questions and Comments

The first comment by Tyler on Webster was that the clause 4 episode demonstrates the enormous lack of understanding in Washington of international broadcasting issues and EC institutions. Webster response was that nobody in the Reagan Administration was interested in the subject and when the broadcast directive draft first came out no one in the U.S. said a thing. The reason is that this policy was done in a very odd way, given the Motion Picture Association lobbying style and the lack of expertise in the area in Washington. Thus the policy was simplistically cast as an issue of freedom and a possible

trade precedent.

The next question was what Citicorp does when it lays private lines in Europe and how that compares with the U.S. experience. Phillips response was that Citicorp mostly subcontracts the building of its private networks abroad and that requirements vary from country to country. In the U.S. Citicorp and other corporations have in fact built private networks, and the regulation of that activity depends on whether the network is interstate, intrastate, inter-LATA, intra-LATA and a host of other distinctions. It is not surprising that some of the corporations that have built some of the largest bypass networks are themselves regulated, namely banking, pharmaceutical, chemicals and brokerage houses. One creative notion developed by Citicorp to get around these problems is to do equity swaps for bandwidth over transmission systems with players who hold natural rights of way, gas companies and electrical companies in particular. There is more room for creativity in the U.S. than in Europe.

The next question was that there may be after all a practical effect for the new program providers under the Broadcasting Directive rules. For example, Berlusconi's (Italy) channel in France was heavily fined and ordered to increase French domestic content because of the stricter French quota. Isn't that kind of quota likely to increase political pressure on new program providers and perhaps increase their costs? Will this be a precedence for other areas like computer and telecommunications services? Webster's answer was the clause as drafted is so porous that it is merely a guideline, that it is unenforceable. There is a need to distinguish carefully between national and European quotas. Webster has battled for national governments to adjust their quotas to the European level. The average import level is 23 percent and it is unlikely that it will go above 30-40 percent. It has become so easy to set up business from a technological point of view, but not from the programming point of view. Phillips added that quotas can also cause domestic political problems, and often the technology is years ahead of regulation: by the time these regulatory problems get sorted out broadband will have surpassed broadcasting. Delivery vehicles and the setting of standards are not technological issues but rather more of marketing issues.

A comment stated that European television, compared to the U.S., has never been a moneymaker. The latest thing in Europe are the two broadcasting satellites, ASTRA and BSB. Households however cannot receive both satellites with the same receiving dish, a condition symptomatic of the problems facing the shaping of European television in the nineties. Webster's reply to that comment was that most of the cable in Europe is low capacity and its distribution patchy. BBS got the official British franchise and will adopt the MAC transmission standard while the ASTRA has followed the PAL requirements. The real question is which hardware to buy. This is a barrier in the market. Competition comes down to programming. There are no new programs. You have to go to multiple options to convince the customer to invest in the reception hardware and drive the market.

How will VSAT policy influence stakeholder? Phillips answer was that CCTU and INTUG and a number of trade associations representative of the manufacturing sectors are trying to lobby. But in fact, 50-60 percent of the VSAT components in the market are assembled outside the United States, notably in the Pacific Rim. Tyler added that in the area of

telecom network equipment the broadcast quotas will not have a demonstration effect because in effect the quota today in some types of equipment is 100 percent in terms of the assembled product.

Webster next question to Tyler was that there is somewhere in Europe a Directive being drafted that requires equal access procurement across member nations. Will this intra-Europe procurement agreement also set up a barrier to outsiders? Tyler hinted that there are two big controversies about public procurement: 1) whether it should include telecommunications, and 2) how to define public, as this in parallel with privatization or better said "corporatization" in France.

The final question was whether there has been any thought among European PTTs to set up a centralized database for 900 and 800 lines and advanced value-added services, and what would be the position of the large users. Phillips commented that he is opposed to that in the U.S. because the operation of that database would add 1 to 4 seconds to the operating charges associated with the traffic of 800 numbers. The answer for Europe is no, there is not even bandscan traffic. Tyler added that one of the arguments for competition in Europe is the effect of the fear it had on the PTTs. There is a need to put a perspective on the time it takes for this to develop. There is a lot of interest in Europe on these new value-added services. Webster concluded by suggesting that even though a lot of what is said about 1992 may not happen, the important thing is that business thinks they might happen, a self-fulfilling prophecy.

**TELECOMMUNICATIONS: "THE TEN COMMANDMENTS" (EC GREEN PAPER, 1987)**

- **Open market for telephones/terminal equipment**
- **Common technical standards for connection of telephones/terminals to the network**
- **Separation of regulatory and PTO operational functions**
- **Open market in value-added services**
- **Safeguards against PTOs cross-subsidizing their activities in competitive areas**
- **Open Network Provision (ONP)**
- **Open intra-EC purchasing by PTOs**
- **Europe-wide services initiatives:**
  - **RACE**
  - **ISDN**
  - **Pan-European digital cellular (GSM)**
- **Liberalized satellite communications market**
- **Tariff harmonization**