International Telecommunications in Transition

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1. THE SETTING

1.1 Introduction

The term "international telecommunications" encompasses such a complex matrix of countries and issues that it would seem difficult to find unifying themes to contain all phenomena. Is it possible that international telecommunications are simply a hodge-podge of national systems, each reflecting its society's history and economics, and each happily self-contained except for collaborations on technical issues? Or, to go to another extreme, are all national arrangements inexorably driven into the same direction by a technology that is destiny? Or is there a third explanatory concept beyond historic materialism or technological determinism? This paper argues that while the forces represented by these views play an important role -- the former through the emergence of a service-based economy, the latter by the convergence of telecommunications and computer technologies -- the primary development that changes the institutions of telecommunications today is the steady breakdown of a rent-seeking coalition. This trend has its expression internationally in a similar deterioration of the traditional arrangement of cartel. In this light, the turmoil of telecommunications should be understood as nothing more than a "normalization" -- i.e., their transition from one of the most tightly controlled sectors of the economy into one more generally resembling the rest of the economy, not necessarily deregulated but more "normal."

For over a century, telecommunications around the world were characterized by three interlinked institutional arrangments:

(a) monopoly in operations (typically governmental)

(b) international cartelization

(c) protectionism in favor of domestic manufacturers

An additional key institution, largely since the end of World War II, was

(d) redistribution in favor of economically weak or favored groups

For a long time, this arrangement was remarkably stable, successful, and undisputed. But for a number of years now, it has been subject to forces of disintegration. While it was at first possible to dismiss changes as policy initiatives of a conservative American regime, subsequent events in Britain, Japan, the Netherlands, Denmark, and others suggest that broader forces are at work. And now, as Third World countries such as Pakistan and Malaysia, and even a mainstay of the traditional system such as Germany, are seriously contemplating change, the existence of a trend can be discerned. The causes of this change and its regulatory implications are discussed elsewhere [Eli Noam, "Transition in the concept of the Public Network", Journal of Communications, forthcoming]. The purpose of the present paper is to provide a factual analysis of the international scene, survey the battles, and link them to the broad forces of change and to the defense strategies of the traditional institutions.

1.2 Origins of the Traditional Network System

The key institutional feature of traditional telephony around the

world has been, for almost a century, a ubiquitous network operated by a monopolist. The operating entity usually was a government administration known generically as a PTT (Post, Telegraph, and Telephone authority). In United States, these three functions were split between three near-monopolists, AT&T, Western Union, and the U.S. Postal Service.

Public telecommunications were not merely a technical system, but a social, political, and economic institution. One must go back to the origins of the traditional system, which precede electronics and telecommunications by centuries and date to the emergence of European postal monopolies in the 16th century. While much later the monopoly system was rationalized as based on technical economies of scale, strategic necessity, cross-subsidies, or public infrastructure needs, the early creators of the postal monopoly were quite forthright in their primary mission to make profits for the state and its sovereign [Van Beust 1748; Stephan 1837] [*]. The postal system was a major source of revenue, just at a time when absolutist European rulers had insatiable needs for them. This goose with its golden eggs was ardently protected through the centuries against encroachment by private competitors and by other states [Dallmeyer 1977]. [*] When the telegraph and later the telephone emerged in the 19th century, they were rapidly integrated into the preexisting postal monopoly system, persuant to the same protective policies, and together became the PTTs.

For almost a century, a tightly controlled system of telecommunications was in place in all industrialized countries. Its

structure was supported by a broad political coalition that can be termed the "postal-industrial complex." It included the network operator, the equipment industry as its supplier, together with residential and rural users, trade unions, the political left, the newspaper industry whose postal and telegraph rates were heavily subsidized, and affiliated experts. The system worked in no small measure to the benefit of the equipment industry. The PTTs, through their huge procurements, especially after World War II, provided large markets for the industry. Even better, these markets were substantially protected from foreign competition and production by buy-domestic policies. Within most advanced countries, domestic equipment manufacturers often collaborated with each other in formal or informal cartels which set prices and allocated shares of the large PTT contracts. In the United States, the structure of telephone communications, although private, was not all that different from the PTT model. There was a less complete service monopoly, but more integration of network operation and equipment manufacturing.

1.3 Political Telematique, the New Ideology of the Postal-Industrial Complex

For a long time, the mission of the postal-industrial complex in developed countries centered around the achievement of a high degree of penetration. With this goal largely reached in effective collaboration of PTTs and industry, a new organizational ideology needed to be articulated, both to instill a sense of purpose internally and to legitimize the continuation of the institutional

regime externally. The new views were expressed in the 1978 French Nora-Minc report [L'Informatisation de la Societe], [*] This influential government report concerned itself at length with the threat posed to national sovereignty by its lack of control over the industry of the future, electronics, whose paragon IBM was viewed as threatening French sovereignty:

> "As a controller of networks, the company would take on a dimension extending beyond the strictly industrial sphere; it would participate, whether it wanted to or not, in the government of the planet. In effect, it has everything it needs to become one of the great world regulatory systems."
> P.72

How to deal with "one of the great actors on the world stage"? The growing interaction between computer technology and telecommunications in what the authors termed "telematique" makes it possible. While governmental influence over the computer industry was limited, the latter's overlap with telecommunications -- over which the state traditionally has control -- provides the state with a lever of power. Governments need to "strengthen their bargaining position with a solid mastery of their telecommunications media." However, "the difficulty lies even more in the fact that no country can play that role alone" (p. 72).

Nora and Minc coined the term "telematique" for the sector that is also variously referred to as IT, C & C, informatics, or compunications. Their political analysis which may be described as "political telematique," became extraordinarily influential as PTTs embraced its notions, which assigned to them a central role in high-technology policy and in the preservation of the national interest against American (and later Japanese) economic and technical

interests. The equipment industry was similarly delighted, since the Nora-Minc notions created a presumption in favor of government subsidies and protectionism as a matter of national sovereignty.

Political telematique's view of liberalization is negative. In 1984, the influential French daily newspaper Le Monde carried a series of lengthy articles assessing US deregulation. [le Boucher, Eric, and Quatrepoint, Jean-Michel. "La Guerre Mondiale de la Communication," (four parts): Le Monde. (January 11-14.]

It viewed the United States as engaged in two wars, militarily against the USSR, and industrially against Japan, with the advanced technologies of computers and communications vital factors in both battles.

To win this international war, the United States deregulated and divested AT&T. This may be at first glance surprising. "Why smash this power [AT&T] in the middle of a war against Japan?" The answer is that "Deregulation of communication in the U.S. has as its main goal to give American industry a good °kick in the pants' in order to get it to start a conquest of the rest of the world".

Given such energizing effects of divestiture and deregulation, one would expect that the United States would prefer to be the sole custodian and beneficiary of such a deregulated system. Nevertheless, Le Monde saw the U.S. as proselytizing the rest of the world. Opening the American equipment market to foreign imports is part of a U.S. export offensive. International liberalization gives the U.S. several advantages. It reduces the communications costs of its multinational (i.e., American) users and it pries open European

equipment market. Once 'liberated,' European telecommunications would be captured by American firms. "Would not abandonment of state control over communications cause them to fall under the control of IBM?" Having posed the issue in such a way, the analysis, too, leads to advocacy of political solutions of international agreements and domestic restrictions. Liberalizing change is described as profoundly threatening to French and European economic and sovereignty interests, and requiring an energetic containment.

1.4 Forces of Disintegration

Political telematique is colored by a Spenglerian pessimism about the ability of major European countries, with their proud scientific and technological traditions, well functioning R&D infrastructures, sophisticated users, and large financial markets, to succeed in the electronic field against the rivals in the United States and in Japan.

For all of its political strength, the traditional network system has been subject to forces of change. Transmission technology is one of the reasons, though one should not exaggerate its contributions. It was not microwaves, optical fibers, and satellite which have made long distance competition possible. One driving force for restructuring of telecommunications has been the phenomenal growth of user demand for telecommunications, which in turn is based on the shift toward a service economy. Information-based services, including headquarters activities, emerged as a

major comparative advantage of developed countries. These activities were reinforced by productivity increases in information transactions through computers and advanced office equipment. In consequence, electronic information transmission, i.e., telecommunications, became of ever increasing importance to the new services sector. It also became a major cost item. This led to the emergence of private telecommunications managers whose function was to reduce costs for their firms, and who for the first time established sophisticated telecommunications expertise outside the postal-industrial coalition.

By their very nature and tradition, the traditional PTTs provided standardized and nationwide solutions, carefully planned and methodically executed. In the old days, sharing a standardized solution was more acceptable to users, because the consequential loss of choice was limited, and outweighed by the benefits of the economics of scale gained. As the significance of telecommunications grew this balance shifted, providing the incentive for private and group network solutions.

The globalization of commerce increased the importance of telecommunications, but also created forces of centrifugalism. If one country's PTT exercises restrictive policies, its firms will be disadvantaged internationally, and foreign firms may choose not to domicile themselves. Similarly, acquaintance with options available elsewhere create, by their demonstration effect, pressures for change accross borders. One example: in country after country, the international electronic funds transfer network system SWIFT is able

to force PTTs to change their rules to enable SWIFT operation, or else the countries' banks would be left out.

For satellite transmission, in particular, the marginal cost with respect to distance is virtually nil. Communication flows can therefore be routed in indirect ways to circumvent regulatory barriers and restrictive prices. Arbitrage becomes possible, and with it the incentive for a country to liberalize its regulatory regime to become a "communications haven." This undermines attempts to administratively set rules for prices and service conditions.

1.5 The Emergence of the "Second" Electronic Industry

Meanwhile, traditional telecommunications firms were losing their preeminance. Insulated from competition, secure in their profits, they had not been particularly successful in technological terms, in relation to their resources. Almost all missed out on the development of computers, or were unsuccessful in staying at its leading edge. Siemens in Europe and the Japanese firms are the main exception. This lack of success came despite major national efforts and subsidies for the development of computer and semiconductor components.

The development of micro-chip components provides an instructive illustration on how the traditional equipment manufacturers fell behind technologically; and how they permitted the emergence of a "second" electronic industry which is now undermining them. Contrary to popular belief, the American advantage in electronic component development did not result from European devastation in

World War II. At the end of the war and in the early 1950s, the United States and Europe were at similar levels in terms of technology development. The war had provided an impetus for innovation in Britain, Germany, Italy, and the Netherlands, and though many production facilities were destroyed, the technical know-how remained. European firms were as advanced in tube technology as their American counterparts, and were doing sophisticated research in solid state technology, such as the one which led to the development of semiconductor diodes.

In late 1947, the transistor was invented at Bell Labs, and its superiority over traditional receiving equipment soon became apparent. The large, established telecommunications suppliers moved into transistor manufacturing, and although the Americans had a head start, European companies managed to keep up with the new developments. Philips (with its various European subsidiaries), Siemens, AEG-Telefunken, Plessey, Ferranti, GEC, and Lucas were all doing quite well, with many of them having close development links with American manufacturers or with each other [Malerba, Franco, 1985, The Semiconductor Business, University of Wisconsin Press, Madison].

But in the next stage -- integrated circuits -- different market structures evolved on the two sides of the Atlantic. In the United States, new innovations were met not so much by traditional manufacturers as by new firms. Furthermore, American computer manufacturers themselves went into component production. In Europe, meanwhile, much of the development of the new integrated circuit

technology was left to the traditional manufacturers, who were larger and slower to innovate than their American -- and later, Japanese -- counterparts. The new technology was based on silicon instead of germanium, and on planar fabrication, which made mass production easier. And it made possible substantial component integration within one chip, which eliminated the need for the construction of discrete components. Firms that switched to the new technology were either young companies who were wedded neither intellectually nor financially to the olders ways. Firms that were able to move rapidly into the new, superior technology left the older, vertically integrated telecommunications manufacturers behind.

The integrated circuit period lasted from 1959 until the stage of large scale integration (LSI) starting in 1971 and the introduction of microprocessors; this period was in turn followed by the stage of very large-scale integration (VLSI) beginning in the early 1980s. During the LSI period, Americans were dominant in high technology and increased their lead over their European competitors, with the Japanese also making serious advances. European public policy, by then, had focused on micro-electronics, and encouraged finished goods producers such as telecommunications and consumer electronics firms to integrate vertically into micro-electronic component manufacture. Government development projects provided investment funds. On the whole, however, none of these efforts succeeded in significantly challenging the American and Japanese. With the advent of the VLSI stage, Japanese firms took the lead in

mass manufacturing of components.

It is frequently asserted that it was an absence of R&D funds that was the explanatory factor in European firms following behind. But surveys by industry analysts conclude that in 1982 R&D expenditures by the European computer and component industry were about $3.7 billion. This compares to about $1.7 billion by Japanese and $4-5 billion by U.S. firms. [Kraus, Jim. 1984. "EEC Computer Manufacturers Tie R&D to Compete with U.S., Japan." Electronic News (September 10): Section II, 11.]. As an OECD specialist in high technology and elecommunications writes, "Per unit of output, and especially exports, the R&D spending of [European] high technology firms--notably that part of it financed by public money--vastly exceeds that of its trading partners. Whatever the cause of Europe's difficulties may be, it is not that too few resources are devoted to R&D (Ergas, 1985) [Ergas, Henry. 1985. "Exploding the Myths About What's Wrong." Financial Times (June): 15].

Over time, elements of an independent computer and component industry evolved in most developed countries, forming a "second" electronic sector. In Europe, Nixdorf and Olivetti are probably the best-known among them. These firms are used to direct relations with the users without the mediation of the PTTs. They are often not integrated into the traditional club. They provides an element to a new coalition which is challenging the postal-industrial complex -- the alliance of large service users with the "second" electronic industrial sector into a "services-information coalition." In the United States, examples for this grouping would be American Express,

IBM, Time, TWA, Silicon Valley firms, Citicorp, etc. Defending the traditional system was primarily AT&T -- not enough to stem the tide. Hence, the victory of the services-information coalition over the traditional forces was inevitable in the United States; Judge Greene and William Baxter merely fixed the details of a historic trend.

In Britain, the new coalition was slower to gather, and the defense of the traditional industrial sector was more tenacious and ideological. But the balance of power swung in the 1970s. British electronic industry was not especially successful internationally, particularly once one subtracts the UK's former colonies as a market. GEC, Plessey and STC were solid performers, but not especially successful in mass production of novel technology. On the other hand, British service industries such as banking, insurance, trading, publishing, and media were doing well. London, along with New York, was the major center for international services, and the preferred European headquarters of non-European firms. While the Thatcher government argued for the deregulation of telecommunications largely on the ground of making British high technology more competitive, the most important effect was to help make London the convenient center for Euoropean business transactions. This is a role with which Britain, given its traditions, was comfortable and familiar.

A similar story can be told for the Netherlands. In Japan, where the "first" telecommunications industry transformed itself better than anywhere else into the "new" information industry, the changes

were smoothest, since the private industry had been successful in moving with technology, and did not stand to lose, while the service sector was gaining strength. Reform was accomplished as a continuation of industrial policy. NTT was privatized, and competition introduced, under the prodding of MITI, and without the public conflict of the U.S. or Western Europe.

Variation of industrial structure helps explain the structure of telecommunications. In several other European countries, such as France, the service sector is, relatively speaking, weak in comparison to manufacturing. French banks have been nationalized and do not play the same role in international business as do London banks. On the other hand, the industrial sector has been the darling of the political left. Partly, this can be explained by a traditional socialist emphasis on the production of goods, with its proletarian connotations, in contrast with the more middle class-rooted white collar service activities such as finance and international trade. It also reflects the electoral base of socialist parties in the working class and the trade union movement. The emphasis on high technology also fits neatly into France's traditional concern with national autonomy, which appeals to the political right, too.

In addition to the external challenges, the traditional coalition can also weaken internally when its constituent parts begin to redefine their advantages. A good example are the Netherlands. Here, the 1985 Steenbergen Commission report led to a functional separation of the PTT's telecommunications activities into the basic

network "social services" of the PTT the PTT, and a "competitive services" complex of PTT and private suppliers, which included user group networks, value added networks, and complex terminal equipment. A third function, that of licensing, rate regulation, equipment approval and standardization was taken from the PTT altogether and lodged in a newly created agency. The PTT itself was transformed into a private holding company company (PTT NV), 100% owned by the state, which in turn owns two separate limited companies, BBV for postal services and BV Telecom for telecommunications.

Perhaps the most significant aspect of the Dutch reform was the attitude of the PTT and its labor union. The PTT reconciled itself to change and concluded that some of it was in fact in its own self-interest. A German Bundespost analysis of the Dutch situation surmises that the change of heart in the Dutch PTT may have been a generational matter, whereby the younger managers who had reached leadership positions preferred the greater independence outside of the government civil service. [Wieland, 1986] The PTT labor union, on its part, concluded that wages, salaries and especially pensions would be improved by a switch to an independent corporation status. Under the old system employee were paid as civil servants and tied to the pay scale of the entire bureaucracy rather than of the electronics industry. This union acquiescence, in turn, made it possible for the Social Democrat Party to agree to the proposal.

The Dutch example shows that a transition can be smooth when it is not enacted as a "PTT-busting" measure, but rather when the PTTs

embrace it as an opportunity. This will also be the likely route of change in Germany in the near future. In Israel's transformation of the government administration into the semi-independent Bezeq, similar considerations permitted the change. In Japan, too, the trade union Zendentsu went along with privatization in order to benefit its members by an uncoupling from the lower civil service pay-scale. It gained above-normal increases after privatization, while achieving job-security in the reform legislation.

Indeed, as will be shown below with the example of British Telecom, invigorated and entrepreneurial PTT-successor organizations may create a whole new set of problems of liberalization.

2. LIBERALIZATION AND INDUSTRIAL POLICY IN EQUIPMENT

The previous section discussed the emergence of a new coalition of services sector and "second" electronic industry. The interests of the partners in that coalition, however, are not congruent, and can stymie government policy. The British example is instructive, and will be discussed in detail. Margaret Thatcher won the 1979 general election with the slogan, "It's time for a change," and proceeded to apply it to telecommunications. Of course, earlier Conservative governments had privatized industries which the Labour government had nationalized before. But in the case of telecommunciations, this nationalization had not been of recent origin but went back to the turn of the century, and was in an industry which was state-owned in most other industrialized countries, including economically conservative ones.

In advocating reform, the government's articulated emphasis was one of industrial policy, aiming to influence the structure of the telecommunications industry, on the assumption that structure determines conduct, which in turn affects performance, the classical paradigm of industrial organization economics. The four distinct elements of governmental policy were: (a) a formal separation of telecommunciations from the Post Office and establishment of British Telecom as an independent but regulated entity; (b) establishment of competition in peripheral equipment and in services by permitting rival carriers and value added network services; (c) privatization of the public network, by selling a majority of British Telecom, (d) establishment of the regulatory body Oftel.

2.1 The Impact on the British Telecommunications Industry

As mentioned, Thatcher and her advisors' plan of restructure was based on the two partly conflicting policy goals of encouraging the service sector and reversing the decline of British technological leadership. The British share in the world market of telecommunciations equipment had fallen in 20 years from 25% to 5% by 1980. The government instituted as a major goal to encourage industries with a future -- electronics, information, biotechnology, -- all industries which were, not inconveniently, closer to the interest of Tory followers than traditional smoke-stack firms. A minister of State for Industry and Information Technology, serving under the Secretary of State for Industry, was named, the first such appointment anywhere.

While the aim to encourage the service sector has been, on the whole, successful, particularly in conjunction with other steps such as liberalization of financial services, it proved more difficult to change things for the electronic industry. Despite the efforts to provide a competitive environment and public money, the electronic industry continued to slide. Ironically, one factor that has put the industry under pressure was the increased cost consciousness of British Telecom and of the Ministry of Defense, which are by far the largest customers of electronic equipment.

The traditional major British electronic firms were not doing well. At Standard Telephone and Cable (STC), the Chairman and Chief Executive, Sir Kenneth Corfield, resigned in August 1985, partly because its 1984 acquisition of Britain's major computer firm, ICL, performed poorly. STC also experienced problems in its traditional telecommunications equipment market. Meanwhile, STC's parent ITT, itself in need of money, reduced its ownership share successively. Eventually, ITT brought its telecommunication interests into the French-dominated Alcatel, with the notable exception of STC, which therefore was left potentially stranded without a strong technology supplier.

The other two main telecommunications equipment suppliers, Plessey and GEC, also had problems. Development costs for their flagship "System X" digital switch were much higher than expected, production was delayed, and export orders were not forthcoming. In 1985, Plessey's profits declined dramatically, and the company also had to carry the losses of its American acquisition Stromberg-Carlson. It

sought a major American military communications procurement order, jointly with Rockwell International, and even got Prime Minister Thatcher to raise the matter personally with President Reagan. But Mrs. Thatcher reportedly had not been told that the Plessey/Rockwell bid was three billion dollars higher and almost twice the amount of the bid submitted by GTE with the French Thomson-CSF. ["Battlefield Casualty." 1985. Connections (November 22):7.] Not surprizingly, Plessey lost out.

The traditional response of ailing firms has been to seek a merger which would reduce the limited competition. Thus, in December 1985, GEC made a takeover offer for Plessey for about 1.7 billion dollars. Plessey rejected the offer, and instead counterproposed to take over the System X digital switch operations that GEC operated in parallel with Plessey. Thus, both companies ended up arguing that each was attempting to end dupliation of telecommunications equipment. The merger bid divided the government. Both GEC and the Department of Trade and Industry argued that it would require a large company to compete in world markets. But the Monopoly Commission's conclusions were that while the merger would create cost savings for System X production, it would also reduce competition for PBXs, transmission equipment and traffic control systems. [Mergers and Monopolies Commission, The General Electric Company, PLC, and The Plessey Company. 1986. PLC: A Report on the Proposed Merger. London. HMS Stationery Office.] In consequence, the government reflected the merger.

At the beginning of 1987, of the big five of the British

electronics industry (GEC, Plessey, STC, Racal and Ferranti), only Ferranti had no major problems. Meanwhile, the smaller, newer semiconductor and computer companies were performing poorly, too. Acorn Computers was largely taken over the Italian firm Olivetti. Sinclair Research had to sell out. Inmos, Britain's most important developer of semi-conductor technology, was an acquisition target for AT&T. For industrial policy reasons, a British "white knight" was promoted in the form of Thorn-EMI, which purchased the government's stake. Soon, Thorn-EMI itself went through turmoil, with Inmos a major money loser. The parent firm, under pressure, sold off its ambitious cable television ventures.

2.2 Impact on Users and on BT

If the traditional equipment industry has as yet not greatly benefitted from the reogranization of British telecommunications, the question is, who has? The answer is, not surprizingly, large service industry users, but also, much more than expected, British Telecom itself. The latter observation is important, because it suggests in the future a more general weakening of the alliance between network operators and equipment industry.

As a supplier, British Telecom's sensitivity to its customers increased considerably, in particular to business customers. Examples of improved service include a speed-up in installation of private lines in the business district of London. Within the company, independent profit centers were established to control performance. Management employment contracts began to include

performance clauses, and at high levels were limited to three years. Within a geographic region, profitability of the telephone area entered into management salary.

The UK's more liberal telecommunications policy and her lower international telephone rates attracted traffic. One large user, Ford Motors, set up its communications center in the UK because it could establish a private mail system for European operation there. In 1986, about 40% of all North American private line traffic to the European continent was routed through the UK.

The rules established in the BT license were to limit price increases on domestic calls for a five year period to the rate of inflation, minus 3%. In the first year after the license, long distance call charge were increased for five types and reduced for four. Overall, the weighted average price increase was 3.7%. Calculations for consumers show that for low volume users, the rates went up by 7.1%, and for high usage consumer by 5.7%. If only local calls were made, the increases would be 7.8% for light residential users, and 7.1% for heavy residential users, including inflation. BT also has a low user rebate. For business users, the rate increases were on average lower. For a "moderately high" business user, telecommunications rates went up by 2%. (Oftel, 1985). [Oftel. 1985. "British Telecom's Price Changes." Oftel Press Notice (December 16).]

In the following year, inflation rate was 2.5%, which therefore required a price roll-back by BT in absolute terms, somewhat mitigated by a small accumulated credit from the previous period.

BT submitted overall rate reductions totalling .3%, which satisfied Oftel. Residential rental rates increased by 3.7%, ahead of inflation.

2.3 Movements Towards Vertical Integration

The strength of the postal-industrial complex derived from the strength of its constituent members, and this strength exists even after liberalization has been legislated from above. It would be naive to expect a newly reorganized PTT to simply strive for an improvement in its efficiency. It finds itself in a double-bind. If the exhortations to entrepreneurialism are taken seriously by the previous monopolist and are acted upon, the resulting expansion creates criticism of power-grabbing and unfair competition. On the other hand, if the firm does not embark on new activities, it is dismissed as hopelessly stagnant. In Britain, the government discovered that it had established an AT&T-like company on its shores, but without the regulation that had kept AT&T in its place, at least most of the time. BT began to pursue several avenues of vertical integration. In the equipment field, it announced its intention to purchase the Canadian PBX manufacturer Mitel. This led the regulatory body, Oftel, as well as the almost entire British equipment industry to argue that the acquisition would not be in the public interest because it would strengthen BT's power in terminal equipment and threaten British PBX manufacturers. The Monopolies and Mergers Commission, though accepting the problem that was identified, accepted the merger, with some tough conditions

attached. But even those conditions were waived by the government approved the acquisition.

BT's second attempt at vertical integration was in advanced services. In June 1984 BT and IBM/UK Ltd. announced their intention to establish a joint value added network services (VANS) venture for data network management service, and applied for a license. This venture, under the name of JOVE, would have provided network service applications, including database systems and electronic mail. The data network management service would have been available under the plan to other VANS operators. However, the plan set off strong domestic protests in Britain. About 100 computer and communications companies registered their opposition. Some were concerned with the reliance on IBM's SNA architecture, while others feared the linking of two dominant firms in closely related markets.

In the face of such pressure and arguments, the British government rejected the application in October 1984, but left the door open for either company to offer such services on its own.

BT is not unique in seeking to expand its market power vertically in an (old) AT&T-like fashion. In Spain, the telecommunications monopoly CTNE ("Telefonica") which is partly private, has increasingly been involved in manufacturing. It holds a large interest in Standard Electrica, an ITT subsidiary, which is by far the largest Spanish electronic manufacturer, and owns a majority of the stock of twelve equipment firms and minority interests in seven others. Their aggregate output accounts for about 1/3 of total Spanish telecommunications production (MarTech, 1983: 139).

More recently, Telefonica linked up with three major high technology manufacturing projects. The largest of these is a $200 million export-oriented semiconductor manufacturing venture with AT&T. AT&T put up 80%, CTNE the other 20%. The Spanish government provided subsidies totalling $60 million and credits worth another $75 million. Spain thus became a major manufacturing base for AT&T and provided it with a component production toehold in Europe.

CTNE's two other major joint ventures are with Corning Glass and Fujitsu, the first a $20 million project for the construction of a fiber optics plant, the second a $200 million computer production venture.

Another instance of vertical integration is Italy. Here, the predominant telephone carrier SIP is not run as a government administration but rather is largely owned by the holding company STET, which in turn is partly private, and mostly controlled by the government holding organization IRI. STET also owns several major manufacturing firms, including Italtel, the country's largest telecommunications equipment firm, and several leaders in semiconductor components and robotics. In September of 1984, IBM struck a major cooperative arrangement with the Selenia-Elsag, part of the STET group, to develop and manufacture industrial and electronic equipment together, in return for participation in the packet network Itapac. This was IBM's first joint manufacturing venture with a European partner; it was particularly remarkable since the partner was controlled by the government. But it was part of a pattern in which IBM sought collaboration with the network

operators or their affiliate firms.

In Japan, the newly privatized NTT has formed within a year almost 70 subsidiaries or new ventures, which have only begun to be active in new products, services, and marketing.

Those instances of vertical integration by the network operators indicate that liberalization transforms the previously existing coalition PTT/equipment firms from one of partnership into one of conflict, or alternatively, a vertical integration of the two.

3. LIBERALIZATION OF SERVICES: THE NEW GENERATION OF TELECOMMUNICATIONS CARRIERS

Liberalization leads, in stages, to the emergence of carriers outside the traditional PTT. These can either be operators of new facilities, as in Britain or Japan, or enhancers of regular transmission that is provided by the PTTs, as in the case of value-added service networks. Meanwhile, the traditional networks have been upgrading themselves technologically to meet the challenge.

3.1 International Carriers

Cable & Wireless (C&W) is the prototype for the new generation of international carrier. In the past, the company used to operate telecommunications services in Britain's overseas possessions. In 1947, C&W was nationalized by the Labor government and remained state controlled for almost 35 years. In the mid-1980s, it still operated public telecommunication services in 28 countries and territories on behalf of their national government, with a major operation in Hong-Kong. In many of these countries, the operations

are as a joint venture with the local government or local private interests.

From 1981 through 1985, the Conservative government re-privatized the company. Privatization made it possible for the company to expand rapidly and it quickly transformed its somewhat sleepy image into arguably today's most interesting international carrier.

C&W's announced goal is to become the first global telephone carrier. In persuit of this ambition, it is a major participant in a joint venture, with NYNEX, for a private submarine fiber optic cable to the United States, to be operational in 1989. C&W also participates in a trans-Pacific cable with Pacific Telesis, the American independent telephone company Pacific Telecom, the Japanese Itoh & Co., and others. For C&W, these efforts are part of a strategy to link the four major financial centers in the world: London, New York, Tokyo, and Hong Kong. It is already a dominant presence in Hong Kong, where it owns the local telephone company.

In Britain, C&W has become the sole owner of Mercury, which provides it with a long-distance capability within Britain.

In Japan, two consortia applied for a license to provide international service in competition with the previous monopolist KDD. One of them is International Telecom Japan, (ITJ) owned by 53 large users including Mitsubishi, Somitomo, Mitsui, the Bank of Tokyo, and Matsushita. It planned to commence service at first on circuits leased from KDD. The second consortium was International Digital Communications, in which C. Itoh & Co, as well as Cable & Wireless, were the largest partners (each with 20%), joined by 33

others, including Toyota. The Ministry of Posts and Telecommunications tried to nudge the two ventures into a merger. Part of the agreement would have been to reduce C&W's share to 3% for reasons of "national security," and to exclude it from a role in management. This had the British and American governments up in arms.

3.2 New Domestic Carriers: Mercury and the Japanese NCCs

In Britain, the government encouraged a consortium of three major companies to offer long-distance telecommunications services. These companies were Cable & Wireless (C&W), British Petroleum (BP), and Barclay's Merchant Bank.

Although Mercury was modeled on the American MCI as a competitor to AT&T, there were great differences. MCI was an entrepreneural maverick firm which entered the market by opposing federal authorities and prevailing in court. Mercury was born with three silver spoons in its mouth and the government as its god parent. (Within a short time, however, Mercury became wholly owned by C&W.) The existence of Mercury was less a response by entrepreneurs to the market and more to a government blueprint. Mercury did not emerge on the basis of competitive bidding for a franchise, but rather was a classic insider deal. The Conservative government staked the credibility of its telecommunications program on the effectiveness and survival of this particular enterprise, and made Mercury in 1982 the only licensee for the forseeable future, giving it thus a monopoly on competition.

Mercury's permanent license, granted in 1984, permits it to run,

install and operate an independent national telecommunications system, for a period of at least 25 years. The license is similar to that of British Telecom, but with several important differences. Mercury does not have to fulfill BT's universal service obligations. It need not operate a national system.

Mercury quickly established a microwave network within London in 1983. It subsequently constructed a figure-eight fiber optic trunk system with its center in Birmingham. Its full-scale operations started on May 15, 1986, with long distance rates about 15% - 20% lower than BT's, despite BT's anticipatory tariff reductions. Mercury's goals is a 5% market share by 1990, but obviously a much larger share of large user business. Price advantage is not the only reason why large users are likely to allocate part of their use to Mercury. Another is simple diversification to be less dependent on one supplier, particularly in a country as prone to strikes as Britain.

As in the case of MCI in America, the issue of interconnection with the BT network was central. In 1985, Oftel decided on a framework for the interconnection, largely in favor of Mercury. BT has to provide Mercury with local interconnections at both ends of a telephone conversation; and the compensation that Mercury must pay BT would be set, in the absence of agreement, by regulation.

The issue of fair interconnection is complicated. In the United States it has led to two decades of dispute, and was a major reason behind the entire AT&T divestiture, when the Justice Department, and with it Judge Greene, concluded that one could not expect genuinely

nondiscriminating access by a local monopoly to its long-distance competitors.

Subsequent to the divestiture, which established the principle of complete and equal access and of user choice of a "primary long-distance carrier," the issue of the cost for such access to the local network, whether by AT&T or its competitors, precipitated one of the fiercest battles fought between long-distance carriers and local exchange companies, and among long-distance carriers themselves.

Interconnection is BT's lever to control competition. Thus, the regulatory determination of that interconnection relation was critical. It involved questions of how much BT can charge, an area of great murky conceptual and accounting issues, as well as the technical aspects such as numbering system, the points of interconnections, the quality of service, the number of digits to be dialed, etc. In all these issues, BT has an understandable incentive to be uncooperative. But even when BT's proposals are fair by some objective standard, Mercury also has an incentive to cry wolf and seek an advantageous interconnection arrangement, using the argument that it is an "infant" competitor needing a period of protection. Without protection, it could not compete with BT, and this would undermine the entire basis of government policy on competition. Indeed it would be embarrassing (at least for the Conservatives) to see Mercury fail. One government minister commented,

> If we opened up to free competition there is a danger that British Telecom would be able to wipe the floow with all the tiny

> competitors. We think the method of introducing a little competition is betwee with just the Mercury rival network. It is our duty to look after Mercury, to nurse it.

Hence Mercury has a certain leverage over British policy makers out of proportion to its economic power. With the Labor party in power, the reverse is possible, and Mercury could be choked to death by "technical" regulatory decisions rather than by policy decisions debated and passed by Parliament.

In its initial phases, Mercury's main contribution has been to lead BT to a reduction of its long-distance rates. In that sense, Mercury's presence is one of a potential than an actual competitor, helping to push down British Telecom's rate schedule. For example, faced by competition by Mercury, BT cut its prices to North America by up to 20% in mid-1985, just prior to the inauguration of Mercury's service to New York.

At the same time, it is likely that some form of tacit collaboration will occur. Mercury does not have much of a support base. At the same time, Mercury's existence provides a useful argument for BT to reduce government interference in its operations. Therefore, it is not necessarily interested in totally winning this contest.

In Japan, seven domestic carriers, including NTT, received operative licenses in the first year of the new law that became effective in 1985. They are in several instances affiliated with major institutions (the National Railways; the Public Highway Authority; the Tokyo Electricity Company; Mitsubishi/Ford; Itoh/Mitsui/Hughes). Of these carriers, two plan to use satellites,

two fiber optic cable, and the other microwave. The first alternative service began in August of 1986 by the National Railway's Japan Telecom in the Tokyo-Osaka corridor.

In light of the American experience, it is an interesting question whether all these licensees will indeed be able to be profitable. In another liberalized service, mobile telephony, the PTT ministry already has been restrictive, pointing to the law which suggests that telecommunications facilities should not be in excess of demand.

Dealing with the issue of interconnection, and under government prodding, NTT reached interconnection agreements with the "new" common carriers that were favorable to the latter.

3.3 Value Added Networks Services: Hybrid Communications

In addition to international and domestic carriers, specialized network services can also be offered by specialized providers. Value added network services play a much greater role in European or Japanese policy discussions that they do in the United States, and it is important to understand why that is so. Again, it is the fundamental interests of the traditional network operators, and not a technical or business reason, which leads to the new regulatory category of "value added service networks." It is an inevitable intermediate step in the liberalization of services, and just as inevitably it is not the last one. The key problem that leads to the licensing of value added networks is the potential resale of leased transmission to third parties. This form of arbitrage by a

service reseller leads to loss of control by the basic network provider, to competition, and to a reduction in revenues, at least in the short term. In the United States, such resale is possible and widely practiced. Lessees can do almost anything they want. The regulatory constraints that do exist are largely to prevent the basic carriers from extending their market power over the basic network downstream into the applications stage by internal subsidies. In other countries resale is prohibited -- though it seems to exist unofficially in several instances. However, some of these countries have realized that the use of leased lines can provide communications applications of a sophisticated nature for use by third parties, and they do not wish to prevent these services from emerging. Thus, some countries lean towards permitting the provision of "value added" services, where something has been added to basic transmission. This technical addition legally transforms what would otherwise have been a resale into a sale. (Another alternative is to establish usage-sensitive pricing to eliminate the incentive for retailing of services. But this creates other efficiency problems in pricing.) However, the problem, as in any kind of attempt at price discrimination that is not cost-based, is that one cannot underestimate the ingenuity of arbitrageurs. Thus, those who wish to resell basic transmission (or switching services) but can only sell "value added" service may try to add a trivial amount of value or an entirely unnecessary amount, solely to become legal. In order to prevent this, it is then necessary to license value-added networks, after scrutinizing the nature of their "value added." Hence, a

formal approval process is necessary, together with some form of ongoing monitoring, to protect the system of price discrimination. This restricts the range of services, and limits the licensed VANS' operating flexibility. But it is deemed to provide some protection to the monopolistic "basic" service, although the stability of such protection is illusory over time.

In the United States, as mentioned, such procedures do not exist, and VANs are hence merely a functional description and not a regulatory category. Being undefined officially, they have in consequence different meanings for different people, and often simply refer to packet switching networks. It is true that there is a regulatory distinction in the U.S. affecting VANs, between "basic" and "enhanced" services. But it serves an entirely different purpose. Whereas PTT countries seek regulation of VANs to prevent the resale of leased capacity, i.e., to protect the PTT service monopoly, the U.S. categories are to prevent the cross-subsidization by a dominant carrier of its value added services through revenue gained in those dominant activities. In other words, the American "basic/enhanced" dichotomy is established in order to <u>prevent</u> the dominant carriers' exercise of market power, and not to protect those carriers from competition.

The British Telecomunications Act 1981 provides for the Secretary of State for Industry to grant VAN licenses. A general license is required which prevents interconnections except to a public telecommunications system. It also requires the use of approved equipment. Resale or shared use are not permitted.

Licenses can be granted to foreign operators. But, internationally leased lines cannot be used for VAN services, and the use of foreign based services is restricted to operate over international switched circuits.

The VAN and data services were subject to a new set of rules in 1985. By that time there were 688 VANs operating under a general license, operated by 164 different companies. ["Future Licensing of VANs." 1985. Oftel News 1 (December):7.] Of these, the most popular were store and retrieve systems (89); mailbox (71); protocol conversion between incompatible computers and terminals (71); customers' data bases (54); deferred transmission (50); user management packages (46); viewdata (49); wordprocessor/facsimile interfacing (40); multiaddressing routing (49); speed and code conversion between incompatible terminals (43). Other VANs include automatic ticket reservation, conference calls, long term archiving, secure delivery services, telesoftware and retrieval and text editing.

For all the liberalization, the licensing system has quickly shown itself, not surprisingly, to be overly rigid. This led to still newer rules in 1986 and 1987 which substantially simplified and liberalized procedure and made, in effect, the resale of capacity for computer data transmission fairly unrestricted, thus demonstrating the difficulty of holding any regulatory line in this area. VANs with a volume of more than 250,000 pounds per year are subject to rules that prevent the establishment of a dominant market position. These limitations were aimed at BT and IBM, which had unsuccessfully

applied to establish the joint VAN venture JOVE for data network management service. BT, under its license, must provide any VAN service nationwide, in contrast to its competitors. It is also subject to rules which prevent a cross-subsidy out of other services.

In Japan, two types of VANs have been established by the 1984 reform. "Special Type 2 Carriers" resemble large packet data networks such as Tymnet and Telenet in the US. Several such networks have been established, including by the computer firms Hitachi and Fujitsu. NTT itself has also formed such a network, jointly with IBM Japan (Japan Information Service). This is in interesting contrast to Britain, where a similar alliance of IBM and British Telecom was prevented by the government as anti-competitive. In Japan, however, the strength of the computer industry and their own energetic involvement in VAN services has made the joint venture acceptable.

The second type of VAN in Japan are "General Type 2 Carriers." Of these, more than 200 emerged after the law went into effect in 1985. The by far largest category are order networks of retailers and wholesalers (e.g. for food, used cars, etc.), followed by credit card verification, financial networks, electronic mail services, voice mails, and transportation. Also in the service regulatory category are a dozen resale carriers, of which the largest are Recrute and K-VAN. They offer rates at 20-30% below those of NTT. However, this resale cannot include connection with NTT public switched network, and therefore makes economic sense only for larger users with private line needs.

Japanese VAN providers found themselves unable to provide

international service under international CCITT recommendations. To do so required their being awarded by the government the status of a "recognized private operating agency" (RPOA).

Both the British and Japanese experience indicates the difficulty in permitting competition in "new" and advanced services while insulating the "old" services.

3.4 ISDN

The preceding discussion of new carriers should not lead one to believe that the traditional telecommunications coalition is technologically passive in defending its position against challenges. One form of this defense is by moving forward and expanding into new and adjoining fields of activity such as cable television transmission and videotex. Another strategic move is the upgrading of the network in a way that raises barriers to entry and necessitates monopoly It is argued, in the spirit of political telematique, that this is a condition for technological innovation. The primary initiative is known as the integrated digital services network (ISDN), another issue of international contention. ISDN, at its most elementary, is an integration of voice, data, and telex networks into a unified "super-pipe." Though hundreds of papers on ISDN have been published -- almost all of them from a technical perspective -- virtually no public discussion of the ISDN concept has taken place. Part of the problem that hinders discussion is that the term ISDN encompasses several sub-concepts. As a move towards more digitalization of the network, it is squarely and positively within

the trend of technology. As an upgrading of the networks to higher transmission rate, it similarly responds to the greater data communications needs, particularly of larger users; for residential users, the need is less clear except as to create the proverbial egg (the network) for future chickens (the applications).

The third element of ISDN is integration, and much weaker in its rationale. To put together separate communications networks into one super-pipe is more elegant from a technologist's view, but from the user's perspective, the cost, performance, and choice of services is what counts. Integration is a standardization process, which is always a trade-off between the cost reduction of streamlining and benefits of diversity. A process of integration is usually a reduction of options. Users are interested in choice for selection, at a price, while network operators may be more interested in providing standardized options.

The implicit assumption in the justification for the non-duplicating super-pipe is that cost functions, for example for telephone and telex networks, are static. Yet one would expect that different services that are under rival control would usually create a dynamic downward shift of the cost curves, due to the extra efforts of competitors, in contrast with the monopolistic situation of unified services. The effects of these downward shifts in costs can offset, partly or totally, the economies of scope of integration.

Strictly speaking, ISDN as a technical concept does not negate multiple ISDN networks and networklets to co-exist, compete, and interconnect. There is nc notion of exclusivity in the technical

integration. But attitudinally, anything less than exclusivity is almost impossible to accept for ISDN's PTT promoters. After all, the elimination of duplication is the primary rationale for ISDN. To permit multiple integrated networks would defeat the purpose.

For the equipment industry, ISDN is welcome. After several decades of enormous public investments in the public network, expansion has come to a natural plateau or even declined. Export markets are limited because many of the larger ones are protected against imports. One way to activate the sagging domestic market was therefore to launch an ambitious program of upgrading.

The PTTs presented ISDN before equipment manufacturers for its export potential, with a clear call for a quid-pro-quo in defense of the hierarchical network. A high official of the German Bundespost argued to the industry that ISDN is important for the export success of German industry, and that it requires the contribution of the Bundespost to play a role in the equipment supply field, a role which had been under attack by the Monopoly Commission and the Ministry of Economics.

> "The PTT that takes on the leading role internationally when a new service [ISDN] is standardized gives the communications industry in that country a big head start in this service ... Anyone who blocks this influence in his own country damages the innovative force of a future technology and ultimately the entire economy." (Emphasis in original) (Schoen, 1984:22.) [Schoen, Helmut. 1984. "The Deutsche Bundespost on its Way towards the ISDN," Zeitschrift fuer das Post-und Fernmeldewesen. Heft 6, 27. (June):13-24.]

Because ISDN calls for standardization, integration, and international coordination, centralized telecommunications systems such as the PTTs had an easier time in formulating their ISDN goals

than the United States, where such central decision-making does not exist in telecommunications.

It is is not only the issue of technological preeminance that is at issue. Indeed, several foreign manufacturers have been well ahead of American developments. Part of the dispute are issues that seem technical but mirror the underlying difference of regulatory philosophy.

The FCC largely excused itself from the details of ISDN standard setting involvement, and left it to the United States Committee on the CCITT (US-CCITT); but it kept a close watch on policy issues. After soliciting comments, it issued in April 1984 its First Report in Docket 83-841 concerning ISDN, in which it went further into technical standards in a matter before the CCITT than ever before. It is unusual for the FCC to get involved into regulatory standards issues, given its deregulatory philosophy. On the other hand, the emerging CCITT standards could have anti-competitive consequences, some intended and some only perceived later.

The FCC set several policy principles for ISDN design: a flexible numbering plan that permits user choice of carriers, domestically and internationally (this is possible for international telex today, but not for international telephony under the existing numbering plan); no limitations of satellite hops in international connections; customer provision of the network termination device (NT1) as a national option; a so-called U-interface point between users and the network; a distinction between basic and enhanced services; and in general flexibility for national options. It has proven to be

difficult to accomodate these expressions of U.S. philosophy with those of the adherents of political telematique.

4. INTERNATIONAL COMMUNICATIONS SERVICE

4.1 Rate Differentials and Arbitrage

One of the main challenges to the traditional system has been how to maintain control over the international segment of communications. This area has been a major contributor to PTT profits, but at the same time it is more vulnerable to rival service provision than domestic communications where both ends tend to be under the control of the same PTT. International telecommunications is the soft underbelly of the traditionalist system. The need for international coordination and agreement has illuminated the different perspectives of the traditionalist coalition and its opponents. In consequence, disputes have been frequent and harsh. Profits on international service are high because costs have dropped faster than rates. There has been a dramatic decrease in investment cost per transatlantic cable circuit, from $133,000 in 1940/41 to a projected $670 for the fiber optic TAT-8 cable. For satellite circuits, costs have come down from $86,000 for Early Bird to $450 for the recent Intelsat-VI satellite generation. In 1981, according to one study, the cost per year of a direct broadcast-grade connection between London, New York and Frankfurt was $53,000 per year, but British Telecom charged $750,000. (Sapley in CECD, 1983: 106) [Sapley, Barry. 1981. "Managing Communications: The Value of Choice."]

An FCC study shows that the average rate from Europe to the United

States exceeded that from the United States to Europe by 34% in 1981 [Kwerel, 1984: 18]. After AT&T's 1981 price cut, the weighted average foreign tariff was almost 95% higher than the American [*] (Kwerel, 1984: 19). [*] Another report shows that in 1982, a daytime telephone call from New York to Munich, Germany, cost $1.30 per minute, while the same call made from Munich to New York and billed in Germany cost $3.03 per minute (General Accounting Office, 1983: 17)

High profits encouraged the emergence of arbitrage. A Telex message from Germany directly to the United States in 1981 cost $2.58 per minute, but only $1.76 if it was routed via the United Kingdom. This was the reason for the substantial transatlantic traffic to the European Continent via London telex bureaus. European PTTs tried to stamp out this arbitrage, citing the CCITT rules, which they themselves had authored, but, as mentioned, they were harshly rebuffed by the European Commission and the European High Court of Justice.

The implications are that the legal foundations of cartel-like behavior have been shaken. Now all it takes is one country which breaks ranks, be it for reasons of economic ideology or a desire to profit as a "communications haven," to create major problems for the profitable arrangements that have endured a century.

A second area of challenge to cartel solidarity has been how to deal with the new American carriers. In 1984, the European PTTs reaffirmed their policy on the control and limitation of OCC entry. The PTT organization CEPT recommended that its members not open up

their markets to any other than the traditional seven U.S. carriers (AT&T and the six international record carriers such as ITT, RCA, etc.) The new guidelines state that new carriers would have to provide better technical service at a lower cost than at present in order to be permitted entry into the European market in question. New carriers would be permitted for new types of communications service, such as videotex, teletext, facsimile, and packet switching. But the CEPT guidelines would restrict them to one carrier per new service.

The guidelines were in effect a self-limitation on the number of carriers they were able to choose from. Normally, it is to the advantage of any party in a transaction to be able to pick and choose among competitive partners, particularly if the party is a monopsonist. The PTTs, however, viewed the situation in a different light, and acted to restrict entry in order to prevent bargaining between countries. A PTT would presumably not enter into an agreement with additional American carriers if it would make no economic or technical sense in terms of its own self-interest. Therefore, the CEPT recommendations are more likely based on the desire to collectively prevent competitive arrangement to reach Europe by invoking cartel solidarity as the foundation of members' prosperity. They aim at preventing the establishment of telecommunications hubs such as Britain, which would permit European users to choose from among multiple transatlantic carriers by routing their traffic through London.

Given the hostile reception, it stands to reason that the new

American carriers, in order to be admitted, need to offer significantly more attractive deals to the PTTs than AT&T does. But the FCC, concerned about US competitors being squeezed by PTT monopolists, set rules against "whipsawing" which hinder the new carriers' ability to compete with AT&T and with each other for PTT business. Since uniformity tends to benefit the incumbent, AT&T's competitors were unhappy.

MCI tried to reduce the barriers to entry created by the need to negotiate agreements with the PTTs by buying an existing carrier, Western Union International (since renamed MCI International) from Xerox. This created a convenient international outlet for MCI's US involvement in electronic mail, but also provided it with an already established relationship with the PTTs.

MCI actively sought to provide end-to-end international voice traffic, similarly to AT&T. It concluded agreements with several countries, in particular the UK and Hong-Kong, which became its major international hubs. Like US Sprint, it reaches other countries by transfer through these hubs. Overall, the procedures can be complicated enough to prevent the new US carriers from profitable operations to many countries which they serve. However, the OCCs require a full international service to compete with AT&T on equal footing in the United States.

A third type of dispute involves international satellite service. In an extension of its domestic "open skies" policy, the FCC accepted applications from a group of private entrepreneurs for a license to operate the private international satellite system Orion. This was

followed by a similar application by the International Satellite Inc., (ISI), PanAm Sat and Cygnus. All were fiercely resisted by Intelsat and the PTTs.

According to the Intelsat agreement, no satellite competition is permitted that would cause such harm to Intelsat operations and profits. But Intelsat criteria for defining what this means are sketchy. For example, it did not find that the PTTs' Eutelsat system was causing "significant harm" because the European PTTs asserted, with more political than economic logic, that if they could not put up their own satellite systems, they would not use satellites at all.

Ironically, the opponents of liberalization of international satellite communication are partially responsible for its emergence. Several regional and intercontinental satellite systems have been established outside of the Intelsat organization, including a Scandinavian satellite consortium, Arabsat, Eutelsat, and a French system that is "domestic," but stretches that term to encompass communications with French possessions in the Western Hemisphere. These satellite projects arose partly due to several countries' belief that they could follow their telecommunications goals better if they had more control over satellite communications. But, significantly, they also arose in pursuit of various industrial policy goals that promoted electronic development projects. result has been to undercut the argument that an international satellite telecommunications system has to be controlled by one organization for reasons of economical and technical efficiency. Intelsat

commissioned a report in defense of its opposition to competitors. The report argued that as a result of traffic diversion due to competition, Intelsat costs would increase by 8.6% in 1987 and 9.8% in 1988. Even higher cost increases would occur if the rival systems were to divert more traffic from Intelsat. [Walter Hinchman Associates, Inc. 1984. "The Economics of International Satellite Communications." Unpublished report.].

The PTTs are fearful of satellite competition undercutting their highly profitable international service. To defend the Intelsat system, they pursued various ways. An "up-link" strategy aimed to prevent the FCC from granting private licenses as a violation of the Intelsat agreement. A "pre-emptive" strategy sought the cutting of rates and the offering of new service options to deter potential entry. A "down-link" strategy tried to prevent new satellite carriers from connecting into national networks. This strategy required a unified front of all PTT countries in a region against the establishment of a beachhead or, if this becomes impossible, against its use as a transfer point to other countries. Finally, a "Third World" strategy rallied the less developed countries' PTTs in defense of their cross-subsidies to low-traffic routes.

In the end, PanAm Sat got a limited Intelsat approval, while the other applicants were stymied. But this is a rear-guard action. Whatever one may think of the desirability of a single global system with its economies of scale, the simple fact is that a distance and border-insensitive technology such as satellite transmission cannot be successfully restricted for long. And even in the absence of

competing satellites, rivalry from private submarine cables threatens the Intelsat arrangements, and such competitors have already begun to emerge.

5. TRADE

5.1 The Containment of American Equipment Manufacturers in Europe

In the past, the traditional coalition has been fairly successful in the attempts holding the line on equipment imports from the United States. But the AT&T divestiture has led to the emergence of AT&T as a competitor in international markets, a sharp break with the past. This event has received much attention, and was portrayed as part of an American telecommunications equipment offensive into the rest of the world. But for all the publicity, actually the opposite has happened: American equipment makers have been repulsed and almost expelled out of the European market in the recent past, with ITT, GTE, and Honeywell largely departing, and AT&T unsucessful in industrialized countries. Meanwhile, exports to Japan are subject of what is almost a trade war.

For more than fifty years, AT&T had stayed out of international equipment activities, despite its position as the largest such manufacturer in the world. But, this had not always been the case. In the early years of telephone, the Bell System had licensed several European equipment manufacturers, acquired others, built its own facilities in Europe, and had a substantial manufacturing and distribution presence in several major countries. But in the 1920s, the company was under much US pressure to sell off its international

operations, since American critics of AT&T charged that American rate payers were subsidizing AT&T's international operations. For that and other reasons, the company in 1928, [*] decided to sell its European operations to the then relatively insignificant firm ITT run by the Virgin Islands entrepreneur Sosthenes Behn.

This event marked ITT's entry into the big league of telecommunications. ITT's major European operations included Standard Telephone Co. (STC) in the UK; Standard Lorenz Elektrik (SEL) in Germany; FACE in Italy; Bell Telephone Manufacturing (BTM) in Belgium, Standard Electrica in Spain; LMT and CGCT in France. Other subsidiaries existed in Norway, Denmark, Portugal, Austria, etc. Given the nationalistic nature of the telecommunications equipment market, it was to ITT's advantage to have a physical presence in Europe, since this allowed it to present itself as a domestic rather than American company; local ITT companies often downplayed their US connections.

GTE was another American telecommunications company with presence in the European equipment market. It had substantial manufacturing involvments in Italy and Belgium until a deal with Siemens transferred 80% of these interests to the German company.

Following divestiture, the international market became interesting to AT&T. Since the domestic equipment market had been opened to all comers, its US market share had nowhere to go but down. Hence, the rest of the world was its field of growth. AT&T's strategy was to align itself with domestic interests, thus overcoming the barriers that an American company would face. The first such alliance was a

joint venture agreement with the Dutch electronics giant Philips. However, Philips' home country of the Netherlands is a limited market.

AT&T's second major international involvement (in addition to other international involvements in Korea, Taiwan, and Ireland, and the aforementioned Spanish component ventures, which are a combination off-shore manufacturing efforts with added local toe-hold benefits) was with Olivetti, the Italian office equipment and small computer manufacturer. AT&T purchased 25% ownership of Olivetti for $260 million, with the option to acquire another 15% after 4 years.

Olivetti's ambition is to become a major European player in the world computer markets. In that industry, the main rival is IBM, which has more than 50% of the European market. To help it with technology and capital, Olivetti's alliance with AT&T is a great advantage, given AT&T's own technological capabilities. AT&T, which had planned for a European beachhead and distribution system, found itself making a nice windfall profit on its Olivetti investment. Fuelled by Carlo de Benedetti's success as Olivetti's CEO, and the rise of Italian stock market in general, AT&T's investment quintupled in value. Olivetti's PBXs, terminal equipment, and personal computers make it an increasingly strong rival to the STET complex. STET, in turn, is involved in significant collaborative efforts with IBM. Thus, the Olivetti-STET rivalry is joined by the American rivals, AT&T and IBM, each the ally of a major Italian company.

Another major move by AT&T was to try for an agreement with the

dominant French firm CGE, and this unleashed another round of politicking. Behind the story was the question what to do with the remaining French public switch manufacturer, CGCT, (not to be confused with CGE) which the French government had nationalized in 1982 from ITT. CGCT was losing money quite heavily, but it had one major paper asset: it was traditionally allocated 16% of the French public switching market, approximatley 300,000 lines per year. After the government-generated merger of the telecommunications activiities of Thomson into CGE (and its Alcatel subsidiary), CGCT was the only remaining second source for the DGT, which did not want to confront CGE as the only supplier. CTCT, in consequence, was given the task to manufacture the Thomson MT digital switch under a license, but it was in no position to develop its own equipment for the future. The question then was who would be the second source supplier to the DGT. CGE, holding already 84% of the market, was negotiating with foreign firms about which of them should be admitted to the market as CGE's competitor in return for concessions to CGE. CGE was, in effect, selling the small share of the French market which it did not hold for political reasons, and selecting its own competition. Eventually, CGE agreed with ATT-Philips Telecommunications (APT) that APT would receive CGCT's market share of 16% for its 5-ESS PRX switch, which would be manufactured in France by CGCT and adapted to French standards. In return, AT&T would give marketing and technical assistance to CGE to adapt its E10-5 switch for North American use, would include it in its product line, and would pay certain indemnities if sales for that switch would not reach a

specified amount. Furthermore, Phillips would transfer the microwave equipment manufacturing of its French TRT subsidiary to a joint venture controlled by CGE, while AT&T would undertake to buy at least two hundred million dollars of such microwave transmission equipment over four years. Lastly, CGE would receive $100 million. [*]

CGCT itself was unenthusiastic about the deal with AT&T, preferring instead to deal with Siemens or Ericsson. But for CGE, AT&T was a more compliant partner. The presence of a company such as Siemens, once it had a toehold in the French market, could not be as easily contained, given the close European collaboration between France and Germany, which includes French companies having large involvements in German television set mnaufacturing. In contrast, any AT&T involvement in France would be subject to much greater government scrutiny and future pressure, since public opposition against it could always be more easily organized.

The DGT network operator, too, was in favor of the APT deal, because it wanted to use the AT&T Centrex capability. But it wanted to get a better bargain. Through the then PTT Minister Mexandeau, it engaged in attempts to pressure AT&T's equipment price down. It called upon other firms, specifically Siemens and Ericsson, to also enter into negotiations. (Left out was the British System X from Plessey and GEC after British Telecom had decided to use for its own digital exchange needs as a second-source ("System Y") the Swedish firm Ericsson rather than CGE; this the French minister considered to be an "un-European" act, despite the geographical facts to the contrary.)

Now the story accelerates. What started out as bargaining to bring AT&T to terms soon changed its character when CGE struck a historic deal with ITT and gained control over the latter's telecommunications activities. This will be discussed in the following.

5.2. The French Conquest of ITT: The High Point of Political Telematique

To appreciate how sweet the acquisition of ITT's world-wide telecommunications operations must have felt for French policy makers, one must go back to the low point of French electronics. At the close of World War II, the French telecommunications industry was almost non-existant. There was CIT, part of the French General Electric Company (CGE). And there were Le Material Telephonique (LMT) and the Compagnie Generale Telephoniques Constructions (CGCT), both of which were French subsidiaries of ITT, as well as the foreign owned Ericsson-France and the Philips Group. These companies were licensed by the PTT to manufacture items of foreign design (Darmon, 1985:79). [Darmon, Jacques. 1985. Le Grand Derangement: La Guerre du Telephone. Poitiers/Liguge: Editions Jean Claude LaHesi.] Other companies which subsequently joined the market were the French Thomson-CSF and AIOP. But by the mid 1980s, only one company, Alcatel, remained, with CGCT surviving artificially. At the same time that the French government expanded the national telecommunications network, and therefore market, the foreign presence was almost entirely pushed out of the country. The government had ITT's French manufacturing subsidiary LMT and

Ericsson's French subsidiary transferred to Thomson-CSF, a private firm which was later nationalized by the Socialist government. Still later, it transferred Thompson's telecommunications activities to CEG. ITT's other subsidiary, CGCT, was nationalized in 1982. CGE and Thomson-CSF also took over in that period AIOP, a workers' cooperative.

In July of 1986, CGE entered into an extraordinary transaction with ITT, leading to its taking control over the telecommunications operations of the American-based firm. Despite ITT's American headquarters, the company had only a limited equipment presence in the United States, and in the telecommunications equipment field it was a multinational firm without a home base. The company, which had become a far-flung conglomerate in the 1960s and 1970s under the leadership of Harold Geneen had subsequently come into hard times. It was losing money heavily, and its innovative telecommunications switch System 12 was in technical trouble. The company also had to concede humiliating defeat in adapting the European-developed switch to US specifications, a very costly withdrawal caused by weak management.

Meanwhile, CGE's Alcatel telecommunications subsidiary had difficulties of its own, especially in export sales abroad; it had almost no public switch sales in Europe, and many of its international sales were political deals, particularly with former French colonies, or part of foreign aid packages. Domestically, the golden years of the expansion of the French network were coming to a natural plateau, and orders were dropping. Its mainstay digital

switch family, E10, developed for the expansion, was showing signs of age. Having failed to penetrate foreign markets through its products, CGE set out to purchase foreign toe-holds by acquiring ITT's presence.

Through a complex agreement, ITT merged its telecommunications equipment, office automation, and consumer electronic into the new entity. CGE contributed its own Alcatel equipment subsidiary. ITT kept a 37% share of the holding company, while CGE, together with other European firms, controlled the rest. ITT received 1.5 billion dollars [*] in return for its giving up its share, and the holding company assumed $800 million of ITT debt. The new firm was named Alcatel, after CEG's telecommunications subsidiary.

Because the problems inherent in having a French nationalized company own the centerpieces of other countries' electronics industries, it was envisioned for several other entities to have a share in the new venture. But this proved difficult, and in the end only the Belgian holding SGB participated in a limited way. The new firm's headquarters were placed, nevertheless, in the Netherlands, to provide for a less French image.

The merged firm became the second largest international telecommunications firm after AT&T, with seven billion dollars in assets, almost ten billion dollars in sales, and one hundred fifty thousand employees. It accounted for 42.5% of European public telephone switches, by far the largest. CGE heralded the agreement as establishing for the first time a large scale European telecommunications firm; however, most Europeans oculd not get

enthusiastic over such a French government- dominated arrangement. CGE claimed that the merger was necessary for reasons of economies of scale. The notion that it takes almost one half of the European market to be successful is a logical continuation of the obsession with economies of scale that pervades the industry's thinking.

The deal put into question CGE's separate arrangment with AT&T. Now, with CGE inheriting much of ITT's footholds in so many other European countries, it was likely that a greater reciprocity would be expected by those countries, and the 16% market share that had been allocated to AT&T might be needed to assuage one or several European countries. In particular, the German government began to be active in behalf of Siemens, pressuring the French government at the highest levels to substitute Siemens for AT&T-Philips in the spirit of European solidarity, as well as in reciprocity for the newly acquired German ITT subsidiary SEL. The tug-of-war grew acrimonious. FCC chairman Fowler pointedly sent inquiries to major American telephone companies inquiring as to their use of equipment from countries where US firms were being discriminated against. Within the French government, the DGT preferred APT, while other ministries did not wish to antagonize Germany. The rival companies successively sweetened their bids. In the end, the government chose Ericsson as a compromise, together with the French defense firm Matra, which thus gained a foothold in telecommunications.

5.3 The Failure of Political Telematique in Mainframe Computers

It is useful to contrast the French success of empire-building in

telecommunications with the performance in computers or components. Where monopoly leverage did not exist to the same extent as in telecommunications, the success of French firms was less impressive. The French government had long been worried about "computer sovereignty." De Gaulle unsuccessfully attempted to veto GE's ownership involvement with the French computer firm Bull. The French were rightly shocked when the U.S. State Department had refused an export license for large scientific computers to the French atomic energy commission for use in H-bomb research. When the GE-Bull deal could not be prevented for financial reasons, the government formulated in 1966 its "Plan Calcul." Among its projects was a merger between the two French-owned computer manufacturers. Bull was left out of the Plan Calcul because of its American links.

Plan Calcul established targets for development of scientific computers, leaving much of the commercial office computing to IBM. This completely misjudged the explosive growth of business application of computers, and, in any event, never touched the predominance of the American Control Data Corporation in this field.

The product strategy behind the Plan Calcul missed future developments also in other respects. It observed the emergence of time sharing use of computers in which terminals were linked to a powerful central computer and predicted a future with a few giant mainframe computers only. Consequently, its product development set priorities towards the development of such machines. But the subsequent trend was almost the opposite. Mini and micro computers proliferated, in which IBM did not dominate. On the other hand, the

main benefit from the Plan Calcul was unanticipated: it provided technology skills to Thomson and to CGE, which they could later apply in their development of digital telecommunciations switches.

General Electric, in the meantime, experienced major headaches with Bull. Even French companies had agreed that almost half of Bull's employees would have to be dismissed, but GE had committed itself to keeping them all. When confronted with the reality, a period of labor strife ensued. GE also cancelled two ongoing computer developments at Bull. Later, it sold its interest to Honeywell when it left the computer business altogether.

By 1976, neither CII nor Honeywell-Bull were doing well; with government pressure and financing, they were merged into CII-Honeywell-Bull, which was 53% French (private and governmental) and 47% Honeywell. By 1979, the French government had subsidized CII-Honeywell-Bull over a four year period with about $300 million, and had issued loan quarantees during the same period for about $1 billion dollars. The socialist nationalizations of 1982 also included the computer firm. Honeywell was forced to reduce its involvement substantially. Because its participation was deemed to be desirable due to its access to advanced technology and the American market, it was left with 19.9% of Bull and a ten year marketing and technology agreement with its former subsidiary. In 1986, Honeywell exited from computer manufacturing altogether, and sold its French interest. Bull's affiliations with American technology were, in addition to its Honeywell link, a 7% share in the U.S. company Triology, founded by Gene Amdahl in 1981 in order to

advance the state of high speed mainframe computers and VLSI components. Trilogy, however, was unsuccessful in its development efforts. This, after RCA, GE, and Honeywell, was Bull's fourth luckless marriage with an American firm.

Following the Socialist victory of 1981, 12 big industrial groups were nationalized at a cost of about $6 billion. In the electronics field, this included CGE, Thomson-CSF, CGCT, Matra, and CII-Honeywell-Bull. The total losses which the government had to subsidize grew from 226 million dollars in 1980 to 4.6 billion in 1982, and 4.2 billion dollars in 1983. The annual subsidy of losses were more than 2/3 as high as the inital costs to the government of taking over the companies!

Direct government aid for the electronic industry was $1 billion in 1983; $1.2 billion in 1984 and another 1.2 billion dollars in 1985 (Electronic New, 1985b). [Electronic News. 1985. "$275M earmarked for French groups." (February 25).] This was only the direct aid, and does not include indirect support through the telephone administration DGT. In 1985, Bull received $100 million in new equity, the same amount as the year before. Thomson, which received $100 million in 1984, got another $130 million in 1985, primarily for its electronic components division.

Eventually, ending the state companies' deficits became a priority, and the nationalized companies began to rapidly cut jobs. By 1984, unemployment was at a post war historical high of 10%. The electronic companies, too, laid off workers during 1984-5. For example, Alcatel eliminated 1700 jobs; and Thompson cut 4,000 employees.

For all of the expensive French government efforts, it was ultimately the ineffectiveness of several American firms which caused their departure from France. Meanwhile, IBM was as strong as ever, with Bull not a serious threat, even in the private French market.

5.4 Equipment Imports

Though the traditional coalition was critical of US liberalization, it was not above benefitting from it in trade. At the same time that it was reluctant to alter domestic procurement practices. This has created problems of reciprocity in trade which have spilled into the political arena. The lack of acceptance of American exporters in Europe has been described above. This section deals with trade to the United States.

The U.S. market is not only the largest domestic market in the world by a vast margin, but it is also relatively free and has a large number of small and medium-size telephone companies (approximately 1500). There are more potential customers in the United States than in the rest of the world put together (Many of them are, of course, quite small.)

The US liberalization provided non-U.S. manufacturers with exciting opportunities. The Bell Operating Companies, which prior to divestiture of AT&T had relied largely on Western Electric, thus giving AT&T a captive market of 80% o the total US equipment market, were now free to buy equipment from other suppliers. They have indeed actively done so, primarily from Canada's Northern Telecom, but also with a strong presence of Siemens.

Even before the AT&T divestiture, the Swedish firm L.M. Ericsson had been an active supplier to American independent telephone companies and to MCI. The British company Plessey purchased the public switching business of the well-established American manufacturer Stromberg-Carlson.

Georges Pebereau, then president of the French giant CGE, declared that "It is obvious that no European company, French or not, can remain a world company if it does not have a significant position in the American market, which represents 40% of the world market and, in addition, is from the point of view of technology the best testing grounds one can imagine. Happily, we have a historic opportunity to develop ourselves in the U.S., with the deregulation of ATT...If, sadly, CGE's presence in the U.S. failed, we would need more than a decade to regain the confidence of our American customers. Thus the interest in finding a partner in place which would permit us to penetrate the American market faster, more surely and at a lesser cost. Of course, if such an occasion presented itself, we would seize it (L'Expansion, 1985) L'Expansion. 1985. "Pebereau joue quitte ou double," (June 7-20):67-81]

The opening of the American market was some of the best news that many non-US manufacturers had for a long time. Other industrial countries' markets are largely closed to imports, even within the European Economic Community. Demand from the OPEC countries declined with the fall in the price of oil and due to the fact that the initial large equipment orders had already been placed. Likewise, in the Third World markets, fewer funds than before were available for telecommunications investments, and many countries encourage the development of a domestic telecommunications industry to spur their own industrial development. Thus, open markets for telecommunications equipment were limited, according to a 1982 OECD estimate, to less than 15% [*] of the world market. Since then, the US market was opened, more than doubling the total. Some of the

strongest advocates of protectionist policy in telecommunications procurement were subsequently beginning to seek their fortune in the newly-liberalized US market. But this asymetric situation unavoidably had to create tensions. It was highly unlikely that the US government would stand by as others sold freely in America, while US manufacturers were shut out. It is therefore not suprising that the FCC, in December 1986, initiated a Notice of Inquiry in which it invited comments on whether there should be restrictions on the approval of equipment exported from countries which discriminated against American equipment.

Thus, the opportunity to enter the US market is ultimately a double-edged sword, threatening to bring about a reduction of European and Japanese firms' own protected positions. It has the tendency to split the telecommunications industry of other countries: strong and advanced manufacturers who can compete successfully in the American market, and at home on the merits of their products, could accept American entry in their home base; but weak firms in need of protectionism would have little to gain and much to lose from the lowering of the barriers.

5.5 Services Imports

Just as in the equipment market, deregulation of US domestic telecommunications services provided foreign organizations with new opportunities to enter the US market. Already mentioned was Cable & Wireless, which established with NYNEX a joint venture for a fiber-optic transatlantic and transpacific cables. The liberalized environment makes it possible for European carriers to acquire

American domestic long distance carriers. Cable & Wireless owns TDX System Inc., an American discount long distance carrier company servicing business users. Likewise, France Cable et Radio, a subsidiary of the French DGT, in 1983 acquired a share in Argo Communications Corp., a newly formed American interexchange carrier which was an early offeror of an ISDN-type service. The imbalance of this ability to offer services in the U.S. is striking when compared to the barriers which prevent American carriers from even reaching international markets.

Cable & Wireless also attempted to acquire Pacnet Communicatrions Corp. Pacnet then requested a data network identification code which would enable it to provide overseas customers with a U.S. resale packet switched network. With such a status, under the Computer II decision, Pacnet, as an enhanced service provider, would not have had to file with the FCC, and could even have acquired satellite circuits from Comsat without requiring authorization. This situation creates the possibility that a PTT could set up their own unregulated distribution networks in the U.S. As a staff memorandum to the FCC concluded,

> "It is fair to say that the ability of foreign telecommunication entities to enter the U.S. international telecommunications market is in large measure unprecedented and raises serious issues not presented by foreign entry into the U.S. domestic market..."
>
> "In the U.S. international telecommunications market, an unregulated foreign enhanced service provider would have the ability to both prevent the entry of additional U.S. entities into the market for service between the U.S. and the home country of the foreign entity and to remove existing U.S. carriers competing in that sub-

> market, at least as a common carrier service to be provided by the telecommunications entity of the country. Such action by foreign entities would run directly counter to the U.S. policy of fostering increased competition in the provision of international telecommunications services [General Accounting Office, 1983]."

Although the Pacnet application was withdrawn, similar actions are a clear possibility. Argo provided long distance service in the US, and also served as sole connection for all American competitors to AT&T who wished to be routed to France. Just as in the case of the opening the American market to European equipment sales, this potential of European service provision within the American domestic market, linked to a domestic monopoly position, raises issues of reciprocity, and again points out to the problems inherent in coordinating and balancing a system of communication links when their two ends are controlled by fundmentally different concepts of the nature of telecommunications.

6. INTERNATIONAL COLLABORATION IN TELECOMMUNICATIONS

From the beginning, telecommunications were a highly internationalized affair. For a long time, international organizations were used to shore up domestic arrangements and protect PTTs by creating welcome international restrictions. What started as technical collaboration across borders almost immediately became deeply involved in economic arrangements and the protective regulations of a cartel. This tradition, too, goes back into the early period of postal systems, where the checkered map of central Europe usually permitted alternative routes, and thus made inter-

governmental agreements desirable for states in need of the postal revenue. Hence, the maintenance of stable international arrangements is a central policy concern for the postal-industrial complex. But times have been changing. More recently, other international organizations have begun to disturb this harmony. Private collaborative ventures, too, have accelerated with the growing complexity of technology, and begin to disturb the compartmentalization of national markets.

6.1 The Traditionalist Institutions

The oldest and most venerable of institutions is the International Telecommunication Union (ITU), founded in 1865 by several European telegraph administrations. From the beginning, the ITU was controlled by the major European powers. Not only were these countries at the forefront of telegraph technology and usage, but they had also provided for themselves voting membership though the colonial telegraph administrations of their overseas colonies. In 1925, France, Great Britain, Italy and Portugal all had 7 votes in the ITU.

Technical coordination was only one aspect of the ITU activities. The issues of international rate making, i.e. of economic collaboration, was important from the beginning, and much of the ITU meetings were spent establishing uniform rates and agreeing upon the charges for coded messages. (Codding, and Rutkowski, 1982:7) [Codding, Jr., George A., and Anthony M. Rutkowski. The International Telecommunication Union in a Changing World, Dedham, Mass, 1982]

Until World War II, the United States' attitude toward the ITU was one of benign neglect. It did not send delegates or observers to the International Telegraph Union, and did not participate in the international consultative committees when they were formed in the 1920s. In the late 1920s, it opposed the creation of the unified telecommunications ITU, since this extended the potential for an international cartel. The exceptions in the US's attitude were the two periods following the World Wars, when the U.S. was more closely interested in international arrangements. This led to the 1947 Atlantic City conferences which reshaped international communications into arrangements that have lasted until today.

A majority of ITU members are against any form of liberalization. On the other hand, while the political majority is conservative in outlook, its victories are hollow if the minority consists of major telecommunication countries such as the United States, the United Kingdom, and Japan, which may not abide by the recommendations.

Of particular importance in the telecommunications field is the Consultative Committee on International Telegraph and Telephone, CCITT, which has a subsidiary relationship with the ITU. The role of the CCITT is to harmonize operational, technical, and tariff issues of international telecommunications. It functions primarily through expert groups that deal with specific questions. The CCITT issues recommendations, and has no enforcement power. It is not a treaty organization with binding resolutions. But it functions as a de-facto standards setting organization, for which there is often a need. But it must also be recognized that the emphasis on tidy

standards is most appropriate to an era in telecommunications where technological change was slow. In the present rapidly changing environment, standards can be used to establish artificial stability, and to protect favored firms. One domestic example: The Swiss PTT, set in 1984 (*) requirements for cordless telephones such that they were met by one firm only, from Switzerland (not surprisingly), which reportedly planned to charge the PTT above $600 per set, leading to a monthly rental rate of $15. (Wolf, Thomas, "Akzeptanz und Kosten des Schnurlosen Telephons." Neue Zurcher Zeitung, Oct. 26, 1983.] At the same time, one could buy simpler but perfectly adequate cordless telephones in the US less than $75. Thus, the problem with CCITT recommendations is not so much with the notion of standards per se, but with their being agreed upon by a body thoroughly dominated by the institutional and economic interests of the PTTs and of favored supplier firms. CCITT recommendations can (and do) clash not only with liberalization of individual countries (as in the case of the Japanese VANs' ability to operate internationally as discussed above), but also with other international agreements. The European Community's Treaty of Rome provides for the elimination of restrictions in trade of goods and services among European countries. In the 1970s, telex bureaus emerged in Britain to route telex messages from Europe to the U.S. through London, at a considerably cheaper rate than that charged by the European countries' PTTs for direct service. CCITT recommendations, however, prohibit such third country traffic, and the PTTs sought to enforce them. The telex bureaus sued under the Rome Treaty, and eventually won before the

European Commission and the European High Court.

CEPT is another PTT organization. It was established in 1959 as the organization representing the interests of 26 European countries. It is closest to a cartel organization in international telecommunications, and it "harmonizes" European positions for CCITT and ITU discussions. While manufacturers are included in CEPT discussions, user groups are not represented, except an by occasional and special invitation.

6.2 International Institutions of Change

The emergence of telecommunications policy discussion in other international organizations such as the European Community and the OECD is a reaction to the often narrow perspective of the PTTs in their own international bodies. It is an extension to the international level of domestic conflicts that exist in many advanced countries between the PTTs on the one hand, and the ministries of economics or industry and of anti-monopoly agencies on the other. Generally speaking, the ministries of economics or industry see telecommunications issues in the broader context of high-technology development and national competitiveness of information sector.

However, one should not overestimate the divergence of interest. The ministries of industry, the OECD, and the EEC do not primarily focus on services and on user interests, but largely on equipment issues. They are allied primarily with the "second' electronic industry rather than with service-industry users.

The OECD, the organization of the developed world, has displayed particular initiative on matters of information flows, where it took a role in identifying and discussing the issue of transborder flows of data, privacy, and national sovereignty.

Another international body into which telecommunications issues have spilled is the GATT (General Agreement on Tariffs and Trade). Here, the United States has proposed to extend the GATT code to cover trade in services, including telecommunications services, to match the GATT's liberal trade regime for goods and commodities, which did not apply to services.

For a long time, telecommunications matters were outside the reach of the European Economic Community and its Commission. In June of 1983, the European Commission concluded that the fragmentation of European telecommunications into a nationally protected environment was an important element in Europe's falling behind the United States and Japan. This led to the formation of the Esprit program, which excluded, however, telecommunications. In 1985, the Race program was added, specifically for telecommunications, and Eureka was established in 1986.

Particularly active in pushing for a joint European telecommunications policy was France. Given its own high standard of telecommunications technology within Europe, it saw itself as a potential beneficiary in the opening of European markets. The French PTT Minister Louis Mexandeau, strenously argued for reciprocal and open European Community market, but specifically with a "delay" in the opening of the market with the United States and Japan.

One of the priorities of the efforts by OECD and the EEC is to break down the protectionist walls that have separated many developed countries from each other in their telecommunications procurement. The European Commission has pursued several cases against member states for discrimination against each other's equipment. Another important strategy has been to create links between firms in different countries, and thereby to dilute the notion of nationality and strengthen Europeanism. At the same time, it would encourage European high technology development. These efforts include the following upbeat acronyms:

(a) Esprit (European Strategic Program in Research and Development in Information Technologies). Esprit matches industry financing by an equal-sized subsidy; it requires participation by firms from at least 2 EEC countries in each project. Although small companies and universities have also been helped, the prime beneficiaries have been the established and large companies. [Marsh, Peter. "Boost for Joint Ventures," Financial Times, June 24, 1985, pg. IV.]

(b) Race (Research and development in Advanced Communications technologies for Europe) targets telecommunications, which were not included in Esprit for various reasons, including jealousies among PTTs and suppliers. It seeks to involve the PTTs in developing a reference model for integrated broadband telecommunications networks, as well as several other research priorities.

(c) Eureka, (European Research Coordination Agency) is based on a French initiative proposed by President Mitterand. It is not specifically a project of the European Economic Community, and

eighteen other non-EEC nations participate. As the discussions in Europe on participation in the American "Star Wars" project grew heated, Eureka was stressed as the European civilian alternative to the American military-oriented research effort. The British government, after some misgivings about the creation of a big bureaucracy, and fearful of a large financial commitment, warmed up to Eureka. But skepticism remained. Eureka was described by The Economist as "[promising] to take more money from taxpayers to bribe rich European companies to do the sort of R&D they should be doing anyway if they want to stay in business." [*]

(d) Euronet is a packet switched data transmission network, run by the European PTTs to provide for international on-line data base access, specifically to the DIANE system. DIANE (Direct Access Information Network for Europe) includes several hundred databases, and is supported by the EEC to promote European software development and usage.

(e) The European Space Agency (ESA) was created in 1975 as a continuation of efforts to catch up with the American and Soviet space efforts by cooperatively developing the launcher Ariane, the ECS satellites, and a manned space laboratory. Technical responsibility for the development of the Ariane launcher lies with CNET, the telecommunications research laboratory of the French telecommunications authority DGT. [*] Firms in several European countries participate in development and production. In 1983, subsequent to the OTS experimental satellite, the European

Communications Satellite ECS was first launched by Ariane. The system of ECS satellites, in turn, is operated by Eutelsat, the satellite organization of European PTTs.

6.3 Private Collaborations

Even without EEC subsidies there have been a large number of international joint ventures. [Cowhie and Aronson, 1987] Only a few should be mentioned beyond those discussed above and below. Olivetti owns a major part of the British firm Acorn Computers; Philips, in addition to its links with Siemens and AT&T, also entered into joint ventures with Ericsson in Sweden, and with Bull, Alcatel, and Thomson in France. In 1983 it took control of the German consumer electronic firm Grundig when that company had financial problems. Thomson, similarly, acquired the consumer electronics division of AEG-Telefunken in Germany when that firm was near bankruptcy. It also acquired the Germany television producers Nordmende and Saba, as well as the stereo equipment manufacturer Dual. Siemens and ICL distribute Fujitsu computers. Siemens has a good number of US ventures, including a joint one with Corning Glass for fiber-optic cables. CGE, together with the Belgian holding company SGB, acquired a majority share in the Belgian electronics company ACEC. SGB is also a part-owner of the Alcatel venture. Alcatel, Siemens, Plessey, and Italtel have a joint research effort for telecommunications switches and transmission.

A major cooperative effort for the development of semiconductor components is the joint $600 million "Megaproject" of Siemens and Philips. In addition to the huge private investment in Megaproject,

the German and the Dutch governments have contributed about $100 million each. The aim is to develop a 1 megabit static random access memory (RAM) chip by Philips and a 4 megabit dynamic RAM by Siemens (both are comparable products). The companies' aim was to begin production in quantity in 1989. Another cooperative project joined Siemens with ICL of Great Britain and Bull of France.

International joint ventures are often difficult in practice. In addition to the obstacle of incompatible products, they have to overcome of problems of selecting the physical location of a project, the language to be used, the composition of management, and labor sensitivities. A collaborative effort of Siemens, ICL, and Bull to develop fifth generation super-computer technology was launched with the shared R&D lab located in Germany, a French director, and English as the operational language. For the same reasons that firms like to see duplication of efforts reduced by joint ventures, trade unions are suspicious of such efforts. They are fearful of employment reduction and of the ability to deflect the effects of strikes in one country.

Difficulties in cooperation have resulted in the collapse of several joint efforts; in the mid-1970's, Unidata, a data processing venture of Philips, Bull, and Siemens fell apart after bitter disputes involving allegedly over-aggressive French government involvement in its affairs.

Multinational cooperation and mergers can also be hampered by some countries' promotion of high-technology companies as 'national champions,' making it difficult to have these firms as junior

partners in a collaborative effort, as is often necessary. This was one of the factors that prevented the British firm GEC from acquiring its German counterpart AEG-Telefunken when the latter was having financial problems.

One of the consequences of joint venturing is that it leads towards a greater importance of standardization. In March of 1984, the twelve leading European computer and communication firms agreed to draft common standards for the interconnection of their products. In 1985, six European computer manufacturers, STC, Nixdorf, Siemens, Olivetti, Philips, and Bull, undertook to base their future computer systems on AT&T's Unix operating system, and to develop software for such uses. In 1986, they further agreed to collaborate on OSI interconnection standards. Membership was open to other European firms, but non-European companies, i.e. American and Japanese, were pointedly excluded.

7. OUTLOOK

Communications are becoming too varied, complex, and significant for one organization, together with a handful of favored suppliers to cover the entire field well. As effective as the old arrangements may have been for their times, circumstances change and so must institutions. The notion that in the age of information and in societies operating largely on the market principle, all communications flows would pass through one super-pipe controlled by a single organization is hard to entertain on technical, economic, or political grounds, except by reference to the present balance of

power. But these conditions are not very likely to prevail. The traditional arrangement is being challenged from a multitude of centrifugal forces. Demand conditions are changing due to the growth of an information-based service sector. Technology is changing and merging, and propells the telecommunications industry into the broader electronic sector, with less cozy relations with the PTTs, more competition, and less protection. And the greatly increased volume of international transactions creates pressures of inter-jurisdictional competition. If one country's PTT exercises restrictive policies, its firms may be disadvantaged internationally, and foreign firms may choose not to domicile themselves in the country.

These forces, while having different manifestations in each developed country, are not peculiar to any of them; consequently, one must expect the breakdown of the system of domestic monopoly and international cartel to continue, and to spread to other industrialized countries, even if the details vary.

Once the notions of the traditional network are breached in some respects, the process is hard to contain. A dynamic process sets in in which each step of liberalization leads to a challenge of the next. The growing complexity of the emerging system make it increasingly difficult to formulate consistent rules. And these rules are not likely to be enforceable. The subject of the regulation -- streams of electrons and photons, and patterns of signals that constitute information -- are so elusive in physical and even conceptual terms, and at the same time so fast and distance-insensitive, that, to be effective, a regulatory mechanism must be

draconian, and for that the traditional system has neither the will nor the political support. There is still need for regulatory oversight under which networks and users interrelate in the future, but with less control than in the past. In international communications, the absence of an effective centralized regulatory mechanism leads one to expect the breakdown to be fastest.

This development is inevitable not because it leads necessarily to a superior result, but rather because the traditional centralized and protectionist network and its international extension into a cartel is an anomaly, though one almost too familiar to be noticed as such. As long as the economic system of Western industrialized democracies is based on markets supplied by private firms, the exclusion of major economic parties from a major field is an unstable affair at best. It is hard to keep a moat between telecommunications and the rest of the economy. To differentiate it as an infrastructure service is too vague to be useful. Telecommunications, unlike a lighthouse, is not a public good in the classic sense: users can be excluded, and charges can be assessed, breaching one of the criteria for a public good.

Obviously, governmental outlays for the electronic industry have been associated with some successful product developments. Japan, Korea, and Singapore are examples; so is NASA and the Pentagon, or the French state support for the Filiere Electronique. This, however, does not prove causality, the cost-effectiveness of such support. Channelling funds into future oriented technologies is difficult at best. Aside from questioning the ability of

bureaucracies to make these choices well, one must also recognize that the PTTs are not disinterested funders of technology, but politically highly alert institutions which use their industrial policy role to cement their own position.

The traditionalist system was international in the sense of a collaboration on the level of government organizations. It held together well because of a similarity in perspective -- the values of engineering and bureaucracy -- and because of a common interest to protect the domestic arrangements. For a long time, national PTT administrations almost joyfully participated in the international sphere, because they could return home with an international agreement that would buttress their domestic position. But in the age of satellites, internationalism has become a threat because it is increasingly difficult to reconcile the traditional arrangements with it. And there is much more change to come. For example, we still think of international telecommunications as a federation of networks that are legally and territorially based on the nation-state. And yet, the breakdown of the system, as described in the paper, would not stop at the borders. In the long run, therefore, telecommunications networks will transcend the territorial concept, and the notion of each country having control over electronic communications may become archaic in the same sense that national control over the spoken (and later the written) work became largely outmoded in open societies.

As this process of normalization takes place, those identified with the traditional system, who are rightly proud of its technical and

social accomplishment, will defend it as best as they can. The transition will therefore be a difficult one. The United States is at the leading edge of this secular change in international telecommunications, and it is no place to make many friends. Hence, one should expect the future to be full of discord as the developed world's telecommunications moves reluctantly towards normalcy.