RESTRUCTURING TELECOMMUNICATIONS TARIFFS IN EUROPE

AN HISTORICAL ANALYSIS OF THE POLITICAL-ECONOMICS OF TARIFFS IN FOUR EC MEMBER STATES

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ABSTRACT

This thesis researches the influence of national and international political-economic factors on the evolution of telecommunications tariffs in four European countries: the United Kingdom, the Netherlands, France and Germany. It argues that in the past as in the present tariffs are far from an outcome of a simple, 'objective' and straightforward cost calculation combined with an uncomplicated valuation and depreciation of existing assets and new investments. The reason for this is not just the traditional public ownership of the telecommunications operator, the PTT, nor just because of its legal monopoly: the main reason why telecommunications tariffs did not and do not reflect their 'true costs' is that they cannot reflect 'true costs' as that concept itself turns out to be a myth; or to be more precise: an ideological construct veiling the actual (re-)distribution of costs, revenues and profits between user groups and operators, nationally and internationally.

Using the French regulationists' school of political-economy and their interpretation of International Relations a multi-disciplinary and multi-facetted concept called the Telecommunications Regulation Mode (TRM) is constructed. It incorporates national as well as international developments in technology, production, consumption, accumulation and regulation in a non-functionalistic and non-deterministic manner. This TRM is subsequently studied in a abstract, logical fashion (its logical working, consistency and stability) as well as in a historical fashion (its concrete international development as well as its concrete evolution in the four EC countries). For both the pre-Fordist as well as the Fordist TRM the specific variations per country are analysed, as well as the developments of cost accounting, cost allocation and pricing. Much attention is given to the demise of the Fordist TRM throughout the 1980s and the recent shift towards what is categorised as a post-Fordist TRM. The latter is, contrary to the Fordist model, characterised not by a highly centralised and standardised, relatively inflexible and monopolistic operator and standardised, inflexible and averaged tariffs, but by emerging competition in some market segments, network fragmentation, internationalisation and de-averaged, flexible tariffs.

PREFACE

The aims of this thesis are twofold. On the one hand it tries to demonstrate why the science of International Relations - as conceptualised in the French regulationists' school - is relevant for the study of telecommunications and how it can make a contribution towards a better understanding of current developments in this field. On the other hand it argues that telecommunications and their tariffs can only be properly understood by analysing their wider politico-economic environment. This is more radical than it looks at first reading; it implies, for instance, that current debates on 'cost based tariffs' are basically flawed and veil what truly is a highly contentious and political debate about the future of telecommunications in general and its tariffs in particular.

The work on this thesis largely coincided with my stay here in the United Kingdom, the 'sceptred isle', where a Conservative Government set the pace for radical change in telecommunications in the early 1980s. The UK was and probably still is the best place in Europe to learn about the effects of liberalisation and privatisation policies - policies which still have not found an equivalent on the European continent. Without giving an overall assessment of the blessings and curses of the Thatcherite policies, this thesis is, nevertheless, critical of some aspects of telecommunications liberalisation; it warns us that 'cost based tariffs' are not what they seem to be and that continued, critical analysis is needed as well as increased concern for a truly universal and public service. I cannot do better than illuminate this point by quoting from an article from Nicholas Garnham, discussing the impact of new information and communications technologies:

> "The problem posed for the world's major telecommunications operators is that telecommunications usage is highly concentrated. Typical 80 per cent of revenues and nearer 100 per cent of profits are generated from a few hundred major corporate customers. In an unregulated competitive market there is little incentive to provide the rest of the customer base with new services. Moreover, those profitable customers are located in a very small geographical area world-wide - the downtown areas of a few major financial centres, perhaps 60 square miles of the globe's surface. With modern satellite technology and fibre optics, these centres and customers can be efficiently linked without the expense of building a network for anyone else and the intelligent switching, the source of the information services, can control the network and the services run over it from one global control centre. The problem is that most people, even in developed countries, live outside this charmed circle." (Garnham 1991, pp.31/32)

Writing a thesis is not an easy job, and this one is no exception. I could not have done it without the support of many people inside and outside academia. First of all I want to thank my tutor, Jill Hills who

has been a great inspirer from the start and helped me to get through all the little crises on this seemingly endless journey. Then there are a number of persons who provided me with ideas, suggestions, contacts, support, information or who, via discussions, made me look at issues from a different, and more fruitful angle: Richard Barbrook, Nicholas Garnham, Suzanne Hasselbach, Jenny Owen, Anna Reading and Ginni Tym at the Centre for Communications and Information Studies in London; Robin Mansell at the Science Policy Research Unit in Brighton; Gillian Marcel at City University London; Richard Cawley at the European Commission in Brussels; Dominique Garnier and Allain Vallée of the *Direction Génénerale des Télécommunications* in Paris; Dimitri Ypsilanti at the Organisation of Economic Cooperation and Development in Paris; Ray Smith and Nigel Hidgens at BT in London; Marcus Weinkopf at the *Wissenschaftliches Institut für Kommunikationsdienste* in Bonn; Peter Culham at OFTEL in London; Frits van Dam at the *Hoofddirectie voor Telecommunicatie en Post* in The Hague and Richard Kramer from Northern Telecom who was also a most supportive flatmate. Finally I want to thank my parents, Miep and Sef Joosten, and friends, Tony Ajai, Karin Chalmers and Zàb Chughtai for their understanding and moral support. They all deserve my gratitude. And yes, René Bardoel, without you I could not even have started all this. It was not only a telephone line which kept us together for all these years - but it helped a lot though.

This thesis is dedicated to Christianne van Heijst and Gemmy Duisters, children of the next generation, who, I hope, will share the joy of living in a truly global 'charmed circle' embracing all other children in the world.

London, February 1993

Matthieu Joosten

INTRODUCTION

The general theme of this research is the influence of national and international politico-economic factors on the evolution of telecommunications tariffs in four European countries: the United Kingdom, the Netherlands, France and Germany. It argues that in the past as in the present tariffs are far from an outcome of a simple, 'objective' and straightforward cost calculation combined with an uncomplicated valuation and depreciation of existing assets and new investments. The reason for this is not just the traditional public ownership of the telecommunications operator, the PTT, nor just because of its legal monopoly: the main reason why telecommunications tariffs did not and do not reflect their 'true costs' is that they cannot reflect 'true costs' as that concept itself turns out to be a myth; or to be more precise: an ideological construct.

Whilst many an economist would agree with the first, historical, statement they would maintain that there are nevertheless 'objective' methods to calculate costs and determine prices. The 'free market mechanism' would guarantee tariffs reflecting 'true costs', as well as generating the best, that is the most efficient use of capital and labour, which would benefit society as a whole. Some ultra-liberals have accordingly concluded that, in order to have 'cost-based tariffs' and tariffs which would not 'unduly' favour one group of users by taxing another, the telecommunications sector should be deregulated completely and the old PTTs privatised. State regulation ('dirty politics') only corrupts the benign workings of the free market. The costs of providing a public service should then be financed out of general tax revenues in order to prevent market disturbances.

Other, more moderate liberal economists, have pointed out that deregulation and privatisation without new, (re-)regulation would hardly create the desired outcome: it would merely turn state monopolies into private monopolies. What according to these economists is needed is a new regulatory framework which intervenes in the telecommunications market in order to generate real competition. Paradoxically, the 'free market' would need considerable intervention to protect new entrants against possible abuse by the still dominant, incumbent PTT. The Herculean tasks the regulator should fulfil are to 'mimic' a market mechanism as long as protection of infant industries were required and to 'smooth' the general functioning of a competitive market whilst securing the public interest and intervening in as 'neutral' and 'minimal' way as possible.

The basic flaw of the radical 'free-market' view is that it treats the subject (telecommunications markets or societies in general) as if it could be defined by immutable laws, behaviour and tendencies. This view could not be further removed from real life: not only have 'free markets' hardly ever existed, state policies and interventions can, and historically have been conducive and necessary for the unfolding of markets and creation of wealth. The second group of moderate economists have understood this point

better and agree that sometimes the market mechanism simply cannot be left to its own devices and needs a certain degree of 'correction' according to the specific circumstances, although it is up for debate when and which 'correction' is required. Nevertheless, the main aim of interventions should remain solely the better functioning of the market mechanism on a piece-meal basis; steering the market in certain directions would namely eventually demolish the market system, that is the basis of our current economy and wealth.

This thesis rejects both views as far as the telecommunications market is concerned. It demonstrates that even in the case of moderate economic intervention it is impossible to avoid political questions and decisions which, explicitly or implicitly, will steer the whole of the sector in a certain direction. The typical politico-economics of telecommunications networks and their services render a 'neutral' role for a regulator impossible. In the case of tariffs the regulator, implicitly or explicitly, has to make intricate decisions about cost accounting, cost allocation and the relationship between costs and prices. Since economics cannot give a final answer on the extremely difficult question of costs and prices in telecommunications, there is more than a margin for political (or non-economic) manipulation and interpretation.

The main question of this research can thus be formulated as: if there is no objective method of tariffing, if they are not set according to a-historic and neutral laws and accounting principles, how have tariffs then come about in the past and present? What has been the effects of technological developments on tariffs and whose interests were more involved and whose interests less? How were international tariffs regulated and what was the role of states and international organisations in this? To answer these questions we clearly need more than a narrow economic perspective: we need to include politics, technology and international relations as well.

The first Chapter tries to formulate a theory which can be used to model the research. It starts by arguing why it is appropriate and significant to relate the contributions of the science of international relations (IR) to the multi-faceted phenomenon of telecommunications. Several IR theories are assessed for their contribution to the study of telecommunications. The Chapter also tries to close the traditional gap in political sciences between the international and national level. The division between comparative politics - concentrating on state theories and alliances at a national level - on the one hand, and IR - focusing on the international system of states or class relations - on the other, has often led to a regrettable shortfall in the explanatory power of models developed in each field. Equally, and inevitably, a study of telecommunications must deal with issues such as the long-term and sunk investments involved in the creation and maintenance of networks, the question of natural monopoly, the determination of costs and prices, the production and consumption of telecommunications services, the changes in the field of technology and the transition of inventions into innovations. Therefore the Chapter combines issues, concepts, theories and approaches from the fields of economy and technology as well as politics.

The analysis developed here attempts to construct theoretical and analytical bridges, cutting across these different social science disciplines, or sections thereof, without losing the original perspective of IR (although the adopted IR perspective - see below - is antithetical to the Anglo-Saxon IR tradition). Converging these different theories is nevertheless problematic. Firstly, on a higher level of abstraction they often represent rival philosophies of science (ontology and epistemology). As we will see, some theories take the individual whilst others take the system or structure as the basic unit of analysis. Some stress the scope and general consistency of explanation, others narrow their focus and give greater priority to prediction and testing of empirical hypotheses. Secondly, there is the danger of explaining the highly complex totality of telecommunications with too many variables. Some social scientists have stressed parsimonious (that is, economical) forms of explanation which explain 'a lot from a little'.

Aware of these problems, this study tries to manoeuvre between the Scylla of inconsistent eclecticism and meaningless relativism and the Charybdis of crudely oversimplified abstractions and generalisations and theories with a severely limited scope. After a broad assessment of several theories and approaches, the French 'regulationists' school is chosen because this comprehenise and integral approach combines international relations, economics, politics and technology in a non-reductionist and historical way (it thereby deviates from mainstream IR theories). Their concepts of a regime of accumulation and a mode of regulation are subsequently used to construct a concept which will structure the rest of the thesis: the Telecommunications Regulation Mode (TRM). Because of the extremely broad, integral approach of the regulationists, many variables are incorporated in this TRM. For practical reasons, however, only some variables have been operationalised in this thesis: particularly the historical development of technology, and specific interest groups such as state departments, PTTs, regulators, national and international industry and international organisations.

The second Chapter investigates the history and workings of the period of Fordism in general and the Fordist Telecommunications Mode in particular. Central to the understanding of the Fordist TRM is the formation of modern states in the four countries (France, Germany, United Kingdom and the Netherlands), the reasons for state regulation of telecommunications, European integration under the Pax Americana and the developments in telecommunications technology itself. This Fordist TRM was based on a workable consensus between and interest coalition of manufacturers, telecommunications users, state departments, unions, international organisations and Post, Telegraph and Telephone (PTT) administrations themselves. The consensus was based on the ideas or philosophy of Theodore Vail, who had become AT&T president in 1907: the unity of the network ('one system'), 'one operator' and 'a service for all' (universal service). These principles, first applied in the USA, were later gradually introduced in Europe. Their introduction and advancement were not always necessarily smooth and their application and interpretation differed between countries according to their specific circumstances and political struggles; nevertheless, after the reconstruction following the Second World War the Fordist TRM was firmly established in the European countries.

The consensus and interest coalition on which the Fordist TRM was based started to erode first in the USA in the 1960s, resulting in AT&T's divestiture in 1984. The reasons for this decline, growing internationalisation, social and technological innovations leading to convergence between computing and telecommunications, liberalisation and changing demand of large users, are discussed in Chapter III.

After this general exploration of the rise and fall of the Fordist TRM, Chapter IV takes a step back and discusses the intricacies of telecommunications tariffs. It addresses several mainstream and alternative price theories, cost allocation and cost accounting methodologies and concludes that because of the network character of telecommunications, it is impossible to formulate one 'objective' and coherent theory of how telecommunications services should be tariffed. Exactly how telecommunications tariffs were set in the early days of telegraphy and later in the highdays of Fordism is the central question in the next Chapter. It untangles the different interest groups involved in the tariff setting process and shows that, contrary to a currently commonly held view, the 'universal service' did not always win; indeed, tariffs were often specifically set in the interest of business users. Moreover, much of the public network modernisation from the 1960s onwards, which predominantly benefitted business users, was financed to a disproportionate degree out of residential charges.

Nevertheless large business users, often transnational companies, and computer companies increased their attack on the Fordist TRM in the 1970s as their interests shifted away from the Fordist development model which itself had slid into a major international crisis in the first half of that decade. One of the main targets of this newly emerging coalition were the tariffing principles of the old model. Using the concept of 'cost-based' tariffs as 'objective' norm and ideal, they accused the old model of systematically discriminating against business users. Chapter VI describes the tariff situation in the 1980s and the growing criticism of the old practices by the new, expanding, coalition of business users, neo-liberal governments (USA and UK) and international organisations (GATT and EC).

Chapter VII looks at the impact the pro-competition policies and the changes so far in the market structure have had on tariffs in the four European countries. There are some common themes of 'splitting' the network and shifting costs towards the local loop and residential consumers, but also some differences between the countries, caused by differences in history, politics and national interest coalitions. Finally, Chapter VIII sums up the main conclusions of the previous Chapters and tries to look into the (near) future: is there a new, post-Fordist (?), Telecommunications Regulation Mode in sight?

CHAPTER I

TELECOMMUNICATIONS AND THE SCIENCE OF INTERNATIONAL RELATIONS

1.1. Introduction

This Chapter sets out the theoretical framework for the thesis. It will first address the question why the science of International Relations (IR) matters for telecommunications research in general. It then criticises currently highly fashionable terms such as 'globalisation' and the 'information society'. Subsequently a definition or description of telecommunications is given; it is stressed that this phenomenon can only be analysed by combining several, different disciplines. By discussing the backgrounds of several IR theories as well as other social sciences and relating them to the field of telecommunications the Chapter ends with the construction of a concept, the Telecommunications Regulation Mode, which will be used for the further discussion of telecommunications and their tariffs.

1.2. Why International Relations Matter

Generally, the case for an IR approach can be made with reference to issues and policies, as well as economics and technology. Whether discussing South African apartheid, US military expenditures in the 1980s, the standardisation of Integrated Services Digital Network (ISDN), the decline of UK hegemony after 1870, the allocation of the radio spectrum in the Netherlands or the drastic decrease in international telecommunication tariffs in Germany - in all cases internal, national issues are closely related to international forces, whether they are economic, political, technological or a combination of these. Conventional, strict, divisions of domestic and international politics therefore need to be overcome for purposes of analysis and policy-making. The general importance of international politics and international economics has undoubtedly increased. This century alone has already witnessed two World Wars, an East-West Cold War and a growing divide between North and South. Equally, internationalisation or transnationalisation[1] is an overwhelming force in economics. After the first phase (internationalisation of commodities and finance capital) a second phase (productive capital - foreign direct investment) followed after 1945 (Hymer 1976). World trade has grown much faster than world production over the last four decades, reflecting growing international economic entanglements as many former national firms became TNCs (transnational corporation)[2]. Increased international and transnational political, cultural,

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[1] In many cases the term internationalisation is used whilst actually a process of transnationalisation is described (see for the difference section 1.3.1.).

[2] Other terms used are multinational enterprise (MNE) and multinational corporation (MNC). Some authors prefer MNE to MNC since some MNEs are government controlled and are not corporations in the conventional sense. United Nations agencies prefer the term transnational corporation (TNC) as some

military and economic links are also reflected in the fast growth of international organisations, notably after the Second World War

Although telecommunication activities expanded quite early beyond the boundaries of the state, the international dimension long remained of only secondary importance for this sector. Historically, its inception was firmly based in the configurations of states: most early telecommunications began with a host of individual inventors and then were quickly implicated in the industrial, legal, economic and political structures of a state. Regulation of operation, the manufacturing of equipment and the consumption of offered services were all firmly based on states' policies and embedded in national economic formations. Whilst other sectors have a long history of internationalisation (eg. banking, chemicals, food, oil, car manufacturing and electronics) telecommunications remained a 'national fortress' for over a century.

Nowadays, however, telecommunications seems to be escaping from its narrow national economic confines, which nourished it so well. Internationalisation now has telecommunications firmly in its grip. Flabbergasted by the alleged overwhelming success of newly applied telecommunication and computing technologies[3] and feverish because of the new opportunities the breaking up of the national telecommunication fortresses promises to bring, scholars have announced not only the demise or breakdown of the traditional national network (Noam 1988; Noam 1989a) and the erosion of the effectiveness of national regulations (Noam 1989b) but even the end of the relevance of the nation state, its specific polity and geography altogether (Toffler 1981; Beetham 1984; O'Brien 1992).

'Globalness' as the superlative form of internationalisation, transnationalisation or worldwide integration, has indeed become a prominent concept in many a study related to international relations, telecommunications, information technology (IT) and broadcasting (Robertson 1990). Toffler talks about 'global space pageants' (Toffler 1970, p.356), Rosenau depicts growing links between states, companies and societies as 'global interdependence' (Rosenau 1980), political scientists announce the advent of the 'global political economy' (Gill and Law 1988), management and business literature abounds with terms like 'global production', 'global marketing' (Leontiades 1985; Kaynak 1987), 'global telecommunications' (Booz-

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enterprises are not located in enough countries to make them truly multinational in the strict meaning of the word. Here the term TNC will be used (see also section 1.3.1.).

[3] Pelton, provides us with an apt example of this bewilderment when speaking about the huge volumes and high speeds of today's world communications: "Large numbers are difficult to understand. A thousand is big. A million is huge. A billion is so gigantic that it is difficult to relate to. A trillion? Well, a trillion is a trillion. If you were to start counting once a second you would not even each 3 billion in 100 years. You would have to live a long, long time to reach a trillion - over 30,000 years to be exact. Yet within our lifetime we may see optical fibre cables or satellites capable of sending over a trillion bits of information in a second." (Pelton 1981, p.7).

Allen & Hamilton 1990; NíShúilleabháin and Kramer 1992[4]), 'global network' (Analysys 1991a), 'global culture' (Smith 1992), 'global society' (Albrow 1990) and 'globalness' in general (Marien 1989). Indeed, 'globalness' is all the rage.

This 'global' fashion seems to stress the significance of studying topics in the field of communications from the perspective of international relations or international politics. The use of the word 'global' or 'world' functions however more as a camouflage for ignorance and conceptual confusion than as a useful, analytical tool for studying international relations. The confusion starts with the different variants of 'global' (Tudyka 1989). Firstly, it is sometimes used as an emphatic substitute for 'human mankind', the 'human race' or 'family of people' as in the 'global village', the 'global society' or the 'world society' (Banks 1984; Burton 1972; Hollist and Rosenau 1981; Wright 1990). In a second variant it refers to an ensemble of national entities, mostly nation states, with common values, interests, aims and rules as conceptualised and argued in international law (Bull 1985, p.32). A third variant uses 'global' to indicate the growing entanglement of national, supra-national and sub-national entities. A fourth variant finally, employs the word specifically for the increasing linkages and interactions of economies in general and large companies (TNCs) in particular (Reich 1990). This conceptual and theoretical confusion is subsequently veiled by a plethora of 'evidence'. Cultural and techno-economic indicators are selectively used as the yardstick of 'globality': multinational flows of capital, technological innovations, services, manufacture, goods, data, cultural artefacts, communications and so forth. The historical role of stratification systems based on state, class, caste, party, ethnic cultures and traditions in general and their dialectical function in 'globalisation' are conveniently forgotten. Indeed, in their a-historical research the 'globalists' often confuse fact with fiction and conflate the descriptive with the normative: what is offered is an inconsistent mixture of 'historical inevitability' embedded in inferences of 'globalisation' as an unidirectional process or a *fait accompli* and certain ideological baggage whereby 'globalisation' becomes 'good' and the new dynamic, the motor of world change. Ferguson has depicted some of these normative ideas or myths about 'globalisation': 'big is better', 'more is better', 'time and space have disappeared', 'global cultural homogeneity' and 'the new world order' (Ferguson 1992).

In so far as 'global' refers to a process of globalisation - growing entanglement, interdependencies etc. - one should not confuse the process with an imagined and projected final aim or purpose (there is, by the way, a danger of a teleological fallacy here). Reverse developments or counter tendencies might easily be overlooked. For instance Frei has pointed out that the quotient for the trade sector (calculated as the total world trade divided by the sum of trade within countries) was much higher in the 19th century than in the 20th century (Frei 1975). Yao-Su Hu has demonstrated that, contrary to the new conventional

[4] In their analysis of emerging 'global' oligopolies NíShúilleabháin and Kramer argue that 'global services markets' are already a *fait accompli*: "We need to stop talking about the international services market as if it had parameters or boundaries, size etc., as did (and still do) the other transport industries." (NíShúilleabháin and Kramer 1992, p.5).

wisdom about the emergence of 'stateless' corporations operating in a 'borderless' world (Reich 1990), so-called 'global' or 'multinational' companies only rarely exist. With a handful of exceptions such as Shell, Unilever, Nestlé and ICI, most of these companies are merely national entities with foreign operations. In terms of geographical spread and scope, ownership and control, research and development (R&D), employees, top management, legal and political nationality and taxation, most 'multinationals' are not multinational at all (Financial Times 22 March 1992). In the case of telecommunications even the most 'global' operators such as AT&T, Cable and Wireless (C&W) and British Telecommunications (BT) are still very much dependent on their home-markets. The primary source of a (telecommunication) company's international competitive advantage most often lies in its home nation. Foreign sources can supplement national ones, but not replace them. The essential 'global' market for Public Telecommunications Operators (PTOs) is currently not more than approximately 64 square kilometres wide. These tiny spots on the globe generate by far the largest part of the profitable national and international business traffic. Not surprisingly, these concentrations of traffic (expressed as Erlangs[5] per square mile) are firmly based in the financial centres of the Triad (USA, Western Europe and Japan).

Equally, seamless integrated 'global' networks are still very much a fairy tale since crucial matters such as protocols, standards, equipment, network structures, billing and tariff structures vary considerably between countries. To argue that all these significant differences will soon disappear in the process of 'globalisation' presumes that 'global' development would bring all the relevant political, cultural or economic entities on to the same level, and at the same time increase their entanglements to such a degree that one highly integrated, 'global' entity would be the result. In the light of the extreme international discrepancies and continuing presence of states[6], this view might turn out to be highly idealistic or straightforwardly naive. Indeed, one can hardly ignore nor neglect counter tendencies to 'globalisation' such as uneven development. Significant differences as regards the number of telephone lines, facsimile machines (fax) or public phone boxes per capita, the availability and quality of high-speed and high-capacity data lines, the consumption of telecommunication services, or, as discussed here, the level and structure of tariffs, often run parallel with states' boundaries. One quick look at the map of international telecommunications traffic flows suffices to falsify statements such as 'global talk' (Pelton 1981; Pelton 1991) or the interconnected 'global village': whole communities, countries and regions are simply not

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[5] Erlang represents the quantity of switching equipment or circuits required to carry the traffic with a specified grade of service depending upon the number of calls and their duration. To facilitate the calculation of equipment and circuit quantities it is necessary to express the traffic in a suitable unit. The unit chosen is called the Erlang, named after a Danish engineer. In any given volume of traffic the traffic flow for a specified period, generally the busy hour, is said to be unity when the average number of simultaneous calls during the period is also unity. In these circumstances the traffic flow is 1 Erlang. An Erlang is thus equivalent to the traffic flow in one circuit continuously occupied. Traffic flow in Erlangs will thus be numerically equal to the average number of calls simultaneously in progress during a period.

[6] One could even argue that in certain areas of the 'globe' there is a growing interest in the formation of states and/or nations (eg. the Balkans, Central and Eastern Europe and the former Soviet Union).

'plugged in' for certain network based services. Particularly less developed countries, organised in the Non Aligned Movement, have since 1976 repeatedly pointed out how 'unglobal' world communication flows are (Roach 1990). For instance, BT's lucrative Global Network Services (GNS) currently covers only 28 countries which account for around 90 per cent of 'global' datacommunications traffic. When the next 34 countries come on stream this figure will be virtually 100 per cent, leaving a large majority of countries unconnected (Lucas 1992, p.23).

The unevenness of international (tele)communication flows has also troubled 'information rich' countries as discrepancies between in- and out-going traffic have an effect on the (invisible) trade balance. The USA, for instance, in 1990 had a net telecommunications traffic deficit of over 3.1 billion MiTT (Minutes of Telecommunication Traffic) leading to net out payments of approximately $3 billion. The principal beneficiaries of this deficit were not only less developed countries, but also a country such as Germany (IIC 1991, p.7). But whereas in the case of the less developed countries these unbalanced traffic flows have prompted debates over a more equal and fair New World Information and Communication Order, mostly industrialised countries have stressed the importance of a free trade regime and a general rebalancing of telecommunications tariffs. International telecommunications, in spite of its international dimensions, thus seems to entail different economics and politics for different countries or states.

Significant differences within states do exist too. Just as on an international level variations often reflect divides between states and societies forming the centre of economic development, and those more on the periphery, so too are there divides between richer and poorer and between urban and rural areas. Some have however argued that these divisions are bound to erode as new information and communication technologies mature. Alvin Toffler, for instance, has argued that the centralisation forces of the 'old' industrial societies will increasingly be replaced by 'anti-centralist tendencies' that are decentralising production and economic activity. Toffler's envisioned 'third wave' society is one of decentralised communities and equal, interdependent 'sub-economies' with the fundamental social unit being the electronic cottage (Toffler 1981). This view has been seriously challenged by more critical scholars. Robins and Gillespie point out that however much recent developments in information and communication technologies are associated with the hypermobility of capital, with an unprecedented organisational and locational flexibility, they by no means signal the final transcendence of spatial barriers. Like telegraphy in the past, these new technologies restructure - in a complex way - 'territorial units' rather than transcend them, leading to new spatial forms of production, consumption and communication (Robins and Gillespie 1992; see also Castells 1989 and Hepworth 1992). And rather than fostering geographical decentralisation the new digital communications systems contribute to new and more complex forms of corporate integration, reinforcing centre-periphery problems on an international scale (Gillespie and Robins 1991).

Nevertheless, these sub-state levels are difficult, if not impossible, to understand without the

encompassing state with its specific geographical, historical and politico-economic idiosyncrasies. State developments in telecommunications, in their turn, are again incomprehensible without taking the importance of the international level for both the sub-state and the state levels into account. If the essence of telecommunications is to overcome distance and time limitations from which other media (messengers, post, railway, cars and aeroplanes) might suffer, it logically follows that it is most likely to cross state borders. This in its turn implies that all kinds of international rules must be agreed upon in order to avert negative externalities such as interferences and incompatibilities. Then, telecommunication is becoming increasingly international as industries, economies and societies become more international. For these increasing transfrontier movements of people, capital, products and information we already have the apt and correct terms of internationalisation and transnationalisation. The terms 'global' and 'globalisation' are therefore not only incorrect and confusing, but superfluous moreover.

Telecommunication plays a critical role in this internationalisation/transnationalisation process. In politico-economic terms the telecommunication and related information industries have become an important cutting edge of many a developed country's domestic and international strength (Jonscher 1983; Rothwell 1983; Porter 1985; Porter 1990; Ramsey 1991). For instance, market transactions based on electronic trading networks can both facilitate international trade and give some key players in the 'electronic market' a competitive advantage (Mansell and Jenkins 1992). Equally, telecommunication networks are used to coordinate R&D (research and development) efforts and production facilities of TNCs with sites or subsidiaries are spread over more than one country (Henderson 1989; Howells 1992).

In the next three main sections of this Chapter the science of international relations (IR) is discussed as well as the meaning(s) of telecommunications and the relation between both. Telecommunications does not feature large in IR studies, although the former's international dimension would suspect otherwise. Subsequent sections will show that the study of telecommunications as conceptualised in this thesis, traditionally has had more overlap with the political economy of communication than with IR. Section 1.7. tries to combine some IR concepts and insights with political economy theories in general and political economy of communications literature in particular, resulting in a multi-disciplinary approach to telecommunications.

1.3. The Science of IR

The attempt to bring the relations between different states, communities and cultures to a theoretical level and understanding, has its own specific history. Most important, IR is relatively young compared to other scientific disciplines. It was born when the British and US delegations to the Paris Peace Conference decided to establish scientific institutes in their countries which would study international relations. Text books and 'readers' on international politics and relations did however not arrive before the 1950s and

were originally only published in the USA (Krippendorf 1977).

Krippendorf points out that the science of IR is the study of a particular historical epoch which is characterised by internationalisation and transnationalisation of societal relations: world politics, world economy and world traffic (Krippendorf 1975). These phenomena are historically closely connected to the advent of the Industrial Revolution which caused a fundamental change in terms of economic growth, traffic flows, demographic developments, military destruction potentials and the general relations between science, technology, economy and society (Kuznets 1966; Landes 1969).

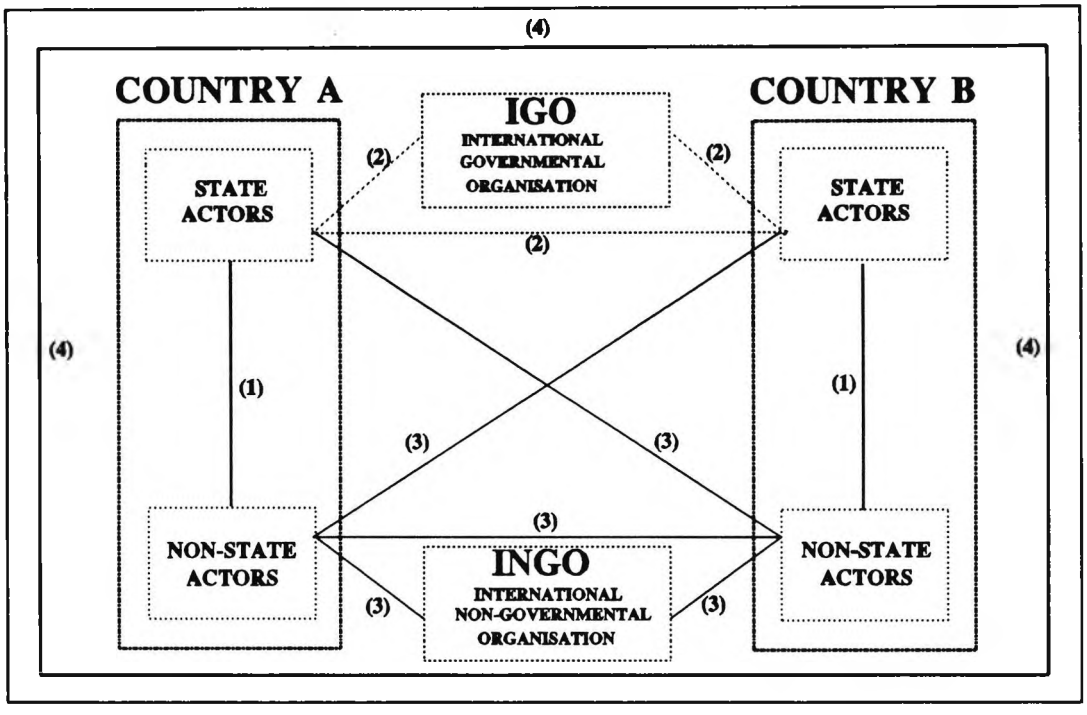
Although one can debate why it became necessary at a certain time to study IR systematically as a 'knowledge interest', or how such a study should be conducted, there are some generally acknowledged themes and questions which run through this young discipline. Thus analysing telecommunications - like any other subject within IR - principally entails dealing with three different sets of theoretical problems: the level of analysis, the factor time, and the relation between both (Overbeek 1990, pp.2-5).

1.3.1. The Level of Analysis

The classical theme of all IR theories is the significance of the level of analysis: which of the distinguishable levels in IR is most relevant? Several dimensions can be distinguished in IR, and their individual assessments vary according to the assumptions of a specific IR theory, or school of theories. In its most basic form there are the international and the national dimensions. More refined, this form can be expanded to sub-state levels (local, provincial) and to a stratification of international levels (regional, continental, global). Related to the level of analysis is the discussion of the importance, functions and roles of the actors and units involved in IR; basically the actors can be divided between international, state and non-state actors.

Putting these basic parameters of IR together the following picture unfolds:

Figure 1.1.: **Actors and Levels of IR**



(1) intra-state level : domestic relations
(2) inter-state level : international relations
(3) transnational level : international relations
(4) world system level : international relations

The late 19th century IR schools of utopianism or idealism, followed by the post Second World War realism school, have traditionally concentrated on the second level. States are the main and dominant actors in their analysis. Idealism focuses on a judicial and descriptive analysis of IR and is based on the normative assumption that international conflicts should be dealt with by international organisations. Realism on the other hand, suspicious of idealistic principles, regards politics, like society in general, as being governed by objective laws that have roots in human nature (Carr 1964). As utopianism stresses the essential goodness of human nature, realism, in contrast, illuminates imperfection. For realists such as Morgenthau and Thompson the key concept is power as an 'objective category' and 'universally valid' (Morgenthau and Thompson 1985, p.10). States are assumed to be coherent entities whose behaviour can be explained in rational terms. International politics depicts a Hobbesian struggle for power not only because of the inherent logic of a competitive realm such as world politics and its anarchic nature, but also because of the "[...] limitless character of the lust for power [which] reveals a general quality of the human mind." (Morgenthau 1946, p.194; Morgenthau 1967 pp.25-26). International politics is thus 'dominated by the quest for power' (Strausz-Hupe and Possony 1954, pp.5-6).

With its focus on 'power politics', 'national power' and 'the-state-as-the-only-actor' (i.e. 'state-centric') model, the theory of realism reigned supreme during the Cold War. The process of decolonization and the 'dependent underdevelopment' of the new, less developed countries introduced other levels of analysis and actors, neglected by both the utopianists and the realists, into the IR debate. Since the late 1960s a growing body of literature, framed within the 'dependency paradigm', has broken with the ethnocentrism, empiricism and associated theoretical myopia of much traditional social science that claims to analyse 'development' (Baran 1967; Amin 1974). Though there are significant internal differences, collectively this literature suggests that it is simply not possible to adequately comprehend a vast array of economic, social and political phenomena in particular less developed countries unless these phenomena are theorised in relation to the changing circumstances under which those countries are structurally connected with the economic and political system of the advanced capitalist countries. The position of Third World countries was no random and regrettable mistake of history, but the logical outcome of a specific structure of international relations based on capitalism: underdevelopment of the Third World, the periphery, was the other side of development in the centre. It was, so to speak, the opposite side of the same coin, international capitalism (Frank 1978).

Wallerstein and Frank suggested that not only new actors had to be incorporated into the theoretical IR framework (eg. TNCs) but more fundamentally that a new, fifth and principal level, had to be added too: the world system[7] - an entirety which is more than the sum of its parts and which explains the behaviour and functioning of its parts. The concept of world system with its specific structure (centre, periphery and semi-periphery) is based on a capitalist world economy, that is a world wide economy based on capitalist exchange relations which were established in the 16th century (Frank 1971; Wallerstein 1974). The descriptive generalisation of a world system based on a capitalist world economy has been much criticised for neglecting fundamental differences in production modes between countries: capitalist exchange relations in the 16th century certainly did not imply a world wide capitalist production mode (Laclau 1977).

A world, international or global economy approach is also pursued and further developed by many economists and political economists. Many Marxists and politico-economists, using the internationalisation of capital theory or the 'product cycle theory', reason that the rise of international capital will not only lead to problems of 'territorial non-coincidence' (Murray 1975, pp.107-134) between international capital and the national state but also to the dominance of a 'global economy' (Holland 1987) and the inabilities of the nation state to cope with these developments (Vernon 1971).

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[7] Wallerstein's analysis has been tremendously influenced by Fernand Braudel and the Annales school with their concepts of 'total history' and history of the '*longue durée*'(Braudel 1980; Wallerstein 1974; Frank 1978).

Neo-realists and regime theorists like Waltz, Keohane and Nye (Waltz 1979; Keohane and Nye 1977), while recognising the importance of growing (often a-symmetric) 'interdependencies' and the 'world-as-a-system' level, nevertheless still regard states as the most important building blocks of international cooperation or discord; in fact international regimes, as a form of international cooperation between states, 'empower' rather than 'shackle' them (Keohane 1984, p.13)[8]. Problematic, and unsolved here is the relation between actors on a sub-state level and international regimes. Keohane tends to analyse states as closed, probably homogeneous, entities, thereby keeping the 'black box' of domestic politics and its relation with international relations closed (Haggard and Simmons 1987). Additionally, regime theories have often overlooked inequalities in power resources and consequently neglected the question of which countries, which states or which sub-state actors are disproportionately favoured by regimes (Strange 1982).

The introduction of Parsonian concepts such as system, structure and function, raise questions about the relations between the structural underpinnings of the world system and its functioning as a whole on the one hand and concrete actions undertaken by concretely identifiable social and political actors on the other. Not only structuralistic[9] and teleological[10] pitfalls lie in wait here but also functionalistic ones[11].

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[8] Some of these neo-realist (as well as some realist) theories have extended their perspective by making use of game theory, notably concerning those games which are not zero-sum in character (eg. a variable sum game as in the repetitive Prisoners' Dilemma). An advantage of game theory is that it offers a common theoretical approach to the analysis of security and economic issues (see: Axelrod and Keohane 1985). Its disadvantage is that many aspects of international politics and economics may go beyond the confines of any game-theoretical model. Since it operates with individualistic concepts (states or firms regarded as one aggregated actor) it cannot understand how for instance the whole, or a structure can shape the parts.

[9] One of the shortcomings of structuralism is its inadequacy to relate its so-called structural determinism to concrete actions of concrete subjects. In Thompson's words, when he was criticising the idealism of the French structuralist and marxist Althusser: "The category has attained to a primacy over its material referent; the conceptual structure hangs above and dominates its social being." (Thompson 1979, p.205).

[10] As Skocpol, criticising Wallerstein's world capitalist system, alleges: "Repeatedly he [Wallerstein] argues that things at a certain time and place had to be a certain way in order to bring about later states or developments that accord (or seem to accord) with what his system model of the world capitalist economy requires or predicts. If the actual causal patterns suggested by historical accounts or comparative-historical analyses happen to correspond with the a posteriori reasoning, Wallerstein considers them to be adequately explained in terms of his model, which is, in turn, held to be supported historically." (Skocpol 1985, p.1088).

[11] There is a clear logical fallacy in Wallerstein's analysis. He is saying that if development requires underdevelopment, then underdevelopment will happen, but not otherwise. This is the crudest kind of functionalism: whatever is necessary for capitalism will happen. For a discussion of functionalistic aspects and fallacies in regime theories see: Tooze 1990 pp.205/206; and: Haggard and Simmons 1987, pp.491-517.

Theories in the field of international economic relations have especially demonstrated a tendency to lapse into functionalism or even teleological finalism, in which theoretical concepts such as the international division of labour, imperialism and dependency gain the status of empirical 'reality' in that they had to perform the function of stimulating international trade and welfare or - in the case of Marxist imperialism theories - resolving the contradictions of capitalism:

> "Ricardo and the supporters of the Heckscher-Olin-Samuelson theorem seem, for instance, to believe that the international division of labour is the result of some world conference at which brilliant economists explained to an admiring gallery of politicians that - given relative levels of productivity, collective preferences and the initial endowment of factors - the free play of market forces would ensure the optimal division of production, and that each participant then went home convinced not only of the virtues of free trade but that the law of comparative costs ensured that the lot that had fallen to his or her country was quite justified, and that they could therefore force it to adopt the requisite specialisation." (Lipietz 1987, p.16).

Liberal economics often takes the individual person or firm as the basic unit of analysis in IR. The primary motivating force is the competitive interaction between individuals or firms, who are assumed to maximise their satisfaction, profit or utility, especially through the institution of the market. The market aggregates these individual preferences and utilities on the demand side, and the actions of profit-seeking firms on the supply side. To explain the nature of market structure and their functioning, liberal economists use ideal-typical cases. On the one side there is so-called 'perfect' competition, with its infinite number of buyers and sellers, full information and perfect foresight, whilst on the other there is oligopoly (relatively few firms) or even more extreme, monopoly (one supplier) or monopsony (one buyer). Perfect competition, perfect markets, with as little as possible interference from a 'nightwatchman' state, would guarantee an optimal outcome for all and thus produce socially beneficial results.

Whereas the classical liberal economists such as Adam Smith, David Ricardo, Jeremy Bentham and John Stuart Mill had still some notion of a political economy, since they allowed for the notion of vested interests, their neo-classical successors postulated highly abstracted, a-historical models in which the individual choices of economic subjects and general scarcity were the central concepts. Neo-classical economists, such as Alfred Marshall and Léon Walras, used marginal utility, marginal productivity, marginal costs and marginal revenue as tools to explain the behaviour of individual consumers and firms (Nentjes 1979)[12].

All these classical and neo-classical economic concepts have been applied to IR, notably in the field of

[12] Even the staunch anti-neo-classical and anti *laisser-faire* economist, Friedrich Hayek, whose theories and ideas became popular in the 1980s, ultimately defend the 'liberating' free market mechanism guided by Smith's 'invisible hand' as superior (Tomlinson 1990).

international economic relations and the international division of labour (see above). Marxists, economists from the historical school (eg. Friedrich List) and institutional economists (eg. Thorstein Veblen, Joseph Schumpeter and John Kenneth Galbraith) have criticised the liberals for being too abstract and static, and consequently neglecting the wider social, political and historical framework of the economy[13]. Robert Cox, for instance, following Marx' analysis of the capitalist production mode, has argued that the latter, understood as both a social process and a power relationship, should constitute a crucial level of analysis in IR, rather than the abstract individual preferences of consumers or firms (Cox 1989).

1.3.2. The Time Dimension

A second set of problems within IR relate to the dimension of time, or as some historians would put it, 'duration'. Some analyse current international relations in the same way as classical Greek or Indian philosophers analysed relations between tribes and city states in their days (Modelski 1964; Holsti 1967). This a-historic approach to IR is criticised by others who would regard the industrial revolution and the 'age of capital' (Hobsbawn 1975) as a quantitative and qualitative rupture in the history of international relations which would require specific concepts and explanations (Krippendorf 1975; Tudyka 1986). A more historical analysis would allow for periodisations, each based on different durations: the long-term perspective, for instance the rise and fall of certain states, often measured in centuries (Kennedy 1988); the medium-term perspective, measured in decennia, like postwar economic, technological and political developments; and finally the short-term perspective, analysing present status.

1.3.3. Continuity and Change

Related to the question of 'duration' is the issue of continuity and change. Large scale technological, economic, cultural and political fluctuations and transformations in recent, post-war history have prompted many a scholar to break free of old paradigms and concepts. Thus the prominent attention to 'late capitalism', 'post-industrial society', 'information age', 'post-Cold War politics' (New International Order), 'post-modernism' and 'post-Fordism': all these concepts - some will be discussed below - attempt

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[13] List argued in his 'National System of Political Economy' (1840) that since all economic life is primarily enacted within the state, the latter is the most relevant economic unit. This institutional framework is not unchangeable. State intervention to realise certain desired developments is therefore possible. Any nation wishing to be wealthy and civilised must develop its own industries and financial capital. List, arguing in a mercantilist tradition, concluded that high tariffs would be necessary and justified, at least temporarily, in order to protect infant industries from the more advanced (in his time: British) manufacturers. Institutional economists, the heirs of the historical school, have tried to integrate economics with other social sciences such as political sciences and sociology (Nentjes 1979, pp.59-65, pp.278-285).

to come to terms with what is regarded as a fundamental break, or discontinuity in recent history. Others have shied away from the substantive implications of basic transformation and continue to rely on conceptual equipment that treats the changes as mere perturbances in and temporary deviations from an otherwise resilient and enduring structure. Indeed, the methodological problems associated with continuity are much more manageable than those linked to transformation. In essence this portrays the tension between structures and dynamics, permanence and variation. For instance, the regime theorists, just as the world system and the dependency theorists, have some major problems explaining change - the transition from one structure to another or changes within a structure. Supporters of the dogma of the inevitable 'development of underdevelopment' were therefore caught off balance when, in the 1970s, real capitalist industrialisation began in certain 'peripheral' countries and when, during the same period, there was a marked downturn in the 'developed North' (Warren 1980; Harris 1987). The world system and dependency theorists had degenerated into the same a-historical dogmatism as their despised rival liberal opponents (notably W.W. Rostow) (Bernstein 1979; Aronowitz 1981). Describing and explaining (regime) changes is also a problem in the regime literature[14].

It is very difficult to strike a balance between continuity and change. Rosenau argues that to be surprised by events is either to lack a theoretical perspective or to be caught with theory that fails adequately to explain and anticipate change. And to possess theory that inadequately accounts for the course of events is to be prey to post-hoc interpretations, to reification or to reasoning by example as explanations for changing patterns (Rosenau 1980, p.14). To be continuously surprised on the other hand, would point in the same direction: a lack of theory or a lack of historical perspective turns any event, random or not, into a revolution, an historical breakthrough or the dawn of a new society. It is thus necessary to transcend the everyday life of descriptive generalisations, based on directly observed facts.

Our next step will be to confront these three sets of questions (level of analysis, time, and their interaction) with the subject of telecommunications. Firstly however, telecommunications and their tariffs have to be defined.

1.4. Telecommunication: Demarcations and Definitions

Tele-communication literally means communication from a distance. The Greek word '**tele**' translates as 'at a distance',or 'far'. The word was first used in 1904 by Edouard Estaunié, novelist, also director of the '*école supérieure de télégraphie*' in Paris. In that year he published a book entitled '*Traité Pratique de Télécommunication Électrique*', thus inventing the word 'telecommunications' for our use (Bertho

[14] In a '10-years-after' review of their 'Power and Interdependence' book, Keohane and Nye admit that their static analysis is a weak point in their theory (Keohane and Nye 1987, p.752).

1984, p.12). From its conceptualisation onwards, telecommunications has been linked to forms of electronic transmission based on a network infrastructure. Much however, has changed since Estaunié's days when telecommunications entailed only two services, telegraphy and telephony, provided over two - often separated - networks.

Whilst the early wire based electric telegraph networks did not entail any switching, the telephone networks - unfolding from the 1870s onwards - incorporated switching equipment, originally manual but later automated[15]. Unlike telegraphy, telephony provided a two-way exchange of information (voice and later also data and video) between two users at distinct geographical locations. By using switches the network operator could economise on the number of links. Switching concentrates calls that are destined for the same end node and bundles them together for bulk transport over a limited number of high-capacity links. Frequently, calls pass through intermediate switching points and additional links before they arrive at a terminating switch, where the calls are unbundled for final delivery.

Throughout its history the basic telephone network - the Public Switched Telephone Network (PSTN) - has developed in terms of density or penetration and, more recently, has become an increasingly sophisticated network which provides more services than basic, i.e. real-time voice telephony. The PSTN has become a complex aggregate of electronic and optical gear (switches) and a transmission medium, which together provide a multiplicity of channels over which many customers' messages and associated control signals can be transmitted. The primary function of this transmission system is to provide circuits having the capability of accepting information-bearing electrical (or optical) signals and delivering related signals bearing the same information to a distant point (Dordick 1986). This information can be a telephony conversation, a telex or fax message, or another so-called information service, often labelled as a Value Added Service (VAS). Equally, the PSTN has become a basic access provider to other specialised telecommunication networks and information services which have emerged throughout the last three decades. Interconnection with other networks together with the ongoing process of digitisation of signals, transmission and switching, have turned the PSTN into a highly complex, multi-layered network, whose boundaries with other networks are often blurry.

As will be pointed out in Chapter III, the unfolding of new, more specialised telecommunication networks reflect the increasing importance of computers in the current phase of socio-economic development in industrialised countries. Telecommunications is not any more, as in Estaunié's days just the transport and switching of a telephone call. Increasingly it includes also typical computer functions like storage, processing and retrieval. Computer functions are increasingly incorporated in telecommunication networks to provide sophisticated switching and signalling functions, as well as in what is called 'terminal

[15] The 150 -year-old telegraph is still with us in both its original form as well as in the form of the modern Telex or switched telegraph.

equipment', such as Private (Automatic) Branch Exchange (P(A)BX) or a telephone set. The connection of computers to the network has particularly stimulated the unfolding of new, specialised telecommunication networks with a better performance than the PSTN; which was originally based on analogue transmission via twisted copper wires with a limited capacity. Local Area Networks (LANs), Metropolitan Area Networks (MANs), packet-switched networks (X.25), Intelligent Networks (IN), a-synchronous transfer mode (ATM) and frame-relay are all newly emerging networks and transmission modes increasing capacity, speed and flexibility of data transmission. Other, more specialised telecommunication networks are not the only challenge to the boundary lines of telecommunications networks. Another category of electronic information transport, broadcasting, is also relevant. Although in the beginning, telephony's application was seen in the field of carrying news and musical entertainment to the home - a point-to-multipoint distribution service - it soon developed to provide interactive, point-to-point voice services. This historically grown divide between telecommunications and broadcasting is notably dependent on differences in regulation, finance, usage or traffic and network configuration:

Figure 1.2.: Comparison of telecommunications and broadcasting

	Telecommunications	Potential Convergences	Broadcasting
Services	- (basic voice) telephony - data communications - Value Added Network Services	- data-broadcasting - public/private teletext services	- television - radio (soundbroadcasting)
Configuration	- point-to-point - interactive - switched-star topology	- point-to-multipoint distributional or interactive telephone services	- point-to-multipoint - distributional - tree-and-branch topology
Regulation	- carrier regulated - rate-of-return / price caps	- content regulated telephone services (eg. message and party-line services)	- content regulated - licence fee fixed by Parliament
Carrier	- twisted copper wire - radio frequencies (satellite or terrestrial) - optical fibres	- integrated broadband communications network (Fibre to the Home)	- radio frequencies (satellite or terrestrial) - coaxial cable - optical fibres
Tariffing	- usage	- pay-per-view TV - flat-rate telecoms services	- licence fee - advertising
Traffic	- continuous (voice, video) - bursty (data)	- digitised and compressed bits, flexibly transmitted (bandwidth-on-demand)	- continuous (audio, video)
Industry	- traditionally PTTs (state or public monopolies) - among the top ten largest national companies; capital intensive	- PTTs/PTOs moving into broadcasting and programming - cable operators offering telephony and data communications	- traditionally public service operators - in terms of revenue and turnover much smaller; labour intensive

The International Telecommunication Union (ITU) uses such a broad or 'converged' definition of telecommunications, that it also includes broadcasting. It defines telecommunications as

> "Any process that enables a correspondent to pass to one or more given correspondents (telegraphy or telephony), or possible correspondents (broadcasting), information of any nature delivered in any usable form (written or printed matter, fixed or moving pictures, words, music, visible or audible signals, signals controlling the functioning of mechanisms, etc.) by means of any electromagnetic system (electrical transmission by wire, radio transmission, optical transmission, etc. or a combination of such systems)." (ITU/CCITT/Blue Book, Volume VI, Fascicle VI 6, Recommendation Q9).

or, alternatively,

> "Any transmission and/or emission and reception of signals representing signs, writing, images and sounds or intelligence of any nature by wire, radio, optical or other electromagnetic systems." (ITU/CCITT/Blue Book, Volume III, Fascicle III 4, Recommendation G701).

What is discussed as the emerging convergence between telecommunication and broadcasting develops on several levels: on a functional level (eg. interactive, multi-media systems), infrastructural level (eg. integrated, optical fibre based, broadband networks) and industrial level (eg. PTOs moving into television programming and CATV companies moving into telephony) (Kelly 1992). Additionally the convergence or integration of broadcasting and telecommunications poses some contentious problems for regulators (Garnham and Mulgan 1991).

Due to the emergence of a myriad of carrier technologies available for telecommunication purposes, most authors speak of (tele-)communication systems and/or telecommunications (plural) (Larsen 1977)[16]. Because of the above mentioned convergences and integration some authors introduced new concepts and neologisms like *télématique*/telematics (Nora and Minc 1978; Schiller 1982), Information Technology (IT), Computers & Communication (C&C) (Kobayashi 1986), Information and Communication Technologies (ICT) (Locksley 1990) and New Information Technologies (NIT) (Antonelli 1988).

The convergence between telecommunication and computing and/or broadcasting are however, not 'iron laws'. Indeed, some scholars regard convergence, integration and bundling as 'inevitable', driven by 'inevitable' and 'commanding' technological developments which 'steer' society as an exogenous, abstract force (Solomon 1990). Others, opting for a more 'soft technological determinism' regard the newly emerging communication technologies as desirable because they entail the promise of 'technologies of freedom' and democratisation and therefore they try to stimulate their introduction (Pool 1983a; Sussman 1989; Malik 1984 and 1990). However, economic and political processes are often overlooked by these studies. Collisions between industries, differences in regulatory frameworks, differences in communication traffic patterns between residential consumers and business consumers, liberalisation and deregulation policies etcetera, have forced telecommunication regulators, operators and service providers

[16] In the British Telecommunications Act of 1984, the term 'system' is used as follows: "[...] 'telecommunication system' means a system for the conveyance, through the agency of electric, magnetic, electro-magnetic, electro-chemical or electro-mechanical energy [...]".(HMSO 1984, p.4).

to develop a more sophisticated discourse as well as to allow for a more fragmented infrastructural and market situation. Functional stratifications have been introduced for technical, economic and regulatory purposes, thereby de-constructing or unbundling what formerly was regarded as one entity: telecommunications. For instance, Arnbak *et al.* differentiate between network infrastructure, transport services and information services (Arnbak *et al* 1990). Particularly for regulatory purposes divisions have been made between so-called reserved, basic telecommunication services (real-time, voice telephony) and other value-added-services or enhanced services which could be provided by others than the PTOs. The boundary lines between these categories are hardly clear cut: if 'value-added' is the difference between the total revenue of a firm and the cost of bought-in raw materials, services and components, then clearly, voice telephony, widely regarded as a 'basic service', is a value-added service too (Mansell 1988).

The tendencies of convergence, integration and bundling and the counter-tendencies of collision, disintegration and unbundling seem to occur simultaneously, thereby decreasing the validity of fixed concepts, definitions and demarcations. Whilst the growth in the diversity of networks and services in combination with specific politico-economic and regulatory developments in the countries studied in this thesis create complex definition problems, statistics provide us with some evidence about the actual use and market shares of the PTO networks. Research shows clearly that - in spite of a downward trend due to declining tariffs - telephony provided via the PSTN is still the main generator of revenue for the PTOs[17]. Also, historically telephony has been the most important category of telecommunications.

Nevertheless, as the market share of both telephony and the PSTN is declining due to the growth of other service categories such as fax, data and video transmission as well as the rise of new public or private (dedicated) networks, we shall concentrate in this thesis on the totality of telecommunications: the whole of regulatory, politico-economic and technical wire-based or radio-based networks required to transport and switch voice, data or video separately or in any possible combination via public or private networks. Unlike the ITU definition this excludes traditional broadcasting (which is unswitched and content regulated).

Another argument in favour of concentrating on telecommunications is that it constitutes a major component of the overall IT industry, with world-wide investments in excess of ECU 600 billion. Caty and Ungerer estimate that telecommunications markets could represent about 60 per cent of the total IT world market by the end of this century (Caty and Ungerer 1986, p.206). Telecommunications is thus not only the infrastructural but also the economic backbone of IT, NIT, C&C, ICT and even to some extent broadcasting.

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[17] Currently, ordinary telephony still represents between 75 and 90 per cent of all telecommunication service revenues in EC Member States (CIT Research 1992). Generally 80 per cent of all current telecommunication traffic is voice.

Telecommunication tariffs as such are not defined by the ITU[18]. Here tariffs will be defined as: the charge made to users by a supplier of communication services - mostly a PTO - for use of a communication network or service. According to this definition 'tariffs' are in fact the same as 'prices', that is the rates or other charges paid by users for telecommunications services. It has to be noted that a 'tariff' is a more complex concept, embodying not only prices, but also legally complete, and sometimes technically complete, descriptions of the service. A tariff can also contain elaborations of regulatory or other terms under which the service will be provided. However, it has become standard practice to use tariff when price is meant - this thesis will continue this common practice.

Tariffs normally entail the users being registered and given a customer reference number for billing purposes. A tariff structure refers to the way in which the charge is composed, which may or may not relate to several distinguishable cost categories related to the instalment, maintenance and operation of the network(s) by the owner(s). For telephony, charges are often related to the duration of the call and its distance; furthermore there are additional charges for the connection to the network (access charge, a lump sum) and the line rental (monthly rent for the connection line). Sometimes there are also charges for renting or leasing equipment connected to the network at the customer's premises (Customer Premises Equipment - CPE), eg. a telephone set.

1.5. Telecommunications and IR

Telecommunications, as described above, is hardly a topic featured centrally and systematically in IR literature. Moreover, with its dynamics and its multi-level, political, economic and technological aspects, it is hardly an integral part of IR theories. In the next section we assess IR literature with reference to telecommunications.

1.5.1. Realist, Neo-realist, Integration and Regime Theories

If (tele)communications is mentioned in realist studies it is mostly regarded as one of many instruments a state can use in its foreign policy for the realisation of political aims such as security and power. Schilling, for instance, points out the importance and effects of improved communications technologies in war situations and for diplomatic negotiations (level 1 in figure 1.1.) (Schilling *et al* 1962; see also Russet and Starr 1985, pp.162-168). Padover and Martin stress the position of mass communication technologies (radio and television) for propaganda purposes (level 3 in figure 1.1.) (Padover, 1985;

[18] Even in the so-called D-Series Recommendations (international tariffs) of the ITU/CCITT Blue Book no definition of tariffs is given.

Martin, 1971).

In Deutsch's reaction to a realist analysis of IR, (tele)communications play a different role (Deutsch 1970). He tries to demonstrate that even if, according to the realists, there is anarchy in IR due to the absence of a world government and states pursuing their own interests, this does not automatically lead to wars and reduced security. His analysis of IR seeks to demonstrate the political aspects of international and transnational communications and the degree to which the flows of communication condition the political behaviour of states. This analysis includes the concept of 'cybernetics' (steering), as developed by Norbert Wiener, to signify the control of communication in political systems. Communication and communications are then judged as important in that they change the environment of the state and, in doing so, challenge the ability of a government to govern. Deutsch's application of the cybernetic model leads him to construct the concept of 'community' and on an international level 'security communities'. Security communities can have an umbrella organisation ('amalgamated security communities') or lack such a central authority ('pluralistic security communities'). The argument is that security communities which reduce wars, disputes and anarchy evolve out of communication. Communication is thus the central factor for integration and the subsequent product 'community'.

Problematic from our point of view is that both these realist studies relate communication to its content or specific forms, just as in the disciplines of sociology or psychology[19]. By doing so these studies ignore not only other aspects of communication such as the interaction between its national and international regulation (multi-levels) but also the economic, technological and political conditions which constitute the inception, development and operation of the (tele)communication networks in the first place. Furthermore, as Garnham points out, all mediated forms of communication involve the use of scarce material resources and the mobilisation of competencies and dispositions which are themselves in important ways determined by access to scarce resources; so accordingly the material base of the communication process is of key importance (Garnham 1990, p.6).

Interaction between the national and international regulation and telecommunications' specific politico-economic and technological dimensions are equally overlooked by integration theories. These use communication and transactions as major factors in the process of integration between states. Communication is regarded as eu-functional for integration. Haas, for instance, uses the telephone per capita rate as one of the indicators of integration, or fragmentation (Haas 1974, pp.223-224). Cobb and Elder intercorrelated eight indicators of international interaction and found that mail is the best overall integration predictor among others, such as trade and telegraphic communications. In Western Europe

[19] De Vree gives, in strict cybernetic terms, the following definition of communication: "[it] consists of the transmission of political messages: demands, supports and binding decisions [...]". (de Vree 1972, p.209).

they found that the absolute level of trade best predicted mail and telephone calls, and these variables in turn clustered with telegraphy and tourism (Cobb and Elder 1970, pp.86/87). Interesting as some of these studies may be, correlation is not the same as explanation: does for instance trade prompt the unfolding of telecommunications networks or is it the other way around (Drucker 1991)? Dunning has observed that in general, it appears as if foreign direct investment in services (including telecommunications) follow rather than lead foreign direct investment in manufacturing industries (Dunning 1991). Furthermore, Haas, Cobb and Elder hardly analyse the dynamics of telecommunications, that is its technological, regulatory and politico-economic aspects. It could well be that telecommunications traffic is not an expression of integration but an outcome of differences in tariffs. For instance, much international traffic between Europe and the USA goes via a 'hub' in the United Kingdom (UK) since the UK-USA tariffs have come down considerably[20].

Integration - formulated in a Parsonian way - is also assumed to be desirable as an objective and is uncontested as a concept. Telecommunications, regarded as a neutral instrument, are for instance, held to be functional for integration purposes. Research has nevertheless shown that telecommunications is often used to extend markets and consolidate power and dependency relations (Samarajiva and Shields 1990). Innis' analysis of the Canadian political economy concluded that Canada's internal and external communication and transportation channels played a key role in Canada's becoming a *hinterland* of first Britain and then the USA (Innis 1972).

Integration theories became less popular when West European integration came to a virtual standstill in the 1970s. (Neo) functionalist integration theories regained some of their attention as the EC integration process accelerated in the second half of the 1980s (the Single European Market and the planned European Political and Monetary Union) (although the outcome of the June 1992 Danish referendum on the Maastricht Treaty on further EC political and monetary integration seems to have generated a new backlash). The 1987 EC Green Paper on telecommunications considers telecommunications as an important instrument for further European integration (CEC 1987). At the same time telecommunications can, along the lines of dependency theories, accentuate or even worsen divides between centres and peripheries, urban and rural areas or rich and poor socio-economic groups. If for instance due to high tariffs certain groups would literally be cut off the network, social disintegration could be a result even if the overall level of national and international traffic were to increase.

Telecommunications as described above has gained more attention in the neo-realist interdependence and regime literature (Ju Kim 1990; Blatherwick 1987). Cowhey analyses the origins and functioning of what he regards as the international telecommunications regime, which has as its most important institution the

[20] The importance of the UK - USA transatlantic telecommunications links is also caused by political, cultural and economic links between the UK and the USA throughout history.

ITU (Cowhey 1990). He tries to overcome some of the criticisms of the regime literature[21] by introducing an explanation for change in the so-called international telecommunications regime and integrating domestic politics into this regime. He thereby opens the 'black box' of domestic politics by arguing that domestic user groups, spurred on by the potentials offered by the digital technology revolution, are pressing nationally and internationally for regulatory and regime change.

This analysis however, remains functionalistic as the discussed actors of change are just functions of the process of regime change. The state with its several constituting and different elements, each of them having their own histories of interventions and regulations, are not part of the analysis, nor are domestic actors other than some large telecommunication users.

1.5.2. Technology, Post-industrialism and IR

Another, quite powerful, stream of IR theories examines telecommunications from its technological angle. The origins of this view are as diverse as its provenances. Generally, many of these views can be traced back to 19th century sociological theories of evolution which were based on organic analogies and emphasised continuity, interdependence and integration. These Spencerian theories were resurrected in the decade following the launch of the Russian Sputnik in 1957 when the prestige of science and technology rose to new heights. The so-called 'space age' inaugurated an epoch of future researchers who tried to demonstrate that after the industrial phase, based on the 19th Century industrial revolution, there was yet another phase in evolution, unforeseen by academics in the 1950s, namely the post-industrial society (Kumar 1978, pp.185-240). Technology, science and R&D all played very important roles in these societal changes.

These changes led some IR analysts to consider technology as an independent variable with its own dynamics (Granstrand and Johansson 1992). Technology in itself caused diverse national and international, social, economic and political developments. As Skolnikoff puts it:

> "[...] technology itself, without human volition, somehow will force political changes on the international scene." (Skolnikoff 1972, p.7)

and more bluntly,

> "It is a common observation that the progress of science and technology is the predominant force causing today's unprecedented rate of change in man's physical and social environment. Nowhere are the changes more evident than in international affairs, where the scientific and technological developments during and since World War II have sharply altered former relationships among nations, overturned traditional measures of power and influence, and made the future a hostage to

[21] See for a critical analysis: Haggard and Simmons 1987, pp.491-517.

the scientific discoveries that are uncertain in form but sure to come." (Skolnikoff 1967, p.3).

By technology 'forcing' political developments he interprets:

- the trend of technological development leading to the rapid growth of many new capabilities that are global in nature, like space communications technology; to use these technologies some degree of international cooperation and agreement is required; and,
- increasingly, the side effects of intensive application of technology throughout the world are becoming global problems, especially in the fields of environmental or military security (Skolnikoff 1972, p.7).

Global technologies, according to Skolnikoff, tend to force decision making away from the national government level towards a centralised international policy machinery and thus de facto undermine the controlling power of smaller nations (Skolnikoff 1967, p.304). Technology is seen as the driving force behind the process of internationalisation, transnationalisation and interdependence[22].

Expressly within the field of telecommunications, IT and broadcasting, most literature is in fact related to this technology-primacy paradigm. As Snow, analysing deregulation policies, states:

"Technology is the pervasive driving force in the global trend towards telecommunications deregulation." (Snow 1986, p.9).

For Neu, Neumann and Schnöring technology is also the basic driving force behind market restructuring and political processes:

"The technological determinants which are changing the industry structure are also the major factors explaining the changing trade patterns and the changing regulatory environment of the telecommunications sector." (Neu, Neumann and Schnöring 1987, p.31).

Often it is further argued, ironically in a version of Marxist economic determinism, that these new pervasive technological potentials are so powerful that no government can stand in their way for long (Malik 1984 and 1990); that the market demand for the increased choice made available will override any countervailing political pressures, and that old forms of state regulation will be swept away:

"As technology advances, the importance of national boundaries will decline and the communications network of the multinational corporation, developed in form by the banks, will have the potential to become the guiding force for the development of world political and economic policies." (Buyer 1982, p.10).

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[22] See also: van Nuys Granger: "Technology's appetite for energy, materials, capital, and labour is the driving force of world interdependence as well as the source of much of the societal and international tensions that tear at the fabric of modern life." (van Nuys Granger 1979, p.2).

Technology is here clearly regarded as an endogenous force. Roobeek has pointed out that several mainstream economists, long-wave theorists and innovation theorists also see technological development as an independent variable (Roobeek 1987, p.115). The problem with this technological determinism[23] is that it overlooks the fact that technological developments are themselves shaped by the prevailing structures of economic, political and cultural power and more importantly that they offer a range of potentials which will only be actualised by the prevailing structure of society (Garnham 1991, p.28).

Some economists, sociologists and political scientists also tend to subscribe to the theory of societal convergence which posits that as societies or countries become more modern, they will increasingly take on identical (post)industrial structures and (post)industrial relations converging into one uniform model of an advanced industrial - or post-industrial - society (Roobeek 1988). Particularly in the telecommunications and IT field there is a massive amount of literature from economists and sociologists who claim that the latest 'technological revolution' (supercomputers, new telecommunication technologies, IT and so forth) changed society and the economy radically. Porat, analysing the impact of IT on the US economy, concludes that

> "[...] the computer and telecommunications are now propelling the United States into the information economy. The US economy is producing and consuming great quantities of information goods and services." (Porat 1980, p.30).

In the so called post-industrial 'information society' information or knowledge, has become a production factor and perhaps the most crucial one (King 1984; Drucker 1992). For the managerial analyst Drucker it has become

> "[...] the central capital, the cost centre and the crucial resource of the economy." (Drucker, 1969, p.ix),

and he argues that

> "[...] the productivity of knowledge has already become the key to productivity, competitive strength and economic achievement. [...] It is the foundation and measurement of economic potential and economic power." (Drucker 1969, pp.248/249).

Most of these theories build on Bell's concept of the 'post-industrial society' and McLuhan's concepts of the 'electronically integrated world' (McLuhan 1967; Bell 1974; Dizard 1982). These theories of countries and economies inevitably converging and integrating into one standard model through the force and internal dynamics of technological development regard a 'failure' to conform to the standard as a

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[23] There is however a paradox in most technocratic literature. Bell for instance sees on the one hand technological development as inevitable and as a 'motor of social transformation' but on the other hand distances himself from determinists like Harold Adams Innis by stressing a kind of primacy of politics.

form of 'lagging behind' or even 'backwardness'; national differences in so far as they - still - exist are generally thus explained.

It must be said that the technological developments in the telecommunications sector were and still are breathtaking and - as stated above - are bound to leave many a politician and academic flabbergasted. Moreover, as we have briefly stated above, in some respects there is indeed integration and convergence of formerly different technologies. Additionally, technological developments have indeed a great impact on national and international forms of regulation, management, the labour process and society and economy in general. However, looking at evidence and arguments put forward in some recent literature, it becomes clear that the way (new) communication technologies are developed and applied is not uniform. Firstly, their applications are driven by deliberate actions by managements and not so much by technology itself (Webster 1991). Roobeek goes even a step further by arguing that as the same technologies and technological research (R&D programmes) are designed and applied differently in different countries, they are more likely to cause divergence in stead of - what most post-industrialists assumed - convergence (Roobeek 1991). What Marx has called the dead weight of history, the accumulated total of social, economic and political relations and structures, also plays an important role in the concrete processes of innovations and their societal adaption and distribution. Secondly, technologies - to use a less abstract term - are developed in several, different and often contradictory directions: some telecommunication technologies point in the direction of increasingly spectrum-based networks (satellite, cordless and cellular) whilst others are specifically designed to operate via wire-based networks (twisted copper wire, coaxial cable and optical fibre). Some technologies such as narrowband (N-) and broadband (B-) ISDN are based on wide ranging integration of digitised voice, data and video, whilst other technologies are developed for specific service categories and specific transmission media only: for instance, Synchronous Digital Hierarchy (SDH) transmission system is only feasible for optical fibre and no other transmission media; optical fibre in the residential consumers' network - the local loop - has been developed to carry video based services, such as television, whilst at the same time other technologies, relying on digital compression and modulation techniques, make it increasingly feasible to send video via existing twisted copper wires to the home, thereby 'threatening' the former technologies (Stern 1993). Although theoretically there is some common ground where all these telecommunications technologies could meet (a Universal Integrated Communication Network?), this would require substantial (costly and time-consuming) interworking and interconnecting.

All this makes the supposition plausible that technology is not an autonomous force, outside of and directing society, but an integral part of it. Just as technology influences other dimensions of a society, the other dimensions influence technology. Also historical developments in the socio-political field, (inter)national industrial and economic developments, previous regulations, the size and the geographical characteristics of a country, education systems, the organisation of labour, aspects of the organisation, company or institution itself, social stratification, all these 'other dimensions' of society influence

technology; or more precisely: they influence inventions, innovations and their diffusions (Roobeek 1991; see also: Freeman and Perez 1988). These anti-deterministic theories use so-called 'techno-economic paradigms' to link technologies to their wider socio-economic and institutional contexts.

These wider contexts are indeed crucial. For instance facsimile took off quickly in Japan unlike the USA because of the specific structure of the Japanese language; cable television density in Belgium and the Netherlands is much higher than in Norway due to population density and its geography; moreover, a totalitarian regime may differ in its application of modern information technologies from a more democratic society based on freedom of the press and freedom of information. Also in the software sector 'societal' differences have considerable impact:

> "Because of language and cultural differences, software written in Japan is obviously difficult to export. Not only must instruction manuals be translated, but often the programs have to be completely rewritten. Japanese accounting rules, for example, are different from those in the US, so accounting software written in Japan is useless in the US." (Forrester 1985, p.42).

Furthermore, the institution responsible for the R&D of a specific new technology influences its invention. Its interests 'form' the developed technology and thus sometimes make it uninteresting for others:

> "Although the Defense Advanced Research Projects Agency [DARPA is part of the US Defence Department] finances some basic VLSI [Very Large Scale Integration of integrated circuits, mj] research, a large fraction of military-sponsored research directly on semiconductor circuitry is commercially useless." (Ferguson 1985, p.52).

Historical and contemporary analysis of countries, economies and world politics seem to give as many arguments for a heterogenization and divergence as homogenization and convergence - this in spite of literature written on the international diffusion of innovations through imitation (Chandler and Daems 1980) and cross border and cross culture similarities between industries and organisations (Donaldson 1985). Not only are there considerable and sometimes growing differences in the development between OECD countries and Less Developed Countries, but equally within the OECD itself, considerable developmental differences between regions still exist and may even grow.

Finally there is the concept of information as used in 'information society' and 'information economy' which must be criticised as a very vague concept[24]. Marvin challenges in a historical analysis the

[24] Roszak, speaking of a 'cult of information', argues: "The word [information] has received ambitious, global definitions that make it all good things to all people. Words that come to mean everything may finally mean nothing; yet their very emptiness may allow them to be filled with a mesmerizing glamour. The loose but exuberant talk we hear on all sides these days about 'the information economy', the 'information society', is coming to have exactly that function. These often-repeated

uncritical and optimistic conviction that people nowadays live in a set of special and unique circumstances created by technology, where the economy is organised around information exchange and not around the exchange of things (Marvin 1987). Furthermore she argues that contrary to what the 'information society' theorists believe, all societies have had information exchange as a central element in their social make-up. What has changed are the various forms of energy in which information is captured, stored, managed and exchanged. The idea that 'information' in the 'information age' has 'grown' more than proportionally is also criticised by several scholars:

> "The popular notion that information is a definite quantity increasing daily in determinable amounts reflects an assumption that information is digital, or at least that all important information is digital." (Marvin 1987, p.59; emphasis in the original).

Statements of a growing 'information sector' or a 'growth' of information and therefore a growing need for instance for ISDN services, reflect the digital fallacy that the amount of information is an index of meaning and significance - which is what information is basically about. Moreover if a growing need for transmitting, storing and managing data could explain concepts such as ISDN, even then this explanation as such is not sufficient to explain the many problems of its current development. When explaining tariffs and tariff structures, and ISDN variations throughout the EC, it will become even more obvious that a technocratic paradigm cannot account for differences caused by political and economic factors.

On a more general level one always has to ask oneself what is the added value of concepts like 'post-industrial society', 'information economy' or 'service economy'. What can they explain that other concepts cannot explain, or only insufficiently. Of course it can be argued that as societies progress, the secondary sector (manufacturing) takes over the lead from the primary sector (agriculture), and subsequently, in the next stage or phase, services (the tertiary sector) takes over from manufacturing (Clark 1940). The question is what follows from this move to a service, knowledge, information or post-industrial economy? The problem is one of the relative significance of the tendencies singled out by these post-industrial theorists. For post-industrialists like Bell, Drucker, Touraine, Porat and Brezinski it means not only a 'new agenda of questions', but more fundamentally a completely new society based on new production factors, production relations, labour relations, professional skills, production processes, consumption patterns, political classes and formations etcetera etcetera.

Apart from the fact that concepts like the service sector, the information sector or the knowledge sector are notoriously difficult to define and measure precisely, in fact only the UK fits into the evolutionary

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catchphrases and clichés are the mumbo jumbo of a widespread public cult. Like all cults, this one also has the intention of enlisting mindless allegiance and acquiescence. People who have no clear idea what they mean by information or why they should want so much of it are nonetheless prepared to believe that we live in an Information Age, which makes every computer around us what the relics of the True Cross were in the Age of Faith: emblems of salvation." (Roszak, 1988, p.81).

trajectory claimed by the post-industrialists. Moreover, looking more closely at the tendencies claimed by the post-industrialists to be signs of a coming post-industrial society, it becomes clear that all of these were already apparent and even firmly established throughout the earlier period of industrialisation (Kumar 1978, pp.200-230). The - false - impression of a post-industrial society based on white-collar work and services, is also created by turning a blind eye to the internationalisation of capital throughout the 1960s and 1970s. TNCs increased investments in peripheric and semi-peripheric countries in order to use cheap and hardly organised labour for their production processes. This led to new forms of international division of labour where a considerable part of blue collar-work was moved from highly industrialised countries to developing countries (Frõbel, Heinrichs, Kreye 1980). The basis of 'post-industrialism' was thus hardly less 'industrial' than its predecessor. As Kumar puts it:

> "The [post-industrialism] theory postulates a 'system break' in the transition to post-industrialism. Such a break is largely illusory. What are projected as novel patterns of development turn out on examination to be massive *continuities* within the basic system of the developing industrial society. Essentially, and in so far as they are actually occurring, the trends singled out by the post-industrial theorists are extrapolations, intensifications, and clarifications of tendencies which were apparent from the very birth of industrialism." (Kumar 1978, p.232).

Most of these continuities were already noticed and analysed by scientists such as Marx (internationalisation, concentration and centralisation, the permanent revolutionising of the production process) and Weber (the relentless process of 'rationalisation' and 'bureaucratisation' in western industrial societies) (Marx 1961; Weber 1978).

Another strand of theories - more subtle than those of the 'information society' - have depicted the shift in the 1970s towards the increased use of new information and communication technologies (ICTs) in the production process as a 'Second Industrial Divide' (Priore and Sabel 1984). This new 'divide' represents the shift from a type of industrial system based on mass production (scale economies), mass consumption, special purpose machines and semi-skilled workers to one based on flexible production and specialisation (scope economies), customised consumption, flexible, general purpose machinery and multi-skilled workers. What makes these theories rather problematic is that not only little evidence supports this theory, but, moreover, mass-markets, mass-consumption and scale economies are (still) of considerable importance (certainly in the case of telecommunications) (Miles and Robins 1992).

The idea of continuity and radical discontinuities and phases in societal evolution will return when we discuss the regulationist contribution to IR. The difference with these post-industrial theorists however is considerable as in the regulationists' framework the continuity throughout all discontinuities is formed by the capitalist production mode. But before we move to the regulationists we have to briefly analyse an often neglected dimension in IR: the state, and, more importantly, the relationship between state, society and economy.

1.6. Into the 'Black Box': State Theories

Neglect of the analysis of the state is not just a prerogative of the technology-primacy paradigm; also realists and neo-realist regime theorists tend to reduce the state to a homogenous apparatus steered by rational decision makers representing 'state interests' and seeking 'power'. The alliances and conflicts between different state apparatuses and between state apparatuses and other societal organisations as well as the economic functions and dysfunctions of the state are consequently ignored whilst these are so crucial for explaining phenomena such as Keynesianism, the welfare state, public service regulation, deregulation, liberalisation and privatisation.

Equally, many free-market theories in the field of international economic relations analyse the state as an external - and most often, a dysfunctional or even obsolete - force in international trade (Pearce 1967). A famous IBM spokesperson once argued that the world's political structures were completely obsolete and that the critical issue of our time is the conceptual conflict between the global optimisation of resources and the independence of nation states (Kidron and Segal 1987, p.41).

It seems that states are only allowed into these economic models when one seeks a scape goat for explaining sub-optimal outcomes of international trade. It seems to be lost in these abstracted models that states and societies greatly differ in history, geography, demography and social, political and economic development, and that there is a hierarchy of states and economies maintained via politico-economic and military means. Additionally, there is no understanding of the positive roles states can, and historically often have, performed for economic development. Senghaas has pointed out in an extensive historical study that - with the exception of Switzerland and the Netherlands - none of the currently highly industrialised European countries developed itself under abiding free trade conditions (Senghaas 1982, p.37). Most often states directly or indirectly intervene in the economy, in a mercantilist tradition, as argued by the German political economist Friedrich List[25]. It is therefore essential to understand the internal (as well as external) workings of this 'black box'.

The state itself can be defined in terms of its origins, its central characteristics, the institutions which make it up and the functions these institutions perform. Whilst a precise definition is hardly uncontested, it is possible to describe the state in general terms. For a start the state is a relatively new development in the history of human society - not arising until around the fourth millennium B.C. All human societies

[25] The mercantilist tradition - challenged by Adam Smith in *The Wealth of Nations* - stresses the importance of the national power of a given country relative to others. It emphasises the importance of national security and external economic autonomy; consequently the central concern to the state should be the ability to control the movements of goods, technology and capital and to channel such economic power resources for national purposes.

before that time and most human societies since (that is, primitive hunting and gathering and simple horticultural societies) have been without states. These early states had three characteristics that nowadays are still paramount in both political sciences and international relations: the state consists of a defined territory, the state represents the supreme power within that territory (Weber refers to the monopoly of the legitimate use of physical violence (Weber 1984, p.33)) and consequently it is able to rule over the subjects and institutions within that territory (sovereignty). The creation of the nation-state - the European Enlightenment idea(l) that a nation has a right to self-determination and should have its own state - and the development of the modern state with its balanced institutions is hardly two centuries old (Anderson 1983). The modern state, supposedly expressing Rousseau's *volonté général*, comprises a whole range of institutions: legislative bodies, including parliamentary assemblies and subordinate law-making institutions; executive bodies, including governmental bureaux and departments of state; and judicial bodies - principally courts of law - with responsibility for enforcing and through their decisions, developing the law. States vary in the extent to which legislative, executive and judicial institutions are separate from one another or overlap; they also vary in the way they are centralised or decentralised and in the way the ruling elites, classes or groups have come to power (Hamm and Hill 1984, p.23). To support and maintain these institutions, police and armed forces are employed to guarantee internal and external security; additionally, and more important support is generated by exploiting the legitimacy of the modern state created by the idea(l) of the state as the 'locus of the public will' (Connolly 1984, p.7).

A more precise definition of the (modern) state, its demarcations and ties with society and economy and its functions has been the focus of many a political scientist's study. The dominant tendency over the last generation has been pluralism. Pluralists define society as an aggregate of dissimilar and to a large extent equally influential interest groups and associations with highly diverse and often conflicting interests (Dahl 1961; Easton 1971). Each of these diverse groups attempts to influence governmental policy - defined as the product of the conflicting pressures of all these groups, none of which is dominant. The balance between the various conflicting claims on the state is represented by state policy. A complex web of 'cross-pressures' operating in society guarantees that no systematic conflict develops that endangers the stability of the state itself. The balance among these pressures and groups is an essentially fair and true equilibrium among all the various interest groups, with no great and consistent bias in any direction (Bentley 1967). This pluralist view of the state and society has been challenged - among others - by the elite theory which regards the state as nothing other than the organ of a minority that will necessarily rule in its own interest. Both the aristocratic varieties of elite theory (for example the work of Pareto, Michels, Mosca and Baltzell) and the more radical varieties (for example the work of C. Wright Mills) consider the masses as manipulated by the ruling elites (Halebsky 1976). Szymanski, criticising the elite-theories, has pointed out that by arguing that the masses are totally controlled and manipulated by elites, the power of the dominant group(s) in society is greatly exaggerated. Similarly, society and groups vary considerably in the degree to which the masses actively and authentically participate in the determination of policies and in the degree to which state policies serve the people's interest. Rather than an 'iron law'

applying to all societies at all times, the relative distribution of power and privilege is a product of historically specific forms of social organisation (Szymanski 1978, p.14/15). Following this historical-materialistic perspective Marxists argue that the state is not a neutral agent but an instrument of class-domination (Milliband 1969) or an expression of the structural relationship between classes (Poulantzas 1969). The state is thus more or less functional for the capitalist production mode: the state is a capitalist state.

The problem with these state theories is that they focus on the state as such; they hardly consider what is one of the most important phenomena for political systems in general and modern states in particular: internationalisation. Although Marxists specifically use an historical framework, studying the different forms of pre-capitalist and capitalist states, thereby overcoming the pitfalls of the other, a-historical analyses, the current pressing question is how does internationalisation relate to the modern capitalist state and its (class) structures, institutions and legitimations? Following a Marxist analysis which argues that the base (production forces, social relations) determines - eventually in the 'last instance' - the 'relative autonomous' superstructure (political system, ideology, culture), the question can be reformulated as: how do the classes, historically constituted within the boundaries of a specific capitalist state, relate to the internationalisation of capital? And what is the position and function of the state institutions in this process? Poulantzas, criticising the over-simplified 'economistic'[26] view exemplified by Mandel's thesis that the success or failure of European integration depends on the form taken by the international centralisation of capital (Mandel 1974, pp.289-317), points to this problem when he states

> "[...] the state is not a mere tool or instrument of the dominant classes, to be manipulated at will, so that every step that capital took towards internationalisation would automatically induce a parallel 'supra-nationalisation' of states. [...] The problem we are dealing with [...] cannot be reduced to a simple contradiction of a mechanistic kind between the base (internationalisation of capital) and a superstructural cover (national state) which no longer 'corresponds' to it." (Poulantzas 1975, p.78).

He nevertheless fails totally to give an alternative analysis of the material basis of - in this case - European integration. This theoretical *cul-de-sac* can only be 'solved' by stressing a) the relative autonomy of the superstructure and b) the dominance of the national form in the class struggles "[...] however international they are in their essence." (Poulantzas 1975, p.78). Particularly the first point creates considerable problems as the state - even if in the last instance - becomes a derivation of the capitalist production mode. This makes it very difficult to explain the considerable and obvious variations in states and - for instance - their regulatory policies. Skocpol, representative of the state-centred or

[26] Economic reductionism, economic determinism or economism claims that the forms and functions of non-economic systems necessarily correspond to the forms and functional needs of the economy. It also treats economic factors as the mechanism which generates this correspondence. In this sense it denies that non-economic systems have any significant autonomous institutional logic and also denies they can have significant independent effects on the economy.

'statist' approach, has additionally argued that states also have their own, autonomous (first, intermediate and last instance) interests:

> "States conceived as organisations claiming control over territories and people may formulate and pursue goals that are not simply reflective of the demands or interests of social groups, classes or society." (Skocpol 1985, p.9).

Jessop asserts that whilst it is true that no society could survive for long unless it made arrangements for economic (re)production, it is also trite:

> "For this truism by no means implies that the requirements of *particular forms* of economic (re)production must (or can) be satisfied; nor that these particular requirements (or, indeed, those of economic reproduction in general) somehow take priority over other activities." (Jessop 1990, p.84).

One could equally well argue that economic (re)production itself depends on elements from the superstructure (internal law and order and ideological cohesion and legitimacy). Secondly, the 'relative autonomy of the superstructure' and Poulantzas' 'economic determination in last instance' ignore the extent to which the economic realm lacks the self-sufficiency needed for it to play such a determining role. Clearly the capitalist mode of production needs an extra-economic actor such as the state to secure capitalism's various extra-economic conditions of existence. In so far as non-economic factors are essential for reproducing the economy, the latter lacks the autonomy and self-sufficiency to be economically determinant of other systems in the first, intermediate or last instance. Looking closely at the so-called economic base, Jessop argues that the forces of production not only include the means and objects of labour but also labour power itself. The 'economic' base is in fact never purely technical in character and has crucial extra-economic conditions of existence, for example, in law, the state and - as feminists have argued - certain gender related social relations, norms and values (Jessop 1990, pp.81/82; p.13). Consigning the 'relative autonomy' to the theoretical dustbin, Jessop stresses the 'contingent necessity' of social development, which tries to assess the relative weight of different institutions and social forces in determining specific outcomes in a complex, changing conjuncture.

This argument is however prone to the dangers of ethnomethodological indeterminism and the radical relativism of most post-modernist discourse theory. A way forward would be to analyse the state and internationalisation as actual historical processes which concretely exhibit structurally ordered determinants within which material production is ultimately determinant. Rather than using the indeterminate concept of 'contingent necessity' it will be more valuable to argue for a hierarchy of determination within a mode of production (capitalism) such that the possibilities at each level are limited by the resources made available by the logically preceding level (Garnham 1990, p.10). Within this hierarchy it will be fruitful to establish correspondences and co-evolutions among the economic, legal and political

domains, recognising their blurred boundaries and the paradox of their own workings, dynamism and histories on the one hand and their interdependencies on the other. The state has its own independent history (one should not forget that the state pre-dated the rise of the capitalist production mode) and consists (nowadays) of a myriad of heterogenous institutions, organisational principles and practices through which artificial 'unity' (in so far as this is feasible) has to be (re)produced. Jessop uses the term 'state project' to sensitise us to the inherent improbability of the existence of a unified state and to indicate the need to examine the structural and strategic factors which contribute to the existence of 'state effects' (Jessop 1990, p.9). The separate histories of each concrete state and the way (some) states have fundamentally and specifically shaped the form and dynamic of the international expansion of industrial capitalism, means that there is little reason to expect a convergence among states in capitalist societies: they will vary with national modes of growth and their changing insertion into the international markets as well as with changes in the balance of class (or political) forces. This corresponds in fact with Poulantzas' second point (see above): the national form of class (-relevant) struggle is still dominant. In spite of extensive efforts to establish a European polity (the concept of a 'European state' would be equally as incorrect as delicate), to form closer political integration in other parts of the world or to construct international regimes of cooperation (Keohane), there is no such thing as an international (super, or supra) state which could take over the essential state characteristics, institutions, functions, legitimacies etcetera. But also in concrete terms national markets, formed within states' territories and constituted via state institutions such as contract law and monetary policies, are still paramount. Certainly in the case of telecommunications - as we have argued above - (entrance to and reliance on) national markets are the critical elements of many a 'global' operator. The state remains equally crucial for the internationalisation strategies of these firms; it not only constitutes the legal, monetary and social pre-conditions of the market, it moreover is directly involved in important issues such as interconnection, standardisation, tariff setting and market entry. Even where some of these functions and powers have been transmitted to supranational organisations, as in the case of the EC, states remain very powerful entities. Clearly the EC has not or has hardly taken over functions such as the generation and reproduction of the legitimacy of (capitalist) society and polity, the protection of private property and the maintenance of law and order, the provision and regulation of the educational systems, the engagement in countercyclical economic policies and so forth.

Woolcock *et al* have demonstrated that often Member States simply have not been able to agree on the objectives to be pursued by new EC-level regulatory powers and therefore only a limited degree of discretionary power to regulate is being transferred to the EC level. In this sense the 1992 project does not introduce extensive discretionary powers at the EC level (Woolcock *et al* 1991, p.5). Additionally, one should not forget that states, with their enormous apparatuses, are themselves the main consumers of telecommunications equipment and services (in all four countries researched here, the state is the PTO's largest single client).

This does not imply that the state in its current historical form is independent from the prevailing capitalist production mode, nor that its capacities to intervene autonomously and effectively in the economy are unlimited. On the contrary. Firstly, to support the modern state's central and continually expanding functions and - often - growing number of employees, institutions and programmes, it directly depends on the (capitalist) economy via taxation, deficit financing or income obtained from state enterprises. Secondly, since the state is mostly excluded from the heart of the production process, it must either react *a posteriori* to events it cannot directly control (but is often held responsible for in the political arena) and/or engage in ineffective *a priori* planning. Consequently, the state tends to respond to economic problems and crises in terms of surface phenomena (such as rates of inflation, unemployment levels or trade deficits) which have no obvious or consistent relationship to the real course of capital accumulation. Thirdly, the steering capacity of its policy instruments (taxation, subsidies, official interest rates etc.) is dependent on both the general performance of the economy, the 'strength' of the state to implement its policies and the concrete market structure and attitudes and interests of market actors in a particular field. For instance, when the Dutch Minister responsible for telecommunications decided in favour of increased (network) competition, she was very much dependent on the willingness of cable operators to compete with the monopolist, PTT Telecom. Equally, her British colleague was very much dependent on the performance of BT's main competitor Mercury for stimulating competition. But, since the state operates at a distance from economic agents and processes, a considerable scope for avoidance and evasion of intended effects is created. Even if this distance is reduced by forming close ties with industry via 'policy networks'[27] or forms of corporatism[28] the basic problems of the state as an extra-

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[27] Schneider defines a policy network as clusters of relatively autonomous but interdependent actors that are incorporated into the process of public policy making (Scheider 1992, p.109). He regards the emergence of policy networks as a state strategy in the context of more complex policy problems and a greater dispersion of policy resources within society which makes states increasingly dependent upon the horizontal cooperation of private actors in policy formulation and implementation. Policy networks can be institutionalised as formal advisory bodies, semi-institutionalised working groups or highly informal and even secret forms of cooptation of private actors. Cox has extended this concept into IR by stressing the rise and importance of institutional linkages of a transnational nature (transnational policy networks) (Cox 1987). Some Marxists, stressing the importance of a class analysis of IR have argued that transnational class formations and class alliances should be central to IR research (van der Pijl 1984; Junne 1987; Overbeek 1990).

[28] In a review article Schmitter defines corporatism as: "[...] a system of interest representation in which the constituent units are organised into a limited number of singular, compulsory, noncompetitive, hierarchically ordered and functionally differentiated categories, recognised or licensed (if not created) by the state and granted a deliberate representational monopoly within their respective categories in exchange for observing certain controls on their selection of leaders and articulation of demands and supports." (Schmitter 1979, p.13). Corporatism's popularity grew partly because it offered - within a national framework - an explanation for the relative success of some states in adjusting to economic instability in the 1970s and 1980s. Corporatist theories however, often fail to note the role of class conflict in politics and the alliances between capital, or fractions thereof, and the state. Cox has pointed out that as corporatist theories often failed to empirically support their argument, they redefined corporatism to include forms of policy-making in addition to types of governments (Cox 1988). These ever growing connotations have spurred scholars to describe, at some time or another, almost all modern societies as corporatist (Williamson 1989).

economic agent persist. An additional problem is created by the international scope and flexibility of capital which makes it difficult for individual states to monitor and control the course of capital accumulation. Paradoxically, the internationalisation of capital does not dissolve the need for state intervention. It merely makes it more difficult to achieve.

Another situation arises in the case of (perceived) market failures: the state might provide goods and services itself (as we will see in the past this has been argued in the case of telecommunications in Europe). But, although a state institution can indeed work as a capitalist institution to some extent and although public provision may sometimes directly or indirectly promote private capital accumulation, it is nevertheless tied to its own internal organising principles and dynamics (Weber's state bureaucracy, political accountabilities and civil servants culture); unintended or even detrimental effects might occur in as far as a state company has to withdraw money from the capital markets or from the state budget, or has to respond to growing and increasingly conflicting demands (fiscal crises, increasing public sector borrowing, rise in interest rates, governmental overload).

The economic system is also dependent on the state since the latter's role has now become vital for capital accumulation due to the increasing complexity of society in general and the highly specialised labour division in the economy in particular. This dependency causes the famous 'paradox of deregulation': the state cannot solve economic crises simply by withdrawing or refusing to intervene. At best it can reorganise how it intervenes. Deregulation, as many a communications regulator realises, is 'at best' re-regulation (V.Porter 1990).

Our next step will be to link up the various theoretical elements of IR theories and political sciences: the predominance of the national form and the state as an actor *sui generis* (not a functional, superstructural derivative of an economic base, but a heterogeneous actor with its own dynamics and organisational principles) and the capitalist mode of production which nevertheless limits state action and drives the internationalisation (and centralisation and concentration) of capital.

1.7. The Regulationist Approach: Fordism and Post-Fordism

The regulationist approach[29], of which Aglietta, Boyer and Lipietz are the main authors, provides a set of concepts for analysing the historical evolution of capitalism in a national as well as international context and the qualitative phases which characterise it. The appeal of this approach, which also makes

[29] Jessop distinguishes four foci of regulation approaches along the dividing lines national/international level focus and economic/societalisation ('Vergesellschaftung') focus (Jessop 1988); additionally he classifies seven regulationist schools (Jessop 1989). The focus in this study will be the international level in combination with political economic regulation.

it compelling for the study of telecommunications, is the pretension that it developed a new framework in which a link is explicitly made between economic developments, technological developments and changes in the social, political, institutional and state structures. The term regulation is central to these theorists.

The starting point of the regulationists' analysis is a critique of the conception of the market and its so-called general equilibrium (Aglietta 1976). From classical, neo-classical and even Keynesian economics comes a long tradition of analysing the Smithonian 'general equilibrium' of a market (price mechanism)[30] or of a whole economy. The concepts of the orthodox economist are regarded as idealistic because they neglect the basic disproportionalities, crises and ruptures inherent to the capitalist mode of production.

The regulationists see capitalist development as a successive evolving, historical, process, each stage having a specific social structure that connects the individual decisions of producers with the socially determined effective demand they must confront. These social structures are called 'regimes of accumulation' and each of them is

> "[...] a mode for the distribution and systematic reallocation of the social product, realising, over a long period, a certain correspondence between the transformation of the conditions of production (volume of capital engaged, distribution between branches, and production norms) and the transformation in the conditions of final consumption (consumption norms of wage-earners and of other social classes, collective expenditures, etc.)." (Lipietz 1984, p.18; translation by and quoted from: Noël 1987, p.311).

Essential in this regime are the correspondences between the transformation of the conditions of production and the transformation of the conditions of the reproduction of wage-labour and between certain of the modalities in which capitalism is articulated with other - preceding or coexisting - modes of production within a national economic and social formation. Basically, there are two forms of accumulation regimes, extensive and intensive:

> "Extensive accumulation implies a growth of the capital stock which does not alter existing production techniques, and which is accompanied by low productivity growth. In intensive accumulation, the technical and social organisation of work is profoundly modified, the growth of investment is better planned, and productivity growth is rapid." (Mazier 1982, p.40).

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[30] Smith sees the equilibrium price as the 'natural price'. A position of equilibrium over the whole economy will be attained when each different type of good is sold at its natural price and when each factor in each employment (capital, labour and land) is paid at its natural rate. This position of general equilibrium depends upon the essentially self-interested actions and reactions of consumers and producers. Smith's treatment of price and allocation shows his emphasis on interdependence and what he calls the Invisible Hand (Smith 1986/1776).

These accumulation regimes possess several dimensions including wage-relations (capital - labour), the mode of life, the labour process (technology and management), the economic cycles and state intervention. Each regime corresponds to certain historical forms of these dimensions.

A regime of accumulation thus describes the relations between several political economic variables like wages, profits, investments, prices and productivity. It can be seen as a specifically extended macro economic model, or in Marxist terms, as a reproduction scheme. Different phases in capitalism correspond to different types of accumulation regimes. Until now the regulationists have defined two specific regimes.

To these rather abstract regimes correspond more concrete forms which make their reproduction possible. Each regime has its own form of regulation: a specific set of institutional forms, of networks, of explicit and implicit norms, ensuring the compatibility of behaviours within the regime of accumulation framework. In fact it is the complete whole of institutions made up of different forms of law, rule compromises, norms and habits which ensure that no catastrophe or disturbance besets economic development. Two forms of regulation have been described by the regulationists: the first is competitive regulation, characterised by wages negotiated on an individual basis and submitted to market fluctuations, by production dominated by price-takers, by tight monetary formation and by a non - or barely - interventionist state. The second is monopolistic regulation where wages are collectively negotiated, rigidly patterned and implicitly indexed to growth of productivity; price-setters dominate the economy; the monetary supply is less controlled and thus, the state is active; this form of regulation is connected to the Keynesian welfare state and Keynesian forms of state interventions.

An accumulation regime cannot exist without some form of regulation. The function of regulation creates the possibility of an accumulation regime. However, due to developments in the labour - capital relations, problems, even unforseen crises in the form of regulation, may arise. On a macro level a crisis can take the form of a conjunctural crisis, a cyclical crisis or a structural crisis. Structural crisis is a dysfunction of the specific institutions and social processes forming a given regime of accumulation. Cyclical crisis refers to the more traditional conjunctural evolution: a particular phase of the cycle manifesting itself in the reverse of a set of business indicators, such as employment, production, the stockmarket and so forth.

Regulation and the state are however not just examined as the 'function' which makes a regime of accumulation work, nor 'preordained in the course of capitalism'. A functionalistic fallacy and crude economistic reductionism are averted by alleging that a certain form of regulation and thus a certain form of the accumulation regime does not just develop out of a basic logic of capitalist economics, but is the result of political struggles, 'trial and error' and the interactions and correspondences between the dynamics and institutions of the state on the one hand and the capitalist production mode on the other

(Lipietz 1984, p.86)[31]. Regimes of accumulation and modes of regulation are thus change discoveries made in the course of human struggles and if they are for a while successful, it is only because they are able to ensure a certain regularity and a certain permanence in social reproduction (Lipietz 1987, p.15).

The structural crisis at the end of the 1920s represented the transition from one accumulation regime (extensive) to another (intensive) and from one form of regulation (competition) to another (monopoly). The then newly emerging development model is called Fordism[32] for it is associated with mass-production and mass-consumption. During the post-war period, Fordism, as organised corporate capitalism, was the dominant regulation form (Davis 1986). Fordism first developed in the USA and later - after the Second World War - in (Western) Europe and Japan. There it was introduced by the hegemon, the USA, via the Marshall and MacArthur plan, investments by American multinationals and further stimulated by the Schuman plan and West European integration (van der Pijl 1978). The structural crises in the 1970s marked the crisis of the Fordist model and, according to several regulationists, marks the transition to a neo-Fordist or post-Fordist model where flexibility instead of mass-production and mass-consumption seems to be a central component together with deregulation policies, social segmentation and intensive competition and rivalry between the capitalist blocks (USA, Japan and Western Europe).

The regulationists also include some aspects of Marxist internationalisation of capital theories. For instance the emergence and significance of TNCs is regarded as part of a much wider process of internationalisation of production and of capital (Palloix 1973). TNCs result from the process of concentration and centralisation of capital on a world scale, in the context of this continuing internationalisation of capital. As shall be shown in the next chapters, TNCs, as producers or consumers of telecommunications equipment and services, play an important role in national and international telecommunications regulations (including their tariffs). Furthermore, internationalisation of capital includes the spread and penetration of certain forms of production and consumption, that is certain forms of regulation.

1.8. Telecommunications Regulation Mode

Just as in the regulationist theories every accumulation regime requires a certain framework of institutional forms (regulation modes) a mode of telecommunications regulation can be constructed. A mode of telecommunications regulation (TRM), being part of the larger societal regulation mode, refers

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[31] Jacobs stresses the importance of 'trial and error' in the regulation process (Jacobs 1989, pp.95/96).

[32] The regulationists derived this term from Gramsci's analysis of Ford's mass production and conveyor-belt system and its restructured class hegemony (Gramsci 1971, pp.279-318).

then to the way in which the determinant structure of telecommunications production and consumption is reproduced. Determinant means that a certain structure of telecommunications production and consumption, though dominant, is not the only present structure; every historical epoch has elements of former or future structures which will collide. Additionally, a TRM will have internal contradictions and limitations which make it susceptible to changes or pressures to change.

The main actors in a TRM are:

- The archetype regulator: the state. The latter is not a homogeneous entity and 'black box' but a collection of structures, institutions, procedures, departments, legitimacies and so forth with legislative, administrative, law enforcing, ideological, political and economic powers. Traditionally telecommunications is regulated by the department of PTT (Post, Telegraphy and Telephony) affairs.
- State related or semi-state organisations involved in telecommunications: R&D laboratories, standardisation institutes, equipment approval bureaus, (in)formal working or advisory groups of industry and/or employees organisations and/or users associations and state officials etcetera. Sometimes the regulator is an institute working at arms length from the government (quasi autonomous governmental organisations - quango). There can be different structures for parliamentary or governmental control and accountability.
- The telecommunications producers: terminal equipment, transmission and switching device producing industries.
- The telecommunications operators and service providers: in Europe traditionally the PTTs (Telecommunication Administration, TAs, or PTOs) have owned and operated their PSTN and other networks. Since the early 1980s new operators have entered the markets, using their own build networks and/or leasing and reselling capacity from the PTO.
- The telecommunications consumers which can be subdivided into residential users, rural users and urban users and small, medium or large companies; providers of value added services are consumers in as far as they have to buy capacity and switching from an operator.
- The telecommunications workforce which is involved in the production of equipment or services: blue collar or white collar, organised or not.
- From an international perspective, finally, foreign actors are involved as well. Foreign operators and regulators and international organisations influence the arrangements on standards, protocols, interconnections and tariffs (settlement and accounting rates of international tariffs). Most manufacturers, operators, service providers and large users are nowadays large TNCs, operating in many countries and continents. Equally their interest organisations are organised internationally and often participate in the policy process of international organisations.

All these actors, working on different levels and within different economic and political structures, constitute national and international telecommunications and its tariffs. They operate within the (ideal typical) structure of a TRM which varies per societal formation according to its own 'dead weight of history' (eg. sunk investments, established practices, principles and interests of economic and political actors), specific market structures, level of development and political struggles. Each of the countries studied here has - within the boundaries of an international TRM - its own ('national') telecommunications equipment producer, its own standards, its own corporate structures, its own policy networks, its own regulatory practices, its own telecommunications consumption patterns, its own telecommunications

interest groups and its own tariffs and tariff structures. However, the national TRMs had and still have many aspects in common. Firstly, this is because there is a strong international pressure to change the old (European) TRM and move to a new one. This pressure comes from the relative dominant hegemon, the USA, from international organisations such as GATT (General Agreement on Tariffs and Trade), IMF (International Monetary Fund), OECD (Organisation for Economic Cooperation and Development), the World Bank and (within the EC) the European Commission and from national and international large telecommunication users. The latter often cooperate via and participate in national and transnational policy networks. Secondly, all four countries investigated here evolved into modern, highly industrialised capitalist, European and democratic/parliamentary societies. Consequently their societies, economies, states and even technologies have many features in common. Finally, as stated above, international telecommunications would break down without some form of standardisation and agreements on protocols, routine procedures, work practices, techniques, interfaces and indeed tariffs; growing internationalisation ties in with growing international telecommunications needs and thus growing requirements for international agreements on technological, political and economic principles governing international telecommunications.

Since the emergence of a new TRM can only be explained from the development, limitations and contradictions of the former one, the next chapter will start with a historical analysis of telecommunications in general and the old TRM in particular.

1.9. Conclusion

This first Chapter has sat out the theoretical framework of this thesis. For two basic reasons the Chapter largely consists of a critical reflection on several theories in the fields of technology, economics and politics. Firstly, and in general, it is crucial to acknowledge and investigate the implicit or explicit assumptions made in theories. These assumptions limit not only the scope of the research and the analysed variables, but also add and direct causal relationships to abstracted concepts which are thought to reflect and explain 'reality'. Secondly, the central research objects of this research, telecommunications and its tariffs, cannot be described, let alone be explained, without some combination of knowledge of the three fields mentioned.

In a search for a conceptualisation of telecommunications, we concluded that its totality is more than the sum of its parts. 'Telecommunications' entails not only technology, politics and economics, but a specific combination and taxonomy of all three. While most theories would not deny this, considerable disagreement exists about the 'mix'. What causes the variations in theories, are the distinctive ways in which the relationships between technology, economics and politics are postulated. Some stress the autonomy and overwhelming influence of technology, while others assume economics to be paramount

and the rest derivative. These variations of determinism manifest themselves also in the science of International Relations: some regard states as the principal actors in international relations, others stress the role of technological development.

The problem of these deterministic or realist theories is, that they reduce highly complex phenomena such as states and telecommunications, to relative homogeneous and nicely packaged, closed entities which cannot explain the obvious variations in technologies between societies nor the increasing powers of non-state actors such as transnational corporations. A study of telecommunications and telecommunications tariffs requires a profound theoretical framework which can analyse the intricate relationships between technology, economy and politics on both a national and an international level, and in a non-deterministic and non-reductionistic way. Most IR theories discussed proved barely equipped to analyse the historically mediated material and distinctive aspects and dimensions of telecommunications.

The French regulationists' approach however, provides a framework in which the distinctive dimensions and histories of national and international telecommunications can be addressed in non-functionalistic, non-economistic and non-reductionist ways. In order to analyse telecommunications, and their tariffs a special concept, Telecommunications Regulation Mode (TRM), has been created. A mode of telecommunications regulation refers to the totality of corresponding production, consumption and regulation patterns in the field of telecommunications. The analysis of TRMs will be central in this thesis to the explanation of developments in telecommunications in general and telecommunications tariffs in particular. The general workings and concrete forms of TRMs will be discussed in the next chapter.

CHAPTER II

THE FORDIST TELECOMMUNICATIONS REGULATION MODE

2.1. Introduction

The period of Fordism - for Europe roughly the postwar period until the 1970s - showed phenomenal changes in the structure of production and consumption, both in terms of the nature and quantity of the goods and services produced and consumed and in terms of the productivity and the manner of reproduction of the labour they required. Not only technological innovations were introduced but also new forms of regulation. This chapter starts with an overview of the nineteenth century's processes of industrialisation and the emergence of the modern state in Britain, France, Germany and the Netherlands. Early telecommunications, in the form of wire-telegraphy, just as other forms of network infrastructures (we will shortly address the railway and postal systems) were formed within this pre-Fordist period. Next the technological, economic and political developments in telecommunications are examined. This is followed by a discussion of the emergence of Fordism and the Fordist Telecommunication Regulation Mode (TRM) in general and its historical variants in France, Germany, the UK and the Netherlands in particular.

2.2. Pre-fordist Industrial Capitalism and State Development

The first fifty years of telephony - approximately 1880 until the Second World War - were embedded in a period of pre-Fordist accumulation and the continuing unfolding of the modern state.

Although the Industrial Revolution - starting off in Britain because of a favourable national and international environment - increased the general productivity of human labour, capital stock grew without major alterations in existing production techniques: the working day was lengthened and intensified and the size of the labour force was expanded. Management operated in terms of short time-horizons and limited its placements of fixed capital. As a result new capital investments tended to embody extant productive techniques, rather than transformed ones. There was, of course "[...] significant use of science in production processes, but firms mainly tried to apply existing knowledge to their business and did not strive to improve them continuously." (Boyer 1988, p.79/80). Within firms, craft workers were able to exert considerable control over the labour process, thereby limiting management's freedom to introduce innovations in production. Productivity growth was consequently limited as was the potential for mass-consumption. Inter-firm relations were characterised by cut-throat competition among many uncoordinated units, so that the investment environment displayed a high degree of risk and uncontrollability.

The development of extensive, industrial accumulation, capitalist production relations and commodities was unevenly spread over Europe. The receptivity to change, including technical change, was on the Continent of Europe generally much less than in Britain. The latter soon became the international hegemon, dominating international trade and 'ruling the waves'. Some of the overriding reasons for the slow changes on the Continent were the continued prevalence of the traditional agrarian structures in countries such as France, Germany and the Netherlands, the small scale of the underdeveloped internal markets and the power of the consumption orientated nobility which still commanded a large part of the disposable surplus but did not think in terms of investments. When early industrialisation took off in Continental Europe it was as uneven as in Britain itself. National growth rates from this period concealed wide regional differences. For instance, there were regions of France which showed quite early in the nineteenth century the symptoms of industrial advance and enterprise which made them leading sectors in Europe, a position which they sometimes retained. However, national averages were dragged down by the backwardness and stagnation which ruled in other parts of the country.

Whilst industrialisation took place within the political, geographical, economical and cultural boundaries of the nation state[1], there were great differences in state formation between Britain and the Continent. Generally, all states, whether national or dynastic, gained economic relevance through tariff frontiers, monetary units and the whole body of civil and commercial law which regulated economic dealings and distinguished nationals from aliens. In the course of the nineteenth century, as economic life became more complex and nationalism became an increasingly important political force, it defined itself still more imperiously in the economic sphere. Additionally, the interests of the rising commercial and industrial bourgeoisie found expression through the state[2]. It looked to the state to provide a favourable business climate at home and to promote its interests against those of its foreign rivals. But whilst the Continental bourgeoisie were confronted with serious competition from the hegemon and had to 'nationalise' and link up with the state apparatuses for extra protection, the English bourgeoisie was much less dependent on direct state support. Therefore, the English state, which played such a central role in the process of the dissolution of feudal relations in agriculture (Thompson 1963), never became a truly modern industrial capitalist nation-state, unlike its Continental companions (Overbeek 1990, p.37).

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[1] It would however, be incorrect to conclude that industrialisation neatly proceeded country by country. Rather, as Pollard argues, it should be seen as a single European process (with, of course, further international dimensions such as colonialism). The political and legal base in each region was very important, but it is clear that the factors which made one area more susceptible than another included locational advantages, resources and preceding economic development bringing in its train a favourable social structure (Pollard 1983).

[2] In the UK and the Netherlands these interests were closely linked with the liberal parties and ideologies which became increasingly powerful via the gradual electoral reforms. In the traditionally much more elitist French and German political systems, these interests were forced upon society by the centralised state system (Stuurman 1992, p.323).

State intervention, industrial policy, tariff walls to protect an 'infant industry' and mercantilist policies were used to develop and support national industries on the continent (whereas Britain chose for a state supported 'free trade imperialism' closely linked to its *Pax Brittanica* hegemony). Building communication infrastructures (roads, canals and railways) for mainly physical transport was another important task for European states in the nineteenth century. Because of the long distances on the Continent which had to be traversed, the new means of transport were bound to have a more revolutionary impact than it had in its country of origin, Britain. Nevertheless, their major importance on the Continent as well as in Britain lies in the fact that they helped to create a national economy.

These transport infrastructures made great demands for capital which was either not available in sufficient quantity or which prospective investors were unwilling to tie up in such a form without some guarantee that a certain return would be forthcoming, a guarantee which only the state could give. In most cases, therefore, transport infrastructure in Europe took place under state auspices and required the cooperation of international bankers and financiers (O'Brien 1983). While banks in Britain might in effect provide long-term capital by renewing short-term credit to favoured business customers, they - generally - made no systematic provision for the financing of industry. British entrepreneurs were on the whole independent of banks and outside financial control. As Britain's economic and technological lead subsided after the 1870s

> "[...] the archaic mould of society and state was greatly enforced [...] and the ruling elite compensated by extending control of the world's money market by building up a financial centre in the City of London. [...] Thus, one part of the capital of England was in effect converted into an 'offshore island' of international capitalism, to a considerable degree independent of the nation's declining domestic capitalism." (Nairn 1977, pp.23/24).

The British railway network, unlike its French and German counterparts, was highly decentralised and fragmented since it was built up by separate local companies, drawing on local capital markets. These inter-local lines were built by essentially speculative private companies. A so-called Railway Clearing House could consign passengers and goods over the tracks of two or more companies in one transaction; the railway companies themselves arranged the appropriate distribution of the receipts (interconnection rates). The role of the state was secondary, although not absent: companies needed an Act of Parliament to give them the power to compulsorily acquire land and to provide limited liability. Additionally, and from the days of canals, the UK Parliament had inherited an interest in the maximum charges which could be imposed by railways. From 1840 onwards a truly national railway system was formed via the amalgamation of little companies into larger, regional companies. To improve their often modest investment further they also bought over their chief competitors, the canals, whose private owners, having hitherto enjoyed inflated profits, were little inclined to see themselves beggared by competition. This development was not welcomed by Parliament, as it found monopolies often unacceptable (Hawke and

Higgins 1983, pp.181-184).

In France industrial capital played a less important role in the transport infrastructure and the state was more careful to maintain its control over the new transport system which was considered to be an integral part of the public domain. Nevertheless, it was mainly private capital, working under auctioned concessions, that initially built the local and regional railway networks. These private monopolists stimulated competition between their suppliers which forced prices to come down rapidly. Rates were relatively low as the state guaranteed a certain return on investment. Lower prices widened markets and stimulated industrial development (Caron 1983). In Germany the state had a more prominent presence as most railway connections - originally set up within its separate states - were built by the state or directly funded by it. In the Netherlands, finally, both industrialisation and the development of railways did not emerge until late in the nineteenth century. The dominance of finance capital - mainly generated from international trade, colonial exploitation and piracy in the seventeenth century when the Republic of Holland formed the international hegemon - and the absence of a strong state, delayed industrialisation in a largely agricultural society. Merchants became rentiers and bankers by investing their capital abroad (eg. British railway bonds) and therefore they often supported free trade and trade liberalisation. Modern capitalist development and the systematic build up of a railway network did not start before 1860, when the Continental economic main point shifted from France to Germany and the Netherlands became an important transit country for the German *hinterland*. Nevertheless, trade capital and finance capital with its specific '*laisser faire*' politics remained the base of industrialisation whilst a now rapidly modernising agricultural sector retained a prominent position in the Dutch economy (Roland Holst 1932; de Jonge 1976).

Britain - just as the Netherlands for a long time - did not develop a modern industrial-capitalist nation-state. Its finance capital was very much separated from industry and manufacturing, the powerful Treasury was much inspired by the interests of the City of London[3] and the economy could always fall back on its colonial empire. The French and German states were all much stronger because of the need for frequent and direct state intervention. In France a good deal of the stimulus for the introduction of large scale organisation and new production methods came from the state. Various forms of financial encouragement and other inducements were offered to entrepreneurs and inventors as part of a traditional policy of active state intervention in and regulation of industry. These policies were given greater

[3] The Treasury developed in the nineteenth century its own bureaucratic ethos of parsimony and rooted opposition to state intervention in the productive economy, whereas it supported the tying of the British currency to gold in order to stabilise British international trade. The City of London was equally interested in predictable trading conditions and more autonomy for finance capital, the Treasury and the Central Bank in managing trade. The result was - and to some extent still is - a system in which the City stands in complete indifference (or ignorance) of domestic industry (Ingham 1984).

coherence during the reign of Louis XIV by his famous minister Colbert - hence 'Colbertism'[4]. Expansion of foreign trade brought some prosperity to the west coast ports but did not have a profoundly transforming effect on the internal economic structure. Moreover, France lost some important overseas colonies during the Seven Years War. Whilst the old regime, old guilds and corporations and the old legal traditions were largely destroyed during the French Revolution, laying the social foundations of a new class of entrepreneurs, rural agricultural production continued to put its stamp on the French economy, demography, politics and the (low) degree of urbanisation well into the nineteenth century and even thereafter (France did not overtake Britain in per capita income until the 1950s). The French state - generally protecting its national industries behind high tariff walls until it entered the European Economic Community in 1957 - played an important role in stimulating large scale heavy industry and the development of bank and credit institutions by throwing its weight behind a programme of railway building and other public works. Nevertheless, bourgeois talents, in Britain so important to build up a class of innovative entrepreneurs, were often drawn into politics and state administration. The latter was traditionally highly centralised (unlike for instance Britain and the Netherlands), with Paris as the central node in political, infrastructural and financial networks (Kemp 1985, pp.49-77). This centralised state has traditionally concerned itself with the regulation and planning of transport (again, since Louis XIV). It is not an accident that the *Corps des Ingénieurs des Ponts et Chaussées* - a seventeenth-century creation of technocratic civil servants, attached to a *grand corps* which was integrated within the administration - played not only an important role in urban planning, but also assumed leadership and control over transport, notably after the Second World War.

The French Revolution, its general appeal and the Napoleonic wars also (re)introduced Roman Law on the Continent, often sweeping away traditional common (customary) law practices. In its new adapted version, mainly developed within universities, Roman Law became highly systematised, rationalised and formalised. As the ideal of a logically consistent set of principles and rules which could best be realised and preserved in a written code it was systematically codified in written form. The most important and influential event in the history of Continental law was the enactment of Napoleon's *Code Civil* in 1804 (Nicholas 1962, pp.46-51). A written constitution and codes were to crystallise social relations into a formal system of constitutional and legal rules defining the appropriate means by which the separated organs of state power should act. Unlike the English Common Law tradition, which did not experience these changes, the private domain became (more) separated from the public domain and the state had certain constitutional obligations towards its *citoyens and citoyennes* to fulfil (Tigar and Levy 1977,

[4] The French statist tradition is also noticeable in economists' theories. For instance the influential economist Michel Chevalier (1806-1879) who was raised in a saint-simonian tradition, stated that "[...] le gouvernement est le gérant de l'association nationale [...]. Partout où l'intérêt général est en question, il appartient au gouvernement d'intervenir." (quoted from Flichy 1991, p.72). Chevalier argued that the state should manifest itself particularly in the domains of education, credit (finance) and communication.

p.281)[5].

Germany suffered for a long time from its political and economic fragmentation and from the dominance of agricultural production and conservative autocracies. Too weak to claim colonies or develop substantial international trade it was economically closed in on itself. These hindrances were partially taken away by the destruction of some feudal practices during the French Revolution and the Napoleonic wars and the emergence of a customs union in 1834 (*Zollverein*). The latter was closely monitored by the Prussian state bureaucracy which spread its tradition of mercantilism and state intervention which both were beneficial to industrialisation (although the prime aim was to serve the interest of the monarchy and not specifically those of a class of entrepreneurs). More than in Britain and France, the German, state-backed, railway building proved to be the important catalyst of industrialisation both through the effects of construction (iron and coal industries) and as the basis for national economic integration. Germany's integration was further boosted by its defeat of the Second Empire of Napoleon III and the establishment of a new German Empire. The Empire (the Second *Reich*) remained ruled by an autocratic dynasty, which still rested on the support of rural nobility. It also incorporated the conservative (anti-liberal and anti-democratic), bureaucratic and militarist traditions of old Prussia. The new Empire took also special interest in developing high educational standards for rather autarkic science-based industries and attempted to ensure the loyalty of the working class by a state-sponsored system of social security, one of the first in its kind in Europe. Extending its general control in society, the young federal state increased its control over the railway system and was thus able to manipulate railway rates in order to defend the home market while stimulating exports. The leading sectors in the economy (highly concentrated heavy industry) leaped ahead on the basis of advanced technology and forms of organisation already worked out and proven in more advanced parts of Europe. Finance came from the fast growing banking sector, which systematically invested in industry, dealt in industrial shares and provided long-term capital and credit. Banks held blocks of shares for their own portfolios and often sat on the boards of the debtor companies (Kemp 1985, p.96). This typical German, high concentration of economic power in the advanced industries and close association between banks and industry is still noticeable today.

In spite of all the advances in British, German, French, and - to a lesser extent - Dutch industrial development, most industries used traditional, relatively cheap, skilled labour. There was little sign of assembly-belt production, continuous flow methods and scientific management. These were being developed not in Europe but in the USA. During the 'rationalisation' movement in Weimar Germany in the 1920s and after the Second World War also in the rest of Europe, European industry had to learn from the Americans (just as most Continental industry had learned from the British in the mid-nineteenth

[5] Whilst Britain has no written constitution (individuals are subjects, not citizens, to its state) and no clear separations between the legislative, the executive and the judiciary, it does have a long-standing, supplementary legal tradition of equity, or fairness (Eddey 1987, p.174/175).

century).

2.3. Taylorism and Fordism

Regulation theorists argue that one of the most important features of Fordism is its specific way of matching production and consumption developments. In the 1920s and 1930s this new mode of regulation, Fordism, was established in the USA. In this period industrial capitalism and industrial capital was seriously threatened by an increasing disparity between rising production, due to new production and organisation techniques (Taylorism[6] and scientific management), and a limited market due to a lack of purchasing power. So apart from advancing new forms of work organisation based on new management techniques and new technologies, Fordism also involved the commoditisation of the means of consumption, the homogenisation of this consumption by mass-produced commodities, and the socialisation of these consumption norms to more and more sections of the employees. The latter was a result of increased wages due to collective bargaining, the growth of the social wage and the extension of facilities for consumer credit (Blackburn, Green and Liff 1982, p.17).

Essential for the required link between mass production as the main production method, on the one hand, and mass purchasing power and social reproduction (via social security, educational institutions and the family) on the other was the development of the welfare state characterised by collective wage bargaining, corporate structures, social security and Keneynesian contra-cyclical economic policies[7]. The new labour process organisations and new technologies[8] emerged originally from a limited number of established and upcoming branches in manufacturing such as the motor car industry, the engineering industry, the electromechanical industry and the (petro)chemical industry. Later these new technologies spread to other economic sectors, generating not only product and process innovations but also considerable increases

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[6] Taylorism, a revolutionary mode of work organisation became generalised in the USA and, to a certain extent, in Europe in the 1920s. Skills of many workers were broken down into component parts and subsequently expropriated and systematised by engineers and technicians using methods of 'Scientific Management'. A further step was taken when that systematised knowledge was incorporated into an automatic system, with machines dictating working methods (Coriat 1981). Braverman has argued that Taylorism is not only a particularly important managerial method but actually 'the' method under 'monopoly capitalism' for the organisation of the labour process, with its attendant deskilling and control of labour. In Braverman's view, Taylorism is essentially both the separation of conception and execution, that is, of manual labour and mental labour, and the monopoly of the knowledge of the labour process by management (Braverman 1974).

[7] The 'tool box' of Keynesian policy included monetary policy, state spending, tax revenues, manipulation of minimum wages and/or the budget of welfare expenditure (Philips 1985).

[8] As Landes explains most of these changes had there genesis in the last decades of the 19th century, but worked out in the interwar period when there was an extensive diffusion of flow and assembly line techniques, and intensive improvement of them achieved by incremental innovations (Landes 1969, p.41).

in productivity. The principles of these innovations, first put together by the American Ford Motor Company, were:

> "1. The production of large volumes of standardised products, using interchangeable parts. 2. A dedicated serial production process, often, but not always, facilitated by the mechanisation of transfer activities ranging from the low level mechanisation of the conveyor belt assembly line to the highly mechanised flow processes of food and chemical production. 3. A division of labour between 'deskilled', material manipulating, machine-minding and machine-feeding workers (usually on the assembly line sector of a process) and skilled metalworking, maintenance, technical, planning and supervisory workers who are less machine-paced, if at all. 4. Amongst unskilled workers an acute division of labour, consonant with the employment of the historically cheap labour of women and migrant workers in these tasks. [...] 5. A set of techniques for the management of this labour; achieved by a combination of Taylorist and systematic management techniques such as the bureaucratic allocation of individual tasks, effort level payment systems, tight supervision and the application of work planning methods (for example, through time and motion study)." (Blackburn, Coombs and Green 1985, p.43).

The post-war period - until the 1970s - entailed the introduction and diffusion of Fordism in Europe and Japan, via the Marshall Plan[9] and increased foreign direct investments by US TNCs. The economic boom in this phase was mainly based on the diffusion of social and technological innovations. Every country developed its own form of Fordism according to its own historically constituted political, economic and social order, structure and power relations. In the USA the New Deal era can be regarded as the period in which the American form of Fordism developed: state interventions took new forms and expanded, an anti-cyclical economic policy was introduced and a social security system developed (Aglietta 1978). However, the American social security system was far less extensive than in the countries of Northern and Western Europe due to the lack of a strong government tradition, of labour politics and of strong labour unions (Davis 1986). Universal social legislation, a central pillar of the welfare state, developed much more in Europe due to the stronger positions of social-democratic parties and labour unions and a general post-war consensus on the building blocks of a welfare state. However, as Therborn has described, the differences between European countries themselves are equally significant (Therborn 1986).

In Germany the First World War caused the downfall of the Second *Reich* and the proclamation of the Weimar Republic. Whilst the German economy - helped by long-term American loans - continued modernising, the political system, and society in general were in great turmoil. After several attempted military, communist and fascist coups, the worldwide depression, touched off by the collapse of the American stock market in 1929, was a further blow from which the brittle Weimar democracy never

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[9] Especially through the Technical Assistance and Productivity Program, the complete inventory of Taylorism and Fordism, like merit rating, job classification, shift labour in continuous processes and so on, was exported to Western Europe.

rallied. The new democratic constitution was for instance hardly supported by an enlightened, liberal middle-class. Moreover, in face of growing economic, monetary and political crises, an increasing part of heavy industry decided to ally with the Nazi movement. The Third *Reich*, established in 1933, led Germany into another World War which ended in its defeat and the establishment of two new states in the Cold War setting: the Western Federal Republic of Germany (FRG) and the Eastern, communist, German Democratic Republic (GDR). The polity and industry of the FRG were however less of a novelty than some would have expected: the new state remained federal (with more powers for the 10 states, or *Länder*), close connections between finance and industrial capital continued and many of the highly concentrated coal, steel and chemical industries retained their position (the German heavy industry was regarded by the Americans as an important asset to support the recovery of capitalist Europe) (van der Pijl 1984, p.145). What did change was the strengthening - under American influence directly as an occupier and indirectly via the Marshall Aid - of the corporate-liberal[10] capital fractions and the integration of the social-democratic party (SPD, *Sozialdemokratische Partei Deutschlands*) and the centralised unions in a new societal setting of what would be named as the *soziale Marktwirtschaft* (social market economy). In this setting unions had considerable formalised influence on both a political level and industrial level, and the state had a widely accepted, elaborate mandate to intervene in society in order to fulfil certain social, industrial, financial and monetary obligations. Additionally the new 1949 constitution, requiring a 'Unity of Living Standards' throughout all *Länder* caused an equalisation process through both federal redistribution to poorer states and through direct payments by the richer states to the poorer ones (Conradt 1989, p.22).

In the Netherlands also a more corporate-liberal ideology gained political momentum in the post-war reconstruction, out of which the country evolved as one of the most open economies in Europe (up to 70 per cent of its Gross Domestic Product being determined by imports and exports). The highly international orientated corporate-liberal groups were concentrated around shipping, banking and industry in Rotterdam and Amsterdam. TNCs were increasingly prominent in industry and banking (Philips, Unilever, Shell, AKZO, ABN and AMRO). In politics - which generally were based on a strong consensus - the political parties modernised, that is adapted to the newly emerging Fordist regime. The Dutch Christian Democratic parties (KVP, *Katholieke Volkspartij*, CHU, *Christelijk Historische Unie* and ARP, *Anti-revolutionaire Partij*), together with the Labour party (PvdA, Partij van de Arbeid) played an important part in the post-war 'renewal' of Dutch society and economy along Fordist lines - just as their Christian Democratic counterparts in Germany (CDU, *Christlich Demokratische Union* and CSU *Christlich Soziale Union*). In France however, a national coalition government which included the communists found its common denominator in a high-pitched quest for the restoration of French

[10] Corporate-liberalism refers to the synthesis between the original *laisser-faire* liberalism of the liberal international capital fractions and the state intervention elicited by the requirements of large-scale industry and organised labour, which in the period between the World Wars accompanied various forms of class conciliation generally referred to as corporatism (van der Pijl 1984, p.xiv).

grandeur. Continuing its traditions of Colbertism and starting up a process of consensual *planification* (planning) under the aegis of technocratic *grand corps* civil servants, the rapid and successful reconstruction and modernisation of the French economy was largely state orchestrated. A domestic market was created through massive public investment in infrastructure and purchases of equipment by government controlled utilities (electricity, railway and telecommunications). The Treasury provided cheap capital and extensive R&D programmes were set up to stimulate innovation (Telesis 1986, pp.24/25). A Planning Commissariat (CGP, *Commissariat Général du Plan*) was set up within the Treasury, reflecting the view that rather than separate the economy from finance, it would be better to make finance more sensitive to economic considerations. The CGP was functional to the formation of dialogue between the various interest groups (industry, state and other interest organisations such as unions) and the formation of medium-term planning guidelines (Ullmo 1975).

In contrast to France, the UK did not pursue a long-standing attempt to fix medium-term development objectives for industry as part of a national plan. Whilst the Labour government embarked upon a programme of social-welfare reform and nationalisation of basic industries, it had no clear plan as to what to do with the latter (Overbeek 1990, p.115). Within and outside the machinery of government, special boards, departments and quasi-governmental or quasi- autonomous non-governmental organisation (quangos) were set up throughout the 1950s and 1960s. Very little thought however was given as to how and in what ways the various agencies were to operate or how they were to relate to one another. Additionally, a great deal of confusion came from the simultaneous presence of the IRC (Industrial Reorganisation Corporation) which promoted structural changes in industry by encouraging mergers and takeovers and the MC (Monopolies Commission - later renamed Mergers and Monopolies Commission, MMC) which was concerned with trust-busting (Smith 1975, pp.53-60). The international decline of the UK economy continued after the Second World War due to much slower growth rates. The problems of decline in competitiveness and profit rates prompted growing concentration and centralisation of capital in the 1950s and 1960s. Whilst interlocking directorships between financial institutions and the top fifty industrial companies grew rapidly in this period, these capital groups did not integrate as much as, for instance, the German industry and banks. Another major difference with the whole of the Continent was the continuation of rigid labour relations: the UK trade unions were not modernised (thus largely retained their inflexible, decentralised and complex character) and were hardly involved in official state policies (unlike their European counterparts). Employers' organisations were even weaker on the national level (Overbeek 1990, pp.122-128; p.134). Although there was some common ground between the Labour party and the 'One Nation Tories' (after Disraeli's expression) on the level of state spending, the establishment of the welfare state and the extension of the state sector in the economy including some industry nationalisation, the rigidity of the two-party system often hindered consensus politics and thus continuity in policies.

Discussing telecommunications under Fordism, or more particularly the Fordist TRM, the next

paragraphs will deal with the technological, economic and political aspects of telecommunications from its inception until the 1970s.

2.4. European Integration under the Pax Americana

One of the main problems US companies faced in post-War Europe was a lack of European purchasing-power (in fact European lack of foreign currency, notably US dollars) and a fragmented market, protected by high tariffs barriers and discriminatory tax and labour laws. At home the same companies were facing a recession due to over-production problems. The 1947 Marshall Plan - marking the replacement of the *Pax Britannica* by the *Pax Americana* - proved to be very helpful since it provided (Western) European governments with the (soft-loan) dollars to start building up their economies. And since one of the conditions was that European markets should be liberalised, it provided US companies with an entrance into European markets. European liberalisation, cooperation and economic and political integration was further promoted via the establishment of the Organisation for European Economic Cooperation in 1948 (OEEC - renamed and restructured in 1961 as the Organisation for Economic Cooperation and Development, OECD) and world-wide via the General Agreement on Tariffs and Trade (GATT) (van der Pijl 1978). The latter's leading principle was not so much a return to nineteenth-century free trade ideology, but more an adherence to the principles of most-favoured nation and non-discrimination. A certain degree of infringement on free trade was allowed in the new system, both to defend domestic industrial expansion and to retain certain preferential arrangements with (former) colonial territories. The GATT launched a series of rounds of tariff reductions from the 1950s onwards, notably the Kennedy Round of the mid-1960s and the Tokyo Round of the late 1970s. The resulting trade agreements involved the removal of non-tariff barriers and the 'binding' of tariffs, that is, tariffs were not to be increased under any circumstances, except in the case of dumping (defined as when exports are sold at prices lower than those which prevail in the exporting country) and certain cases of 'unfair competition'. The GATT - which formed an alternative to the originally planned, more formal and powerful International Trade Organisation (ITO) - negotiations have traditionally concentrated on commodities and less on services (the latter being intangible and thus more difficult to define) (Janssen 1986). Consequently, in as much as telecommunications was part of GATT negotiations in the 1960s and 1970s, it predominantly related to equipment and not services.

Largely under the aegis of the USA, European integration was further shaped by intergovernmental organisation. The Council of Europe, the military West European Union (WEU - closely linked to the North Atlantic Treaty Organisation, NATO), the European Payments Union (EPU) and supra-national organisations such as the European Coal and Steel Community (ECSC, which predominantly restructured these industries according to Taylorist and Fordist principles), Euratom (European Community for Atomic Energy) and the European Economic Community (EEC) were established in the period 1945 - 1970.

Intra-European trade liberalisation and the establishment of a customs union and common market were the main aims of the ECSC and the EEC. Together with Euratom they merged in 1969 and were renamed as the European Communities (EC). The dominant belief was that economic integration would gradually 'spill over' into other, more contentious areas, such as the formation of political, military and monetary communities or unions (Haas 1964; Mitrany 1975). The practice of differences in societal formations, politics, policies, economic development and a general adherence to sovereignty often prevented nevertheless wide-ranging and radical integration of the EC polities and policies. The EEC started in 1957 with only six members (France, Germany, Italy and the three Benelux countries, Belgium, Netherlands and Luxembourg) but was expanded in 1973 with Ireland, Denmark and the UK, in 1981 with Greece and in 1986 with Spain and Portugal.

The modernisation of the core European economies and political systems and their first steps towards greater unity took place throughout the 1950s and 1960s against a background of rapid economic growth. Mass-produced consumer goods reached a growing group of people as general welfare increased. The same period saw a fast growth in the electronic media, radio and television, turning them into a state regulated industry. Equally, during that period the telephone became a more common feature in many a European household (in spite of the fact that its introduction went as far back as the 1870s).

2.5. Technological Developments in Telecommunications: Pre-fordism and Fordism

A proper understanding of telecommunications requires some knowledge of the historical development of its underlying technology and technical principles. The offered telecommunication services, their tariffs and even the billing of subscribers are - apart from socio-economic and political variables, to be discussed later in this Chapter - based on or related to the technologies applied. Only a short historical overview of these technologies can be given here. It would be incorrect however, to deduce from this that the results of technological developments, that is, the common or specific technical practices as realised throughout telecommunications' history, are similar to the causes of existence of such materialised technologies. Telecommunications technology is not one coherent 'system' that 'unfolds' itself through history, that is a linear process of invention, innovation, production and (successful) implementation. Firstly, technical notions, concepts and technologies have been developed in multiple, different, sometimes incoherent or incompatible, directions. Several of these have become common practices, although sometimes much later or for other purposes than originally conceptualised. Many of the inventions or concepts went no further than the drawing boards of the electronic engineers and ended up as 'accidents of history' (Emmerson 1992). Secondly, it would be equally wrong to regard the (tele)communication technologies and their network infrastructure as a static, closed and self-generating system. Just like the state, the network has often been treated as a 'black box', thereby neglecting its inherent (local,

national and international) legal, organisational, management and political dimensions and tensions which give it its potential or actual shapes (Mansell 1990).

2.5.1. Telegraph, Telephone and Radio[11]

The second oldest service systems in modern telecommunications, telephony, was the most important throughout the phase of Fordism[12]. Telephony had taken over from the older form of modern telecommunications, telegraphy, at the turn of the century. The electric wire telegraphy[13] developed in the 1830s by Cooke and Wheatstone in London was later improved by the electromagnetic telegraphy of Samuel Morse. He also introduced the Morse code of dots and dashes representing letters, numerals and punctuation. Operating speed, acquired through practice, was limited by the sender; normal operating speeds were only 20 to 25 words a minute. When, in metropolitan areas, the wire was introduced for underground practice, rubber from the British colony India, satisfied the requirements (this, together with the efforts in submarine cables, gave the UK cable industry an international lead for decades). This lead added a further impetus to the developing networks of telegraphy. The increasing efficiency of wires, the introduction of automatic Morse systems (1858), the first working submarine and transatlantic cables (1866), Baudot's time-division multiplexer (1872)[14] and improved (manual) switching equipment all ameliorated the working of telegraphy considerably.

By 1876 the telegraph was joined by Graham Bell's patented telephone system, based on the electrical transmission of voice. However, the telephone had to tackle many difficult technical obstacles. One of the most formidable arose from the fact that instead of a single terminal in each town, like the telegraph office, there were many, and each had to be connected to one of the others at a moment's notice. Furthermore lines caused intolerable levels of cross talk (interference), so, there was much distortion and for long-distance telephony the signal (voice) needed to be boosted or amplified every few kilometres.

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[11] The general outline of this section relies on: Larsen 1977 and Bittner (1985) pp. 32-96.

[12] Even well into the 1980s up to 90 per cent of most European PTT's revenues was acquired via the traditional service of switched telephony. Telephony took over from telegraphy and telex at the turn of the century.

[13] The history of telegraphy embraces in fact four stages: non-literal or non-alphabetic message; visual telegraphy or semaphone; wire telegraphy and finally wireless telegraphy or radio.

[14] To economise on copper wires or other cables it is desirable to transmit more than one conversation (using one channel) over a common carrier. Time division multiplexing (TDM) provides the possibility of transmitting more than one channel over a common circuit by allocating the common circuit to each channel in turn for a given period of time.

Techniques of the telegraph, like telegraph repeaters, time multiplexing and later frequency multiplexing[15], were adopted and improved. Transatlantic cable telephony was made possible by the development of a vacuum-tube amplifier with an extended life expectancy. The development of plastics, with exceptionally good insulating properties, also contributed to making the project practical, just as coaxial cables[16] improved capacity and performance of transmission significantly.

In 1895 the Italian Marconi started his early experiments with wireless, and by using electromagnetic transmission of signals via radio waves in England he was able to successfully transmit signals across the Atlantic in 1901. Subsequently the detection and reception of electromagnetic waves became more efficiently coordinated by improving antennas, introducing vacuum tubes and using silicone crystals for detection. A further crucial impetus to spectrum based communications were international agreements on standards for equipment, codes and protocols. From 1906 onwards the 'dit-dahs' of the Morse code were gradually replaced by what was called 'radio telephony' and later 'radio broadcasting'. Radio broadcasting was followed by the invention of the electronic television in the 1920s and television broadcasting in the 1940s; in both cases electronics industries were pushing the service primarily as a way of selling the required sets and developing a mass-market in a Fordist fashion.

The spectrum of the electro-magnetic waves began to emerge from various new discoveries and a great deal of research work undertaken from all parts of the world. Most of the new applications of radio - such as broadcasting - were stimulated by the invention of the transistor in the late 1940s, whose main importance was that it replaced the heated, fragile, comparatively large and current-consuming radio valve by a tiny, unbreakable, long-life and low-voltage detector-plus-amplifier. Moreover, it made receiver equipment very much smaller and simpler to produce. The transistor also played an important role in the development of electronic instruments, such as computers.

During the first decades of telephony the exchanges (fulfilling switching functions) used human operators. As networks grew it became very expensive and time-consuming to continue to use people to set up telephone calls via manual switching. Productivity was exponentially increased and mass-applications realised, by introducing Taylorist improvements: the American Strowger step-by-step electro-magnetic and electro-mechanical exchange, introduced in the 1920s, was just such an enormous advancement in switching. It, however, also meant (due to a great many moving parts) high cost of maintenance and not

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[15] Frequency division multiplexing (FDM), just like TDM, squeezes more than one channel into a common circuit by shifting each conversation/channel to a different part of the frequency spectrum by using a high frequency waveform to carry each individual speech signal.

[16] Coaxial cable is made up of a central conductor separated from a flexible, cylindrical, outer conductor by low-loss insulation, often consisting of ceramic wafer and air.

always efficient use[17]. The reed relays and crossbar exchanges, having a centralised control function and non-moving parts improved the general performance (capacity, speed, reliability) of switching and decreased maintenance costs.

2.5.2. The First Generations of Integrated Circuits, Computers and Satellites[18]

From 1935 to 1945 the application of electronics to 'automatic computers' generally took the form of developing faster calculating equipment related to specific problems. In 1946 American inventors developed the Eniac (Electronic Numerical Integrator and Calculator), the first all-purpose, all-electronic, digital[19] computer. It had speeds which were 1,000 times faster than those of the then current electro-mechanical machines. The mathematician John von Neumann improved the mathematical logic of the computer. In 1947, he devised a method for converting the Eniac concept of an externally programmed machine to that of a stored-programme computer, rather similar to the, however unsuccessful, Analytical Engine, designed in 1833, by Charles Babbage. Neumann meanwhile, treated instruction codes as numerals that could be stored electronically just as data numerals were stored.

Vacuum tubes constituted the first generation of computers. The transistor, already used in telecommunications equipment, ushered in the second generation. The transistor improved computation speed, programming, storage capacity and the ability of the computer to interface with other computers, sometimes separated by great distances, and linked by telephone lines. The transistor also permitted powerful computing at a fraction of the size and cost of vacuum tubes. So as radios miniaturized (the transistor radio) the big computers did also. The chip shaped the third generation of computers. A 'printed' circuit was created on a silicon chip, instead of the older and larger wired circuit. These 'integrated circuits' (ICs) became more and more complex so that they could carry out several functions, such as storage and processing. The term micro circuit began to be used for the increasing number of circuits and transistor-type elements placed on a single chip. The fourth generation took full advantage of the micro circuit, which had developed more fully in the 1960s. Again this meant an improvement of the capacity and speed of the computer together with diminishing volume as well as sharp reductions of

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[17] In fact each selector in a step-by-step system is only used while the call is being set up, so, as soon as the appropriate digit has been received and the selector stepped to the particular number dialled, most of these relays are idle; thus a large amount of expensive equipment is inactive for most of the time.

[18] This section relies on: Lavington (1980) and Metropolis, Howlett and Gian-Carlo Rota (1980).

[19] Digital signals are not continuous (like analogue, which was the predominant communications form until the growing convergence of computers and telecommunications in the 1970s) but consist of discrete pulses of voltage, current or light (optical) which represent the information to be processed, switched or transmitted. The binary nature of the signals (on or off) makes it much easier to produce, detect, store, transmit and (even after distortions) reproduce and regenerate.

costs and prices. Cost per function decreased further with Fordist mass production (and consumption) of ICs. The computer family, mainframes, mini computers and micro computers was extended with the personal computer (PC) in the mid 1970s, making way for all kinds of new computer networks (to be discussed in the next Chapter). At the moment several companies and universities work on what is called the fith generation: artificial intelligence.

The developments in the electronic and computer technologies in combination with (radio)frequency and bandwidth inventions made micro wave and satellite technologies possible. Micro wave transmission, found in the very high frequencies of the electro-magnetic spectrum, was more transmission-efficient and cheaper than wire-based systems.

The first operational communications satellite was the moon, used as a passive reflector in the late 1950s for low-data-rate communications. The first communication from an artificial earth satellite took place in October 1957; this was the Soviet satellite Sputnik I used for telemetry information transmission. A year later an American artificial satellite was used for voice transmission and in July 1962 the first non-governmental communications satellite, Telstar I, was launched. In those years, serious limitations were imposed on payload size by the capacity of launch vehicles and the reliability of space electronics. The development of the geo-stationary satellite was the next stage; the conspicuous advantage was that the whole earth virtually could be covered with three satellites, each maintaining a stationary position and able to cover one-third of the earth's surface. The introduction of communications satellites - with the launch of 'Early Bird' in 1965 also used for broadcasting purposes - decoupled cost and distance relationships, and eased the scarcity of the radio frequency spectrum by making useful radio frequencies which were hitherto effectively useless.

The employment of ICs and modern electronics enhanced reliability, power transmission capacity and transmission speed and in the 1970s satellites were used for voice, data and picture (like broadcasting) transmission. Some of these (high power) satellites are designed to broadcast directly to special home receiving terminals - these are referred to as direct broadcasting satellites (DBS).

The introduction of ICs and computers in the late 1960s produced also a wave of innovations in the field of switching. In 1965 Western Electric (USA) presented the first semi-electronic, computer controlled exchanges, called Stored Program Control (SPC). This was defined as the control of an automatic switching arrangement in which call processing is determined by a program stored in an alterable memory. Although controlled by digital computers the signals transmitted through the network and switched by the SCP exchanges were analogue; this did not change until the 1980s.

2.6. Telecommunications and Socio-economic Developments under Fordism

Williams has pointed out that, although early optical and electric telegraphs were specifically used for point-to-point communications with mostly a military or economic content, useage was less clear cut in the case of later communication technologies, such as telephony and radio-communications. Especially in the case of radio the " [...] systems were primarily devised for transmission and reception as abstract processes, with little or no definition of preceding content." (Williams 1975, p.25). Nowadays we might regard (standard) telephony as a highly standardised, mass-produced, personalised, (relatively) universal, point-to-point, interactive, real-time and voice-only communications system which is crucial to the socio-economic wellbeing of individuals as well as a nations - but this has not always been so, nor was this a common view among telephony's early inventors, or of politicians, business people and academics in those days. Not only supply of facilities preceded demand, but also means of communication preceded the specific social, economic, institutional and political framework via which it could develop its concrete forms of production, consumption and regulation. This framework emerged out of the complex interactions, trials and errors, of technology, economics and politics.

Although there were certain technical parameters as to what was possible, several other alternatives to what we now call the universal 'Plain Old Telephony Services' (POTS) were within the range of possibility in the early years of its invention. Other, 'alternative', forms and usages of telephony were for instance forecasted, suggested and sometimes even developed. In the UK and USA journalists had suggested that operators could use the network for the 'narrowcasting' of music concerts and in Germany the *Reichspost* (Post Office), owning broadband cable networks, combined telephone traffic with video traffic and even experimented with picture telephony (indeed, an early form of convergence!) (Pool 1983b, p.27; Hempel 1990, p.125). Others predicted that the telephone was basically an extravaganza with little or no use for common or poor people, and with no prospects for universal useage:

> "When all is said and done the telephone is not an affair of the million. It is a convenience for the well-to-do and a trade appliance for persons who can very well afford to pay it. For people who use it constantly it is an immense economy, even at the highest rates ever charged by the telephone company. For those who use it merely to save themselves trouble or add to the diversions of life it is a luxury. An overwhelming majority of the population do not use it and are not likely to use it at all, except perhaps to the extent of an occasional message from a public station." (The Times, 14 January 1902; cited from: Perry 1977, p.72).

Bennett, demonstrating the negative and sceptical attitude of the British Post Office, quotes a Postmaster General from a Newspaper (Daily Chronicle, March 2, 1895) as saying that

> "[...] the telephone could not, and never would be an advantage which could be enjoyed by the large mass of the people. He would go further and say if in a town like London or Glasgow the telephone service was so inexpensive that it could be placed in the

> houses of the people, it would be absolutely impossible. What was wanting in the telephone service was prompt communication, and if they had a large number of people using instruments they could not get prompt communication and yet make the telephone service effective." (quoted from Bennett 1895, p.26).

These quotes from famous British newspapers, reflected as we will see later, a widespread negative view of telephony in the UK. In contrast, the US political and economic climate was much more supportive of the telephone; telephone entrepreneurs were encouraged to go into business and were provided with rights of way and even subsidies. The fast diffusion of the new technology in the USA also reflected forecaster's expectations about potential trends in the cost of service. The American telephony network unfolded much faster than most of its European counterparts as a low cost, universal service was anticipated from an early date (Pool 1983b, p.24). Very early the American Bell System pioneers developed the conception of what Vail in 1879 called the 'grand telephonic system'. Vail's founding philosophy of American telephony - 'one system, one policy, and universal service' and a network functioning as 'the country's nervous system' - became gradually official policy and turned the company into a mostly monopolistic public utility (Vail 1992). Vail's innovative philosophy thus functioned in a similar fashion to Ford's ideas of motor-car manufacturing, by trying to strike a balance between production, consumption and regulation. American journalists, intellectuals and politicians were generally quick to understand the economic and social importance of telephony and made thus a crucial contribution to the materialisation of Vails' philosophy (Aronson 1992). This revolutionary new model of telecommunications accumulation and regulation - the Fordist Telecommunications Regulation Mode - was first explored in the USA and only later adopted in Europe.

On the production side, the manufacturing of telecommunications equipment emerged in the 1910s as a fast growing industry, using mass-production techniques and applying Taylor's Scientific Management principles. For instance, American AT&T when confronted with a fast growing demand for telephony, developed carefully designed and scientifically based techniques of training and personnel management (Pool 1983b, p.64). Equipment manufacturers kept revolutionising their production process, improving Taylor's basic principles; it was in Hawthorne in a factory of telecoms manufacturer Western Electric that the Australian psychologist Elton Mayo, hired by the management, discovered that productivity could be further increased by creating the right motivation of its workforce. These famous Hawthorne studies formed the start of the so-called Human Relations School in management (Oldcorn 1982, pp.159-161). These new management techniques had a great influence on the labour process and the organisation of labourers. New management techniques were also extended to spheres formerly separated from the direct production process: Ginzberg describes how the cycle from scientific discovery to practical application has been shortened by integrating research and development and incorporating them into the industrial process (Ginzberg 1969). Habermas regards this development as part of the general process of 'modernisation' in which science, technology, industry and state have become closely intertwined (Habermas 1978, p.308).

Braverman has argued that the erosion of skills (deskilling) under the impact of Taylor's management techniques was a specific method of expanding control of the management over labourers. Knowledge of the labour process became a monopoly of the management (Braverman 1974). This view has been criticised for not accounting for the role of worker's resistance in shaping the labour process (Elger 1979). Indeed, in Europe, for example, the employees of the government-owned PTTs have exercised tremendous control over labour policies. The *Deutsche Postgewerkschaft* (German Post Workers' Union) has effectively blocked any attempts to reduce the Bundesposts' labour force or cut back on rigid hiring and promotion practices protected by the *Bundesbeamtengesetz* (the federal civil servants law) (Duch 1991, p.28). As we will see later in this Chapter, unions played an important role in the shaping of the labour process in Germany and the UK too. Consequently the management and production process under Fordism should be analysed as an outcome of a struggle between different interest groups within the specific historical context of a country and industry. Another criticism of Braverman's analysis comes from feminists. The point is made that Braverman (and Marx for that matter) unduly emphasise wage labour and the homogenisation of labour due to the process of deskilling and proletarianisation and that consequently he failed to recognise the emergence of separate labour markets, job allocations, systems of rewards, etc. for men and women. It is often ignored, for instance, that before the automatic Strowger exchanges were introduced, women did the switching in centralised exchanges (Hogesteeger 1989, p.136). Carefully selected (mostly middle class and coming from 'respectable families') they were trained as human switches with a 'nice and friendly voice'[20]. Women have also functioned as a 'buffer' or 'reserves' for temporary shortages in male workers: during and after the First and Second World Wars, when there was a serious shortage of male workers, women worked in the telecommunications sector as engineers. The 'objects' of the above mentioned Hawthorne studies in the USA were all female workers.

Mass-produced standard telephone sets, transmission lines (copper wires) and switching devices were

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[20] In 1871 Scudamore, head of the Telegraph Department of the British Post Office, explains in a report to the House of Commons why he often preferred female staff for certain jobs: "In the first place, they have in an eminent degree the quickness of eye and ear, and the delicacy of touch, which are essential qualifications of a good operator. In the second place, they take more kindly than men or boys do to sedentary employment, and are more patient during long confinement to one place. In the third place, the wages, which will draw male operators from an inferior class of the community, will draw female operators from a superior class. Female operators thus drawn from a superior class will, as a rule, write better than the male clerks, and spell more correctly; and, where the staff is mixed, the female clerks will raise the tone of the whole staff. They are also less disposed than men are to combine for the purpose of extorting higher wages, and this is by no means an unimportant matter." Another argument is: they are less permanently established staff, thus less likely to have their renumeration increased with their years of service. To sum up: "On the whole it may be stated without fear of contradiction that if we place an equal number of females and males on the same ascending scale of pay, the aggregate pay to the females will always be less than the aggregate pay to the males; that within a certain range of duty the work will be better done by females than by the males, because the females will be drawn from a somewhat superior class; and further, that there will always be fewer females than males on the pension list." Report by Mr. Scudamore on the Reorganisation of the Telegraph System in the United Kingdom (House of Commons, Sessional Papers, 1871; vol.XXXVII; pp.826/827).

produced by increasingly large enterprises who were closely linked or even vertically integrated with regional or national Telecommunication Operators. By 1912 telephony was the fourth largest and one of the fastest growing industries in the USA. But the contribution of the new invention had also many indirect effects: as a faster and more efficient intermediate good it fastened and expanded the information flows in the social fabric of markets. Market participants could have easier access to information of supply and demand of goods and services, business could expand their markets, managers could communicate more efficiently with their staff, labour costs could be reduced (no messengers, less drivers), inventory levels could be better monitored and so forth (Jonscher 1985). The adoption of telegraphy, telephony and later also other forms of telecommunications, in business organisations facilitated the creation of great interconnected and interlinked industrial complexes having activities in many locations, even across borders. The whole process of internationalisation of financial and productive capital rests for a large (and currently: growing) part on the telecommunications infrastructure.

In its early days the European - and American - telegraph industry, providing both equipment and services, was characterized by monopolies based on patents, or duopolies with cartel behaviour. Whereas in the USA in 1866 several vertically integrated companies merged and remained private, in Europe service provision and the network (mostly including the terminal equipment) came under government ownership and control. Telegraphy, telephony and later other forms of telecommunications were integrated in the national post offices which were renamed as PTT (Post, Telegraphy and Telephony). The nationalised operator, now holding public monopolies, introduced national tariff structures and additional capital was invested to extend the network to places the private companies had not found profitable to serve.

Not only the services market became highly concentrated in the Fordist period. The equipment suppliers market became also highly concentrated with the share of the four largest firms in industry sales typically being above 70 per cent (OECD 1983 p.12; see also: Arthur D. Little Inc. 1983). These oligopolistic equipment markets had a relatively low degree of internationalisation as due to economic, political and technological reasons the PTTs generally operated some form of procurement policy from a limited number of, mostly national, suppliers (Locksley 1982). Rivalries or competition between the few favoured inside group suppliers was removed by agreed market share-outs and market segmentation. In fact from 1870 until the late 1970s most of these manufacturers operated almost exclusively on a national base. Export to other industrialised countries accounted only for minor shares of their total production, so the guaranteed home markets were of more importance than export markets (van Tulder and Junne 1984, p.8). In France, UK and Germany the market share of the four largest equipment suppliers in the early 1980s was between 76 per cent (France) and 90 per cent (Germany) due to the historical relations between national telecommunications industries, states and PTOs (Locksley 1982, p.163). Most often, large country PTOs accounted, within each country, directly for the bulk of equipment demand. The share of these national carriers in total domestic equipment sales typically varied from around 60 per cent

to about 85 per cent (OECD 1983, p.23). In smaller countries with only small domestic equipment manufacturers, such as the Netherlands, PTOs were largely dependent on foreign suppliers.

Just a few manufacturers had major production and marketing facilities outside their own countries: Ericsson from Sweden, Philips from the Netherlands and Northern Telecom from Canada (because of small home markets), and the American ITT which grew from the rump of AT&T overseas subsidiaries and hived off in 1925, due to an anti-trust suit against AT&T in the 1920s.

Barriers to entry were generally caused by policy networks, that is close ties between the PTTs and their national suppliers, established via procurement policies, industrial polices, R&D and standard cooperation. This situation of close ties between PTTs and national suppliers led, especially in Europe (and unlike the USA or Japan), to fragmented markets, duplication of R&D, and different, sometimes incompatible, technologies (hardware and software). For instance the British Post Office opted for the Strowger exchange and the German Deutsche Bundespost (DBP) chose a different version of the Strowger process developed by the German Siemens and Halske companies. ITT, marketing AT&T's Rotary, won orders in France, Belgium and Spain. When the Stored Programme Control (SPC) switches were introduced, again a plethora of different systems and standards were developed: for instance, the DBP together with Siemens produced their own, unsuccessful exchange, EWS-A, which was later replaced by Siemens' EWS-D; the British Post Office's belated response (in cooperation with GEC, General Electric Co., Plessey and STC, Standard Telephone Cable) was System X. Meanwhile ITT (later Alcatel) produced its System 12, Alcatel its E10 system, Philips its PRX system, Thomson (later Alcatel) its MT system, Ericsson its AXE system and Italtel and Telettra it Proteo UT system (Dang Nguyen 1983, pp.100-104).

The development of the consumption of telecommunications services during the period of Fordism reflects the unfolding of the public switched telephone network (PSTN). Traditional services like telephony, telegraphy and telex accounted throughout the 1970s for almost the whole of the PTO's revenues. In 1978 telephony itself still accounted for about 90% of the total operator's revenue in the USA, UK and Germany (ITU 1978).

While in the USA the telephone network and its usage developed with considerable growth rates, Europe in general lagged behind. A statistical comparison of personal communication forms between the USA and Europe, constructed by Codur, shows clearly that at the turn of the century in Europe telegraphy and courier services were more widely used than the modern telephone:

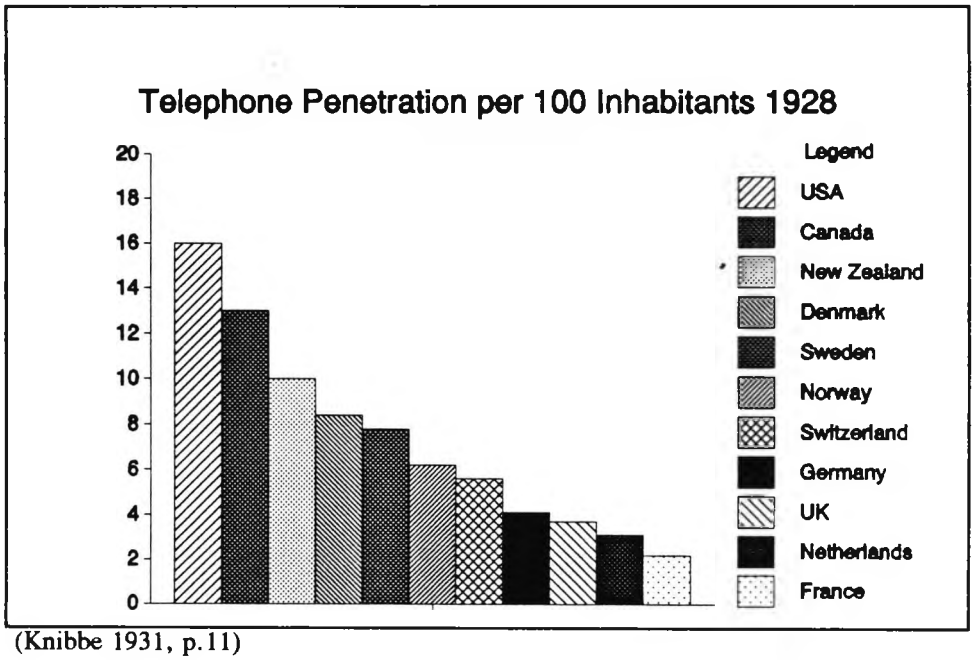
Table 2.1. Relative Usage of Communication Means in USA and Europe in 1909

	Telephone	Telegraph	Courrier
USA	58.7%	0.4%	40.9%
Europe (average)	23.9%	1.7%	74.4%

(Codur 1990, cited from Carre 1991, p.41)

These low levels of telephone consumption in Europe were - as we will see later - not only caused by a much lower telephone density, a poorer state of the telephone network, and a much more wide-spread telegraph network, but also by relatively high telephone tariffs. Telephony at the turn of the century was very much a luxury item, unaffordable for working class people. For instance, a young Edwardian couple living in London on £700 per year would typically allocate £50 for savings, £80 for clothing, £25 for insurances and £20 for the entire year's coal, wood and electricity. In 1901, the British Post Office and the National Telephone Company charged London subscribers £17 per year for unlimited service; for measured rate service they charged £6 10s (shilling) per year within the County of London and £5 10s per year in outer London (Perry 1977, p.78). Another factor is the 'culture' of telephone consumption which was much earlier transformed into a Fordist form in America (Martin 1992). While in Europe telephony was regarded as an exclusive instrument for business, in the USA it became rapidly a more social and mass-consumption article. The Bell company, for instance, stimulated telephone use via modern marketing tools targetting certain potential users (eg. farmers in rural areas) and was able to create a culture of 'social modernity' around the telephone (Fischer 1992, p.87). The (Fordist) commoditisation and commercialisation of products in general (eg. brand advertising) and of telephony in particular was much later developed in Europe. In Victorian Britain the telephone was widely regarded as a business rather than a social instrument (Perry 1977, p.70); equally, the Treasury refused to allow active marketing of telephony until 1902.

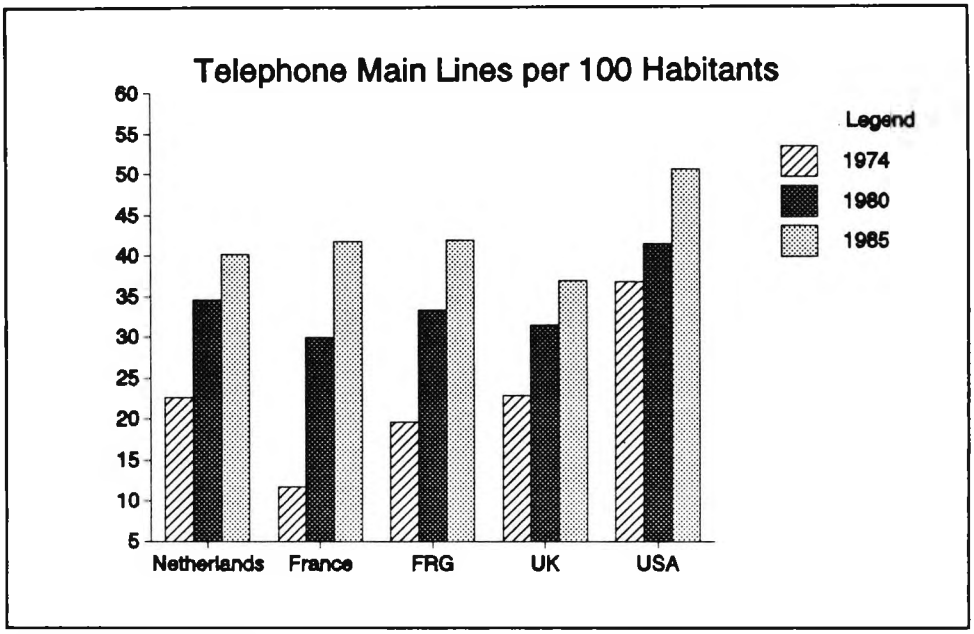
Figure 2.1. **Telephone Density Several Countries 1928** (Telephone sets per 100 inhabitants)



(Knibbe 1931, p.11)

Not until the 1970s did some European countries reach penetration levels, realized in the USA decades before. Even then European telephony consumption lagged behind American levels: for instance, while in the Netherlands 2.8 calls per line per day were made, the US figure was 11 in 1986 (PTT Telecom 1991, p.7). Within Europe, penetration and consumption levels differed substantially due to political, financial (investments) and regulatory factors:

Figure 2.1. **Telephone Density Netherlands, France, (West) Germany, United Kingdom and USA**



(OECD 1991b, p.32)

Table 2.2. **Telephone Consumption within Europe 1901**

	Urban Telephone Conversations per Year/per Capita
Sweden	26
United Kingdom	19
Germany	13
Switzerland	7
Netherlands	7
Belgium	5.6
France	4.6
Italy	2
Russia	1

(Codur 1990, cited from Carre 1991, p.40)

2.7. State Regulation under Pre-fordism and Fordism

Throughout the first century of telecommunications the proponents of some form of state regulation have advanced economic, social and political arguments for their cause (Duch 1991, pp.14-22).

It has been argued that because more remote and rural areas would not prove profitable enough and may even make losses, an unregulated, profit-maximising telegraph or telephone company would not be interested in providing a national telecommunications network. Equity and national social welfare would thus seriously be impeded if no proper regulatory measures were taken. Vail argued for state regulation on the grounds of protecting the technical integrity of the network and its quality and of the need for technical compatibility. In the field of communications states, indeed, have, in cooperation with industry, often set official, *de jure*, standards, or supported industry promoted, *de facto*, standards to guarantee a more efficient functioning of markets and accumulation of capital[21]. Standards and other policy instruments, such as subsidies for R&D, relaxation of anti-trust legislation and stimulation of intra-industry cooperation or private-public concertation, have also been used to support certain industries or even a country as a whole[22]. Particularly in the postwar era states have interfered in telecommunications R&D; subsidies and other incentives are sometimes considered as 'positive' regulation (Snow 1986, p.8).

Further argument has been made about network-economics and the so-called natural monopoly. Natural monopolies have been the most popular candidates for nationalisation in Europe on the basis that declining economies of scale and huge sunk investments[23] make it economically inefficient to have more than one firm providing the service (Sharkey 1982; Faulhaber 1987, p.106). Although the argument has historically been used for the regulation of telecommunications (Owen and Joosten 1992) there is however considerable disagreement on what exactly constitutes a natural monopoly and on the extent to which industries can be considered natural monopolies. During the late nineteenth and early twentieth centuries, when telecommunications technology was in its infancy, the capital costs associated with establishing telephone service were so high and scale economies so significant, it was generally felt that competition was untenable, which led to widespread nationalisation of the industry (Holcombe 1911). Wilson has pointed out that historically, the state has intervened in telecommunications (and gas, water and electricity) to impose or encourage a monopoly structure before a 'natural monopolist' emerged via the market mechanism (competition) itself (Wilson 1992). The decision that telecommunications formed a

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[21] Szymanski points out that one of the functions of the state is to "[...] maintain and guarantee the standardisation of a system of weights and measures for use in exchanging commodities within its territory." (Szymanski 1978, p.188). For instance, the introduction of black-and-white television and later colour television was helped considerably by a state monitored and state coordinated cooperation between the actors involved (Joosten 1991).

[22] Further examples of direct or indirect state regulation or state involvement are: tariff and non-tariff barriers to protect own telecommunication manufacturers - infant industries or not - , innovation policy, tax policy, regional policy and patent policy.

[23] Sunk costs are costs which cannot be recovered (for example, resold to another firm if a business fails). When sunk costs are high, risks are high and thus incentives to enter the business are low (Baumol *et al.* 1982).

natural monopoly has therefore been more of a political than a purely economic decision[24]. The general form of state intervention in telecommunications was in Europe the establishment of a state monopoly - a decision which again could not be objectively justified on both the 'natural monopoly' argument or any other purely economic reasoning[25] (for a further discussion of natural monopoly see section 4.6.).

Universal service or the general, vital importance of the good or service has been another important reason for state regulation of telecommunications. The telephone service has been considered by many to be an essential 'public utility' which has assumed the status of a universal good to which all citizens should have access. Whilst never clearly defined, universal service generally can be broken down into distinct subsidiary concepts: universal geographical availability and non-discriminatory access. Additionally some have argued for incorporating some notion of reasonable prices or affordability (as incorporated in the US 1934 Communications Act), but these were hardly an official part of the universal or public service definitions in Europe (Garnham 1991, p.26). Government action was deemed necessary because of concern that firms would otherwise avoid serving less profitable consumer groups, thereby engaging in what was labelled 'creamskimming' (Kahn 1971, pp.221-246). A state regulated - and even nationalised - telecommunications operator was also regarded as a public trust to keep monopolistically structured industries from earning supranormal profits by contriving a scarcity and charging high prices. Nevertheless, as Nowotny has pointed out, there is no clear-cut economic definition of what constitutes a 'public utility'; Dugger has added that in the late 19th Century often powerful economic interest groups in the USA were successful in defining certain services (eg. railway transport) as a 'public utility' in order to introduce regulation which favoured their position (Nowotny 1989; Dugger 1989). Again, as in the case of 'natural monopoly', this lends evidence to the thesis that the rationale behind public utilities and their regulation is very much political[26].

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[24] Indeed, more recently economists have argued that the natural monopoly argument was a fallacy, or that recent technological developments have raised questions as to whether there is any basis for treating public utilities as a natural monopoly (Bailey and Baumol 1984).

[25] The right-wing monetarist Milton Friedman, influential throughout the 1980s in the USA and the UK, advocated private monopoly in cases of natural monopoly on the assumption that the costs associated with unfettered monopoly are smaller than government ownership or public regulation (Friedman 1962).

[26] Dugger has pointed out that what constitutes a 'public utility' is very much an outcome of the wider societal, legal and political environment. For instance, the conservative and powerful system of state and federal courts in the USA resisted government regulation of business for many years by strictly limiting government regulation to specific areas of business. Legal conservatism limited the scope of 'public utility' until the sea change of the Great Depression. Before then public utility had to meet two strict conditions: First the good or service being regulated had to be a 'necessity'. Second, either an extortionate price or a harmfully inferior standard of service had to be imposed upon the consumer. In the post-war period the definition was expanded, and for a long time public utilities seemed to share two characteristics: 1. A significant portion of the public cannot avoid dealing with the firm. They must buy its goods or services, or suffer harm. 2. The supplier is far more powerful than those with whom it deals. This second characteristic gives the company an unfair advantage. However, to greater or lesser degree, all large companies possess these last two characteristics. So essentially all large companies are public

Universal service can be regarded as a so-called (positive) externality. Externalities can be benefits (positive externality) or costs (negative externality) resulting from the provision of private goods that accrue to society but are not adequately reflected in their price. Through the regulated provision of private telecommunications goods, PTOs can in fact promote a wide range of social and political goals, such as the general positive societal and macro-economic effects of introducing innovations in the network, the benefits of infrastructural development, the importance of the network for national telecommunications manufacturers and telecommunictions' relevance for defense[27]. Together with other externalities, specifically related to the network itself (see Chapter IV), these arguments have often been used as a justification for public regulation or even public ownership.

Finally there was a whole range of legal regulations concerning the proper and just functioning of the network and the services: for instance, there were rules for protecting the secrecy of the messages transmitted[28], rules for way-leave rights and reimbursements and special regulations as regards emergency and national security.

2.8. National Politics and Regulation

The nationalisation of the telegraph and later the telephone system in most European countries, which took place in the nineteenth century and the first decades of the twentieth century, patterned the start of a powerful and durable relationship between telecommunications and the nation state.

Already before telegraphy, the postal services and the railway system (see above) were the object of extensive state regulations. In Europe postal services became state exclusive monopolies in the period of absolutist states. In Germany the king (*KurfÜrst*) Friedrich Wilhelm from Brandenburg established in 1649 a State Post (*Staatspost*) which had a monopoly on all postal services. The other *KurfÜrsten* and *Landesherren* (gentry) of the several German states soon followed. Also in France under King Louis XI (1461-1483) and in England under King Henry VIII (1509-1547) exclusive state monopolies for postal

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utilities. Thus, Dugger concludes, the most significant question raised in defining utility is, why are most large companies not regulated? (Dugger 1989). The tradition of 'public utility' regulation in the UK goes back to the 18th Century toll roads and canals legislation; influenced by the Common Law tradition, this legislation consisted predominantly of private bills in stead of government bills (Foster 1992).

[27] Governments often wanted to control the 'wires' for national security reasons, military defense and general welfare. A nationalised telegraph system was considered as an effective instrument for central government to rule a state (Ringnalda 1902, p.21).

[28] The secrecy of a telegram or telephone conversation (copied from postal regulations) was however not absolute: for instance, the British authorities in India were, for political reasons, permitted to inspect the content of telegrams.

services were founded. The highly decentralised Dutch state did not establish a State Post (*Statenpost*) until 1752. The Dutch postal system was modernised and centralised under French occupation in 1795 (Hogesteeger 1989, p.26). In the first decades of the 19th century the state postal services were reformed and restructured. In the UK Rowland Hill, studying cost structures of postal operations, demonstrated that transit charges were an insignificant factor in the total cost of handling a letter. Charging scales based on distance were shown to be irrelevant so that a uniform rate of postage (the 'penny post'), regardless of distance was introduced. The reform received not only support from the postal administration but also business which favoured a flat-rate system. Similar postal tariff reforms were gradually introduced in other European countries. So by the time that state interventions and state regulations in the field of telegraphy and telephony were discussed in Europe and the USA, there was already an established tradition of specific state policies in the field of communications[29].

Although each country has developed its specific tradition of 'public service', the fact that telegraphy and telephony were integrated in or close to the post offices' administrations, meant that uniform tariffs - derived from Rowland Hill's uniform 'penny post' tariff system - gradually were introduced to these new electronic forms of communications. Generally, the notion of public service is hardly used systematically before the period of reconstruction after the Second World War. Its importance grows in the classical period of Keynesianism, albeit its concrete content is seldom specified apart from notions of universal geographical availability and non-discriminatory access of users in terms of price and/or levels of service (Garnham 1991, pp.23-26)

2.8.1. France

In France the forerunner of the electric telegraph, the optical telegraph, proved very helpful for military communications. During the Napoleonic wars the French War Department developed such a communication system from Venice in Italy to Amsterdam in Holland (Bertho 1984, p.21). In 1837 the French Home Secretary proposed a one section law for a state monopoly on electric communications; this section was still being used throughout the 1970s and 1980s. The unfolding of the electric telegraph was controlled by the French military and other government departments and not by commercial demand. In 1879 licenses were, reluctantly, given to several private companies to develop a telephone system; reluctantly, because the telegraph authority regarded the telephone system as a competitor. These private telephone companies, often set up by local Chambers of Commerce, therefore had to pay royalties of 10 per cent of gross receipts to the French government as a compensation for the state telegraph's losses (Carre 1991).

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[29] Also in other fields of communications like the press, extensive forms of regulation were introduced in European states (eg censorship and special stamp duties on newspapers).

Due to uncertainty regarding the future, private companies pursued short-run profits rather than long-run system development. The long distance service developed very slowly because private companies lacked authorisation and the state telegraph authority only reluctantly moved into (inter-local) telephony. The French government nationalised the telephone system in 1889 after several discussions in parliament which criticised the high tariffs and poor services of the private companies. From then on the government was responsible for maintenance and operation, but often there were inadequate funds for developing an efficient and extensive network[30]: as there were no special state funding for inter-local networks, their development was at the expense of local networks (Hogesteeger 1984, pp.59-64).

After the nationalization in France of the private telephone company SGT (*La Société Générale du Téléphone*) in 1889, telegraphy, post and telephony were integrated into one state department. Due to the administration's distrust of telephony, its network developed only slowly in its first decades. The integration of telephony - a new technology which required different technologies compared to telegraphy and a different organisation structure and functioning than the postal services - into the old post administration, with its established old and dominant working traditions, meant that the telephone network and its management was advanced inefficiently. Its economic, technical and social development was also inadequate: the telephone system made great losses, an inefficient network topology was used, the quality was inferior and distorted labour relations caused some severe industrial disputes in 1906 and 1909 (Bertho 1984, p.31). It was not until 1903 that both government and Parliament became convinced that special funding was necessary for the development of the telephone networks (Hogesteeger 1984, p.66).

After the First World War the need for creating new markets for industries, converting from military to civil production made the government decide - in spite of labour and trade union opposition - to introduce concessions for private radio stations for radio-telegraphy services. This created a situation in which the PTT department, advising on concessions and on the state owned network, had a contradictory role.

In the 1920s the telephone network, overtaking telegraphy, started to grow faster. This was due to a growing demand and pressure from business and due to the fact that several French cantons, which often advanced the required telephone investments, regarded the instalment of telephony in their areas as an electoral item and as a power medium in their relation with the centralist French state.

The growth of the network and the traffic carried by it caused problems in the areas of transmission and switching (especially in Paris). Confronted with these technological, organisational and financial needs the government decided to make the telecommunications sector part of their national industrial policy. An offer from the American ITT to take over and modernise the French network was thus turned down. Politically, there was a strong alliance of national-republican, labour and trade unions against an

[30] The French state budget showed a huge deficit because of the Franco-German war of 1870-1871.

American dominated telecommunications sector (Bertho-Lavenir 1989, p.594) In spite of this new approach and the rearrangement of the financial organisation (the 1923 reform) no extra investments were planned for the network development which additionally suffered from the 1930s depression and the Second World War. In 1942 the two telecommunications entities within the PTT Ministry (telegraphy and telephony) were merged and became the *Direction Générale des Télécommunications* (DGT). During the occupation the Germans also introduced some standards (eg one standard telephone set) in the rather chaotic French network.

In the period between 1958 and 1970 the demand for a connection to the telephone network grew by a factor of five, and in spite of increased telecommunications R&D budgets[31] a wide gap between demand and supply developed due to inefficient planning and insufficient investment in the network itself. French telecommunications legislation and policy remained unchanged until the end of the 1960s when growing pressure from electronic engineers, business and politicians lead to historic reforms in the 1970s.

The French PTT, with few exceptions, never manufactured equipment itself. It was procured from private companies, using the general procedures for state procurement. Procurement policies were part of a national industrial policy, thus close relations developed between the French telecommunications industry and the PTT. Three out of five of the largest suppliers were nationalised in the early 1980s[32].

Networks were usually directly financed, built and operated by the French PTT, or, later, by one of its subsidiaries. In terminal equipment there has been - since 1920 - a certain degree of competition (for instance the medium and big Private (Automatic) Branch Exchanges were - after approval by the PTT - supplied and maintained by the private sector).

2.8.2. United Kingdom

The first thirty years of the development of telegraphy in the UK was provided by competing private companies. Overseas (submarine) cable companies were however for political, military and commercial reasons financially backed by a generally pro-competition and *laisser faire* Treasury. Nationalisation of

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[31] A lot of research was done by the CNET research centre (*Centre Nationale d'Etudes des Télécommunications*), established in 1944.

[32] These companies were: *Compagnie Générale d'Electricité* (CGE) Group, which includes CIT-Alcatel, Télic-Alcatel and Les Cables de Lyon. The Thomson Group, the most important telecommunications members of which are Thomson-CSF and *Lignes Télégraphiques et Téléphoniques* (LTT). And the *Compagnie Générale de Constructions Téléphoniques* (CGCT), a formerly subsidiary of ITT. The civil telecommunications activities of the CGE and Thomson groups merged into a new company, Alcatel-Thomson (Voge 1986, p.109/110).

the telegraph system took place in 1870, support for it coming from newspaper owners, who believed telegraphy would have lower rates and better services under the Post Office. Cartel behaviour of the private companies also stimulated public interest in government ownership. The Post Office improved and expanded the telegraph services and introduced uniform rates.

Due to the Treasury's refusal to permit the Post Office to buy Bell's telephone patent, private companies began to build their own telephone exchanges and lines. The Post Office saw the introduction of a telephone system by American companies as a threat to its own expensively bought and loss-making telegraph system and therefore - after a court decision on the monopoly of the Post Office on telegraphy and telephony - gave a very restricted license for the emerging telephone companies. The Post Office hindered the unfolding of a telephone network. The monopoly it had received in 1869 on communication by electricity, gave it control over the private telephone companies. It used this monopoly to collect a 10 per cent royalty on the earnings of those companies. Equally it limited the size of exchange areas in order to preserve long-distance communication for the telegraph system. One year later the PO received a patent to build its own telephone system - giving the private company in return a limited license. This created a situation of limited competition. In spite of the fact that the Post Office held the most essential license and was thus in a stronger position, the Treasury - confronted with an increasingly loss making telegraph service, regarding telephony as a major cause of these losses and, considering that the state should not be a competitor in trade - objected to further investments and thus the further unfolding of the telephone network. Consequently the life of telegraph technology was extended, especially in long-distance communications.

Between 1885 and 1887 a mounting tide of public opinion, outraged over the poor and expensive telephone services, called for nationalisation of the telephone under the aegis of the Post Office. In 1888 the Associated Chambers of Commerce similarly voted for a national telephone system. Confronted with an eventual lapse of its license the (private) National Telephone Company (NTC) - a merger of the United, National, and Lancashire and Cheshire telephone companies in 1889 - planned to accept no new subscribers after 1904 in order to achieve the largest net income possible. The NTC did good business: it had a rate of return of over 30 percent (Baldwin 1925, p.657)!

Already in March 1896 the government had nationalised the trunk network. Municipal companies private or public (local government) were supposed to provide the local exchange areas in competition. But this local loop competition was - with the exception of one company in Hull - a complete disaster. At the time of complete nationalisation of the network in 1911 the telephone system was still very underdeveloped and it grew and improved slowly due to mismanagement and lack of government funding (Pitt 1980, p.17).

The further development of the network was much hindered by the general decline of the UK economy

and the hostile attitude of the Treasury in particular. The latter was much against state companies and monopolies and did not want to make high upfront investments in telephony. In 1911 the Post Office approached the Treasury on the possibility of opening unprofitable but needed telephone exchanges. The Treasury replied that

> "[...] telephones were not in the same position as telegraph and postal facilities; they were not exactly to be regarded as a luxury; but while postal and telegraph facilities might be provided at a loss to the taxpayer, telephone extension should [...] as a general rule pay their own way. " (quoted from Perry 1977, p.75).

The unfolding of the network into rural areas was caused by a disregard of rural interests and a lack of public or universal service notion. As late as 1901 the Chancellor of the Exchequer, persisted in believing that "[...] telephonic communication is not desired by the rural mind." (quoted from Perry 1977, p.76). As a result of this policy in 1913 London dominated the UK networks by accounting for over one third of the telephones in the entire country.

The Treasury also controlled the day-to-day running of the Post Office, whilst bureaucratic procedures dominated the organisation and ministers overseeing the department came and went with unusual rapidity (Brock 1981, p.144). Typically for the period of unfolding of a telecommunications network, revenues were not sufficient to cover the capital requirements for new investments. Since borrowing was not allowed by the Treasury, customers had to pay for expansion via higher tariffs (which again had a negative impact on the unfolding of the network and the revenue generated). Additionally, costs of buildings and equipment were often high since other departments were responsible for these or costs were not strictly held in hand. Consequently the construction costs for one line in the UK were almost two-thirds higher than those in the USA (Brock 1981, p.155).

Until the 1980s the Post Office provided telecommunications services based on an exclusive monopoly it had acquired in 1911. As in most European countries, services which involved switching to third parties were not possible. Between 1932 and 1940 it received more autonomy from the Treasury in that it was allowed to keep a proportion of its profits for reinvestment; this decision was reintroduced and implemented in 1961. In 1969 British Telecom (BT) - the telecommunications part of the PO - was turned into a public corporation operating at arm's length from government. Although released from most of its parliamentary control it was still under control by the Treasury (Hills 1986, pp.84/85).

The Post Office/BT had until 1984 a monopoly on the telephone equipment and other terminal equip-

ment[33]. The Post Office/BT - impeded by governmental industrial policy considerations and traditional links - procured its equipment mainly from UK based manufacturers such as GEC Plessey and STC[34].

2.8.3. Germany

Whereas early telegraphy in the UK was embedded in a *laiser faire* discourse resulting in a 'light' regulatory regime, the same invention was, from the start, claimed by the military and the post office in Germany, resulting in a strict, public utility regulatory regime. In the period between 1832-1834 the first German optical telegraphs were installed by the military of the Prussian state between Koblenz and Berlin to provide military information about France (Hermann 1986, p.91). The optical telegraph, before taking off, was soon substituted by the development of the electric telegraph which again was adopted by the military and set up as a state monopoly. The electric telegraph carried only governmental messages in its original phase, but was later also opened for the public. The concept of a public telegraph was advanced by the former army officer Werner Siemens, who later became Germany's largest equipment manufacturer and played an important role in the further development of the Prussian telegraph (Holcombe 1911, p.9-11). After the creation of a unified German nation in 1871, post and telegraphy were merged into a National Post Office (*Reichs-Post- und Telegraphen Verwaltung*, RPTV) in 1876. Unlike the postal services in the Netherlands, UK and France, the German Post Office was much further removed from the parliamentary process: the government regulated the RPTV via administrative decrees without interference from the parliament (*Reichstag*) (Thomas 1992, p.40).

Telephony was introduced in Germany by the American Bell Company a few years after the creation of the RPTV. Telephone equipment could be produced cheaply by German manufacturers such as Siemens and Halske as, due to a misunderstanding, the Bell company had no patents in Germany. After political and juridical debates it was decided in 1889 that telephony fell under the 1848 constitutional state monopoly on telegraphy. Long before the 1889 decision (and unlike in the UK) the German Post Office already started installing telephones in small villages throughout the country, thereby expanding the network all over the country and creating the first public telephone network. Since the German Post Office only developed a local telephone exchange if there was a required long-term service commitment from the community, and since most people, not knowing the merits of telephony, underestimated

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[33] The monopoly included not all equipment: like in France the medium and big PABX markets were excluded from the monopoly. In this market British manufacturers have consistently lost market shares to foreign companies, such as IBM and Ericsson.

[34] In 1988 GEC and Plessey formed the telecommunications producer GPT. In September 1989 after a ten months struggle the West German Siemens and GEC took over Plessey. STC (Standard Telephone Cable), for a long time a wholly owned subsidiary of ITT, was taken over by the Canadian telecommunications manufacturer Northern Telecom in 1991.

demand, the telephone system developed only slowly, particularly in the southern states. In Prussia on the other hand, an enthusiastic Postmaster General stimulated telephony so much that, by 1895, Berlin had the largest network in Europe (Bennett 1895, p.178). According to Holcombe the reason why there were only few complaints about the state exploitation of telephony in Germany was due to systematic consultation between the telegraph administrations and economic and political interest groups (Holcombe 1911, pp.63/64). In 1900 new tariffs were introduced benefitting the smaller exchanges and stimulated thereby a more rapid expansion of the telephone, especially in smaller cities.

The German National Constitution (*Reichsverfassung*) of 1919, repeating the 1889 juridical decision, ordered that post, telegraphy and telephony (*Fernsprechwesen*) were an exclusive national matter. A special national ministry (*Reichsministerium*) for post, telegraphy and telephony was founded in 1920. Like the French communications networks the German were heavily damaged during the First World War and for a long period the German PTT endured heavy losses. In 1923 the German National Post (renamed as *Deutsche Reichspost*, DRP) became an even more independent organisation by receiving its own, separate budget (*Sondervermögen*); the DRP's revenues had to cover its costs and investments and it was to be treated as an independent enterprise. The influence and control by parliament and the Treasury were replaced by an Administrative Council (*Verwaltungsrat*) consisting of specialists and politicians.

During the Weimar Republic it was felt that the law needed to be updated to regulate new forms of telecommunications and electronic news services. In the new 1928 legislation, covering the state monopoly, the term telecommunications installation (*Fernmeldeanlage*) was introduced comprising both telecommunications and radio (*Funkanlage*). During the following Nazi period the Administrative Council was replaced by a less powerful committee. In 1933 the first automatic digital network in the world was introduced for telegraphic messages between Berlin and Hamburg and a few years later the *Deutsche Reichspost* started with television broadcasting.

In the postwar constitution for West Germany (Federal Republik of Germany, FRG), the new German PTT (*Deutsche Bundespost*, DBP) received its own constitutionally guaranteed administration. A subsequent 1952 law, which was not replaced until 1989, reintroduced the basics of the former *Reichspost* of the 1920s: the *Bundespost* was to be governed by the PTT minister and would be assisted by the Administrative Council, it would have its own special, self-supporting budget but would also have a duty to pay a certain percentage of its operating income to the state.

The *Bundespost* also inherited the horizontal monopoly from the *Reichspost*; it had a monopoly to establish and operate the public transmission and exchange facilities, it was the single supplier of services channelled through these networks, it provided and maintained the whole range of customer premises equipment and was, like most PTTs in the EC, at the same time the public regulatory authority. It did not produce transmission and switching facilities or terminal equipment. The equipment was mainly

purchased from (West) German telecommunications manufacturers, and as in other European states there were strong connections between industry and the German PTT. Officially however and in principle the DRP/DBP placed its contracts on a competitive basis in the market. Again, in principle, a limited range of approved, user-owned subscriber equipment could be connected. The connection of subscriber equipment to digital telecommunication networks nevertheless required authorisation of the PTT.

2.8.4. The Netherlands

Although the Dutch history of telegraphy and telephony has been influenced by the continental powers, France and Germany, it has some remarkable similarities with that of the UK. Just as its UK counterparts, Dutch telegraphy and telephony was introduced by private companies and remained in private hands for some time; equally, the Dutch Treasury, fearing competition from the new electronic communication inventions, hindered for some time their successful introduction.

Early telegraphy was exploited by railway companies such as the *Hollandsche IJzeren Spoorweg Maatschappij* (Holland's Iron Railway Company) which connected Amsterdam and The Hague in 1845. The legal framework came two years later when a Royal decree ruled that concessions for public telegraphy would be given, provided that the licensee would compensate for 'considerable' losses of the (state owned) postal services. By 1852 the liberal government decided to nationalise the new invention. Firstly, because it was considered to be of great importance for the country as a whole and its economic development (capitalists would not invest in certain areas or for markets which would only evolve in the long-term). Secondly, the government decided in favour of nationalisation because telegraphy in a small country such as the Netherlands was considered to be a 'natural monopoly'; and finally, Prussia, an important economic and political *hinterland*, insisted that no private company would be allowed to interconnect with its state telegraph (Hogesteeger 1989, pp.127/128). The Dutch state telegraph (*Rijkstelegraaf*), which originally only provided for services between large cities such as Amsterdam, Rotterdam and The Hague and international services, had to break even, according to the government. Since the network was only just unfolding and huge investments had to be made, the latter had to be recouped via high tariffs. Although some savings could be made by integrating postal offices with the telegraph offices in 1866 (renamed as State Service for Post and Telegraphy, P&T), the telegraph was nevertheless soon in the red. The P&T State Service was however able to build up its own domain and stronghold within the Ministry of Public Waterworks, Trade and Industry. The Treasury, concerned about rising costs and rating telephony as an interesting milch-cow, was kept at a safe distance as the State Service successfully convinced most MPs and government officials of the crucial role telecommunications could play in a trade-dependent country such as the Netherlands.

Meanwhile the telephone - introduced as the 'sound telegraph' and regarded as a telegraph instrument -

had been introduced by the Dutch Bell Telephone Company and private operators were licensed via the 1852 Telegraph Law. The telephone licences issued were always for a short period only, thus hindering the required long-term planning, continual upgrading and financial backing. As in the UK the Dutch government, occasionally considering telephony as a serious threat to its loss-making telegraph[35], wavered for some time whether to enter telephony itself or license interlocal telephony.

In accordance with the Dutch tradition of a decentralised state and the influential Christian ideas of subsidiarity[36], local companies, licensed by the municipalities, were regarded as better equipped to provide the new service since they were much nearer to the customers than a nation-wide and centralised company could ever be. The government decided against state exploitation of telephony since it was regarded as only in the interest of its subscribers and not in the 'general interest' as was the case with telegraphy. Then, the State Telegraph was already in the red and state exploitation of telephony was expected to be loss-making too; and finally, the only other country which had introduced telephony at the time, the USA, had opted for private exploitation of the new invention (Hogesteeger 1984, pp.126/127). Whilst local networks were soon unfolded, interlocal telephony grew very slowly: the government had only licensed one private operator which systematically favoured its own local subsidiaries. Further difficulties were created by incompatibilities between the different systems used by the private and municipal local companies. After growing complaints by traders, companies and MPs, the government decided to nationalise these long-distance, or trunk networks in 1897. Seven years later, after changing the outdated 1852 Telegraph Law, a start was made on nationalising the local companies too (Ottenheijm 1974). The local networks were often outdated and flimsy as local companies had often recoiled from modernisation and expansion due to uncertainties over their future. Consequently the responsible ministers repeatedly had to ask parliament for additional budgets required in order to buy out the local companies, upgrading the network as well as unfolding it further.

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[35] This position was proven wrong. Contrary to general expectations, telegraphy **and** telephony both grew until the First World War. In fact, as some civil servants of the Ministry of Public Waterworks, Trade and Industry had asserted, both systems were indeed to some extent compatible. For instance, considerable economies of scope were gained by using telephone lines for telegraph services (and vice versa). The use of the simple and cheaper telephone set in fact supported the spread of telegraphy services (Hogesteeger 1989, p.148).

[36] Subsidiarity stems from the Roman Catholic (Thomist) doctrines on communities and their order. Postitively defined it refers to the principle that a higher community (eg. the central state) should guarantee the optimal functioning of individuals and lower communities. Negatively defined it means that a higher community should not withdraw a task which an individual or a lower community could fulfil itself. This principle was close to the corporatist idea that the 'natural order' in a society had to be formed via corporate bodies (this principle was laid down in the encyclical letter of Pope Pius XI *Quadrigesimo Anno* of 1931). Versions of this Thomist subsidiarity and corporatism were adopted by many Roman Catholic/Christian parties in Europe (eg. the German christian-democrats). Post-World War II coalitions between christian-democrats and social-democrats were often based on a shared view on the importance of corporate bodies (van Wissen 1982, pp.11-24)

Unlike in the UK where telegraphy and telephony, once nationalised, had to operate within the severely constricted financial and ideological boundaries of the Treasury, the Dutch State Service of P&T invested considerable amounts of capital in the telephone network. In order to cope with a fast growing demand, the 1920s saw the start of a huge automatisation programme which improved both the efficiency and capacity of the network. This programme was continued by the State Service - renamed in 1928 as Post, Telegraph and Telephone, PTT - even though the 1929 world economic crisis struck a heavy blow to this small country with its open economy.

After the Second World War the reconstruction of the communications infrastructure became a crucial concern for the government. A substantial part of the Marshall Aid was used to purchase network equipment abroad, while at the same time the government tried to stimulate the small and few Dutch telecommunication manufacturers. Philips started to produce its first switches and became gradually the main Dutch supplier to the PTT. The reconstruction, modernisation and further unfolding of the network could however not keep pace with demand for connections and increasing traffic, due to shortages of foreign currency (most equipment was purchased abroad) and a lack of skilled workers. Similar to most other European countries, the general rise of welfare, brought for the first time the telephone within the budgets of an average family, and consequently added many more people to the fast growing waiting lists in the 1950s and 1960s.

2.9. International Politics and International Regulation

An objective need for international telecommunications regulation became imperative as in the middle of the 19th century the number of international telegraph connections grew rapidly. There was not only need for a coherent uniformity in various aspects of the telegraph's technical system (compatibility of equipment, wires and codes) but also of its institution. Organisational and regulatory discrepancies between national telecommunications systems could easily lead to a break down of international telecommunications: we already saw above how Prussia, for political reasons, did not want to interconnect its public telegraph with foreign private networks. Another example were the problems between the UK and the Austrian government over an international telegraph line to the Middle East, crossing Austrian territory, in the 1860s: the Austrian state operator was willing to cooperate but wanted a guarantee from the British government that this line would have a monopoly over traffic between the UK and the Middle East. The Austrian state operator, who would share in the revenues of the venture, clearly wanted to prevent bypass and competition. The UK government (the Treasury) objected to these proposals because, at the time, it favoured competition and private initiative without too much governmental interference (Joosten 1993). Thus potential disputes over ownership, the relation between operator and regulator, market structure and the settlement of tariffs had to be solved before international telecommunications could make a leap forward.

Two international organisation are particularly important here, since they are both typical for the Fordist Telecommunications Regulation Mode (TRM): the International Telecommunications Union, originally established in 1865, and the CEPT (*Conférence Européenne des Administrations des Postes et des Télécommunications*) which was created in 1957. It is no accident that both organisations originated in Europe. There was an early demand for international networks in Europe as this region includes many states within a relatively confined geographical space and these states have many mutual economic and historial links. A multilateral framework was developed because it would be much more efficient than embarking on lengthy, laborious and complex bilateral negotiations. Additionally, a multilateral framework could also deal more easily with bypass problems and imbalances in tariffs.

As the members of both organisations consisted mainly of state departments and their operators (PTTs), the relatively closed and centralised national telecommunications system with its underlying principles was to be repeated on an international scale. This international cooperation and coordination was however limited to serve and maintain the sovereignty of the national networks: the organisations had no supra-national powers and worked basically on the basis of consensus (the ITU working with Recommendations). Equally, because national operators maintained their firm control over their international connections there was no need nor possibility to form an international or intra-European operator[37].

The 1865 Telegraph Convention, predominantly an affair of continental European state telegraph organisations, accomplished a public and mainly administrative international organisation which had to keep the international - mainly intra-European - telegraph network under observation and would make changes when demanded (Bowett 1982, p.7; Codding jr. 1979; Codding jr. and Rutkowkski 1982, p.5). Regulations were not very detailed since there was a feeling that overtly strict regulations might hinder the development of the technology and, after establishing international connections, some unspecified rules were enough for fast and efficient services. International telephone regulation developed relatively late because of the unreliability of early international telephony, the availability of telegraphy for long, international distances and because most telegraph companies or the then emerging Post and Telegraphy Administrations (P&T) saw telephony as a threat to telegraphy. After the Berlin Conference of 1906 the ITU took radio under its wings, and in 1925, extended to telephony by creating a European telephone

[37] Most countries had only one operator which owned, operated (and often also regulated) the national network and its international connections. The UK is an exception to this rule; many of the telecommunications networks connecting the UK with its colonies were concentrated in a separate company, Cable and Wireless, was nationalised by the Attlee government in 1946 (and privatised again by the Thatcher government in 1981). Another exception is international satellite organisations, such as INTELSAT and EUTELSAT, which specifically have been set up as international carriers. Nevertheless, in practice their functioning is quite similar to the CEPT's and ITU's original philosophy: its members are the telecommunications administrations who have exclusive access to the organisations' network, they decide on its operation and determine the tariffs.

network. The organisation was set up as an exclusive club of and for public or state operators, thus the USA, having privately owned networks could not join until in 1932 membership conditions were changed[38].

After the Second World War the ITU was restructured and became one of the specialised agencies of the United Nations (UN). The ITU's main purposes remained international cooperation and the promotion of technical facilities and efficiency (Bowett 1982, p.115). One of the organisation's consultative committees, the CCITT (*Comité Consultatief International de Télégraphe et Téléphone*), has become a key forum for negotiations for the regulation of international telecommunications. The sovereignty of national and international networks remained nevertheless firmly with the national PTTs and ministries.

In Europe the PTTs cooperated via the CEPT which adopted a similar philosophy as the ITU (Bonnefous 1957, pp. 34-52). In practice this meant that national and international telecommunications was provided via the state or public monopolies which had close ties with (mainly) national manufacturers. Mention should also be made of the European Economic Community (EEC) established the same year as the CEPT, but founded on the abolition of national regulation (and the establishment of a 'common market') rather than a loose coordination of national policies. The Community's challenge to the CEPT's philosophy did not become a real threat until the mid-1980s because pro-competition and common market policies were only half-heartedly and rather unsuccessfully applied to the telecommunications sector. As we will see later in section 6.5.3., not until 1987 did the Commission succeed in introducing these pro-competition and liberalisation policies in the telecommunications area which, as we have demonstrated above, remained the well protected domain of the national 'postal-industrial-complex' throughout the period of Fordism (Noam 1987, p.32).

2.10. Conclusion

Telegraphy and later telephony developed rather slowly in Europe due to political and financial factors. High levels of telephone penetration were not reached before the 1970s (in France even later) and even then telephone consumption lagged behind the USA. American telephone consumption became already a mass-consumption product in the interwar period due to a conducive political, economic and cultural environment.

In spite of the differences between the USA and Europe (and the differences between the European countries themselves) a specific model of telecommunications regulation nevertheless emerged gradually.

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[38] For the same reason the UK was refused entrance to the 1864 Berne Convention on international telegraphy. At that time British telegraphy was mainly in private hands.

It was based on several principles, philosophies and practices which formed the basis of the Fordist Telecommunications Regulation Mode:

- A rejection of *laisser faire* policies and acceptance of state regulation: a free telecommunications market was widely regarded as economically inefficient and socially unacceptable because of increasing returns to scale (or natural monopoly), externalities and political considerations such as universal service, secrecy and national security. These political and economic arguments were particularly in Europe used to legitimise nationalisation of the networks.
- The development of one, integrated infrastructure and one operator was regarded as essential for both the unfolding of the network and its integrity as well as the economy and society as a whole.
- This infrastructure should cover the whole nation, so it required a nation-wide coordination, planning and policy.
- The operators were highly centralised organisations, providing a mass-product. Unlike in America however, European telegraphy and telephony were gradually integrated in the postal services and thus became part of the complex workings of the state administration. Telegraph and telephone employees became civil servants and were organised via civil servant trade unions.
- Manufacturers, often operating in cartels and highly concentrated, were closely linked to their national operators.

In the next Chapter we will see how this tightly controlled national and relatively closed system of telecommunications which emerged as a dominant model in the period of Fordism, was increasingly challenged in the 1980s.

CHAPTER III

RESTRUCTURING THE FORDIST TELECOMMUNICATIONS REGULATION MODE

3.1. Introduction

The Fordist accumulation regime was responsible for an unprecedented growth of the major capitalist economies in the post war period. Some limits of the Fordist growth model were reached in the USA when stagnation set in during 1957. Ten years later the first signs of a breach in the postwar expansion became apparent in (West) Germany and other European countries. Profit rates started falling, both as a percentage of the national income and as a percentage of output. A productivity slow down led to falling profits, increased inflation, structural unemployment and eventually to the fiscal crisis of the state which in its turn gave rise to neo-liberalism (Overbeek 1990, pp.141-145). Subsequently, two oil crises aggravated the economic downturn in a period during which the Keynesian Bretton Woods system collapsed and the Keynesian welfare state came under severe criticism (Philips 1985).

Connected with the growing crises of the Fordist growth model and the emergence of a new model were several important reformations in technologies, state regulation, company management and markets. This Chapter will analyse the effects of these reorganisations in the telecommunications sector and the - rather chaotic - first steps towards a new Telecommunications Regulation Mode.

3.2. Growing Internationalisation

Starting with the changes in company structures, markets and trade, the key trend was undoubtedly internationalisation (or more precisely: transnationalisation). Internationalisation of capital speeded up during the sixties in the form of increasing US investments in Europe. American investment flows from the USA represented over 60 per cent of total multinational investments in the early 1960s. Before the crisis in the early 1970s the average annual growth rate of direct investments[1] by companies based in the USA, UK, Japan, Germany and France was about 14 per cent. It fell to 10 per cent in the period 1972-1980 (Michalet 1987, p.212). Even then the direct investments by TNCs were considerably higher than of national companies. Moreover, while national companies were faced with sometimes severe economic crisis, the TNCs often improved their profitability.

The foreign investments by TNCs at the end of the 1960s and the beginning of the 1970s, suggest that

[1] Direct investment flows constitute only a fraction of foreign investments since the latter is also financed by reinvestment of profits made abroad or by loans.

a considerable number of these TNCs had a strong presence in high-tech sectors; others, with equally high foreign investments and high profit rates, broke up their production processes in search of industrial free zones and cheaper labour (Andreff 1982). Even stronger than the internationalisation of production, was the internationalisation of finance capital (port folio investments, stock market dealings etcetera) and trade. Throughout the 1980s world trade grew faster than world production. Equally, international finance capital increased its mobility and the volume of its transactions considerably in this period: gross cross-border stock transactions in the USA went from $80 billion in 1982 to $480 billion in 1987, while in the same period in Japan, they rose from $35 billion to $375 billion. The total international financial markets - the leading growth area in the international economy since the early 1970s - increased to $3 trillion at the end of the 1980s (Frieden 1987, p.240;p.3).

Another important factor for internationalisation of production and trade during the 1980s was the rapidly increasing R&D costs, especially for new growth sectors such as computers (semi-conductors) and telecommunications. These fast rising R&D and capital costs increased the 'minimum efficient size' of a company (Leontiades 1985). The semi-conductor industry, for example, which used to be characterised by a relatively high-labour-intensity, experienced sky-rocketing capital outlays and a dramatic upsurge in capital intensity. In addition, there was pressure to increase technical and industrial synergism and thus to go ahead with acquisition moves and vertical integration on a worldwide scale. Throughout the 1980s, the relevance of the international environment for companies progressed:

> "Over time the emphasis has shifted toward planning carried out at regional and global headquarters within a framework that closely integrates national plans into a regional perspective." (Leontiades 1985, p.32).

This increase in internationalisation went hand in hand with the growth of international telecommunication networks. International networks provided an increasingly vital infrastructure for international trade, production, investment, finance and R&D efforts (Ergas 1984, p.17; Howells 1992). One of the largest single users of international communication networks, the finance and banking sector, has practically grown up with the unfolding of interlocal, national and international communication links. Telegraphy, telex and later telephony played a crucial role in the unfolding of these financial ties. Since World War II, American international bankers, joined by their counterparts in Europe and Japan, have constructed the largest international financial system in world history. Trading rooms in New York, London, Tokyo, Frankfurt and Paris are connected via fast and high capacity lines which give instant access to buyers and sellers of currencies or shares hundreds or thousands of miles away. This financial communication network prompted specialised markets such as the Euro-dollar market and special electronic fund transfer (EFT) systems, such as SWIFT (Society for Worldwide Interbank Financial Telecommunications) and

CHIPS (Clearing House Interbank Payments System) (Frieden 1987)[2].

Whereas the financial services sector has a relatively long history of internationalisation, the telecommunications equipment manufacturers internationalised its trade and production much later. From the early 1980s onwards the old structure in which products were mainly produced for national markets and the national PTT, gradually shifted towards a structure in which both trade and production became increasingly international (Neu and Schnöring 1989). Many a manufacturer was forced to internationalise because of the *de jure* or *de facto* opening up of markets (due to liberalisation and convergence between computing and telecommunications) and the fast growing R&D costs which could not be recouped anymore within a relatively small home-market. For example, it was estimated that annual sales of approximately 12-14 billion ECU were needed in the 1980s to amortise the R&D and investment costs incurred to support the first generation of digital switching equipment (between 500 million ECU and 1 billion ECU at then price levels). This was far larger than any national market in Europe. The next generation of digital public switching systems required even much higher R&D costs (1 to 2 billion ECU) (CEC 1992a, p.14).

Spiralling R&D costs, ICT convergence, increasing competition, shortening product life cycles and decreasing profit margins led to a restructuring and concentration of the European telecommunications equipment suppliers during the 1980s. Major restructuring took place with French Alcatel's acquisition in 1987 of ITT's telecommunication interests and with German Siemens' acquisition of the majority of GTE's telecommunications equipment business (1986) and of a significant part of GPT (1989), which itself resulted from a merger of GEC's and Plessey's telecommunications business in the UK (1987). Within France, Alcatel had already taken over Thomson's telecommunication interests in 1987 and in Switzerland, two major equipment manufacturers had been regrouped into Ascom that same year. More recently, Alcatel and Spanish Telettra have consolidated the telecommunications business of their parents Alcatel-Alstom and Fiat respectively. As a result, where there were 11 major equipment suppliers in the European market in the early 1980s, in the early 1990s only six were left: Alcatel, Siemens, Ericsson, Bosch, Philips and Italtel, with the first two accounting for about half the total European market. One segment of the close web of national links between the PTT, manufacturers and the state, the so-called 'postal industrial complex', seemed to start coming apart at the seams.

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[2] The computer-based SWIFT transfer network does electronically and more or less instantaneously what used to require cabled instructions and confirmations. Working around the clock it can be seen as a financial Just-In-Time service. Dollars sent from London to New York and back, or Deutsch Marks sent from London to Frankfurt and back, are transmitted by SWIFT in split seconds. SWIFT transfers hundreds of billions of dollars back and forth between banks and bank customers every day. CHIPS mainly deals in dollar transfers. Generally speaking, Eurodollar transfers go through CHIPS. CHAPS and CHATS are respectively the UK and Japanese counterparts of CHIPS.

3.3. Neo-Fordism and Post-Fordism

Correlated with the general trend of increasing internationalisation, the 1980s established the introduction of new technologies which affected the organisation of the production process, nationally and internationally. The economics of manufacturing changed radically as computer-based automation, already introduced in the 1970s, by the end of the 1980s had pervaded practically all stages of designing, producing, applying and maintaining goods and services. Many successful producers found that, contrary to the principles of Taylorism, they needed to depend on skilled, motivated, reliable and flexible workers who could take initiatives and were not subjected to the punitive surveillance and supervision that prevailed under traditional management methods. These upheavals are sometimes characterised as a second 'industrial divide', as significant in its ramifications as the first divide which saw the rise of mass production at the turn of the century (Piore and Sabel 1984). Other responses from industry were in the same mould as Fordism, only more intense - more intense Taylorisation of work utilising computers and information technology. These are what some termed neo-Fordist strategies. Other responses moved in a new direction, coined as post-Fordism which, according to Perez (Perez 1983), has as its main characteristics:

1. A sharply increased use of information-intensive products and processes. The stress is on designs which utilise electronic technology whilst economising on materials, components, moving parts and energy. The result is both a shift in the product mix, a transformation in process technologies and in the relationship between services and manufacturing.
2. Systems change from inflexible, dedicated manufacturing of a small range of standard products to plants which are flexible and can produce a range of products; in addition to scale economies, economies of scope thus become increasingly important.
3. *Filières* develop between suppliers, assemblers and sellers, based on the systematisation of communication and the development of common systems.

The latter tendency became evident in the growing amount of EDI (Electronic Data Interchange) based communication systems in the production, trade and distribution sector, and, for instance, triggered the move of General Electrics (GE) and Mitsubishi into value added services provision (GE Information Systems, GEIS, and Mitsubishi Electronic Information Network, MIND). Horizontal and vertical networks were used from trade organisations to vast systems such as that created by General Motors and Mercedes to unite their far-flung operations. Other examples were development of electronic cash registers tied together to form EFTPOS networks (Electronic Fund Transfer at Point Of Sale), Electronic Trading Networks (ETN), urban management networks such as ASTARTE in France and TEMEX in Germany, transport information systems such as INTIS (International Transport Information System) of the Port of Rotterdam and computerised airline reservation systems such as AMADEUS and SABRE.

The post-Fordist strategy aimed for quality rather than just quantity, for flexibility of response rather than (only) standardised long runs, for skilled autonomous worker input rather than (only) the programmed

input of de-skilled process operators.

One set of commentators emphasise a new production paradigm. They argue that new technologies changed the face of production: in the first place the electronics breakthrough revolutionised in industrial production processes by making the Fordist assembly-line structure more flexible. The introduction of computers at management level contributed considerably towards making production flow more easily, thus lessening the need for extensive buffer stocks between different production sections. Even more important, electronics like Computer Aided Design and Computer Aided Manufacturing (CAD/CAM) permitted the introduction of flexible machines. In contrast to the semi-automated Fordist production line, industrial robots could be reprogrammed and adapted to perform a number of different tasks. According to some French regulationists 'flexible specialisation' emerged as a new production principle for the future: a large number of customised products were made in small units by skilled staff working on a variety of different tasks, using re-programmable manufacturing technology. Under flexible specialisation economies of scope would replace economies of scale as small, highly specialised firms would grow in importance (Roobeek 1987).

This view is contested since the findings of internationalisation theorists provide strong evidence that economies of scale still play an essential role in current economic developments. Moreover, vertical and horizontal integration and concentration and centralisation, are also prevalent tendencies in national and international economics. Indeed, economies of scale, integration and scope are generally better realised in large, often multinational, companies[3].

The breakthrough of electronics, and particularly micro-electronics, revolutionised also white collar work. The introduction of microcomputers on a massive scale meant that office work was radically streamlined and many existing services became more efficiently performed. Developments in information technology lead to the creation of new services specialising in efficient data handling. Additionally, more efficient production and the expansion of services helped to alleviate the growing problems posed by the exhaustion of the Fordist labour consumption norm. New or improved consumer durables were made possible by the electronics revolution. Hifi's, videos, electronic gadgets for cars and specific new consumer durables such as home-computers and personal computers (PCs) opened the way for the consumer goods market once again to expand on a large scale (Frantzen 1990, pp.180-182).

The neo- and post-Fordist changes challenged not only companies but trade unions and governments alike; an adequate response was needed on issues like flexibilisation of labour and the requirements for an innovation capacity in an economy geared to dynamic structural adjustments (Mathews 1989). Governments stepped up or introduced new R&D, educational programmes and other industrial policies

[3] See for this discussion: Nicholas Costello, Jonathan Michie and Seumas Milne 1989, pp.19-33.

in an effort to stimulate the restructuring of their economic base (Junne 1984).

New forms and mechanism of international production - and labour division - and complementary services emerged. In the electronics industry location shifts emerged among the major OECD countries and locational shifts from OECD centres to OECD peripheries (Ireland, Scotland etcetera) (Ernst 1987). Additionally, new offshore locations, such as the Philippines, India or the Caribbean Basin emerged. In the insurance sector and software production sector there are momentarily considerable movements toward the development of offshore production (data-processing and soft-ware writing and editing) (Graham 1990; Qvortrup 1992, p.94). Companies, TNCs, often use teleports, or VSATs (Very Small Aperture Terminals) and satellite networks to by-pass obsolete national networks of the peripheric region and exploit its cheap labour (a form of 'tele-imperialism').

These international developments needed, literally, not only a growing telecommunications network but also different, dedicated, specific networks. Not only did the demand for national and international (real time) voice telephony grow but equally, so did the demand for conveying data[4], the latter produced, processed and stored by several national and international companies. Each required more communications because of the application of new production and management techniques (eg. Just In Time, JIT production or Total Quality Control).

The introduction of new Information and Communication Technologies and new management was however not an easy nor painless development:

- Firstly, it inevitably took some learning and investment time to introduce IT systems and to establish their interconnection via networks[5]; often there were social and cultural barriers from unions as well as the management.
- Secondly, whilst during the first wave of IT systems some considerable efficiency gains were achieved, the 'faith' in the latest ICT systems dwindled as cycles of soft-ware and hard-ware shortened, investments for endless re-cabling and reprogramming spiralled and confusion and uncertainty over future developments reigned[6].
- Supply and demand side factors, such as outdated industry structures and information

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[4] Thus whilst world demand for voice-based systems is growing by 4% each year, demand for non-voice systems is growing by more than 20% per year. The amount of data volume doubles every three to five years (Communications News July 1992, pp.18/19)

[5] The work of Christiano Antonelli has emphasised the importance of 'disembodied learning by using' in the spread of IT and associated social innovations (Antonelli 1988).

[6] Two researchers of the World Bank argued in a recent study: "The aggregate impact of IT on productivity performance has been disappointing." Another expert commented: "What makes managers uneasy about IT is the lack of evidence that previous investments have generated business value." (both quotes from The Financial Times, August 12 1992). In the banking sector the adoption of ICTs initially led to decreased capital productivity and profitability (Franke 1987).

deficiencies about IT-opportunities, often hindered its introduction.

- Tariff and non-tariff trade barriers between countries hindered the economic use of IT and their networks; additionally, legal and technical infrastructures differed considerably, hindering the (free) flow of data or information. Particularly the use of different, non-compatible, proprietary standards, sometimes strategically developed for protecting a market or to lock in certain customers, frustrated interconnection and integration.
- As specific ICT applications (eg. an Electronic Trading Network) gave a group of companies involved a competitive advantage, they were sometimes reluctant to provide equal access to others. A closed system might be used to keep others out of an electronic market (Mansell and Jenkins 1992).
- Finally, institutional or regulatory environments hampered the development of IT and new networks. While PTOs traditionally had built national PSTNs for telephony and provided Plain Old Telephony Services (POTS) as a universal service, they were now confronted with a rapidly increasing demand for fast, national and international, and reliable data transmission and managed data networks. Mostly they were ill-equiped to meet that demand or refused, for diverse reasons, to develop new national and international networks and interconnections.

The last point, the mismatch between traditional standardised PTT supply and new, flexible and specialised large users demand, became soon an important catalyst for the disintegration of the traditional Mode of Telecommunications Regulation.

3.4. New Networks and Services: Responses from PTTs and Companies

The growing scale and scope of companies from the 1950s onwards corresponded with a growth of national and international voice traffic and, once IT and ICTs were introduced from the 1970s onwards, with a growing demand for data and - more recently - video links. As most of the international trade actually consisted of intra-firm trade (Holland 1987, p.47), most international telecommunications involved intra-firm traffic. Consequently, most international (and national) networks were in fact intra-corporate networks[7]. The use of IT and post- or neo-Fordist management and social innovations prompted a rapidly increasing demand for transmission and switching capacity, mobility, reliability, intelligence, speed and flexibility in network configurations. The signs of changing demand by particularly large, international business users was originally ill understood by the traditional PTTs which had grown up under Fordism and were consequently used to plan and build uniform, highly standardised networks such as the PSTN and its originally planned successor, (narrowband) ISDN. The increasing divergences between residential households and business customers forced the PTTs to fundamentally re-evaluate their networks, the quantity, quality and diversity of their service packages, their tariffs as well as their general priorities. This re-evaluation was often particularly prompted by political and economic forces unleashed by liberalisation policies (discussed in section 3.5. and Chapters VI and VII).

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[7] An 1983 OECD study estimated "[...] that in automated offices at least 80 per cent of information flows will be intra-establishment, and 20 per cent or less interestablishment." (OECD 1983, p.79).

3.4.1. From PSTN to Leased Lines to Private Networks

Leased lines as such were hardly a novelty: for instance, the Dutch PTT introduced unswitched, permanent telephone line connections in 1907. They proved to be a huge success because in those days (switched) inter-local telephony was scarce and burdensome due to general equipment shortages (Hogesteeger 1989, pp.150/151). The national, inter-local leased lines were mainly used for intra-firm communication by companies with offices spread over a larger geographical area. The advantages for the PTT were that the leased lines formed a regular stream of revenue (the tariff was a lump-sum charge, irrespective of traffic volume) and it did not require scarce inter-local switching capacity. The leased line customer was assured of a permanent connection (no waiting time, high availability and high reliability), fixed costs (high predictability), cost savings for high-density routes and increased corporate control over the network's performance. The early leased lines in the Netherlands became such a success that, confronted with a serious transmission capacity shortage, the Dutch PTO decided to increase the tariffs in 1919. International leased lines were often much more difficult to obtain: apart from problems of establishing reliable transatlantic (wire or later radio) connections, there were strong economic disincentives. Generally, leased circuits only become viable once a certain density of traffic can be guaranteed between two points, or nodes. This in turn depends on the company not only having multi-domestic operations, but also on whether these multi-sited activities are truly integrated, that is driven by integrated management, accounting, marketing, production and distribution practices, thereby exploiting international economies of scale and scope. Such a high level of international intra-firm integration did not become common practice until the late 1970s. The increased internationalisation and company integration spurred then a massive increase in the volume of intra-corporate communications, thereby making national and particularly international corporate networks viable (Mulgan 1991, pp.228/229). The developments in micro-electronics, the expanding application of computers internally and externally (eg. to regulate material flows within a company or to link up with customers and suppliers), the restructuring of the supplier market (computer firms offering network equipment and telecommunication manufacturers supplying not only the monopoly carrier but also the corporate user) and the introduction of new management techniques, gave a further boost to the unfolding private networks which have become increasingly sophisticated or dedicated (Bar and Borrus 1987).

Although most leased line corporate networks nowadays still mainly carry (real time) voice telephony, the increasing use of computers, first isolated and later interconnected, spurred a demand for special data links. Rapidly decreasing prices for microprocessors and the emergence of PC networks stimulated data transmission even further. Special links were required since, unlike voice traffic, data requires more reliability and security, a higher degree of error control and architectures appropriate to rapid, sporadic bursts of computer data. The traditional PTTs were too slow to adapt to these new demands, so consequently it was computer firms such as IBM and General Electric who set up the first private data

networks, later followed by the first world-wide hotel and airline reservation system SITA (*Societé Internationale de Télécommunications Aeronautiques*) (Langley 1990, pp.111-113). For the companies using these private data networks there are some considerable gains: the costs of computers with a fast, large processing and storage capacity are often too high for installation at each point in the companies' organisation. Considerable savings can be made by installing a main-frame computer at only one point in the organisation's network and connecting it with terminals in the branch offices. Particularly airline reservation systems, retailer systems (eg. EDIFACT and EFTPOS), large companies in general (eg. for pay-roll administrations, intra-company communication) and financial companies, such as banks and building societies (eg. to maintain details of customers accounts, EFT and interconnection of Automatic Till Machines) are large users of these computer networks. Organisations also found it attractive for various reasons to be able to share access to their computers and databases with other parts of their own local organisation (so-called distributed computing). To enable one computer to interwork satisfactorily with others in the same area, Local Area Networks (LANs) were developed[8]. Subsequently high speed networks have been designed to carry data calls over longer distances: Wide Area Networks (WANs) and more recently Metropolitan Area Networks (MANs) are, for instance, used to interconnect LANs[9].

Since traditional PTTs originally hardly reacted to the new demand, pressure built up to break the operators infrastructure monopoly and to interconnect one's own networks. In some countries - eg. in the USA after the Above 890 decision in 1959 - it became possible to by-pass the public network completely for developing these intra-corporate dedicated or private networks. US companies - later followed by their European counterparts as liberalisation proceeded there too - were allowed to build their own networks, and to connect their own terminal equipment[10]; these companies would consequently build their own national and international networks out of a mix of self-owned, leased and public networks. Most often, companies built their private networks out of lines leased from the PTTs; whilst this formed no physical by-pass of the public network, it nevertheless constituted a damaging economic by-pass of certain PTT services. New transmission capacity was later offered by new operators (new Public Telecommunications

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[8] The fast growth of LANs has particularly been spurred by the tremendous growth of intra-corporate communication based on interconnecting PCs. According to a survey published in Communications News PC LANs have reached an estimated 7 - 12 per cent of all PCs in the last five years. According to the same survey penetration will climb considerably over the coming years (Communication News, July 1992). IBM's Token Ring, Apple Computer's Apple Talk, Xerox's Ethernet and Digital Equipment Corporation's DECnet are renowned network software systems, each however with a different topology and interconnection technology.

[9] Switched Multi-megabit Data Services (SMDS) are currently emerging in response to the specific market for LAN-to-LAN interconnection over a public network. Initial implementation will be at speeds up to 34 Mbit/s, also suitable for video transmissions.

[10] Legally and technically the PSTN was regarded as one whole, including its highly standardised, uniform and mass-produced terminal equipment. The connection of other than PTO provided equipment was mostly regarded as an anathema.

Operators, PTOs), often using their own international and national networks (the Private Transatlantic Telephone Cable, P-TAT 1 and 2, PanAmSat, MCI, US Sprint and Mercury). The continuously increasing capacity of new cable and satellite networks and the rush to build intercontinental links (quite similar to the 1860s rush to build telegraph networks) has caused a considerable excess capacity in the main routes (particularly between Japan, USA and UK-Europe) (Johnson 1987)[11].

The battle between the traditional telecommunications sector and the newer IT sector was also a clash between two totally different business cultures: Arnbak has pointed out that there is a wide cultural gap between the 'wilder', more 'individual' entrepreneurs characteristic of electronic data processing and IT, and the civil-service ideals of reliable procedures and emphasis on order and compatibility, which prevail in networking (Arnbak 1987). PTTs, confronted with diversifying demand, therefore responded cautiously: originally they tried, reluctantly, to meet the new demand by leasing high(er) capacity lines to large companies, thereby holding strict control over the lines' specificities and the terminal equipment (modems[12] etc.) (Leeson 1987). The large users were however not pleased to find themselves saddled with reluctant and inflexible PTTs often unwilling to respond to their specific and diverse demands as regards network qualities, the connection of non-PTT supplied terminal equipment, the availability and capacity of transmission techniques and tariffs. For them new and fast changing IT technologies and their networking had become an essential part of enhancing productivity, quality, efficiency and flexibility of production, marketing and distribution and had thus become an essential part of new growth opportunities and competition. Electronic communication systems had indeed become the defining architecture of the corporation.

The conceived inertia, the low-tech profile and inflexibility of the PTTs thus prompted large users, computer companies and new entrants offering managed data network services (eg. Electronic Data Systems, EDS) to build up their own network, based on leased lines. Particularly large companies increasingly invested vast amounts of money in ICT to provide flexibility in adapting equipment to meet the needs of the users inside and outside their organisation and introduce state-of-the-art technology (Dowling 1990). Consequently the traditional Fordist model of one, geographical, uniform, centralised, analogue, public network (PSTN) architecture offering a limited range of highly standardised services (POTS, telex and telegraphy) was gradually replaced by a public network overlaid with a myriad of

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[11] Particularly the capacity, quality and cost-effectiveness of submarine communication cable systems have improved considerably, profiting from rapid progress in fibre communication systems. Long haul systems were initially developed in the mid-1980s usually operating at 280 Mbit/s (i.e. almost 4,000 x 64 kbit/s bearer circuits per fibre pair). Current systems work at 560 Mbit/s; state-of-the-art systems such as Synchronous Digital Hierarchy (SDH) increase the capacity of submarine optic fibre to 2.5/5.0 Gbit/s by 1995 (Lilly 1992).

[12] Since the PSTN is based on analogue transmission the digital out- and input of computers has to be converted first before transmission over a PSTN line. A modem (modulator - demodulator) takes care of this conversion from analogue to digital and vice versa.

private and exclusive networks and services.

A growing pressure from large users for fundamental changes in the way telecommunications was regulated received considerable support from both the computer industry and the emerging managed network operators and Value Added Services (VAS) and Value Added Network (VAN) suppliers. The computer industry, largely dominated by the US IBM, wanted to abolish the PTT's monopoly on terminal equipment in order to enter this fast growing and increasingly computer-like market. Additionally they realised that they could control the network and its future evolution if the PTT would only provide a simple 'tube' for sending bits (data, voice or video) between several points, while the computer companies could deliver the required sophisticated software included in their terminal equipment. In other words: they would provide the value added and thus the most profitable share, leaving the 'dumb' and less profitable transmission of bits to the PTTs. Equally, the VAS providers wanted to abolish the Fordist regulatory model as a more liberal and flexible regime would allow them to resell their leased lines after adding a certain value (hard- and soft-ware) in order to offer, for instance, certain managed data services.

3.4.2. ISDN, Hybrid Networks, INs, and VPNs

It would be too simple to depict the start of the fundamental restructuring of the traditional - Fordist - telecommunication regulation as the 'tipping over' point, that is the demise of shared telecommunications network facilities or the breaking up of the cohesion of infrastructural, economic and political forces supportive of that old model (Noam 1992). NíShúilleabháin has argued that such a view is too static and presumes a passive and unreactive PTO clinging to its homogeneous and unified core network, surrounded and interconnected with a heterogeneous federation of subnetworks (NíShúilleabháin 1992, p.1). It would be equally wrong to depict the traditional PTTs as historically and *a priori* unresponsive to the specific interests of their business users. Apart from the fact that (as argued in Chapter II) business users were originally supportive of the establishment of a Fordist model of telecommunications regulation - which in Europe included nationalisation - they also profited from special provisions, such as preferential treatment (eg. shorter waiting lists and quicker repair of faulty lines) and leased lines which - as we will discuss later - were sometimes priced under their cost of provision.

Moreover, the traditional PTTs increasingly realised throughout the 1970s and 1980s that there was a genuine demand for improved data facilities which the PSTN, with its low traffic capacity and sluggish bit rates and relatively long call set-up times, could not cater for. New switching technologies and high(er) speed network components were introduced. Message switching, packet-switching and, more recently, fast packet-switching, Asynchronic Transfer Mode (ATM) and frame relay - all made possible by the computerisation of the switches (SPCs) of the networks - were (and are) gradually introduced as

an improvement to the commonly used PSTN circuit switching techniques[13]. New, faster data network components have also been developed: frame relay has been developed as a 'turbo-charged' version of packet-switching. Whilst packet-switching can handle data speeds from 2.4 kbit/s to 256 kbit/s, frame relay can handle data traffic up to 1.5 Mbit/s. Switched Multi-Megabit Data Service (SMDS), currently planned by some major Public Telecommunications Operators (PTOs), provides speeds up to 34 Mbit/s or more. Speeds go even further up using optical fibre technologies: Fibre Distributed Data Interface (FDDI) can handle traffic up to 100 Mbit/s, whilst in laboratories equipment is being designed and tested for Gigabit networking (eg. Wavelength-division Multiplexing for 10 Gbit/s transmission!) (Kazovsky *et al* 1992; Tolmie 1992).

In technological terms, the underlying driver for the increased networking speeds was the growth of LANs interconnecting PCs which become more powerful and fast; LAN traffic is currently growing at 30 per cent per annum (Williams and Wilson 1992). Additionally the emergence of image and video based applications demanded much more power and capacity from communication networks.

The traditional standardisation process has also been affected by all these changes. The ITU's CCITT remained a major platform for recommending the appropriate technical rules and regulations (protocols) in order to guarantee national and international compatibility. Nevertheless, problems arose due to growing overlap with computer standardisation institutes and the emergence of regional standardisation activities (eg. the European Telecommunication Standardisation Institute, ETSI) (Hawkins 1992). Additionally, a growing number of *de facto* and proprietary computer standards have entered the telecommunications field, effectively decreasing the control of PTTs and the CCITT. For instance, Transmission Control Protocol - Internet Protocol (TCP/IP), is a UNIX-operating system related protocol and, as a direct competitor to X.25, has increasingly been used for LANs and WANS; TCP/IP is not conformant with the so-called Open System Interconnection (OSI), a non-proprietary, open and multi-layered data communications architecture which is also adopted by the CCITT (Costello 1992).

National and international transmission capacity was enlarged by employing high performance coaxial cables, fixed (radio based) terrestrial data links, satellites and, from the mid 1980s onwards, optical fibre links. Many a European PTT embarked on a modernisation programme (including the digitisation and

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[13] With circuit switching a complete communications circuit is established for the exclusive real-time use of the subscribers for the duration of a (continuous) call. Circuit switching is not very practical for computer communications since the latter comes in discontinuous, rapid bursts of data. Message switching is based on a store-and-forward technique, built into the computerised switches or nodes of the network, which makes more efficient use of the network's capacity by not using a whole circuit continuously; it is however generally inappropriate for interactive working as sometimes significant delays can occur. With packet-switching, data streams are split up into short packets with well-defined formats which, due to small end-to-end delays, makes interactive working practicable. Finally with Asynchronous Transfer Mode (ATM), an even more efficient use of the network capacity can be made by adjusting the bandwidth of an interface or transmission link dynamically to the demand being made on it.

soft-ware upgrading of the main switches and the introduction of optical fibres in the trunk networks) not only to increase the general efficiency and performance of their own network but also to improve their service provision to their main and most profitable customers: the large business users.

The development of ISDN as the 'natural upgraded, digital successor' of the 'obsolete and analogue' PSTN, was another response from the PTTs to changing demands and market structures - a response which by the way fitted in nicely with the rhethoric of the information society (Wigand 1988). For various reasons advanced by the manufacturers of telecommunication equipment in the early 1970s[14], the PTTs were (originally) interested in ISDN as a means to redress the balance of public and private networks in their favour. They hoped that ISDN would move some of their business customers, often using leased line based private networks, back to their main public network thereby enlarging their revenues and profits. An additional advantage was that the costs of ISDN would be relatively low for individual users as its costs would be spread out over the whole network, that is the whole customer base of the PTT (Gottschalk 1991, p.168; see also section 4.7. on cost allocation). Thus whilst ISDN was specifically designed for computer communications, and would be of little or no use to residential consumers[15], the latter would nevertheless contribute most towards the costs of its introduction and maintenance.

In spite of all the original ISDN 'hype' and the European Commission's efforts to promote a Euro-ISDN, its current prospects have dwindled due to uncertainties over exact ISDN standards (different PTOs have adapted different ISDN versions), a general lack of ISDN terminal equipment, growing insecurities caused by liberalisation in the late 1980s and a general lack of demand (Fuchs 1992). Competing networks, based on private leased lines or special overlay networks, sometimes installed by the PTTs themselves, have eroded the confidence in the idea of ISDN as an universal, public service network,

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[14] ISDN would not only create a new mass-market but, more importantly, could be instrumental for the equipment manufacturers to reconquer the control over the networks they were losing out to computer manufacturers. Particularly the dominant IBM formed a serious threat since it had developed its own proprietary System Network Architecture (SNA) in 1974 in order to lock its customers in its own standard and extend its control in telecommunication networks and computing (OECD 1983, p.78). The possible expansion of control from computing into telecommunications by the US computer TNC struck a sensitive cord in Europe (Nora and Minc 1979). The non-proprietary, open systems movement (headed by the Open System Interconnection, OSI, model from the International Standardisation Institute, ISO, and supported by the CCITT) can be seen as a common reaction from telecommunications equipment manufacturers, PTOs and smaller computer manufacturers to the threat from 'Big Blue'.

[15] Basic Rate subscriber access to ISDN provides two 64 kbit/s channels and one 16 kbit/s channel (represented as 2B + D). The 16kbit/s data circuit (D) is to be used for signalling and relatively slow data and one 64 kbit/s (B) circuit is available to be used either as a fast data or second voice circuit. The other 64 kbit/s (B) circuit is for voice. Clearly, the 2B + D formula constitutes an overcapacity for a standard telephone call and is thus of no use for residential telephone customers if they require POTS (using compression techniques 4.8 kbit/s would even be enough!). Basic Rate ISDN is more likely to be of use to small and medium sized businesses which require fast faxes (so-called group 4 faxes) and/or require intensive but relatively low speed computer links (Analysys 1990). Primary Rate ISDN, providing 30 B circuits, is specifically designed for large business users.

leaving ISDN's market outlook limited to some niche market applications (Daniels 1992a).

Centrex is another example where PTTs tried to gain control over a specific market segment: the automatic branch exchange. In order to save on the amount of external lines and improve internal communication, companies have installed first manual and later automatic Private Branch Exchanges (PBXs). Unlike telephony, which generally was an exclusive PTT monopoly (including infrastructure, telephone sets and service), the PBX, or in-house switching systems, were excepted from this monopoly. To gain a part of a fast-growing PBX market in the 1970s and 1980s PTTs tried to market their Centrex systems. With Centrex the PBX functions are built into the PTTs central office exchanges; thus the 'value added' remains under control of the PTT rather than the PBX producer and PBX user (Langley 1990, p.43-46).

More recently the PTTs have tried to get their large customers back onto their own public networks via offering so-called national and international Virtual Private Networks (VPNs) (Greenfield 1991). As building blocks for these newly evolving networks they rely on what is called the Intelligent Network (IN). The latter represents both typical post-Fordist technological and managerial innovations. In the IN a strict separation is introduced between development, management and control of the telecommunication services. The control of the exchanges is concentrated in central computer systems (Service Creation Environment, Service Management System and Service Control Point) in order to advance swiftly and flexibly new services in the whole network (de Beer and van der Veen 1992). Services can be taylor-made and require only a fraction of the time it cost to introduce new services in the past (decreasing the 'time to market' considerably and shortening 'service life cycles'). Some examples of these new services are: call-forwarding, voice processing, automatic call distribution (ACD), alternate billing services (ABS, eg. green number services) and integrated messaging. For providing its services IN heavily relies on the digitisation of the network, data communications and the CCITT common channel signalling system (CCSS No.7 or SS7)[16]. An additional advantage is that the new concept allows more efficient routing of the traffic. At the same time these more sophisticated services require much more traffic. For instance, for basic call handling a future mobile system such as Personal Communications Network (PCN, see next section) would require 7 times the signalling and 3 times the processing power of a standard fixed call. Additional service requirements (voice mail, intelligent and adaptable call-screening, cross-network billing etc.) would provide even higher calls on both network intelligence and traffic capacity.

Apart from increasing the value added to its new and existing services the PTTs have also made special

[16] With CCITT CCSS No.7 signalling has been completely separated from switching and speech transmission and thus may evolve without the constraints normally associated with such factors. Being significantly faster than traditional voice-band signalling and more flexible, CCSS No.7 has been designed to control the setting-up and supervision of not only telephone calls but of non-voice services also, such as word processors, teletex machines, computer communications etc.

service packages for large users based on IN. Instead of leasing a continuous, fixed and thus expensive capacity from the PTT, large users would be offered discontinuous links which attributes bandwidth dynamically according to the demand being made on it (bandwidth-on-demand). Provided the tariffs are right VPNs could be cheaper than leased lines. Furthermore, unlike conventional public circuits, IN based VPNs could give the customer some control over the software in the network in order to make up or manage its ('virtually') own network and services, whilst leaving nevertheless most of the 'burdensome', 'nitty-gritty' ICT and management to the PTTs (this externalisation of non-core activities is known as 'outsourcing'). PTTs are currently trying to set up international or worldwide VPNs (WPNS), making bilateral connections and agreements with as many developed countries as possible. These interconnections would also create a more seamless international network, where customers would not have to deal with a different carrier, different tariffs and different standards each time a border was crossed. This so-called 'one-stop-shopping' concept therefore requires the integration of different systems (Gasbarronne 1992).

Another, increasing, pressure on the PTTs which is directly related to the demise of the Fordist accumulation mode, is the revenue gap caused by the (future) erosion of their existing revenue base:

* as, generally, less than 20 per cent of the PTT's customers generate approximately 50 per cent of its revenue and account for 80 per cent of its profits (Analysys 1991a), then a new entrant is likely to target this highly concentrated and profitable market segment for its operations (cream-skimming); PTTs will have to react to this potential threat of liberalisation;
* the growth of POTS, still PTTs' core business, is slowing down: while world demand for voice-based systems is growing by only 4 per cent each year, demand for non-voice (data, video) is growing by more than 20 per cent per year[17]; additionally, the most profitable future services are likely to be services with considerable value added, and not POTS.

For large TNCs where ICT expenditure has increased to 10 per cent or more of its total turnover, and forms - after staff and real estate - its third largest expense, a reassessment of its ICT strategy may become paramount. Options can include sticking to dedicated private networks and in-house ICT management, using its in-house ICT knowledge and capacity to enter the market as a service provider itself (if regulation admits), migrating to (international) VPNs or (less radical) partially migrating to VPNs (hybrid public/private network structure). Not surprisingly, companies' decisions will not only be made on the basis of security[18], service availability and service quality, but also on costs, that is the

[17] Not only wired based networks are increasingly used for data communications; market analysts predict that by 1995 more than 60 per cent of radio based business communications will be data (Adam 1992, p.19).

[18] Security of communications can be an important reason for a company not to rely on public networks or - for that matter - on open standards; the tension between open and public systems and the security of user's resources is however often overlooked (Adam 1992).

tariffs charged by the PTTs.

3.4.3. Increased Mobility and Radio Based Networks

Another development which changed network infrastructure was the increased availability of radio based communication systems and the booming demand for communications mobility from the mid 1980s onwards.

Technical progress and productivity improvements have overcome many of the earlier problems of costly, bulky and imprecise radio communication devices and have pushed radio communications higher up in the GigaHerz regions of the spectrum. Notably in the field of mobile personal telecommunications, advances in micro-electronics (powerful, cheap and low-energy consuming integrated circuits, miniaturisation and new techniques for organising the labour process) have spurred the development of highly sophisticated and cheap(er) handsets, base stations and other mobile network equipment. Radio communications was already used for broadcasting purposes, small (private) mobile systems, trunked (private) mobile radio, mobile car systems and fixed link microwave connections, the latter mainly used by the PTTs. Throughout the 1980s several additional personal mobile systems have emerged: after the introduction of analogue cordless telephone systems (eg. CT/1), digital cordless techniques were produced (CT/2 and, on a European scale Digital European Cordless Telephony, DECT). Equally, after the development of analogue cellular systems, cellular and digital systems have been planned, although the delayed roll-out of digital mobile systems (eg. GSM, *Groupe Spéciale Mobile* and PCN, Personal Communication Networks, PCN) and cordless technologies (CT/2 and DECT) have created uncertainty over their futures[19]. More recently cordless access systems have been proposed for the local loop (so-called radio-tails; van der Hoek 1991) and microwave based Cable Television (CATV) systems (MVDS, Microwave Video Distribution System); but again, the rolling out of these networks seems more like a 'strolling out'. Paging systems have been more successful. Traditional paging systems have profited from technological improvements and have often adopted extra features.

Decreasing costs and sizes of satellite receivers and transmitters have spurred the development of new

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[19] CT/2 is the second - digital - generation of Cordless Telephony and provides a one way mobile public access to the PSTN. Telepoint is the UK CT/2 version (which largely was a failure, see: Littler and Leverick 1992); *Pointel* (now *Bi-Bop*) is the French CT/2 version and Kermit the Dutch (the German CT/2 system was abandoned by the Deutsche Bundespost Telekom in January 1993). PCN is, as to the pan-European GSM, a (future) cellular and digital mobile system, but optimised for high-density and high-capacity operations. PCN licences have been issued so far only in the UK (three licensees, but two merged in 1992); Germany is going to licence a PCN operator while France is considering licensing local PCN services. GSM is still in the doldrums. The complexity of creating a fully functional GSM simulator, against the backdrop of constantly evolving specifications, was severely underestimated (Daniels 1992b).

(land, sea and air) mobile satellite systems such as VSATS, which are often used for specialised links and services such as videoconferencing and Closed User Group services (Millard 1990). Other new mobile systems, replacing and/or complementing existing wire-based links, are: cordless PBXs, cordless inter-LAN connections and personal mobile satellite systems such as Motorola's Iridium.

The exponential growth of mobile systems reveals the need for increased mobility, availability, accelerated transactions, flexibility and 'real time' reaction in voice, data and video communications (Jarrat and Coates 1990). These requirements in their turn reflect - as we have discussed above - changing patterns of production and consumption in societies.

Currently efforts are being made to integrate fixed and mobile networks into Universal Personal Telecommunications Services (UPTS). This new technology promises to provide a range of more flexible and personalised subscriber services. Calls (voice, fax, data) would reach subscribers wherever they are located or wherever they want them to terminate. UPTS will however have to overcome time and money consuming obstacles first. It requires a substantial amount of intelligence in the network and wide-ranging and contentious standardisation of protocols, billing procedures, administration, service quality and so forth. A substantial amount of intelligence and capacity is required in order to define services separately from the core network functions and signalling, and to cope with increasing volumes of signalling traffic (Littlejohn 1992).

3.4.4. Networks under Post-fordism

Probably the most radical change and challenge for PTTs, regulators, equipment manufacturers, customers and new entrants in the telecommunications market alike, is the demise of the traditional, highly integrated[20], hierarchical and standardised public network: the old PSTN providing POTS had a straightforward, logical and hierarchical switching and transmission order: from the twisted copper wires in the local loop to the local exchanges which via higher capacity cables or fixed radio links led to the junction network and the trunk network and ensuing switches higher up. Terminals (telephone sets) were mainly 'dumb', the national network was subdivided in districts and local call areas, signalling was included in the voice channel and switches (manual or automatic) represented the intelligence for call set up and billing purposes. All this has gradually been dissolved into a much more blurred and complex

[20] 'Integrated' refers here to the physical and technological cohesion of the network. It does not automatically allude to social and political integration: the fact that in most European countries a strong consensus on telecommunication regulations has existed for more than a century, does not exclude the fact that the telecommunication networks often reflected historical asymmetric power relations between metropolis and *hinterland* and business users and residential users (see also section 1.5.1.).

network - labelled as the 'geodesic network by Huber[21]. Some of the emerging characteristics of the newly emerging network(s) are:

* intelligence exists both inside and outside the network;
* the logical network topology is becoming independent of the physical network topology (thereby dissolving for instance local call areas); a growing amount of traffic will be in fact separate signalling routing data through the networks;
* the traditional network hierarchy is also increasingly by-passed by special links feeding directly into higher layers of the network; particularly local networks are by-passed (Mansell 1986)[22];
* a great number of smaller, private networks are interconnected to larger, public ones;
* the latter themselves are increasingly overlayed by special (more intelligent) networks in order to compete with the private networks;
* an increasing number of radio based networks coexist with the wire based networks; and
* open system protocols and world-CCITT standards coexist with proprietary, and regional ICT systems.

Although - from the perspective of a large user - public networks in the form of IN/VPNs are coming closer to offerings of private networks (Duckett 1992), questions have been raised as regards the reduced transparency of networks eroding the government's ability to control or regulate (Irwin and Merenda 1989), the growing privatisation or virtual privatisation of the use (and thus access) of networks (Noam 1991) and the growing dangers of ending up with an incompatible and confusing patchwork of networks and technologies (Mulgan 1990).

3.5. Deregulation, Liberalisation and Privatisation

The complexity of the telecommunications networks - the 'largest machine in the world' - has further increased as, due to liberalisation policies, new entrants were allowed to build their own networks, by-passing the PTTs. The pro-liberalisation constituency originally consisted of computer manufacturers and large business users as already mentioned above, plus mostly (neo-)liberal political parties and (neo-)liberal ideologists (journalists, political commentators, academics etc.). Leeson voiced the opinion of industry when he stated:

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[21] Huber described the new emerging network as geodesic since the traditional centralised and regulated pyramid network of the PTO is replaced by a group of networks surrounding, or incorporated in, the basic, more decentralised, core network (Huber 1987).

[22] This essentially means cheap transmission systems, linking clusters of (business) users directly to the higher network levels, skip the often more expensive local network. Flamm has pointed out that, rather than shifting toward a much less hierarchical, decentralised network model as Huber envisions, this by-pass phenomenon, skipping lower and intermediate switching levels, will actually increase centralisation (Flamm 1989, pp.60/61).

> "Telecommunications services will have to grow and diversify in step as more industries find novel ways of applying telecommunications and information processing to improve their efficiency. If the prices and variety of telecommunications services do not keep pace with the diversifying demands of user industries, serious bottlenecks could result and the search for competitive advantage significantly compromised. This could well be an important determinant in any nation's drive to remain internationally competitive, and places telecommunications policy squarely on the larger agenda of national economic policy." (Leeson 1987, p.122).

In the new post-Fordist environment the large users want the flexibility to size their networks to meet the continually changing demand which are placed on them, while retaining high standards of quality that are the rationale for private corporate networks - and keeping control of costs. As one commentator put it, "In essence what they want is lower costs, lower costs, and better services - for lower costs." (quoted from Analysys 1991, p.35). Liberalisation - the opening up of a formerly closed market - together with deregulation - the relaxation or cutback of existing rules - have been suggested as the appropriate policy instruments. Computer industries often supported liberalisation since it would give them further opportunities to move into telecommunications as equipment suppliers (increasing their grip on the PTTs' network via their intelligent terminals) or even as VAN providers. The provision of VANS by third parties or - one step further - the simple resale of unused leased line capacity were only possible if the PTTs monopoly would be reduced. The most radical step would be to lift the PTT's monopoly on the infrastructure, provide equal access to new market entrants and allow these new entrants also to build their own local, national, or international, fixed or mobile networks.

These demands and proposals have been forwarded in the late 1970s and particularly throughout the 1980s when many OECD governments, faced with a financial crisis of the welfare state and an alleged collapse of traditional Keynesian intervention politics[23], introduced new policies of deregulation and stressed the importance of the so-called 'free market mechanism'. The liberalisation and deregulation movement in the western industrialised world also coincided with the coming to power of right-wing governments. For the new right-wing, neo-liberal and conservative governments, such as the American and British administrations under Reagan and Thatcher, personal liberty equalled negative freedom: the 'freedom from' state interference in private, economic actions. This negative personal freedom, conceptualised in economic terms, was a prerequisite for the creation of wealth for individuals and society at large. State interference, it was believed, hindered such personal freedom and wealth creation, and was costly and wasteful moreover as state regulation consumed money and time unproductively (Hills 1986, pp.24/25).

The USA has played a crucial role internationally, promoting and enforcing liberalisation. Having itself

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[23] The irony of the 1980s was that one of the most fervent advocates of neo-liberal and monetarist policies, US president Ronald Reagan, was actually implementing a militaristic version of a Keynesian deficit spending policy.

a long history of regulation - for defending the 'public interest' or intervening in cases of 'market failure' - the regulatory agencies came increasingly under attack in the 1970s. Economists had long criticised the regulation of the transport (airlines, railways) and utilities (gas, telecommunications) sectors for promoting inefficiencies and high prices. They also claimed that the traditional rationale for regulation - natural monopoly, universal service and market failure - was a chimera: contrary to the traditional, Fordist telecommunications regulation philosophy, they argued that competition, or the threat of competition, was not only feasible but also socially and economically beneficial (Baumol, Panzar and Willig 1982[24]). This position delivered the scientific foundation of the deregulation and liberalisation moves from the mid 1970s onwards. In the USA the traditional credo of Vail and the Bell System came under severe challenge when the private monopolist, AT&T, was divested in 1984 from its 22 local operating companies which were grouped into 7 regional companies (Regional Bell Operating Companies, RBOCs). Local services were considered to be monopolistic and remained the exclusive domain of the local carriers, but long-distance and terminal equipment were considered competitive, and were consequently opened; AT&T was excluded for a seven-year period from the electronic services sector in order to stimulate competition, but was on the other hand released from many of its old regulatory shackles (eg. it was now allowed to enter computing). Deregulation soon turned out to be re-regulation. Regulators and politicians were namely determined to stimulate competition which required 'artificial' measures to protect and support newcomers against the dominant incumbent carrier. In addition new regulation was required to guarantee a minimum degree of compatibility and interconnectivity (Breyer 1990).

The politico-economic forces unleashed by US liberalisation have affected other parts of the world as well, directly or indirectly. The 'unleashed' AT&T, together with its competing long-distance carriers and VAN suppliers, penetrated foreign markets. These US operators have a considerable competitive advantage because the USA represents the largest single market in the world and forms the domicile for many of the top 100 world TNCs, among which are the largest computer and database companies. These US TNCs are among the heaviest national and international ICT users in the world (Antonelli 1985) (see also section 6.5.).

Each OECD country reacted however differently to the external and internal pressures, each according to its own social, political and economic constellations and backgrounds. In Europe state or public ownership remained the dominant form of regulation - the UK having first gone through a phase of private ownership and competition. Consequently the European deregulation movement was (is) often translated into arguments for privatisation of the PTOs. Equally, as we will see in Chapter VII, the challenges differed in Europe: for instance, some PTOs provided relatively poor services for high tariffs,

[24] This same trio were also the major advocates of the 'natural monopoly' argument, the threat of competition and the need for regulation before 1982!

whilst other PTOs cooperated closely and satisfactorily with their large customers. Some countries radically changed their telecommunications policy, while others reluctantly introduced only some confined changes and further stuck to their traditional policies while traditional policy networks largely remained intact.

Liberalisation policies were however not only enforced for the ideological adulation of Adam Smith and for the interests of large, corporate users: major industrialised countries such as the USA, Japan and the UK saw competition in this particular industry as enhancing domestic and international industrial competitiveness and reinforcing their roles as international telecommunications centres (hubs for transmission and VAN services) (Langdale 1989). Liberalisation has consistently been parallelled (sometimes even overshadowed) by state interventions. Industrialised nations or trade blocks such as the European Communities have extended state interventions not only to deal with new political and administrative problems created by a changing market structure, but also to keep up with an increasing international 'race' in telecommunications' applications, R&D and general performance (Hills 1984; Jussawala 1987; Roobeek 1990). Industrial policy concerns have, for instance, fuelled much of the European debate on integrated broadband; a so-called Integrated Broadband Communications Network (IBCN) was originally designed to provide a pan-European electronic communications grid, boosting European manufacturers, service providers and the European economy in general (Joosten 1992a).

New regulation has additionally been provoked in the years of 'deregulation' and 'liberalisation' by concerns about the social impact of new ICTs (threats to privacy and public service)[25], its impact on rural or remote areas (marginalising the periphery) and the increased uncertainties of an industry in turmoil (confusing investors) (Voge 1986; Lamberton 1986).

3.6. Conclusion

The Fordist Telecommunications Regulation Mode (TRM), established in a century-long process within the secure boundaries of the nation state and supported by the close ties between regulator, operator and industry, came under severe attack throughout the 1980s. A combination of new developments eroded this traditional TRM: a change in the political climate with the emergence of neo-conservatism and neo-liberalism, the challenges of a new growth model (post-Fordism), the speeding up of internationalisation

[25] Introduction of new telecommunication technologies can have various direct and indirect social effect eg. user aspects (reliability, privacy protection, protection against financial and other kinds of frauds and suitable user and operations procedures), equipment aspects, changing working conditions, effects on the vulnerability of society as a whole etcetera (see Slaa 1988, p.xii). These social concerns have stimulated so-called Technology Assessment (TA) research throughout the 1970s and 1980s; TA has however not been successful in fulfilling its aim of influencing technology development (Kubicek 1991).

and corporate integration, the growing importance and power of national and international large companies, the digitisation of information processing and transmission, the changes in demand for telecommunications services, the quest for intelligence, flexibility and mobility built into networks, the ineptitude of the traditional, often bureaucratic, PTTs to respond to these rapid changes - all these factors pushed for fundamental changes in the way telecommunications used to be regulated under Fordism.

This chaotic and contentious process of dissolution of the old model started, not surprisingly, in the country where it first reached its maturity, the USA; but it was soon to spread to other parts of the industrialised world as well, thereby each time adapting to the specific circumstances of the country involved.

CHAPTER IV

TELECOMMUNICATIONS TARIFFS: THEORIES, PRINCIPLES AND PROBLEMS

4.1. Introduction

One of the corner stones of the Fordist Telecommunications Regulation Mode was its specific tariff taxonomy - an issue which formed an important part of the struggle to establish the old Fordist TRM, and an issue which again has become a bone of contention since the Fordist model started its decline.

Tariffs are not a simple, straightforward issue. Tricky questions have arisen because of the typical network character of the service, the claims of natural monopoly and because of the utility character of telecommunications. These elements have made the structuring of prices and the setting of their actual level a complex and pugnacious exercise. In the past as well as in the present tariffs have been central to many a telecommunications dispute because they are of principal importance for the following reasons:

* Price (p) influences the amount sold (q) and consequently revenue (p x q). The revenue determines whether the telecommunications company, or their (potential) competitors, have sufficient resources to continue investing and developing new networks and services in the future. Regulators have been interested in tariffs for determining the profitability of the regulated carrier.
* Telecommunications tariffs affect the costs companies and institutions pay in producing and marketing their products. Tariffs can influence a country's or region's locational advantage. On a macro-socio-economic scale tariffs influence the distribution of resources between different economic and social groups. Tariffs can carry certain forms of cross-subsidisations, which cause distributional shifts of costs (revenues, profits or losses) between geographical areas, between different time periods and between user groups, which can lead to a situation of (non)optimal, (in)efficient and (in)effective use of resources. The absence of a global or pan-European PTO forces them to cater for bilateral or multilateral tariff settlement principles and procedures; these, again, could incorporate politically sensitive forms of re-distribution of costs and profits.
* Finally, tariffs influence investment plans, the unfolding of a network, the diffusion of services and their affordability.

Applying our theory of a Telecommunications Regulation Mode (TRM) we will later analyse how precisely tariffs developed before, during and after the era of Fordism. But first we will have to investigate the different and sometimes conflicting past and present theories and practices of national and international tariffing in general. What is so special about network-based services that makes their tariffing quite extra-ordinary, and where do politics come in?

4.2. Price Theories

Various economists have put forward the argument for discussing and judging telecommunications tariffs

from a cost based price perspective or from a social or economic surplus maximisation. Mostly, these theories are normative and, in one way or another, derived from the classical price theory and the price mechanism.

According to the traditional economic handbooks, price theory assumes a perfect and efficient market. The conditions for such a perfect market are:

- perfect competition (in all markets): every market has so many buyers and sellers thus no single trader or seller has any control over the price of the product which is being exchanged;
- increasing costs in all industries: as any producer grows and develops, there is some output level at which costs per unit begin to rise;
- the exclusion principle: everyone but the buyer of the product must be excluded from its satisfaction[1];
- absence of public goods: public goods are extreme cases of spill-over; once provided, everybody gets the good;
- complete knowledge and complete mobility: all buyers and sellers must have full knowledge of all the alternatives available to them and they will move in response to changes in prices (Haveman 1976, pp.22-26).

When these conditions are met the adaption of the wishes of buyers to the wishes of sellers will produce an equilibrium price at which both groups are willing to buy or sell a certain quantity of a certain product for a certain price. Ideally, prices would uphold the principles of cost causation and subsidy-free pricing: it is regarded as economic and fair that a consumer should pay neither more nor less than the cost that he or she causes. These principles are linked to the economic freedom of opportunity to enter the market on equal footing and the presumed efficiency of (potential) competition. On a macro economic level this would create an efficiently functioning economy which, according to the theory, would perform in the 'general public interest'.

This theory of the price mechanism in a perfect market system is, not surprisingly, not a realistic one: spill-over and lack of information are common practice in most markets. Equally unrealistic is the underlying idea of unrestricted private enterprise on which a great deal of economic abstractions are based. Having analysed the telecommunication sector in Chapters II and III it becomes obvious that the market conditions here are far from perfect as this industry is riddled with monopolies, oligopolies and state regulations, which are closely connected to the characteristics of a telecommunications network and its service provision. Nevertheless, aspects of the classical price theory are, in a modified form, still used for analysing and discussing telecommunications tariffs.

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[1] Commodities which are not subject to the exclusion principle are said to possess spill-over effects; their benefits, and possibly their costs, spill over onto third parties. Sometimes this is also referred to as externalities - which we deal with later.

4.2.1. Marginal Cost Pricing and Average Cost Pricing

The marginal cost price theory is probably one of the most well-known price theories and is generally regarded as a benchmark for utility pricing (Mitchell and Vogelsang 1991, p.249). The concept of marginal costs[2] is used for determining the quantity of produced products and the price. Production of any given amount is - according to the theory - undertaken by those producers who offer the lowest costs, while production and consumption are carried forward to the point where the benefit of an extra unit is equal to its price, which in turn is equal to its marginal cost. For society as a whole this can be brought to the point where - given a set of consumer tastes, resources and technology - it is impossible to rearrange the use of production factors in such way that it would make some people better off and nobody worse off. This so-called Pareto optimum concept is used for analysing both perfect competitive market systems and the production of what are called public goods. The main characteristics of public goods or services are that if consumed by one person, this does not detract from their availability to others (non-rivalry) and others can not be excluded from their consumption (non-excludibility) (George 1978, p. 222)[3].

According to the marginal cost price theory the price of each product should be set equal to its marginal cost. Applied to telecommunications this could, for instance, mean that the prices in the peripheral or rural areas should be higher, if local and trunk network in those areas are used less intensively and/or if the costs of unfolding the network there are be relatively high compared to urban concentrations. For reasons of regional policy, equity, universal service or following Rowland Hill's one penny post principles, governments have often decided to adopt one uniform, national tariff[4]. This means that some services will be charged at a price above marginal cost to finance, or cross-subsidise, the supply of another service at a price below marginal cost. So, if marginal cost pricing would be fully introduced and implemented in telecommunication services, no cross-subsidisation would occur[5].

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[2] Marginal cost is the increase in total cost when output is increased by 1 unit. As an accounting technique it is primarily concerned with the effects on costs and revenues of changes in the volume and type of output in the short run, although it may be applied to long-run situations. In the short run it only takes into account the variable costs, while in long-run situations it also includes fixed costs.

[3] Van den Doel uses a more limited concept of what he calls 'social goods': "[...] social goods are goods which, once they have been provided for one individual, can be provided for others without extra costs." (Doel 1979, p.26). In this thesis the wider concept of (pure) public goods - non-rivalrous and non-excludible - will be used (see also: Peston 1972, pp.12-14).

[4] The application of the marginal cost pricing within a limited time frame (so-called short-run marginal costs) would also hinder PTTs to cover their overheads (see also section 4.3.3.).

[5] The common sense definition of a subsidy-free price structure is identical to the theory postulated in neo-classical economics: no customer should pay more for a product provided jointly than he or she would pay for the product provided on a stand-alone cost basis (see also section 4.4.4.). No party should pay less than the incremental cost of providing the service.

Additionally, price discrimination[6] would not occur in ideal circumstances. Price discrimination is profitable for the firm if - with equal costs - it can separate its customers into two or more classes whose elasticities of demand differ appreciably. However, the company must succeed in preventing customers shifting from the high price class to the lower. With normal telephony it is very difficult to do so, but things change radically when new services, technologies and groups of customers, such as bulk usage buyers, arise. Price discrimination is only effective if consumers cannot move between the segmented markets, in other words engage in arbitrage: i.e. they are unable to make a profit by buying in the cheaper part of the market and reselling in a higher priced segment by undercutting the price charged by the discriminating producer (monopolist).

Having been designed for an ideal world with a perfect market system, marginal cost price theory is nevertheless regarded as applicable in the more real world of less perfect or very imperfect markets. The principle that the marginal benefit of an action should equal its marginal cost is regarded as the most effective use of resources (Samuelson and Nordhaus 1989, p.552). The use of marginal cost as a benchmark for efficient resource allocation is seen as applicable to all industries and sectors, including telecommunications (Yordon 1984). Vogelsang and Mitchell have however pointed out that the simplicity of marginal cost pricing hides major conceptual difficulties, measurement problems and potential inefficiencies (see below).

An alternative price theory is the average cost pricing theory. The argument of using average costs instead of marginal costs is based on a situation where the firm has declining costs so that the marginal costs are beneath average costs. Marginal cost pricing in this situation would be incurring a chronic loss and the firm could not operate for long unless the government could raise taxes to pay for what is seen as the ideal regulatory solution, namely marginal cost pricing.

There is an additional advantage to average cost pricing: due to substantial and frequently indivisible costs - indivisibilities - it is sometimes difficult to calculate marginal costs; using average cost pricing may be more satisfying in situations where cost functions are seldom continuously differentiable and where calculation invariably proceeds in terms of discrete increments.

4.2.2. Welfare Economics: Public Good Pricing Applied to Telecommunications

In the theoretical literature on public and private goods different pricing schemes are sometimes

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[6] Price discrimination is the sale of the same product at two or more different prices. It has to be noted that different prices for the same product does not necessarily mean discrimination because it could reflect different marginal costs, and conversely, equal prices could be price discrimination if marginal costs differ.

suggested. The marginal cost price theory is mostly used for analysing the prices of private goods, preferably under perfect market conditions. Welfare economics[7] specifically studies non-perfect markets (eg. the existence of externalities and public goods) and analyses the circumstances in which the market mechanism would cause a socially inefficient outcome.

The main point to be made about public goods is that prospective consumers do not have an incentive to reveal their preferences for such a good and are thus not ready to contribute towards financing the provision of the good. In the extreme case this incentive to act as a 'free rider' leads to no supply of the public good at all, although everyone would potentially benefit from its provision. As we have discussed in Chapter II, states have in the past regarded telecommunications as partially a public good - that is a service which would or could not be provided by a free market mechanism as a nation-wide, public and universal service. Therefore, it has been argued, only the state could, and/or should take care of the provision of telecommunication services[8].

Concentrating on welfare effects (eg. consumers' surplus) welfare economics relates prices and price setting to the wider societal environment (eg. effects on income distributions). This does not mean that marginal cost pricing or average cost pricing are automatically rejected; more important has been to correct for certain socially undesirable outcomes. The US low-income telephone assistance programmes, such as Lifeline and Link-Up America, are good examples: the American regulator, the Federal Communications Commission (FCC), in an effort to preserve and augment universal telephone service, established several assistance programmes offering discounted telephone service to qualifying low-income households (Makarewicz 1991). An extreme case of weighting the consumers' surplus has been implied by Rawls' 'maximin' principle according to which the welfare of the most disadvantaged individual should be maximised. This means giving all the welfare weight to that individual (Rawls 1971).

A methodology more specificly developed for public goods is the Lindahl theory of public good pricing. It argues that efficient production (provision of services) is achieved when the marginal cost of production is the sum of the marginal benefits received by citizens. Moreover, in the case of long run marginal costs being equal to average costs, these goods can be financed by contributions of each citizen equal to their marginal benefit multiplied by the quantity consumed (Mulgan 1988, p.12; von Weizsäcker 1986, pp. 20-

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[7] More specifically, welfare economics is the study of using limited resources in an economy and society in such a way that social welfare is optimised. Social welfare is taken to be the sum of the welfare of all members of a defined society. Often it studies the alternatives to the price and market mechanism because of market imperfections and failures or because of political reasons like equity (Charles and Webb 1986, Chapter 3).

[8] Taylor argues that certain (not internalised) externalities of telephony give it 'the dimension of a public good' (Taylor 1980, p.16). It is however impossible to argue that it is a pure public good since people can be excluded from its consumption and in a situation of no spare capacity a call can be rivalrous.

27). According to the theory it would ensure an efficient outcome and correspond to the principle of equivalent burden sharing (the principle of equivalence) in that each citizen shares in the total finance burden to an extent that is equivalent to his or her marginal benefit from the good. Lindahl pricing, and the equivalence principle, is best implemented by so-called value-based pricing. This means pricing in proportion to the value of the service to the user. Thus, services of high value to the average user will be priced much above their marginal cost, and services of lower value to the user will be priced barely above marginal cost. This method has traditionally been used to differentiate, for instance, between business users and residential users of telephony. Bennett, in his historic work on the telephone systems in Europe, points out that business users should pay more:

> "That is, of course, as it should be: the important firms paying, as they can well afford to do, in proportion to their actual needs. When an all-round rate exists the poorer folk are really taxed for the benefit of their richer brethren, and such a rate possesses no other merit than convenience." (Bennett 1885, p.219).

Another method of pricing, originally designed for a monopolistic market structure, is Ramsey's principle of optimal pricing. Prices reflect a combination of the actual marginal costs and the demand for a certain service. It evades some important deficiencies of the marginal cost theory - as will be shown in the next section - namely the neglect of demand elasticities[9] and low or zero marginal costs. Ramsey recommended that the second best solution to marginal cost pricing would involve moving the burden of costs on to consumers with the most inelastic demand. This means that where demand is inelastic, and given certain costs, prices should be set higher than where demand is elastic, in a very precise way. So the relative markups of prices over marginal costs for the various services offered should deviate in inverse proportion to the respective demand elasticities. According to Ramsey's theory the welfare of customers taken as a whole would increase substantially if this second best option would be applied (Littlechild 1979, p.131).

Another pricing model is the two-part tariff structure - an alternative to constant per unit prices. This involves a per unit price below average cost or set at marginal cost, plus a lump sum fee for the right to consume. Consumers are charged uniform price per unit, based on marginal operating costs, and also a lump sum, quarterly or annually designed, to cover the difference between short- and long-run marginal costs[10].

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[9] Income elasticity will usually be positive for telecommunications. For local calls the price elasticity of demand is regarded as very low and for trunk calls somewhat higher, but still inelastic. Business demand is usually thought to be significantly less elastic than residential demand (Littlechild 1979, Chapter 3).

[10] Long-run marginal costs can exceed short-run marginal costs by an amount reflecting capital charges (reflecting capital investments) per period (Waterson 1988, p.68).

Finally there are some models of introducing special taxes as the means of financing deficits in cases where marginal cost pricing or other pricing systems would lead to loss-making of (public) enterprises (Utton 1986, p.169).

4.3. From Theory to Practice I: Theoretical and Practical Problems of the Theories

The theories, principles and methodologies mentioned above have been, and still are, used in debates over telecommunications tariffs. The specificities of telecommunications economics and its socio-political aspects have however often hindered a simple and straightforward application of these theories.

4.3.1. Very Low Marginal Costs

One of the biggest problems of the marginal cost price theory are marginal costs themselves. Often suggested for a (public) utility pricing policy (Wiseman 1973), the theory cannot deal with a situation where the marginal costs are extremely low or even close to zero - and this is exactly what sometimes can happen in telecommunication networks.

Suppose a PTO plans a PSTN with a certain capacity. For determining the price it will want to know the total costs involved and the marginal cost, that is the cost of one extra circuit. The latter can be divided into several parts; in its most basic form it requires an extra network access provision (local loop and its PSTN connection) and extra capacity on the trunk, or long-distance network. Of these, only network access can have clearly defined marginal costs: those of laying a wire into the customer's premises, of increasing the capacity of a feeder cable and of adjusting the frame capacity of a local switch (local exchange). Problems can arise when a part of this local loop uses commonly used ducts. Quite different is the situation for the rest of the network: since an increase (or decrease) will more likely happen in increments of say 250 or 500 circuits at the time, the marginal costs will be very low.

Littlechild suggests using the concept of incremental costs for these cases (Littlechild 1979, pp. 61/62); incremental cost is typically defined as the additional cost in plant, labour and materials to add or expand a service. But given the often substantial capacity enlargements planned for by PTO's this usage becomes a real problem. Marginal cost calculations will produce figures close to zero in cases of extremely large capacity expansions made possible by multi-Megabit broadband systems such as Broadband ISDN or systems working in the Gigabit region; in these cases marginal cost pricing could become obsolete:

"The single largest investment will be in single mode fibres and associated opto-

> electronics in the local loop. Such an investment is not incremental but is rather an order of magnitude jump in the network's capacity: investments of this kind may be justified in terms of cost savings (most significantly in maintenance) but their main *raison d'etre* is to anticipate and create demand for future services. The marginal cost of such an investment is clearly not comparable to that of an overlay designed to provide a single new service in response to an already existing demand. The relevance of marginal analysis thus depends very much on the state of technology and the time horizons of investment. Once in place the marginal cost, at least of the transmission of any service provided over the fibres, will approach zero." (Mulgan 1988, p.19).

If marginal cost pricing were to be applied rigorously in such a situation the network operator would be soon out of business.

4.3.2. Cost Categories: Fixed And Variable, Sensitive And Unsensitive

The previous quotation points out another problem or rather set of problems, namely the concept of 'costs' itself.

Normally costs are divided between fixed costs and variable costs. Fixed costs do not vary with output levels and variable costs do. The telecommunications network represents high fixed costs: the production of services is very capital intensive, and - unlike other networked utility services such as gas - there is scant opportunity to store output in inventory in order to buffer differences in the timing of production and demand. Variable costs have declined considerably since the days of manual switching: due the PTOs reliance on electronic components, maintenance and energy costs are mostly the result of simply operating a facility and are nearly independent of its actual use. Once these capital investments have been made and facilities have been installed in an operating network, most of the specific costs become sunk[11].

But whether costs are variable or fixed depends on the factor time: in the long run fixed costs become variable. The time factor therefore determines the depreciation of 'fixed' capital. It is very difficult to plan and account depreciation in a fast changing telecommunications environment of technological developments, short product/service life cycles and uncertainties over standards and protocols (see below). Additionally, the more precise cost behaviours of digital and integrated networks remain unclear since there is (yet) little certainty about the life of optical fibre cables, uncertainty about standards and volumes

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[11] Sunk costs are investments that once made cannot be retrieved for purposes other than the original intent. Telecommunications is characterised by sunk costs which are a very high percentage of total capital investment. The reason for this is that the utility is closely connected with the consumer and must provide service instantaneously on demand. This service, moreover, is of such a nature that neither can it be stored, nor its purchase deferred. Not only does this explain why sunk costs are so high, but it may also be used to identify the kind of sunk costs which are common to public utilities, i.e. those which are related to service on demand involving a direct and more or less permanent connection between supplier and consumer (this also explains the high non-traffic sensitive costs, NTS).

and thus uncertainties about future prices of new equipment. Network modernisation is thus hindered by both the huge sunk investments and uncertainties over technological developments.

Looking at the costs a PTO generates it seems quite obvious to make several objective categories such as overhead costs (indivisibilities[12]), switching costs and transmission costs. On an other level costs can be divided between traffic sensitive costs and traffic insensitive costs (non-traffic sensitive costs, NTS costs). However, the actual accounting of costs for a certain service can be very difficult. Suppose A wants to phone B. The first prerequisite is of course that both A and B have to be connected to the network (a PSTN). The PSTN connection itself will generate NTS costs (see above); mostly, operators divide these fixed costs between an one-off connection fee and a rental charge (line rental). As stated above there are some problems to calculate the marginal costs of an extra connection. On top of that there are other costing or accounting problems: should a new subscriber only pay for the extra local exchange line (local loop) or also contribute via the connection fee (or rental) to the costs in the interexchange areas of the network? Should access to the network be seen as a feature of the exchange areas or the (whole) network? Subsequently, if for instance the access charge (connection fee) is only related to costs in the local exchange area, what is exactly the local exchange area, or rather, how big should it be? After calculating these costs there is a decision to be made how to divide these between the one-off access charge and the line rental (again the problem of the line rental is which costs should cover which part of the network).

Once connected to the network A wants to phone B. Since A and B do not live in the same local exchange area the line set up for the call goes via the (primary, secondary or tertiary) networks and exchanges. How are the costs accounted? Caller A uses two local loops and parts of the trunk network; both times costs are generated by using transmission and switching capacity. The question, or difficulty, is how to account and subsequently, allocate, the costs generated in the several parts of the network to this phone call? Using a marginal cost price rule would in case of abundant spare capacity - which itself will vary during the day - lead to an extremely low price. Alternatively, in case of scarce capacity, a call could create an urgent need for an increase of network capacity, and thus lead to an extremely high price, or it could even block other lines. Both price settings would cause problems: extremely low prices would create a loss for the PTO and extremely high prices would be seen as undesirable monopolistic prices and could restrain people from making phone calls.

Looking at the actual usage of a network the usage sensitive costs can be divided between the factors, time, distance and capacity of usage. During the period that the PSTN was the only network and telephony was - apart from some telegraphy and telex traffic - the only service, usage tariffs were related

[12] Indivisibilities are some quantity of inputs required by the firm to be in business at all whether or not output is created.

to the time of call (line connection) and the distance between the callers (callers were divided into local call areas). The introduction of digital transmission, digital switching, high speed packet-switching, optic fibre networks, satellite communications, ATM and flexible routing - to avoid blocking or congestion - not only improves efficiency, quality and capacity but also tends to decrease costs per function and per service. Furthermore, they make the factor distance less important and thus change the cost structure of a call or circuit. A large part of the costs are for example caused by regeneration points (amplifiers) in the network: satellite communications and optic fibres need fewer regeneration points for a given path length. This results in smaller cost differences between long- and short-distance transmission paths[13]. However, improved cost characteristics of optical fibre with respect to distance will be more realised on a transatlantic cable or a connection between the East and West Coasts of, say, the USA, than between connection points within relatively small and densely populated geographical regions, as in some European countries. Flexibilisation, high speed and high capacity networks also tend to make the other usage related costs (connection time and capacity or bandwidth used) less important. Fixed costs would, logically speaking, become relatively, and absolutely, increasingly important.

These developments make it problematic to use 'old' cost structures of usage and network connection for setting prices. On top of that, there are the issues of joint costs, elasticities, grade of service, social obligations (universal/public service), network planning, congestion problems and externalities.

4.3.3. Planning, Time and Elasticities

The telephone call between A and B draws attention to some further cost and thus tariff related problems. How do we make sure that there is the right capacity for making calls? Planned and actual demand are of major importance: too large an unused, spare capacity or buffer leads to unnecessary costs, just as a too small buffer can lead to call failures and thus revenue losses during peak hours. Therefore possible differences between planned and actually consumed capacity can influence costs considerably. Again here the time- dimension is of great significance, as well as the PTO's investment plans, which will depend on its assessments of the long and medium term market outlooks and its strategic aims. Traffic forecasting is a crucial instrument in determining investment plans. Calculating average traffic-flow figures, average call holding time, busy-hour call-attempts and analysing the changes in the traffic forms and formats (generally an increase in more spasmodic data communications) over a period of time, carriers try to

[13] This advantageous cost structure, however, is subdued by countervailing effects when a long-distance connection is made up of a number of short segments, as is often the case in densely populated areas. The reason for using short segments in such areas, thus defeating a major cost-saving opportunity, is that entry points to the transmission system must be located where the traffic originates, not at the points that would be most technologically convenient for permitting optimum utilisation of the facility.

extrapolate future demand and requirements, given a certain grade of service (GOS)[14]. Generally a difficult trade-off has to be made between a market demand forecast, a technological supply forecast and the economic-strategic limits and aims of the company (which includes the tariffs charged!).

Telecommunications services demand has strong daily and weekly patterns. In most urban markets, for example, local calling reaches its highest rate in the early morning and mid-afternoon (Farr 1988, pp.7/8). Up to the available capacity, additional output can be produced at negligible additional cost: off-peak telecommunications services have thus nearly zero marginal costs. As regards these capacity problems of peak-hour traffic, PTOs have tried to shift traffic to less busy hours via price disincentives and incentives. Tariffs have thus deliberately been used to influence call behaviour: most PTOs have gradually introduced special high tariffs for the peak hours and normal or lower tariffs for off-peak hours. This provides incentives for customers to use the network's capacity more economically, that is to consume services more during off-peak hours.

Prices can influence the behaviour of the telecommunications' customers if demand elasticity does not equal zero. For instance, high fixed charges (connection and rental) can restrain certain groups in society from subscribing to the network, whereas low fixed prices could give an incentive to subscribe. In general however, demand for network access is quite price-inelastic, just as are local calls. Overall, residential demand is more elastic than that of business customers. Nevertheless, the demand for one supplier's services can be very price sensitive, particularly from larger business users who have more than one option (Mitchell and Vogelsang 1991, p.12).

Prices are thus not only influenced by costs but also by call behaviour and price elasticity. Weinhaus and Oettinger pointed out that high access and local charges would have been unacceptable in the first decades of American telephony: regulators in those days believed that basic local rates should remain relatively low to encourage the broadest possible distribution of service (Weinhaus and Oettinger 1988, p.63). This argument - special introductory prices - can also be applied to new services in order to stimulate a fast uptake and positive network externalities or to allow for cumulative economies of scale (learning by

[14] Although a traffic route is designed to a particular GOS at the normally expected busy-hour load, the actual quality of service experienced by users deteriorates when the route is overloaded. A GOS of 0.01, for instance, means that, if traffic flow is at the forecast level, the probability is that 1 busy-hour call attempt in every 100 will fail at that particular stage of a call attempt because of a lack of free circuits. The best possible - but more costly - GOS is an end-to-end GOS of zero, which implies that all call attempts within the designed busy-hour capacity should find a free circuit at all stages encountered throughout that call. There is thus is an important decision to be made about the GOS, which, via related investment plans will influence costs and thus tariffs (Farr 1988, pp.78-95).

doing)[15].

A variety of systems of tariffs have been devised in the past to take into account elasticities and call behaviour of certain user groups. For instance, one of the rationales behind higher business rates is the fact that businesses tend to use the network at certain times (office hours, particularly in the morning), causing a peak of traffic which in turn requires additional equipment.

It may well be possible that a PTO would make a loss when a uniform price system would be used. If demand elasticities between for instance business subscribers and residential subscribers differ considerably it could be more economical to charge two prices for the same service for both groups - a case of price discrimination (Littlechild 1979, p.110)[16]. The simple marginal cost price rule thus tends to be 'disturbed' or modified by price elasticities in combination with the (limited) network capacity and the need to use existing capacity as efficiently and effectively as possible.

4.3.4. More Networks, More Services

Going back to A's phone call, the case is further complicated by the fact that the PSTN is used for several different services (not only POTS, but also telex, telegraphy and more recently fax, data-services and in the near future maybe even video-services). This usage raises questions such as which costs of which part of the network (local line, local exchange, trunk lines or other exchanges) should be allocated to which service? Since different services use different parts of the networks with distinct requirements[17], cost accounting and cost allocation becomes even more complex. Should a POTS user contribute as much to a sophisticated and expensive digital switch built into the PSTN as a business user who probably will benefit much more from the improved performance and capacity? More concrete: should a residential consumer of telephony contribute as much for an ISDN or digitised or intelligent

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[15] This practice however can pose a serious problem for the regulator as it may be difficult to distinguish between efficient, or legitimate introductory pricing and inefficient predatory pricing (Faulhaber and Boyd 1989).

[16] It also could be more economical to reduce prices beneath the 'marginal costs' (if calculable); the lower the prices the more the network becomes attractive for existing subscribers and potential subscribers. Increasing the number of calls by reducing their price could generate some additional revenue in the form of more rentals which could lead to further economies of scale and make the network more attractive and so forth.

[17] Some services require large capacity, others just small; some need digital switches and digital, sophisticated transmission systems while others can do with the 'old' analogue systems.

upgrading as a business user? Digitisation, flexibilisation and sophistication of signals and transmission can complicate things further by making it quite difficult to make distinctions in the network between the different services.

Related to the issue of using a network for different services are the problems of indivisibilities, common and joint costs[18]. Administrators and regulators have a great desire to allocate overhead, common and joint costs between the various outputs made possible by the network operator. It is for example very difficult to separate the network's parts and analyse its costs in isolation. The issues related to joint costs and cost allocation will be discussed in the next sections.

4.3.5. Externalities

The marginal cost price theory, applied to telecommunications services, also fails to take externalities into account. We already mentioned possible congestion problems caused by an extra call: each customer making a call presumably considers the cost to him or herself or his or her organisation, but ignores the additional congestion costs imposed on other callers. If the operator were to use marginal costs as the only indicator for prices, the other callers would have the disadvantages, that is the costs of the congestion, which of course would also affect the operator itself.

Another, positive externality is the benefit each subscriber joining the network confers on other subscribers. A larger number of subscribers increases the value of the network. This positive network externality, which results from adding a new subscriber, is the aggregate benefit that other subscribers enjoy by being able to call, or to be called, by the new subscriber. Equally, there is a positive call externality to the party that does not have to pay for the call (usually the party being called).

Positive network externalities are used in discussions on the 'universal service concept' or the PTO's social obligations: universal service is not only relevant because of equity aspects but also economically relevant for the network itself since the higher the network penetration, the higher the value of the network - and of course its economies of scale (Miller 1986, p.187). There are benefits conferred on the recipient of a call and benefits which accrue to all existing connections when a new connection is made.

Chapters II and III already referred to some additional externalities such as the impact a network may have on the economic infrastructure and society in general. The telegraph and telephone networks played

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[18] Joint costs arise when two outputs are of necessity produced together; common costs occur when the same input is used to produce several different outputs (such as telephone cables, their ducts and the switches provide for local, trunk and international calls; buildings, energy and logistics serve all telecommunication activities).

an important role in the development of management and business throughout the period of Fordism (Pool 1983). The importance of telecommunications has even increased throughout the 1970s and 1980s as we demonstrated in the previous Chapter. The benefits of, for instance, the old telegraph network or the newest Intelligent Networks, go well beyond the immediately privately appropriated benefit. PSTN, digital networks, broadband networks, PCN and so forth, have and will produce positive or negative social externalities with which society, companies, users, providers and regulators had and will have to deal. It is however, often very difficult to quantify these social or economic benefits or costs (which, by the way, is one of the reasons why they often have been neglected).

4.3.6. Alternative Theories

Suggested alternatives to the marginal cost theory such as average cost pricing, Ramsey pricing and the Lindahl theory, also have major weaknesses. As stated above, average costs can only be a useful indicator when marginal costs are extremely low or zero. Yet here again the whole range of highly complex problems of cost accounting, externalities, elasticities and so forth arise.

The major problem of the Lindahl theory of public good pricing is that it is not feasible in practice because of the lack of incentive for anyone to reveal the scale of their benefits and because it is partly based on the marginal cost idea. The discussion of Lindahl pricing policies rests on the extent to which telecommunications services are (pure) public goods. In other words, to what extent is it appropriate to apply this methodology to a good (service) which may not satisfy all the major criteria for a public good? As argued above, it is very doubtful whether telecommunications can be regarded as a (pure) public good.

Ramsey's theory of the 'second best' is in fact a 'sophisticated' way of using the ability of customers to pay for a certain service. Applied with non-linear or non-uniform prices - ie. the selling of different units of the same service to the same consumer at different prices - it might improve the Ramsey prices, yet allow the firm to raise enough revenue to cover costs. To some extent it forms a case of 'what the market or traffic will bear'. As it modifies the simple marginal cost rule by bringing in elasticities it is more realistic, although it does not provide solutions for many of the other problems mentioned above. The framework of Ramsey pricing, even if some externalities are included[19], does not take account of opportunities for improving the internal efficiency of a PTO and also neglects the fact that costs are likely to fall as network modernisation proceeds. In addition, Ramsey pricing is strictly applicable to situations

[19] Culham, using a Ramsey price model, developed a model which internalised one positive externality, namely the benefit enjoyed by the recipient of a call when the person making the call bears the cost (Culham 1987).

in which a monopoly supplier is providing a number of outputs. The introduction of competition in these markets may eventually make Ramsey prices unsustainable (Faulhaber 1975)[20]. Some theoretical research shows the possibility that value based price structures - such as the Lindahl theory - may not be sustainable either if competition arises (Baumol, Bailey and Willig 1977).

Other disadvantages of Ramsey pricing are:

- the elasticity estimates on which the adjustments are based are weak or even sometimes non existent for certain product lines or customer groups;
- elasticity estimates and elasticity models need some major improvements still;
- it is very difficult or even impossible to measure the demand elasticity for new products (Pollard 1989, pp.69/70); in general, the analysis and implementation of non-linear tariffs substantially increases the (costly and time consuming) informational, computational and conceptual requirements for the tariff-setting firm or regulator;
- the Ramsey rule runs into difficulties when there are cross elasticities between products; equally, if output has several dimensions and can thus be defined in a number of ways, there is no unique elasticity measure and the pricing structure may therefore be sensitive to the way in which output is measured.

The theoretical objection to the two-part tariff structure mentioned earlier, is that some consumers who would be prepared to pay the per unit price equivalent to short-run marginal costs, may be deterred from consumption by the fixed charge. In effect, some consumers have insufficient consumer' surplus out of which to 'pay' the fixed charge (Mitchell and Vogelsang 1991, p.250).

Another suggested alternative, taxing the deficits of a public company, could create its own distortions in the rest of the economy and could involve non-trivial collection costs. Additionally, taxing the deficits away could cause difficulties in maintaining the internal efficiency of a large public undertaking if it is all-along known that its pricing plans are designed to ensure that losses are made. There is no impetus to keep costs for any level of output to a minimum and this could lead to a misallocation of resources.

Finally, the problem of Rawls' maximin principle is not only that sometimes it might cause some difficulties to identify the disadvantaged individuals - although Milne has identified some for the UK (Milne 1990) - but also that it gives no concrete directions as regards cost accounting and price setting.

4.4. From Theory to Practice II: Some Further Problems of Cost Accounting and Cost Allocation

The problems of cost allocation and accounting methodology - often ignored in economic pricing theories

[20] For a critique of Faulhaber's conclusion that Ramsey pricing is not compatible with free entry into some of the regulated firm's markets see: Brown and Heal 1987.

as discussed above - have already been mentioned, but need some further attention here. Accounting and allocation methodologies are the central factors in determining the costs for telecommunication services and are therefore - if there has to be a clear, transparent relation between costs and prices - essential for the fixation of tariffs. Particularly concerns over alleged cross-subsidies from the long-distance network to the local network, unmetered local calls and problems over interconnection tariffs have, as we will see in Chapter VI, fuelled the interest in cost accounting and has put the aim of so-called subsidy free, cost-based pricing firmly on the political agenda.

Many neo-classical economists consider cost-based pricing to be much more neutral and efficient as opposed to the more traditional process of tariff setting where regulators are mostly influenced by political considerations (Peltzman 1976). If cost-based pricing is regarded as the prime goal, concerns about optimal social fairness, positive externalities, Pareto optimum or Rawls maximin principle become less important.

Costs can be looked at from several angles:

- Costs can be thought of in pure accounting terms - for example for purposes of paying taxes or to comply with reporting requirements to shareholders (if there are) or management[21].
- Costs can be thought of in economic terms - for example, in developing net present values of alternative courses of action (opportunity costs).
- Costs can be thought of in engineering terms - for example, as annualised values for the life of equipment.
- Costs can be influenced by certain political or market behaviour. One regulator may want to promote the introduction of an universal broadband network and therefore permit the operator to depreciate higher costs in the first years. Another regulator, keen on promoting competition, will probably calculate the tariff costs of interconnection with the main, incumbent operator rather towards to lower end. Incumbent operators again, may present costs in such a way as to keep competitors out. Costs can furthermore include forms of cross-subsidisation or transfer pricing[22]. Finally, and not unfamiliar to stockbrokers, company costs can be 'creatively' accounted for specula-

[21] Governments do influence cost accounting operations in a general way. For income tax purposes, for instance, they are particularly interested in items such as the valuation of inventories, the rates of depreciation of equipment and the treatment of interest on investment as an element of cost. Governments do also issue accounting regulations to protect the interest of shareholders and other financiers (Neuner and Frumer 1968, p.11). Furthermore, the EC has also issued accountancy regulations which are part of a broader programme for the harmonisation of company law in the EC member states (Taylor and Turley 1986).

[22] Since goods and services are often exchanged between various departments, divisions or even subsidiaries of the same company, the problem arises as to what prices should be assigned to these transfers (in most cases there is no real market between these separate departments or divisions). Transfer prices can be used, openly or secretly, for transferring costs or profits from one part of the company to another for purposes such as tax evasion, cross subsidisation, marketing or predatory pricing.

tive reasons[23].

Ultimately the issue is one of clarity of measurements, their associated purposes, and - of utmost importance - the availability of detailed figures and the capacity of a company or regulator to process them. Not surprisingly, it took PTO's accountants a while before reasonable sophisticated accounting methods were in place to cope to some degree with the difficulties posed by the unfolding telephone networks.

4.4.1. Cost Causality and Depreciation

The above mentioned principle of cost causation is in the practice of telecommunications hardly straightforward and simple. In fact, very few costs are the direct effect of the activities that are normally considered to be their causes. For example, subscribers requiring an operator assisted call are not the direct cause of the costs associated with the operator's salaries. The latter were already determined when the operators were hired. In fact, it was the forecast of the subscriber's calls that were the direct cause of the costs associated with the operators' salaries. So, as Elek points out, in the very short term it costs nothing to use the operators because they are available anyway and, if their assistance were not required, they would still collect their salaries (Elek 1989). The same applies to capital expenditures: when a company installs a new equipment it incurs a substantial one-time expense. Once the investment is made, subscribers will be able to use the equipment for many future years, without incurring additional expenditures. Thus, there is no direct relation between the use of the equipment, as a cause, and its costs, as an effect. Rather, the direct cause was a management decision based on a traffic forecast and a technological, economic, political and financial assessment of the medium or long-term market prospects. Cost causation is thus only indirect, that is, mediated by other considerations and causes.

Depreciation is the most important way of overcoming sky-high tariffs when a new investment is made: the original capital expenditures are allocated to each future service served by the asset. One problem of depreciation has already been mentioned - how to depreciate an asset in a fast changing environment. Another depreciation problem is related to the capital costs of the assets. Using the standard straight-line depreciation method, the depreciation expenses are identical each year. However, interest on the debt portion of the depreciated (net) value of the asset declines each year. Consequently, higher costs are

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[23] London City analysts (Philips & Drew) completed January 1991 a thorough analysis of all the accounting tricks used by companies in the 1980s to inflate their profits. It turned out that even some long-established businesses, such as the telecommunications firm Cable & Wireless, were accused of questionable accounting practices (The Independent on Sunday, 20 January 1991). More recently the world stock markets have been 'shocked' by accounting malpractices of the Bank of Credit and Commerce International (BCCI) and the Maxwell newspaper and publishing group.

allocated to the services or usage of the asset in its early life than to identical services or usage in its late life. This imbalance is further aggravated by two factors: the initial low use and inflation. As for instance optical fibre installations will fill only slowly over the years, the costs allocated to services or uses during the early years of this asset's service life are much higher than in later years. Inflation again, distorts identical real costs between identical service users in time.

As an alternative Elek - starting from the objective of equity among today's and tomorrow's users of telecommunication services - proposes a sinking fund depreciation method, where the sum total of depreciation and financial expenses remain constant during the service life of the asset. Such a decision is, however, based on a strategic or political judgment, not on an objective determination about costs and cost causation.

4.4.2. Inflation

Inflation, a not negligible economic phenomenon since the demise of Fordism, can, as mentioned, distort cost calculations too. Normally accountants measure profit by finding the difference between the net assets at the beginning and end of the accounting period, by comparing the actual revenues with the actual expenses. If one uses a so-called historic cost accounting system, the comparison may be of revenue over the accounting period with costs of an earlier period. After inflation there can be some considerable differences. Additionally, the balance sheet of the company is made up of a mixture of currency from different periods, so although the nominal value could be the same, the currency's real value varies. Ergo historic cost accounting - neglecting the effects of inflation - could lead to a downward pressure on real prices, an overstatement of profits, good dividend prospects for possible shareholders, and an understatement of assets employed. In times of high inflation it could lead to liquidity problems and (replacement) investment problems.

Current cost accounting, on the other hand, tries to take into account the effects of inflation on depreciation and costs, and could thus lead to higher prices and - in case of a company with shareholders - lower dividends paid to shareholders (Sizer 1979, pp. 52-57).

Obviously a decision on whether to use historic costs or current costs is of vital importance for a telecommunications company: its technology involves strong economies of scale, a long life time and therefore large, lumpy and sunk investments. Capital costs will thus be very high, while variable costs will be much lower. Equally, a decision over historic or current cost accounting obviously influences tariffs, eventual interconnection rates and the costs for other companies entering that market.

4.4.3. Direct and Indirect Costing

Another decision to be made (particular in the short run) concerns fixed costs and particularly fixed overhead, or indirect costs. On the one hand one could apply the fixed overhead costs to the goods or services produced (fully distributed or absorption costing) or on the other hand one could only apply the variable costs to the goods and services (direct costing). Proponents of direct costing would argue that the fixed part of overheads is more closely related to the capacity to produce than to the production of certain units, while opponents maintain that because both variable cost and fixed costs are necessary to produce products, fixed cost components should be included (Horngren 1977, p.260 & pp.294-296). Direct costing - if used for determining prices - will lead to lower prices than fully distributed costing (FDC) and has a different impact on net income because fixed overheads are regarded as a period cost (charged against revenue immediately) rather than as a product cost (assigned to units produced). However, direct costing enables management to appraise the effect of sales fluctuations on net income.

In the telecommunications sector a system of FDC is regarded by many as a good alternative to marginal or incremental costing or as a method of testing for cross-subsidies. The problem however is how to allocate the un-allocatable: by definition common or joint costs cannot be causally assigned to individual outputs, yet this is exactly what has to be done.

4.4.4. Cost Accounting and Cost Allocation

FDC has several methods of handling joint costs. It essentially distributes joint or common costs - which can account for some 80 per cent of the total costs of a telecommunications system[24] - on some accounting basis, eg. by the revenue share each product earns, or by the share of direct costs each product carries, or by some physical measure, eg. by share of total phone calls. As Ralph points out, FDC approaches have been widely criticised for their extreme arbitrariness: depending on the basis chosen for cost allocation or cost distribution, a very large number of inconsistent results can be generated (Ralph 1989, p.224; see also Cave *et al* 1990a, pp.11/12; Cave *et al* 1990b). The favourite FDC pricing by revenue shares involves a simultaneity problem in that revenue shares can only be calculated after prices are known, while they in fact are needed to determine such prices.

Another way of dealing with the cost accounting problem is the stand alone cost (SAC) concept: the costs for the services provided are separated and accounted for as if each service stood alone. Clearly, the total costs accounted using this system will be considerably more than the actual cost to the company because

[24] Pre-divestiture AT&T $43.0 billion or 80.7 per cent of its total costs were subject to joint use (Weinhaus and Oettinger 1988, p.61).

a network enjoys considerable economies of scale, scope and integration. It will also be clear that this system - creating relatively high prices - will only be sustainable in a non-competitive environment (Ridder 1989, p.14).

The occasionally used method of cost allocation on the basis of the ratio of usage during peak hours (the planning of network capacity is based on peak hours usage to avoid congestion) also has its problems:

> "Some current practices allocate capital related costs strictly on the basis of the ratio of usage during peak hours. For example, when costs are allocated to overseas service and it is found that during the peak hours only five percent of a particular equipment serves that sector, five percent of the equipment's capital-related costs are assigned to overseas service. It may also be found, however, that during off-peak evening hours 15 percent of the equipment carries overseas traffic. Consequently, two thirds of that traffic (i.e. ten per cent) gets a 'free ride', with no capital-related costs allocated to it." (Elek 1989, p.250).

Cost causation can also lead to situations where new local subscribers have to pay for the costs of the expansion of the network; this would mean that long distance services (trunk calls) escape paying towards a large part of the fixed costs, as Hills points out (Hills 1989, p.132).

4.5. From Theory to Practice III: Social Obligations and Quality of Service

As stated in Chapters II and III, PTOs have been working (and still work) under certain regulatory conditions. One of the most important being the so-called social obligations, which heavily influence costs and tariffs.

Throughout the PTT's histories the 'universal service' condition has been the most essential social obligation. In general it is understood as:

- non-discriminatory access to
- the telephone network on a
- similar basis among different customers, and on a
- similar geographical basis (Garnham 1989).

The precise content of universal service differs throughout history and from one country to another. Some PTOs or regulators, such as the US FCC (the 1934 Communications Act) include for instance notions of 'reasonable costs' or 'affordability'. Regulatory conditions laid down in licenses or laws are however not always clear.

Other social obligations can relate to public call boxes, special low user rebate schemes or special tariffs for certain (low) income groups such as the unemployed.

Apart from social obligations, regulators or politicians can impose certain quality of service or grade of service (GOS) conditions on the PTO. Again, there is much discussion and confusion about what exactly good quality entails, how it should be implemented and how it should be measured. Some indicators used in several countries relate to:

- service provision;
- fault incidence;
- fault repair;
- call connection;
- voice transmission quality;
- billing; and,
- promptness and accuracy (Mitchell and Milne 1989).

Both social obligations and quality of service will obviously influence costs and cost structures. Uniform tariffs as such do not necessarily disrupt the concepts of marginal cost pricing, Fully Distributed Costs, elasticities or externalities unless of course the costs and cost structures are not the same for all subscribers to the network. One can however presume that this is the case: a twisted copper wire access line to a mountainous, rural and thinly populated part of the country will probably cost much more than a line to an urban subscriber[25]. Furthermore, elasticities and externalities may differ between regions. This means that uniform tariffs may include forms of cross subsidisation, but, exactly which, is - again - dependent on costs, prices and their relation.

4.6. Costs in a Wider Context: Monopoly, Competition and Natural Monopoly

PTO's costs and tariffs are of course also - or, some might prefer, primarily - demarcated by the sector's market structure. The traditional, Fordist market structure was generally closed, non-competitive/monopolistic, integrated, and regulated by the telecommunications operator (PTT) itself.

In a monopoly situation the firm is a price-maker rather than a price-taker. Comparing two companies with identical demand and marginal cost functions (other factors *ceteris paribus*), one being a competitive firm, the other consisting of a single monopolistic firm, it can be shown that output will be lower and prices higher in the monopolistic case. In the competitive industry output is chosen so that price is equal to marginal cost, since all firms are price-takers. The price-making monopoly, chooses a price-output combination that makes marginal revenue equal to marginal cost: by restricting output, the monopoly can raise price and profit (Smith 1982, p.143). Additionally, there is no incentive to enhance efficiency and

[25] This example ignores however the possibility of relatively cheaper alternative carrier systems like microwave or satellite transmission, and it ignores the possibility that a rural access line may generate much more revenue than the urban (see also section 4.7.).

productivity. As the public interest theory would reason, regulatory conditions and control are or should be installed to prevent this non-optimal situation, outcome of non-competitive behaviour. Proponents of competition would then argue that in spite of, or even more so, because of monopoly and state regulation, quantity or quality of output is too low, efficiency is lacking and prices too high (this compared to a more competitive market structure)[26].

One argument against competition is that industries which have become a private or public monopoly are those with substantial economies of scale and scope, extremely high capital costs and sunk investments - telecommunications is such a case. Some would argue that telecommunications is - just because of the scale economies - a so-called natural monopoly. The traditional and classical theory identified unexhausted economies of scale as a source of natural monopoly (Mill 1965, pp.141-142). More precisely, Faulhaber, Mitchell and Vogelsang have defined natural monopoly as a situation in which the production technology is such that one producer can supply the entire market more cheaply than two or more producers (Faulhaber 1987, p.106; Mitchell and Vogelsang 1991, p.14). In industries like gas, water or telecommunications the need for a network implies high fixed costs and high sunk costs; if two or more firms incur these expenditures necessary to supply the same market(s), costs could be extraordinary high.

Although historically both the natural monopoly and the network externalities arguments have been used as grounds for regulating telecommunications, it is hardly clear what exactly constitutes the former (Faulhaber 1987, p.110). Wilson has observed that different definitions and criteria have been used to identify natural monopolies. One definition presupposes that competition is sustainable but that it will be inefficient due to factors related to the production of technology (eg. duplication of production facilities). The regulator should in this case impose a *de jure* monopoly to prevent consumers subsidising inefficient competition. This argument is problematic since it gives no clear criteria how to calculate *a priori* a natural monopoly. Another definition, reasoning from historical market failure, argues that competition will automatically eliminate competition and result in a *de facto* monopoly which subsequently has to be regulated in order to prevent market abuse, inefficient monopoly pricing[27] and so forth (Wilson 1992, p.348). As we have seen in Chapter II, states and regulators have however intervened in the industry before it could historically be proven that it indeed formed a real natural monopoly; rather monopolies were imposed.

This confusion has been used by the proponents of liberalisation to 'prove' that telecommunication is no natural monopoly. And if it ever was one, it is certainly not any more because of the new ICTs

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[26] These arguments are especially used in regulatory failure or perverted interest theories, conspiracy theories and free market theories (Horwitz 1989, pp.22-45).

[27] Monopoly pricing is viewed as inefficient because it excludes consumers from the market who are willing to compensate the producer at the level of marginal cost.

introduced throughout the 1970s and 1980s. The 'proof' of this second assertion is that, although scale and scope economies are indeed important, there is nevertheless scope for competition in, at least, the long distance market, if not in the local loop as well (Bornholz and Evans 1983; Wenders 1990; Mitchell and Vogelsang 1991, p.14; Wenders 1992). The subsequent argument concentrates on the inefficiencies of the regulator and the regulated industry in the past, rather than proving that sustainable competition would be efficient. It can be argued that, especially in the local loop, competition is inefficient and that, ultimately, selective upgrading of the network by competing and by-passing private networks hinders the upgrading of the local base network and thus the improvement of its efficiency and service provision (Wilson 1992, p.361)[28]. Although it might be still too early to judge the effectiveness of local competition, it nevertheless can be stated that the upgrading of local networks has indeed become much more selective in the liberalised UK market (Hills 1992). Moreover, competition in this part of the network is rather imposed or generated via artificial measures - for instance by restricting the incumbent operator as we will see - than a phenomenon the market itself has provided for.

4.7. The Cases of Cross-subsidies, Tariff Rebalancing and Cost-based Tariffs

In the previous Chapter we already discussed the general background to the increasing pressures to change the traditional, Fordist model of telecommunications regulation. One issue has been exploited in particular in this debate: the cross-subsidisation of the local loop by the long distance network[29] - a popular argument used by the traditional PTTs, regulators, (potential) new entrants, economists, liberalisation opponents and proponents alike.

The argument - which brings us straight back to the heart of the cost allocation and cost causation problem - is as simple as it is questionable: as most of the local loop costs are NTS, or fixed, costs, the telephone users are the only true cost causers of the local loop (Weisman and Kridel 1987). The local service is described as the basic service and long-distance is merely using, but not adding any cost to, the local loop. Denious questions this simple reasoning:

> "Although it may sound reasonable on the surface, this characterisation of the local loop is highly arbitrary. Following similar logic, one might arrive at an opposite conclusion, namely that long distance should be assigned all of the loop costs because long distance has emerged as the most important telephone service in our highly mobile and

[28] With fixed costs and a shrinking customer base, the PTT's remaining customers would also have to pay higher tariffs. Otherwise, the reason for by-pass is not just (high) prices: often the quality or availability of the PTT's services is judged as inadequate (Gabel 1985, p.53).

[29] Other forms of cross-subsidisation, such as from regulated to unregulated parts of the same PTO or from the international network to the national network will be discussed in Chapter VI (see also: Rao and Klein 1992).

communication-driven economy." (Denious 1986, p.262).

In fact, as Denious observed, long distance has not performed a cost-free use of the local loop. If the local loop were used only for local service, the loop would require much less sophisticated technology than in its current form and consequently, would cost less:

> "Technological changes in the local loop over the past 50 years have been driven by the needs of high-quality long distance, not local, service. For example, equipment used to boost signal strength and eliminate distortions such as echo is not necessary for short-distance local calling; it is a cost imposed on the local loop by long-distance service." (Denious 1986, p.263).

In the same manner David Gabel has drawn attention to the fact that particularly computer communications have driven most of the investments in the network as high-speed data communications requires different, higher-quality signals because computers are unable to filter out noise on the line that is indiscernible to the human ear. Equally, major portions of local switching costs are designed to meet the requirements of long distance (eg. direct distance dialling) or specialised (eg. data) services or VAS (eg. premium) services. The local switching facilities required for only basic local voice service are less costly (Gabel 1991). This misallocation of costs induced by an upgrading of the network could become even more serious with a future IN, as Richard Gabel points out. Whereas in the past, combinations of cost reduction and revenue growth resulting from the introduction of new technologies and new services permitted overall prices to decline, and cushioned the burden of misallocation, it is now unlikely to occur with IN services. The costs are so large, the benefits so heavily concentrated in specialised services and the demand for those services is so uncertain that the possibility of price reductions is very small (Gabel 1992).

Contrary to the unbundling argument which has led to separating local loop costs and long distance costs, Denious argues that the network should be regarded as one whole in which two separate local loops are required to complete every local or long distance call. Consequently the most sensible approach would be to recognise the shared nature of the local loop and to divide its costs between long distance and local service. Weinhaus and Oettinger, in their overview of the US history in cost regulation, show how in the period 1930 - 1950 the so-called 'board-to-board' methodology, which allocated all local NTS costs to the local loop, was gradually replaced by the 'station-to-station' principle whereby the costs of the local plant were shared by local and long distance (toll) services. This contribution of long distance to NTS loop costs - in the USA approximately 50 per cent in the early 1980s - was heavily criticised by business users as arbitrary and a form of cross-subsidy. But as Melody put it, simply because the allocation is arbitrary does not mean that it creates a subsidy flow from long distance to local loop. In fact the opposite might be the case:

> "NTS (local loop) requirements to complete toll (long distance) calls to subscribers are greater than NTS facility requirement to complete local calls. Thus, the long distance toll share of common NTS costs should be greater than 50% [...]. Thus, there is no substantive basis for the claim that interstate toll is subsidising local. In fact, the available evidence indicates that it is much more probable that local is subsidising toll, [...]." (William H. Melody's Direct Testimony to the Pennsylvania Public Utilities Commission, August 1984, as quoted from Denious 1986, p.264).

The basic 'station-to-station' philosophy was not revoked until the FCC decided in a liberalisation move in 1983 to recover loop costs allocated to long distance through access charges on local users (Weinhaus and Oettinger 1988, pp.53-103). In fact the network was - again - 'chopped up' into its different segments and costs were allocated accordingly. Not surprisingly economists subsequently found that local access charges and line rentals did not cover the 'real costs' (whether based on FDC or SAC calculations) and subsequently have been pushing for 'redressing of the balance', or 'tariff rebalancing' (Cave *et al.* 1990b). In the USA local tariffs have increased considerably since 1983.

The fact that competition in the long distance network in the USA has been sustainable does also not prove a subsidy flowing from long distance to local loop. The question of subsidy is unrelated to the fact of market entry: the possibility that the post-divestiture AT&T was subsidised would hardly deter other potential long-distance carriers, since they would be entitled to the same subsidy (*i.e.* the non-payment for certain local loop costs). Market entry by competitors such as MCI and US Sprint merely points out that these firms, often using the more modern equipment, can beat AT&T's (marginal) costs in transmitting and switching long distance calls (Denious 1987).

Other, examples of alleged cross-subsidisation are subsidy streams from urban areas to rural areas and the provision of socially obligatory services (Community Service Obligations, CSOs) which costs have to be recouped from other, more profitable services.

The exact calculation of the latter is, not surprisingly, dependent on who produces the figures for what purpose. A pro-liberalisation government might be tempted to keep CSO cost estimates low in order to privatise the public telecommunications company successfully and/or to keep interconnection charges low. It would be in the PTT's interest to produce higher cost estimates to demonstrate the 'huge CSO burden' on its general revenue: it could then use these figures to justify tariff increases for its loss-making CSO customers (tariff rebalancing) and/or deter new market entrants by charging them an extra contribution for the PTT's CSO costs.

The operator's exact CSOs are obviously related to the laws and policies of a government and its regulator. In a limited definition, CSO can be described as an official requirement to provide products or services to community groups at a price less than the 'cost' of supplying them (this of course depends on a specific definition of what costs are!). More broadly defined, it could also include costs induced by

additional industrial policy requirements or general network requirements. An Australian study found that the following PTO services could be identified as CSOs:

- unprofitable standard telephony services;
- unprofitable public telephone services;
- services provided at concessional rates to specific groups or for specific services (eg. free emergency numbers, lower rates for low-users or pensioners etc.);
- provision of national infrastructure (redundancy capital and route diversity);
- support for national telecommunications industry through 'buy national' policies; and,
- consumer protection through regulation of standards of equipment connecting into the network (BTCE 1989, pp.xiii/xiv).

The study found that the total of CSO costs was very much dependent on the definition of CSOs, the applied cost allocation methodology and the opportunity costs of capital (OCC). By using a more limited CSO definition (only the first three elements of the CSO description above) and using another cost allocation philosophy (a so-called avoidability approach[30]) the Australian government's economists produced a total CSO cost which was more than three times lower than the estimate from the Australian PTO! The latter, which was facing a pro-liberalisation drive of its government, had used the 'broad' CSO description (see above) and applied a FDC method[31].

Whilst confusion over real CSO costs continues, there is a further complexity as regards the precise definition of the local loop. Most alleged CSO costs are made in this part of the network. The issue also relates to the claim of cross-subsidies from urban areas to rural areas (Fuhr 1990). The confusion is caused by equalling the 'local exchange network' with the 'local call area' and making a sharp distinction between local services provided via the local network and long distance services provided via the trunk network. The latter distinction originated in the early days of the telephone industry. The first telephone companies sprang up in cities to provide local services. Eventually, inter-local networks emerged, which were soon called long-distance, inter-exchange or trunk calls. The confusion is caused by the fact that within many a local service area already two or more switches were used; larger 'local' call areas even used several levels of switching. Consequently calls within such a local call area were in fact inter-exchange or long(er)-distance calls. These historical and - from a current technological perspective - arbitrary boundaries of local call areas are often still with us today. The terms 'local' or 'inter-local' (long-distance) thus refer to geographic boundaries, not the technical facilities needed to make the call. What constitutes a local service consequently differs from country to country and region to region (Weinhaus and Oettinger 1988, pp.121-125).

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[30] The avoidability approach involves an assessment of the contributions made to the PTO's overheads and profit by telephony operations at various levels of the network. Contributions are calculated as the difference between revenue and avoidable costs at several levels in the network.

[31] Both calculations were made with the same OCC which equalled the PTO's normal rate of return.

Often the term 'local' grew with the urbanisation process; so, whilst some 'local' call areas comprise nowadays just a couple of thousand subscribers, others include millions. These regional imbalances which affect the economics of switching are mostly not taken into account when calculating the possible inefficiencies or losses of rural areas. On the revenue side, as mentioned earlier, it is important to look at the traffic generation in rural and urban areas (rural areas might generate more traffic than urban areas). Sometimes local call zones were an outcome of a political struggle: Hills points out that the UK Post Office defined the local call area by postal service area when it acquired the local telephone networks in 1912. In contrast the UK Treasury wanted local calls limited to a narrow area surrounding an exchange on the basis that long-distance revenue would be enhanced and large users would benefit (Hills 1993, p.23).

All these claims of cross-subsidisation have been used as arguments for:

- rate rebalancing: increasing local tariffs, decreasing long distance tariffs
- unbundling: formerly unmetered local calls become measured; formerly 'free' directory inquiry services are being charged for; and,
- de-averaging: uniform tariffs are partially abandoned in order to allow special, more flexible tariffs related to the 'real' costs of service provision (giving special discounts to large users).

4.8. International Tariffs

The setting of international tariffs is only partially influenced by the above mentioned theoretical and practical issues because the crossing of borders brings in a range of new considerations.

Clearly, there is no 'global PTO', that is, one single PTO operating all international connections; nor has there ever been such an entity. The historically grown practice largely remains that of a myriad of different - 'sovereign' - countries and different PTOs with different networks and different tariffs. Consequently, international tariffs are generally influenced by three different economic policies and organisations: (1) the in-country structure of the country where the call originates, the home-country, (2) the in-country structure of the country receiving the call and (3) the international structures of cables, satellites and multi- and bi-lateral agreements which tie them all together in terms of network technology and organisation:

> "The home country has virtually complete control over decisions regarding the structure and use of its own communications sector. It has essentially no direct control over decisions regarding the in-country structure and use of the communications sector of other nations, and has only partial control through cooperative arrangements over the structure and use of the international facilities that link countries together." (Leeson 1984, p.63).

International regulation and operating agreements were effected via bi-lateral negotiations within the multi-lateral setting and recommendations of the ITU (and CEPT). On a national level the state and the PTT would decide on the conditions of access to the national territory or the national network. Operating agreements specify the type of service to be provided and the rules for administering and sharing revenues between both sides. Neumann has pointed out that one country's international tariff policy thus determines to some extent the level of international tariffs in other countries (Neumann 1986, p.6).

The ITU's Convention and the International Telecommunication Regulations set up under this Convention have the status of an international treaty binding on governments. According to article 29 of this Convention:

> "The settlement of international accounts shall be regarded as current transactions and shall be effected with the current international obligations of the countries concerned, in those cases where their governments have concluded arrangements on this subject. Where no such arrangements have been concluded, and in the absence of special agreements made under Article 31, these settlements shall be effected in accordance with the Administrative Regulations." (ITU 1987)[32].

ITU's International Consultative Committee on Telegraph and Telephone (CCITT) has been responsible for (non-binding) recommendations regarding both technical and organisational aspects of international telecommunications. The basic principles for international tariffs are laid down in the CCITT Blue Book D-series Recommendations.

The CCITT principles, which generally rule the setting of international tariffs, reflect the monopoly structures of the national operators and consequently prevent price competition over international routes:

> "- The rate for a communication between two countries shall be the same no matter the route used, be it direct or through a transit country.
> - Each country shall be considered as a single unit of area in establishing telecommunications rates.
> - There should be only one transit rate for each country, which is the same for all countries.
> - Member countries accept no responsibility towards users as regards claims for damages. Refunds may be made for non-delivery of telegrams.
> - International accounts should be settled on a bilateral basis.
> - Every effort should be made to reduce rates as low as possible on a reciprocal basis." (Reid 1985, as quoted from Neumann 1986, p.7).

Recommendation D.5 on "Costs and Value of Services Rendered as Factors in the Fixing of Rates" provides first some guidelines for some form of cost-based pricing and then formulates some modifications to this. The first guidelines are modified to allow some sort of - what we here have called -

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[32] The D-series were modified to some extent in 1992.

Community Service Obligations (CSOs), cross-subsidisation and value-based pricing:

> "1. The income from the totality of services provided by a telecommunication organisation should cover all the costs incurred by that organisation, namely: a) operating expenses; b) interest on capital involved; c) fiscal charges; d) depreciation of equipment; e) cost of research and development; f) capital investment (as required). For political or social reasons the rates for certain services may be so arranged that they do not cover all the costs involved. In addition, the rates applied should not create harmful competition among the various telecommunication services.
> 2. The CCITT therefore considers that the rates for the various telecommunication services should be such that they cover the items of expenditure listed above. However, in view of the difficulty of applying rates based on these criteria, in certain cases, for the political or social reasons mentioned above, the CCITT considers that the overall balance in the telecommunication services required should be achieved by applying an increase factor to the rates of other telecommunication services in the same telecommunication organisation which will compensate for the deficit incurred by services run at a loss. In determining this increase factor, the value of the service rendered to the user should be taken into consideration. In any case the rates adopted should be such as to avoid harmful competition among the different types of service provided by the organisation concerned. Recognising that a telecommunication service is of the greatest importance for the economic and social life of every country, the CCITT recommends that the surplus income from the telecommunication services considered as a whole should not be greater than the amount required for the efficient running of these services." (CCITT 1988, pp.25/26)

The home-country PTO charges a client who makes an international call for the use of the national network, the use of the international network and the use of the network of the receiving country. The home-country PTO can remunerate the country of destination via three different procedures, according to CCITT's Recommendation D.150 ("New System for Accounting in International Telephony"):

- Firstly, via a flat-rate price procedure where the destination country is paid for the facilities it makes available on a price-per-circuit basis.
- Secondly, via a traffic-unit price procedure where the destination country is paid on the basis of a price per traffic unit.
- Thirdly, via an accounting revenue division procedure, where the accounting revenue from the traffic exchanged in their relationship is divided between the PTOs of the terminal countries, in principle on a fifty-fifty basis.

The latter system, which is the most common method in international telecommunication services, includes two different rates: a collection rate and an accounting rate. The collection charge is the price a carrier charges users in its country for the use of the international service. In dealing with each other operators agree on an accounting rate, which is the rate agreed for a given relation and used for the establishment of international accounts. With regard to the collection rate the ITU Regulations recognise that: a) the level of the charge is a national matter; b) in establishing charges there should not be too great a dissymmetry between the charge applicable in each direction of the same relation; and, c) charges for a given relation should be the same regardless of the route chosen by the operator. Appendix 1 of the Regulations lays down the general provision concerning accounting procedures. Accounting rates need

to be established and revised bilaterally between carriers. The rates should also take into account trends in the cost of providing the specific telecommunication service (WATTC-88 1988, Appendix 1. 1.1). Accounting rates are expressed in Special Drawing Rights (SDRs) of the International Monetary Fund (IMF), or in gold francs or in a currency agreed bilaterally. CCITT's Recommendation D.150 gives four reasons why the collection charge and the accounting rate may differ:

1. The accounting rate can be expressed in gold francs or SDRs whereas the collection charge is normally expressed in the national currency.
2. Collection charges and accounting rates may be based on different traffic units.
3. The value of national currencies can fluctuate relative to the SDR or the gold franc.
4. Collection charges may be influenced by government fiscal policies.

In practice, however, there can be additional factors causing variations as operators often 'mark-up' collection rates - a practice which, similar to the case of 'overcharged' long distance calls, has come under ample attack over the last years.

Where there are traffic imbalances, the country sending the greater amount of traffic pays a settlement based on the traffic imbalance multiplied by the accounting rate share due (normally half the agreed total international accounting rate). International traffic imbalances have troubled some developed countries as discrepancies between in- and outgoing traffic have an effect on the (invisible) trade balance. The USA, for instance, in 1990 had a net telecommunications traffic deficit of over 3.1 billion MiTT (Minutesof Telecommunication Traffic) leading to net out payments of approximately $3 billion. As this deficit has increased over the last years - partially caused by some unilateral cuts in US accounting rates - political pressure has grown to change the international accounting regime and introduce some form of 'reciprocity' (see also section 6.4.).

4.9. Conclusion

Tariffs have always formed a crucial economic and financial base of a telecommunications operator, whether classic telegraphy was provided or state-of-the-art broadband services. Tariffs do not only constitute the main source of revenue for operators, they are also closely linked to demand functions of consumers for which they form an expenditure. In fact, putting tariffs in a broader perspective, they form a crucial linkage between production and consumption as well as accumulation and regulation.

To demonstrate the link with the wider accumulation and regulation environment this Chapter has argued tariffs cannot be a simple, static, mathematical calculation based on a straightforward neo-classical price theory. Telecommunications' economics (or for that matter, most of network-economics) is by definition characterised by immense complexities of huge fixed, joint and common costs, massive overhead costs,

sunk costs, demand fluctuations, regional and international imbalances, Community Service Obligations, to name just a few. Not only the cost-based tariffs of neo-classical economics constitute a problem, other, alternative price theories, based on some form of value-for-user or value-for-society assessment have their own, immense problems too. All this leaves accountants, managers, regulators and legislators - whether in a Fordist environment or a so-called Post Fordist environment - with considerable margins and powers to manipulate the determination of costs and the setting of tariffs according to their own subjective interpretations, interests and strategies. The actors involved in this continuous and dynamic process of costs and tariffs decisions are influenced by market-structures, management strategies, governmental policies, consumption patterns and so forth. All this implies that if the Fordist Telecommunications Regulation Mode had an own, typical set of consumption, production, accumulation and regulation patterns, then it must also have had a characteristic set of tariff practice, which would vary according to country-specific circumstances.

The specific problems of telecommunications' economics and telecommunications tariffing, which, again, are inherent in its network based character of service provision, have thus been mediated in two ways. Firstly, by the typical elements of the internationally dominant regulation mode and secondly by the country-specific historical circumstances. Chapters II and III already analysed the principles and practices of the Fordist Telecommunications Regulation Mode and its restructuring throughout the 1980s and 1990s This was done both on a general, abstract level as well as on a more concrete level of the four countries explored. The next two Chapters continues this research method as regards the development of tariffs.

CHAPTER V

TARIFF POLICIES AND PRACTICES: THE FIRST HUNDRED YEARS

5.1. Introduction

To complete our research of the Fordist Telecommunications Regulation Mode we will have to address now the concrete and antagonistic process of the formation of a matching tariff model. Its construction will be crucial for our understanding of the current challenges posed to the Fordist Mode in general and to its tariff principles and practices in particular.

Tariffs, the hinges connecting production with consumption and accumulation with regulation, have historically developed from rather unsophisticated and almost crude flat-rate charges in the 1880s and 1890s to a much more refined - but still highly standardised - structure incorporating several variables in the period after the Second World War. This Chapter describes the factors, considerations and policies that determined the tariffs and their taxonomy in the pre-liberalisation period which largely coincided with the rise of Fordism. Firstly, the developments of telephone tariffs in the four European countries will be analysed; each of these constructed an own taxonomy corresponding to their own specific historical background. Important themes here will be: the integration of the telegraph and telephone operations into the established postal services, the relationship of the PTT with other deparments (particularly the Treasury), the development of the network itself and the politico-economic interest groups involved in the tariff debates. Secondly, international tariffing will be further explored. This will enable us finally to deduct the general common principles of tariffing of the Fordist Telecommunications Regulation Mode. We will concentrate on telephone tariffs as they formed the most widespread and single largest services category in the first hundred years of telecommunications.

5.2. Tariffing in the United Kingdom: 1870 - 1979

The two oldest private telephone companies The Telephone Company Ltd, which used Bell's telephone patent, and its competitor, the Edison Telephone Company of London, which used Edison's patent, both introduced a simple, high, flat-rate, traffic insensitive, tariff structure in the early days of telephony. The setting of the flat-rate basically reflected construction and maintenance costs.

'A fixed price had to be paid for the exchange lines, covering an unlimited number of calls. The Telephone Company charged £20 (20*l.*) per annum, the Edison Company offered its service at £12 per annum. The reason for this inclusive rate was that those who were finding the money to exploit a new industry were anxious to have a fixed revenue from their subscribers, rather than risk an unknown return,

which a charge per conversation would have produced. The huge upfront investments required to build a network and the uncertainty of demand in the early days of telephony prompted these private companies to develop such a tariff structure. The two companies, concluding that their business would suffer from competition, merged into the United Telephone Company (UTC) in 1880. A flat rate of £20 per annum was established for exchange lines within the Metropolitan area.

The British Post Office - which had already acquired the telegraph in 1869 for which it had paid too much and which was loss-making[1] - saw telephony as a threat and tried for a long time to frustrate its development. It soon realised that the new invention was not just a scientific toy without commercial value. Regretting the fact that it had declined to acquire the new system when the patents were offered to it in 1876, it decided to claim the exclusive rights on telephony on the basis of the Telegraphy Acts 1863 and 1869. The judgement of the court in 1880 was in favour of the Post Office. The Post Office used its exclusive right to license companies on certain terms, which included the payment to the Postmaster-General of a royalty of 10 percent on the gross receipt arising from the telephone exchange business - this system of cross-subsidising telegraphy from telephone revenues remained in place a long time after the telephone was nationalised and raised the telepone costs and consequently the tariffs considerably (Johannesen 1991, p.158).

Protecting the investments and revenues of the telegraph, the Government adopted a policy of retarding the growth of the telephone system. In the case of the licences issued by the Post Office in 1881 a separate licence was granted for each locality in which it was desired to open telephone exchanges. Local telephone companies sprang up which were later often taken over by larger companies, which again often resulted in predatory and monopoly pricing and thus artificially high tariffs[2]. As local networks multiplied the Post Office decided in 1881 to set up some exchanges on its own. The rate structure it adopted was taken over from the established rate structure of the (nationalised) telegraph which was a flat-rate system (the latter was introduced in 1869 due to pressure from business users and the success of Hill's flat-rate one penny post system (Meyer 1907, Chapter VIII)).

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[1] One of the reasons for the losses of the Post Office's telegraphy services was the special, lower than cost rates for the press introduced in 1868 and abolished only in 1955; this de facto press subsidy was seen as a policy instrument for the stimulation of the small and provincial press (Kieve 1973, pp.216-229).

[2] Bennett gives the example of predatory pricing and subsequently monopoly pricing: The large National Telephone Company in Dundee decreased its high £20 rate to £5 after being confronted with a new entrant, the Dundee District Telephone Company, which was quite successful with its £10 rate. The Dundee Company reacted to NTC's move by decreasing its price to £5 and 10 shilling. The low rates proved to be very successful with small businesses and residential users: together the two Dundee companies constituted the largest exchange in the UK, except London. But not for long. The National Telephone Company bought its competitor and then raised the rates to £10; the number of subscribers subsequently dwindled away to about a half (Bennett 1895, p.15).

Later the Post Office - reluctantly - decided to enter gradually the inter-local, trunk business, as demand for this service increased sharply. For interconnection the PO charged companies £10 per mile per annum for a double wire and took in addition half the surplus gross revenues beyond the rental. Consequently many telephone companies made a loss on their long-distance calls (Johannesen 1991, p.160). So, local telephone companies were subsidising the long distance network. The Post Office further frustrated the unfolding telephony networks by demanding a royalty of 50 percent on the gross receipt from call offices and by denying subscribers of the telephone companies the right to send telegrams except on payments to the Post Office!

Confronted with growing irritation and resentment about the Post Office's practices the Government decided to change its policy: the old restrictions were rescinded and in November 1884, new licences were granted for the whole of the country. After this liberalisation the Post Office reduced the prices of its long-distance telegraph service by 50 per cent, putting its revenue below its operating expenses. The term of the new licences was the same as in the original licences - for 31 years from January 1 1881 - with a royalty of 10 percent on the gross revenue derived from every form of telephone exchange business. Under the new licences the Postmaster General had the option of purchasing the telephone business by giving to the companies six months' notice expiring on December 31 in any of the years of 1890, 1897 and 1904, but, by a curious oversight, no provision or arrangement was made for his acquiring the companies' property at the expiration of the licence on December 31 1911. The new policy gave an important boost to the telephone business. Hopes of the private companies to receive wayleave rights however, were dashed as a Bill on this issue had to be withdrawn.

In March 1885 a Select Committee of the House of Commons was appointed to consider the law relating to the control over telephone, telegraph and other wires, and after a prolonged enquiry and hearing the evidence of witnesses representing the public bodies, the Post Office and the telephone companies issued a report on May 12 1885, fully recognising the great advantage in the public interest of granting to the Post Office and the telephone companies the necessary powers to be exercised under the reasonable control of some official authority. The UTC had for the second time prepared and presented a Bill in Parliament asking for wayleave facilities but in view of the appointment of the Select Committee, the Bill was withdrawn. The Committee's report was never acted upon, and the local authorities continued to deny the company the facilities which the Committee considered to be essential to the proper development of the telephone service. Again in 1888 the UTC proposed a similar Bill, again without success.

The need for more cooperation and concentration of companies increased as long distance traffic grew and uniform arrangements about standards and billing became paramount. The approaching expiration of the master patents was also a factor in directing attention to the advisability of consolidating the administration and management of the several companies and the advantages which would follow the adoption of uniform methods and systems. In May 1889 the three principal companies - the UTC, the

National Telephone Company and the Lancashire and Chesire Telephonic Exchange Company - amalgamated into the National Telephone Company (NTC). The other companies were later merged with the NTC. Subsequently the flat-rate tariffs were reduced from £20 to £15 per annum. One year later - 1891 - a general reduction of rates outside the Metropolis was made from £15 and £12 per annum to £10 per annum.

The flat rate tariff system was increasingly criticised in the early 1890s, after analyses by an American organisation of Merchants' Associations. It was argued that a system which exacted an average uniform charge for widely varying degrees of services was obviously inequitable to the public and should therefore be abolished for large cities (Johannesen 1991, p.182). The result of the adoption of the (measured) message rate in New York was that the number of stations had doubled over four years, which was clearly beneficial for the unfolding of the network. The flat-rate system was nevertheless maintained. Another American innovation, higher tariffs for business users than residential users, was mentioned in a Select Committee report of 1895 but not taken over either.

The Post Office and the Treasury meanwhile, decided to extend their control over the trunk network - which via the many mergers was mostly in the hands of one company - by nationalising all long-distance networks. A nationalisation Bill was proposed and adopted that same year. Its actual implementation was very burdensome as it was very difficult to calculate the price (costs) of the trunk network where the plant was very much interwoven with that of the local exchanges. The Post Office in the end nevertheless paid - again - too much. Much of the plant it bought was already worn out at the time of acquisition and had to be replaced immediately, so consequently trunk lines were paid for twice over which in its turn increased the trunk call costs considerably (Bennett 1905). Since telegraphy was partially integrated into the telephone network, newspapers, who already enjoyed special, low telegraph tariffs, could now also use the telephone network cheaply for their telegrams[3].

By 1904 the Government started negotiations to take over the private local companies. An agreement, signed on February 2, 1905, was subsequently investigated by a Select Committee that year. The Committee's advice that the NTC should allow free interconnection between the municipal and its own

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[3] This discount for the press was introduced in the Telegraph Act of 1868 and implemented after nationalisation (the newspapers were one of the major proponents of nationalisation). A Select Committee report, investigating the PO's telegraph's losses in 1873, did not want to increase press charges too much: "It is contended that this alteration would be unfair to towns in which there was only a single newspaper, and that the towns with several papers, by dividing the cost of transmission, would have an undue advantage." Newspapers were also able to lease lines during night hours cheaply or even hire permanent leased lines cheaply. (Report from the Select Committee on the Post Office (Telegraph Department), House of Commons, Sessional Papers, vol.XIII; p.11). The PO, according to its own calculations, was losing £20,000. annually by the transmission of news from news associations. This (cross-) subsidisation continued when in 1895 the telephone trunk lines were nationalised and telegraphy services were partially integrated in the telephone network.

subscribers, was refuted by the Government on grounds that this would destroy the company before the end of 1911. In 1907 the NTC persuaded the Postmaster General to agree so far as the provinces were concerned, to abolish the flat or inclusive rate of charge for all new subscribers. As already practised in the USA (see above), a lowered, separate connection charge, enabled a large number of small users to take advantage of the telephone service. It raised, however, a shower of protests from the various Chambers of Commerce, who considered that although they lacked expertise they were quite competent to fix the rates to be charged by the NTC for the service which it provided (Johannesen 1991, p.221). In 1916 the trunk-call charges were reduced to one-half in the case of conversations between 7 p.m. and 7 a.m., in order to spread the traffic and stimulate a more efficient use of the network. Flat-rates were completely abolished by 1921.

After lengthy negotiations the telephone network was nationalised in 1912. That year the Post Office gained control of virtually all the telephone networks in the country. It bought the National Telephone Company (NTC) out for the huge sum of £12,515,264 and gave Britain a unified service, apart from a few municipal systems (such as Hull) (Post Office 1976). A combination of these high costs, obsolete equipment, and the need to roll out the network further and make upfront investments, ensured that the PO's telephone business remained in the red for most of the interwar period.

That same year the Post Office approached the Treasury on the possibility of opening unprofitable but needed telephone exchanges. The Treasury's typical reply was that

> "[...] telephones were not in the same position as telegraph and postal facilities; they were not exactly to be regarded as a luxury; but while postal and telegraph facilities might be provided at a loss to the taxpayer, telephone extension should [...] as a general rule pay their own way. " (quoted from Perry 1977, p.77).

This reply is typical for three reasons. Firstly, it reflects the Treasury's hostile attitude towards the telephone - a hostility inspired by its annoyance over an already loss-making telegraph system and its fundamental 'free market' stand. Secondly, it reflects the adopted network taxonomy - namely a belief in that it would be 'logical' or 'correct' to strictly separate the cost accounting of different parts of the network, thereby neglecting the argument that long distance should make a contribution towards the costs of developing and maintaining the local loop. Thirdly, it is a one-sided view of the network which neglects externalities.

Whilst the Post Office believed in what it regarded as cross-subsidisation of rural areas (Baines 1895), the Treasury was much stricter and insisted that exchanges should be opened only when the projected deficit was 3 per cent or less.

Before its nationalisation there had been many problems with administration: technical innovation

followed technical innovation, but the various private telephone companies and their administrative methodologies were ill equipped to deal with this fast changing environment. The nationalisation and integration of telephony into the Post Office did not improve matters much: bureaucratic and inefficient procedures and old fashioned accountancy methods dominated the organisation. Since the Treasury did not provide the Post Office the necessary funds for the further development of the network, customers had to pay for the network expansion via higher usage prices and rentals. The telephone network administration was integrated in the accountant traditions of the Post Office and the Treasury. The Treasury worked to prevent the emergence of 'unorthodox' policies relating to tariff policy (Pitt 1980, p.53). The administration of postal services and telecommunications was also barely separated so that even Parliament - which had to vote on the accounts - was unable to see what costs and profits accrued separately (Hills 1986, p.83). This parliamentary control, Meyer argues, caused also some inefficiences within the PO organisation. Members of Parliament frequently intervened on behalf of an individual civil servant of the PO; because of this up to one third of the highest officials in the PO were consequently occupied with petty questions of administrative detail (Meyer 1907, Chapter XIV and XV).

The inflated prices the Post Office charged for its often rather poor telecommunication services restricted the growth of the network for many years. Special surcharges were even imposed for connection in order to dampen demand. This restrictive policy of the Post Office and - notably - the Treasury, was criticised by large business users and several committees which wanted a more 'commercial' and less bureaucratic policy. A Parliamentary Committee in 1922, increasingly concerned about what later came to be known as 'universal service', suggested the introduction of price discrimination (residential connection fees cheaper than business fees) which would stimulate overall growth and usage of the network (Pitt 1980, pp.45/46). The Post Office, under strict control and pressure from the Treasury, refused however to change its policy. Nevertheless, a considerable political pressure was building up to move towards the American system where tariffs were aimed at a long-term strategy of unfolding the network swiftly instead of the short-term cost recovery strategy resulting in high entry costs in the UK. In order to avoid congestion in the public network business users were to be encouraged to use leased lines and PABXs; so consequently leased lines tariffs were to be decreased, whilst standard business connections were increased (Hills 1993).

During the interwar economic crises the Post Office, as a consequence of an orthodox economic policy, was put under further financial constraints while tariffs were raised as inflation went up. Keynesian policies - big investments in telephony for its modernisation and expansion and prices related to that expansion, i.e. lower prices - were turned down.

Although the postwar Labour government introduced a programme of nationalising the 'commanding heights of the economy' it did not have a clear cut view on nationalised and public enterprises (Overbeek 1990, p.115). The enterprises were expected in effect to break even 'taking one year with another', and

there was no explanation or guidance given in the legislation of what criteria should govern cost accounting and the price structure of the produced goods and services. Apart from some references to the avoidance of 'excessive' prices and - in some cases - to keep prices 'reasonable', there was no indication of how prices should be set (Utton 1986, pp.172/173). In the White Paper of 1961 (Financial and Economic Objectives, 1961) some financial targets, such as an overall rate of return on assets, were laid down as a guidance; but even here there was still no concrete guidance on pricing. In 1963 a White Paper was adopted which announced massive increases in capital investment in the network. Hopes of the Post Office entering a period of relative financial stability were however dashed by the adoption of governmental deflationary policies. Rather 1966 brought a massive cut in the telecommunications investment programme and increases in the amount of telephone rentals and charges to the consumer (Pitt 1980, p.145).

In a subsequent White Paper in 1967 (Nationalised Industries, 1967), the possible advantages of the marginal cost price rule were officially recognised but at the same time it was made clear that in cases where there were substantial divergences between social and private costs and benefits, the rule would not apply. The general pricing principle that the industries were to use to achieve an efficient distribution of resources was to align prices with long-run marginal costs. It was recognised that in some circumstances short-run marginal costs might be used (in cases of excess capacity) or prices above long-run marginal costs (where excess demand was pushing against the limit of existing capacity) (Utton 1986, p.174). The latter was the case in the 1960s, when, due to technological and production developments, the telephone became relatively cheaper and the Post Office could not meet the demand due to consistent underestimation. Rental and connection charges were manipulated throughout the 1960s in order to dampen demand. Between 1955 and 1965 connection charges were increased by as much as 400 per cent (Hills 1986, p.85).

In 1969 the Post Office became a public corporation and a new more 'functional' organisation structure and management were introduced. The escape from inflexible bureaucracy was only partially successful. Tariffs that were set to gain a certain return on capital - as put forward in the White Papers - often interfered with the macro economic policies of governments. The Conservative government of 1970 froze telephone tariffs in its desire to keep down inflation, with the result that the telephone service made a loss during the 1970s which was then met out of public taxation.

In 1975 there was wide public concern about heavy increases in charges for postal and telecommunications services and about reductions in services. In response to this concern and to the recommendations of the Post Office Users's National Council (POUNC), the government invited an independent committee under professor Charles Carter to review the performance of the Post Office and its use of resources and assets. Apart from the controversial issue that the Post Office should be divided into two sections, the Review Committee 'welcomed' short run marginal cost pricing for telecommunica-

tions services especially when used for shifting demand from peak to off-peak hours; furthermore it criticised the inefficient and inadequate accounting system, for it provided poor information on costs, investments and revenues (HMSO 1977). The government did not however, accept the recommendations of the Carter report (HMSO 1978).

The 1978 White Paper (The Nationalised Industries, 1978) recognised that the complexity of industries frequently made marginal cost pricing unrealistic. While industries were urged to relate prices as far as possible to 'costs' and to avoid arbitrary cross-subsidisation, pricing decisions were left up to the management of the individual enterprise and their judgement of the market.

A major date in the history of tariffs in the UK is 1958 when subscriber trunk dialling was introduced together with changes in the way calls were metered and charged (Hunter, Lawrie and Peterson 1988, pp.21-38; Harper 1986, pp.153/154). Trunk call charges reflected both the time and distance involved and a complicated system of tariffs was in operation. Whereas distance still remained a factor in the cost of a call, new technology had reduced its importance and a simpler tariff structure was introduced. The new system involved timing all calls and the cost to the customer depended on the length of the call and whether it was a local or non-local call (non-local calls were divided into three distance related groups).

For a more cost efficient use of the network's capacity three in stead of two time zones were introduced (peak, standard and cheap). Finally new local call areas were started which replaced a system based on the radial distances between exchanges (a so-called 'sliding zones system'). The new local call areas (approximately 640, each of which contains a charging point) determined what was a local call (call inside local area or to adjacent area) and what not (others). The Post Office tried to make these areas comparable in size, 'to ensure an equality of treatment for all subscribers' and to avoid anomalies. However, since the reformation of distance metering (from radial metering to metering the distance between charging points) became less exact, anomalies occurred. These were in fact strengthened as some local call areas were bigger or included more PSTN subscribers than others (see also section 4.7.). London got a large local area and thereby a privileged position (Reid 1984). Metering costs and the topology of the existing network also played an important role in the final implementation of the introduction of new charging groups.

Basically, the 1958 system is still operative especially for PSTN/telephony services, although unit values (charge per unit) and charging intervals (time periods for metering) have changed. Gradually more sophisticated metering equipment is being introduced as old systems are often inaccurate and disadvantage BT's customers.

5.3. Tariffing in France: 1870 - 1986

By the law of 1837, confirmed by that of 1851, the monopoly of telegraphic communication rested with the State and the French authorities had little difficulty in pronouncing the telephone a telegraph. By 1879 three five-year concessions, comprising between them the whole of Paris, were granted to private companies. These concessionaries decided to merge and formed one powerful association, the *Société Général des Téléphones* (SGT) which later undertook also the concessions for Marseilles, Bordeaux, Lyons, Havre, Rouen and other leading French towns. The French state, that is the Department of Posts and Telegraphs (DPT), timidly started to build some small-town local networks in 1881. The French state claimed a general control over the private provision of telephony, including the right to fix the charges, and reserved power to buy the system at the value of the material employed on the termination of the five-year concession. The Department of Posts and Telegraphy (DPT) approved of a fixed rate for Paris of 24*l.* per annum and for the provinces 16*l.*. This rate was exclusive of the subscriber's transmitters and receivers. This rate proved rather too high for the provincial towns as local networks had hardly unfolded (Bennett 1895, pp.136-140).

When in France in July 1889 telephony was nationalised as a *service publique* it became part of the (DPT). Arguments of equal access, lower charges and non-discrimination of users and possible abuse of a private monopoly were used in the French debate on nationalisation, which was further much influenced by Saint-Simonian and Colbertist ideas of the state and its societal tasks. After nationalisation investments and tariffs were decided by the central government, especially the Ministry and the Treasury.

The first act of the government after nationalisation was to reduce the rates of subscription (the Parisian tariff came down from 24*l.* to 16*l.* and the provincial from 16*l.* to 8*l.*). A differentiation between business users and residential users, at the time already common practice in New York, was not introduced. On top of the rental charge, the subscriber would still have to buy his or her own customer equipment (CPE) as well as contribute 12*s.* per 200 meters of single wire towards the cost of his or her line, which would practically pay its entire cost. Further, in towns possessing any considerable amount of underground work the provincial subscriptions was 12*l.*. These (still) high rates hindered the development of the provincial networks considerably.

The PTT Ministry was not capable of developing the telephone network further as it used a finance system copied from public works, roads and bridges. Local groups of banks and business, needing a (mostly local) telephone network and dissatisfied with the Ministry's policy, decided to advance money to the government. After a successful start this financial scheme lead to a multiplication of - hardly interconnected - little local networks in a society which was (still) very rural and hardly industrialised. Following a fusion of all network accounts it was found that a strict control of the rentability of the many little networks had become impossible (until then the accounts of the local networks had been separated

from each other and from the long distance networks). Meanwhile, in line with developments abroad, metered calls were introduced for the slowly unfolding trunk networks while the administration as a whole was regulated by a rate of return system (Bertho-Lavenir 1989).

After many years of discussion and trailing network development the government decided in 1923 to reform the PTT financially and give it much more elbow-room. It was decided that:

- the PTT revenues should be separated from other state revenues;
- the PTT revenues should be kept within its own budget for the development of post and telephony; and,
- the PTT was allowed to borrow capital itself to develop multi-year programmes, and to create special funds for the needed investments.

This 1923 reform (*le budget annexe des PTT*) should have given the PTT a more 'industrial and commercial' and less administrative character[4]. Nevertheless, due to the financial, economic and political crises in the interwar period, the reform was not fully implemented: in fact the Treasury regained power over the PTT and the investment funds required for unfolding the network were not created.

Telephony became in the 1920s fully integrated in the old postal administration; this integration went as far as to copy the geographical postal infrastructure literally onto the telephony network topology. The consequence was an enormous amount of small exchanges (21,500 in 1928 - 20 times as much as in the USA) connected by low capacity wires (Le Diberder 1983, p.17). This topology lead to a very inefficient and technically inadequate network with very high connection and call charges. Telephone penetration was therefore low compared to other Western European countries - a situation which remained unaltered till the late 1960s.

In the first decade after the Second World War, when the major banks, insurance companies and the electricity companies were nationalised, telecommunications had a low priority. Tariffs were raised to dampen a fast rising demand throughout the 1950s (Vedel 1986, p.15; Catharine Bertho-Lavenir 1989, p.596). In the 1960s the pressure for more and better telecommunication provisions grew as the French

[4] The 1923 reform installed also an advice council (*Conseil Supérieur des Postes et Télégraphes*) which advised on the PTT budget before it was sent to parliament; this council was composed of representatives from industry, commerce and user representatives (Bertho-Lavenir 1989, p.594). Typical for the France, it also reflected the close links between the professional staff of the ministry on the one hand and the leaders of the business community (especially banking, insurance and the major public and private enterprises) on the other. Most often they shared a common educational background, such as the highly selective *grandes écoles* (eg. the *École des Ponts et Chaussées*).

industrialisation process gained speed[5]. In 1967 plans to create a more autonomous public telephone company were rejected after protests of communists and unions who were afraid of loss of employment and state control. However in 1970 a financial institution was created which allowed the PTT - in 1968 renamed *Direction Générale des Télécommunications* DGT - to borrow money from abroad. The same year the accounts of post and telecommunications were separated and one year later a financial system, based on private industry, was introduced for the telecommunications administration.

At the same time the conservative governments embarked on a huge public spending modernisation programme, in spite of the oil crises and the world economic recession in the early 1970s. From 1974 to 1980, public investment increased by 91 per cent (whereas private investment decreased by 5 per cent)! Massive investments took place in the period 1974 - 1977 in a drive to expand the customer base of the PSTN rapidly. Following the Nora Minc report in 1978 again a vast investment programme was implemented, now for a radical modernisation and digitisation of the network. This modernisation plan was part of a bigger governmental policy to compensate for the obsolescence of the prewar period and prepare the French economy and industry for what was called the 'information society' (PSI 1986, pp.165-170). Not surprisingly it increased DGT's debts to the French state enormously.

Meanwhile the Organic Law of 1959 provided that remuneration for state provided services could only be set if instituted by decree of the Council of State, upon the report of the Minister of Finance and the Ministers concerned. Additionally, a PTT Code provided that tariffs for domestic services would be set by a normal decree and tariffs for international services would be set by order of the PTT Minister (Ergas 1984, pp.291/292). Although in theory the DGT's tariffs were subject to a considerable degree of *ex post* political control, in practice the DGT had a high degree of relative autonomy.

When the French government changed its telecommunications policy radically during the 1970s the tariff policy was also changed. As stated, at the beginning of the decade the French network was antiquated, a rising demand for telephony was neglected and there were significant delays in installation and services. Together with the introduction and implementation of state led modernisation programmes, local decentralisation of activities and massive investments (e.g. *Plan Télématique* in 1978, the *Plan Câble* in 1982 and the *Plan Filière Electronique* in 1982), tariffs were decreased considerably to stimulate the unfolding of the network infrastructure (more subscribers) and to activate the usage of the network (new services for both business and residential users). The PSTN connection charge was divided by more than five in the period 1977 - 1987 as a consequence of changed regulations and became one of the lowest in Europe. In the period 1974-1987 the rental charge was halved in real terms, and in the period 1975-

[5] France industrialised relatively late. However, following the Second World War output grew rapidly and commentators often refer nostalgically to the period as the *trente glorieuses*. From 1969 to 1973 real GDP was growing at around 6 per cent per year (Thomson 1991, p.105).

1985, the unit charge declined in real terms by 20 per cent (OECD 1987, p.231). Consequently the number of subscriber lines increased from 4.6 million in 1971 to 22.05 million lines in 1984. Moreover, due to growth and higher usage of the network the revenues increased and successively the level of self-financing rose from approximately 40% in the mid-1970s to 74.6% in 1983 (Bruce, Cunard and Director 1986, pp.515/516).

DGT's status grew as its importance in an envisioned 'information society' and its relevance for the whole of the (micro-)electronics sector (*filière electronique*[6]) increased during the 1970s and 1980s. The new, modernised structure of the French telecommunication industry influenced the tariffs considerably. On the one hand intricate cross-subsidies to and from other electronic industries (nationalised under the socialist Mitterand-Mauroy in 1981/1982) were established throughout the 1980s, thereby increasing the DGT's costs and putting pressure on its tariffs. On the other hand its tariff flexibility was increased. A web of DGT's affiliated entities, each of which operated as a *société d'économie mixte* - a private company with the state holding all or a majority of its shares - were specifically conceived to encourage the development of new services. These were marketed creatively thanks to - among others - DGT's newly acquired, substantial flexibility in pricing these services. DGT's affiliates bought capacity from the DGT and sold it to their customers (in fact an institutional resale).

A good example of a new way of pricing is the French videotex service, *Télétel*, introduced in 1978. Stand alone and unintelligent videotex terminals, *Minitels*, were distributed free-of-charge so that a large user base was quickly established and the so-called chicken-and-egg-problem of no market base avoided. The Minitel terminal was introduced as the means to provide an electronic telephone directory, which was presented as a cost-cutting exercise and a means to increase the range of services offered by the DGT. Since it is an open system, the DGT allowed service providers to freely connect to this service network. To facilitate these services, switches providing the interface between the PSTN, the X.25 packet-switched network (Transpac) and the service providers, were implemented.

The tariff structure for this new service is as follows:

- the user pays only for local access; the service providers pay for the use of the Transpac network;
- the user pays the entire access fee based on two minutes of usage independent of distance; this option is intended for use where information providers want to distribute information broadly but do not want to pay the transport charges;

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[6] The term 'filière' originates with French industrial economists' work on 'triangulating' economic input - output matrices which permits the identification and ranking of inter-industry flows of goods and services so as to highlight degrees of interrelation between industrial sectors. A filière involves thus a flow of goods through a succession of primary, intermediate and final goods sectors and thereby makes it possible to analyse and define the relations (interdependencies) between different enterprises and industries in a wider economic context. See: Jean Montfort, A la Recherche des Filières de Production, in: Economie et Statistique, No.151, January 1983.

- users pay for videotex calls on their ordinary telephone bills and DGT hands over a proportion of the collected sums to remunerate the service providers[7].

The consequences of this so-called Kiosk-mode tariff, introduced in 1984, are that there are no subscription fees and no expensive direct billing by the service providers themselves (Maury 1986, pp.3-6)[8].

Whilst the telecommunications industry - in spite of a right wing RPR Chirac government in 1986-1988 - remained under the control of a socialist (PSF) government throughout the 1980s, some limited forms of competition emerged. This limited competition came from the relatively autonomous DGT's affiliates and their subsidiaries which sometimes offered the same services as DGT itself, as boundary lines were not always very precise. If for instance an affiliate like FCR (*Groupe France Câbles et Radio*) set its digital service prices very low it cream-skimmed the DGT's own business base by drawing customers away from the public switched network.

So-called Management Charters (*Charte de Gestion*) provided rules for management as well as the benchmarks and objectives for the DGT for a certain period, including a certain rate of return. In the Charter for the period between 1983 and 1986 a goal was established preventing telecommunications prices from increasing in excess of the overall economic price level (Bruce, Cunard and Director 1986, p.532). DGT's affiliates, mainly catering for the business users, were not so rigidly covered by the PTT Code so that they enjoyed a certain price flexibility and therefore were able to tailor tariffs to the needs of users.

Still, the government challenged the growing autonomy of the DGT and its affiliates in 1984 when it decided unilaterally, and contrary to the wishes of the DGT, to increase the basic telephone rates. This tariff increase was decided by the government in order to avoid a financial deficit for the DGT for a

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[7] The French videotex system has been regarded by its proponents as successful due to this 'revolutionary' tariff system and free of charge terminals. The English Prestel videotex system - the first videotex system, first demonstrated in 1973 - was less successful because BT underestimated the price elasticity of demand (expensive terminals and high tariffs) and software difficulties. The German DBP, introducing its *Bildschirmtext* only in 1984 due to regulatory difficulties, avoided the mistake BT made by setting its tariffs at a level designed to recoup costs, with a million subscribers, with 'loss leader' incentives (for example electronic mailing was free until 1985 and at half price from 1985 to 1986). However, the growth of *Bildschirmtext* was initially hampered by an expensive decoder and moreover - as in the Dutch case of *Viditel* - general lack of demand (a second launch of *Bildschirmtext* in 1992 has been aborted for this reason).

[8] Although DGT (nowadays *France Télécom*) claims that *Télétel* is a success due to its innovative marketing strategy and attractive tariff structure, it is not clear whether it is making real profits or losses since the system is subsidised from several related industries (see also Kramer 1991). Furthermore the French videotex system hardly generated the originally expected spin-off of new value added services. The liberalised UK VANs market grew much more vigorously than elsewhere in Western Europe (Humphreys 1990).

second consecutive year. This deficit was partly caused by revenue transfers to the state's General Budget. A few years later the government decided that the DGT should also subsidise the postal service as well as contribute to the electronics industry and the space agency CNES (Dang Nguyen 1988, p.137).

Similar to the UK, distance related and time-of-day tariffing had already been introduced at the turn of the century. In the 1980s the time-of-day metering became more sophisticated (three time zones instead of two), local calls became metered[9] and for newly emerging private and public data networks volume based tariffing was added.

5.4. Tariffing in Germany: 1881 - 1989

Similar to France and the UK, the German local networks, set up by the *Reichspost* and local authorities, used an annual fixed tariff which included access, line rental and unmetered local calls. The rates were uniform throughout the Imperial Administration. For a distance not exceeding five kilometres the charge per annum was 7*l.*10*s.*. When the distance exceeded five kilometres the charge was increased by 3*s.* per 100 metres. Bennett judges this to be a relatively high rate and the tariff structure was disadvantageous for smaller, rural towns (Bennett 1895, pp.179/180).

As the network slowly developed cost structures and tariffs changed accordingly. However, the organisation of the German PTT, reflecting the German political system, differed considerably from its European counterparts.

In 1924 the *Reichspost* was excluded from the governmental budget and was then treated as a 'special budget' (*Sondervermögen*). It thus gained an early independence and was less restricted by Treasury politics than, for instance, the British Post Office. Nevertheless in the aftermath of the First World War, the political confusions and insecurities of the Weimar Republic and the economic and financial crises of the late 1920s considerably limited the investment in expansion of the network.

After the Second World War the 'special budget' system was copied onto the new *Deutsche Bundespost* (DBP). The other principle of the DBP's dual institutional character was laid down in the West German Constitution of 1949 and the Post Act of 1953 (*Postverwaltungsgesetz*): the DBP would not be an independent company but part of the general legal structure of the federal state (*Bundesverwaltung*). So partly it became an element of the federal state and partly - due to the 1924 exclusion - it remained a relatively independent company. Therefore the DBP got - partially - a normal economic task equal to every

[9] Additionally the local call pulse (metering unit) was decreased from 20 minutes to 6 minutes in 1986.

other commercial company: it had to finance its own expenditures out of its revenues (paragraph 15 of the 1953 Post Act). At the same time it had to meet several special policy requirements, such as:

- it had (has) to give 10% of its annual revenues to the federal State; this *Ablieferungspflicht* was introduced in 1931 and will end in 1993; it has been concluded that such payment is higher than would be the case if the DBP were taxed as a private firm (Bruce, Cunard and Director 1986, p.556); thus on the part of the Ministry of Finance there is a strong institutional interest in increasing revenues and enhancing the operating efficiency of the DBP;
- it had (has) the obligation to connect people or institutions, on their request, to the network and deliver them the requested services (*Kontrahierungszwang*) (Neumann 1984, pp.177-187).

Officially the Administrative Council (*Verwaltungsrat*) decided on tariffs. Only on a conclusion of the Council and after the approval by the federal Minister of Economic Affairs could the Post Minister release a tariff decree. The Post Minister had some autonomy: in case he or she considered that a Council decision was 'not in the interest of the federal state' (paragraph 13 Post Act 1953), he or she could ask the federal government for a final decision; this happened only twice, in 1964 and 1971, which demonstrates how much this tariff system was based on a strong consensus between politicians, unions and industry. This consensus included a philosophy of the state responsibility (delegated to the PTT) for maintaining the unity of the public network and the central role it should play for all telecommunications. This resulted, for instance, in a reluctance to offer private lines for business users; this contrasts with the UK (and, as we will see, also the Netherlands) where the Post Office in fact stimulated, private lines in the 1920s via cheap tariffs.

The Post Minister made the tariff recommendations for the Administrative Council; MPs (mostly members of the government coalition parties), Cabinet Ministers, user groups and some members of the Council were involved in the process of formulating these recommendations so that there was seldom a need to use the paragraph 13 provision.

Throughout their history the *Reichspost* and later the DBP, together with other actors of the political process, developed several basic principles and rules for its tariff policy (*Gebührenpolitik*) which in fact are not laid down as such in any law but were nevertheless strictly upheld and which partially differed from the British, French and Dutch tariff principles:

- The principle of general cost coverage (*Globalkostendeckung*): this meant that it was - legally - possible to cross-subsidise the loss making postal services (and giro bank services) with the revenues of the profit making telecommunication services. The cross-subsidisation of postal services was considered a politically and financially relevant subsidy for the distribution of the press (stimulating its pluriformity, *Meinungsvielfalt*) and a right of (access to) information for citizens (tariff revenues of the postal services only covered some 50 per cent of their costs) (Herrmann 1986, p.167).
- The principle of self financing: the tariffs should not only cover the costs but also cover

the need for new investments.

- The equivalence principle: there had to be some form of equivalence between the price of the service and its economic value or benefit; this led to a differentation of tariffs between business and residential users.
- The need to introduce innovations (*Innovationsförderung*) and to use special (low) prices during the introduction phase.
- The need for stable tariffs: since price increases of DBP's services could easily lead to discussions and questioning in the political and public sphere and could stimulate inflationary forces (a very sensitive issue due to the inflation problems of the Weimar Republic), there was a general consensus for stability in the price development. Due to the time and money consuming process of deciding and implementing a change in tariffs, the DBP itself was often not very eager to change its tariffs.

Additionally, other principles, more common to all four countries discussed in this Chapter, were:

- The manipulation of demand: especially shifting demand from peak hours to off peak hours via special price settings.
- The principles of uniform tariffs and their publication; the reasons for using a uniform DBP tariff structure were:
  - equity: differences in cost structures for providing a service in a rural area or an urban area should not influence people's ability to become a DBP customer; cost related tariffs would also strengthen disparities in income between urban and rural people;
  - regional policy: since telecommunication was regarded as a central part of the country's economic-technical infrastructure, disparities in tariffs could weaken the 'underdeveloped' regions;
  - public utility: information and communication could be seen as a basic need which should be provided to society in general by the State and on equal conditions;
  - externalities: a tariff policy can be used for exploiting externalities; and,
  - metering and administrative costs: using a cost benefit analysis it was assumed that sometimes it could be more efficient to use simple uniform tariffs (such as average prices) rather than difficult and costly to calculate differentiated tariffs (Herrmann 1986, pp.161-170; Scherer 1985, pp. 258-265; Neumann 1984, pp.192-204).

The history of the German tariff policy started when telephony for private communication was introduced in 1881. A flat-rate tariff (*Pauschalgebühr*) covered the - original - relatively high connection costs and the relatively low switching and exchange costs. Similar to France, and the UK (until the 1920s), no tariff differentiation between business users and residential users was introduced. With the unfolding of the network the cost structure changed: switching costs grew more rapidly than other costs so that usage dependent tariffs for long distance calls were introduced. The flat rate from 1885 comprised only the local loop costs (connection, rental, switching and usage). Districts or zones of first 30 kilometre and later 50 kilometre were introduced in 1892 due to the further development of the network; also time dependent tariffs for long distance calls were initiated. Due to political pressure which prevented the abolition of the attractive flat rate tariff for local calls in 1899 the network expanded swiftly. However, the Reichspost succeeded in 1921 abolishing the flat rate tariff and introduced local call charges and a separate connection charge. Six years later a peak and off peak tariff differentiation was introduced (Neumann

1984, pp.205-207).

The basic system of the tariffs (connection charge, rental charge and usage charge dependent on time and distance) has not changed very much since - except in 1953 and 1978. Nonetheless, cost structures did change and also the relative and absolute prices. The decline of long distance prices, especially in the period 1950-1980 reflected the decreasing costs in the trunk network due to technological improvements. In 1953 a new tariff structure for long distance calls was inaugurated; it was based on a more linear metering method (repeal of the 3 minute minimum tariff), made possible by declining time independent costs, and a less refined system of measuring distance, which reduced metering costs. Instead of measuring the distance between the two local exchanges, the distance between the district exchanges (consisting each of up to 20 local exchanges) was measured. The price effects of these changes were not distributed equally over all the West German regions, although the DBP tried to compensate them. The price difference between local calls and trunk calls decreased due to these changes in cost structures and tariffing. In 1974 time dependent tariffing was introduced for local calls.

Another change was implemented in the period 1978 - 1983 when the local call areas were expanded (*Nahdienst*) and the time metering changed. Due to the growth of metropolitan areas, which were bigger than the local call areas, many phone calls within a city were charged at the more expensive long distance call rate. A zone system adjusted to cities, regions or agglomerations would have required a complete remodelling and reorganisation of the network and would have cost the DBP around 16 billion Deutsche Mark - the book value of the total DBP network. So, after intensive debates in the Bundestag, the West German parliament, it was decided that the local call areas were to be expanded by 20 kilometres. Especially the local areas close to metropolitan areas profited from this change; the benefits for rural areas were much less. The changed time metering caused a rise in local call prices and cost the DBP an extra 395 million DM (metering costs) (Neumann 1984, pp.228-247).

The 1953 'Law pertaining to the Administration of the Deutsche Bundespost' introduced a 'cost calculation by service' system which is described as a centralised full-cost distribution system (FDC):

- centralised, because breakdowns can only be provided at the national service level; and
- full cost, because historic costs, including overheads, are fully allocated to services, rather than marginal costs (Lewin, Rogerson and Johnson 1989, p.94).

This cost allocation and accounting system has been changed since 1989 (see section 7.4.).

5.5. Tariffing in the Netherlands: 1852 - 1988

Telephony has been offered by private companies for a long period in the Netherlands. These private, mostly municipal, companies were rather successful as Bennett has pointed out: an extensive network was built swiftly and tariffs - approved by Royal Resolutions - were relatively low. In Amsterdam, for instance, subscribers paid a fixed rate of 9*l.* and 14*s.* and 2.5*d.* which included the subscriber's equipment (Bennett 1895, pp.225-227). The state nevertheless gradually took over the telephone system, thereby inserting its own principles into telephony.

When the main (long distance) telegraph lines were nationalised in 1852 the Dutch Treasury introduced the principle that its revenues should cover its expenses. However, as the liberal governments rapidly became convinced of the importance of this new form of electronic information transport, they accepted the initial losses which proved inevitable as an extensive network was unfolded swiftly. This scenario was repeated for the (long distance) telephone lines which were nationalised in 1897 and required such enormous expansion investments that the service was deep into the red by 1910. So, unlike the UK where the British Post Office financed the extension investments for long distance telephony out of high interconnection rates charged to the local companies, its Dutch counterpart used state budget money. The state budget was further debited with capital required to acquire and expand the local private telephone companies after 1911. The Dutch parliament, confronted with these piece-meal acquisitions and capital investment plans, subsequently forced the responsible Minister to re-organise and rationalise the whole of the P&T administration's accounts in order to introduce a more systematic policy and increase parliament's grip on the administration. The P&T administration already had introduced separate accounts by 1904 and had become a separate state company (public company) by 1915; the reason for this was that its long-term investment plans did not fit in with the state's annual budget system. Parliament was however very reluctant to give too much independence to the new state company, since it wanted to control investments and tariffs for the sake of the 'general interest' (*algemeen belang*).

To lessen the state's financial problems during the First World War (the Netherlands was neutral) the P&T tariffs were increased. The P&T's contribution towards the state budget continued until the early 1920s. Successful planning, modern administration and fast growing demand brought telephony back into the black by the mid 1920s. This growth and its consequent revenue stream was such that the PTT state company (the P&T's successor in 1928) could introduce tariff reductions from 1934 onwards (which in its turn stimulated traffic growth). An independent Post Council (*Postraad*) with members from industry was installed in 1928 to advise the Minister on PTT affairs. In spite of pressure throughout the 1920s to cut the P&T's budget, Ministers decided to continue their investments and acquisition plans as the telephone's profits were partially used to cover the telegraph's and postal services' losses. The use of the PTT as a net contributor to other state activities was increased throughout the 1930s and the post war period (Hogesteeger 1989, pp.124-153).

The start of a radical network automatisation programme and the Taylorisation of the organisation in 1929 inaugurated a new era in tariffing. Before, only inter-local (long distance) calls were separately charged for; local calls were included in an annual subscription charge. In order to expand the network's residential customer base it was decided to lower the relatively high subscription charge and introduce the message rate system also for local calls. It was further reasoned that by automatising the network, costs per call would come down due to saving on operators, saving on exchanges (less exchanges meant less buildings), shorter connection times (more efficient use of the network) and the telephone could more easily be introduced in rural areas (no personnel required in automated rural exchanges). The same period saw a decrease of the civil servant wages, thereby decreasing the PTT's costs. This programme was implemented in spite of the economic crises and after a short stagnation, the number of subscribers per 100 inhabitants increased from 3.8 in 1930 to 5.2 in 1939 (Dek, Manders and de Vries 1981, pp.225-233).

In section 2.8.4 we have already discussed the continued importance of telecommunications for the Dutch post war governments. New expansion investment plans were announced, but due to a general equipment shortage and fast growing demand the PTT introduced time-of-day related tariffs in 1961 in order to shift traffic to off-peak hours. Large parts of the PTT's capital expenditure in the 1960s and 1970s were invested in the new, more cost-efficient coaxial cable and (fixed) microwave systems. Tariffs increased nevertheless in the late 1960s to compensate for the inflation of the 1950s and early 1960s when tariffs were not increased because of government policy. Another reason, successfully used by the PTT to convince the Dutch parliament which had to approve the tariffs, was that the telephone was now introduced in residential households which used it much less intensively than the PTT's older clients. The resulting decreasing revenue and profit per new subscriber had, according to the PTT, to be compensated by higher charges. The last major changes in the Dutch national telephone tariffs in the period discussed here, were introduced in early 1970s and early 1980s. In 1971 the discount for off-peak (or cheap) calls was increased from 30 per cent to 50 per cent and sliding zones were introduced in the 'local charge' area. Ten years later local calls became time-measured while the call distance component was reduced to only two zones because of decreased costs of inter-local (long distance) telephony.

The rate-of-return regulation, already introduced in the 1920s was based on a 'fair rate of return' (7 to 9 per cent). However, this included often contributions towards the state budget. The post war investment programmes caused a net stream from the state budget to the PTT; this was not reversed until the mid 1970s.

5.6. Setting the International Tariffs

Requirements for international telegraphy had to be made as soon as the telegraph wires crossed borders.

Necessary agreements on protocols, standards, administration and tariffs were indeed one of the most elementary reasons to start forms of international cooperation between the telegraph companies and administrations. The International Telegraphy Union - the predecessor of the International Telecommunication Union - started in the 1860s to work on the settlement of international tariffs. For a long time the UK company Cable and Wireless (C&W) was the key figure, and London the main hub, in the international web of telegraphy wires. Reflecting the UK's empire and (waning) hegemonic position C&W accounted for the bulk of intercontinental traffic via wires it wholly owned. C&W charged for access and usage within the Empire; and it claimed a large share of the revenue generated by traffic between the Empire and the rest of the world. The continental PTOs (PTTs) developed throughout the 1930s a system which was based on joint ownership of international lines and via the ITU they tried to develop objective principles to determine the costs involved terminating foreign traffic. The continental PTOs nevertheless, themselves embedded in a colonial web, were not able to establish a stable pattern for defining and settling their telephone accounts. It was the new hegemon, the USA, which was most interested in changing the international rate system and succeeded in doing so in 1944. The first element of the new system was direct routing of traffic, providing for shortest-distance transit and - in an adaption of the practices developed in continental Europe - a 50:50 division of the revenue collected from the service. The second element was the harmonisation and standardisation of the structures of international tariffs. The simplicity, uniformity and predictability also helped to generate capital to develop jointly owned submarine cable systems in the 1960s and 1970s. The 50:50 split effectively spread the risks involved; for even if an investing carrier's outgoing traffic did not increase as rapidly as predicted, it would still benefit from payments on the incoming stream. This was important since most carriers in the 1960s were still building and extending their basic PSTN networks (Ergas and Paterson 1991, pp.29-32).

International communication links - submarine cables from the 1860 onwards and satellites one century later - were jointly owned by the traditional PTOs and so-called recognised private operating agencies (RPOAs). Costs of the international network have come down considerably since the first low capacity (and low quality) submarine cables were laid; improvements in transmission technology (particularly improved conduction and increased capacity) and less need for repeaters rapidly reduced the costs per circuit. For example, if only the costs of the international, trans-Atlantic cable network were calculated (this excludes costs of the international gateway switches and allocates further national joint costs completely to the national network) then the per minute cost declined from $2.53 in 1956, to $0.04 in 1988 and $0.02 by 1992. Modern submarine cables such as TAT, CANTAT and COMPAC[10] were mostly run by consortia of two or more PTOs while most international satellite communication was operated by the INTELSAT (International Satellite Organisation) consortium.

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[10] TAT-1 (Transatlantic telephone cable) connecting Scotland (UK) and Newfoundland (USA) had a capacity of 50 voice circuits. It came into service in 1956 and retired in 1978; TAT-8 (40,000 voice circuits) came into service in 1988. COMPAC (1963: 80 voice circuits) connects Canada, Hawaii, New Zealand and Australia.

In section 4.8. we made clear that the CCITT Recommendations allow many possibilities for rate setting and settlements and in doing so impose few constraints. A number of CCITT Recommendations have gradually been developed for regional application of tariffication procedures. One of these is the Tariff Group for Europe and the Mediterranean Basin (TEUREM) which determines remunerations of PTOs on the basis of traffic units as set down in CCITT Recommendation D.300R. The TEUREM rates are divided into three basic elements: a) the transmission part of the international network; b) the switching element of the international circuit; and, c) the costs of the extension of calls over the national network. The a) and b) rates are fixed; the c) rate is limited by a maximum (set by TEUREM) and depends on national charging zones per country (within these boundaries a country is thus 'free' to decide on a cost-allocation between the international, national and local networks). The Recommendation states that in principle collection charges should be equivalent in national currency to the accounting rate, however, if:

> "[...] an Administration wishes to fix a collection charge at a higher or lower amount than the direct equivalent of the accounting rate, this Administration may apply a multiplication factor K. This factor K should not be more than 1.8 when applied to the total accounting rate in the relation concerned." (CCITT 1988, p.3.3.1.).

In practice international call charges between two countries can vary substantially. These variations are caused by the differences in the use of the K factor, differences in the amount and extent of price adjustment, differences in fiscal and social policies (eg. different Value Added Tax rates, distinct Community Service Obligations, CSOs), dissimilar cost accounting and cost allocation methodologies, differences in the degree of network modernisation or PTO's general productivity and differences in the degree to which CCITT Recommendations are applied. Accounting rates in this multilateral bargaining framework are distance related and have fixed settlements for termination or transit which are 'cost based'. Since price-discrimination against another country in settlements is not allowed, accounting rates do not consider demand elasticities. The European Commission has advised that the TEUREM group uses ECUs rather than SDRs in order to eliminate dollar fluctuations and resulting imbalances between accounting and collection rates in Europe (OECD 1991c, p.17).

5.7. Conclusion

Tariffs are the outcome of interrelated and complex processes occurring in production and consumption, accumulation and regulation. This Chapter described the setting of telephone tariffs in the four European countries in the first hundred years - a period which essentially generated the build up of the Fordist Telecommunications Regulation Mode. In spite of the considerable differences between the four countries, common themes, if not a common pattern, underly the formation of the PTTs and the setting of the telephone tariffs. In due course all four had to deal with the problematic relationship between telephony

and an established telegraph network, the integration of local telephone networks and trunk-lines into one, centralised network and organisation, the cost allocation between the local, long-distance and international parts of the network, the financing of the huge upfront investments required to provide the telephone service, the subsequent financing of network automatisation and modernisation, the accounting methodologies for these capital intensive investments, the distinctive interests of business users and residential users, the recognition of telephony as a 'public utility' and so forth. All finally adopted a highly centralised and standardised tariff structure consisting of connection charges, rental charges and call charges related to time-of-day and distance. Moreover, all gradually adopted a 'Vailian' notion of telephony as a 'public utility' and furthered a tariffing taxonomy based on some combination of calculating costs with the advancement of the network in order to provide an universal service (non-disrciminatory access and uniform tariffs). These common themes and patterns formed finally the tariff model of the Fordist Mode of Telecommunications Regulation.

But there were also wide differences, reflected in different consumption levels, quality of service, size of the local call areas, wages of telephone operators, differentiation between user groups (only in the UK), the integration and organisation of telephony in the state bureaucracy, telephone density and height of tariffs. For instance, while the UK Treasury for a long time frustrated the unfolding of the telephone network with tariff policies based on short-termism and tariff structures favouring particularly business users, the German PTT received strong political (and financial) support for a long-term policy furthering the swift unfolding of the network.

This tariffing model, the basis of the Fordist Telecommunications Regulation Mode (TRM) matured in the period 1950 - 1960. As in the early 1970s Fordism worldwide slid into a severe, structural crisis, the PTTs were confronted with the first signs and ingredients of what would end in a crisis of the Fordist TRM: the entrance of computers in companies' production and management processes and the subsequent need for increased control over and flexibility in the performance of telecommunications networks. The centralisation and homogenisation of public networks and their tariffs, core elements of the Fordist TRM, were soon to be challenged and gradually eroded.

CHAPTER VI

CHANGING THE TARIFFS: THE POLITICS OF COST-BASED TARIFFS

6.1. Introduction

While in the field of religion it might be possible to detect an almighty 'first mover'- in social sciences causal relationships are much more intricate. There is no single and isolated powerful actor or subject which caused the decline of the Fordist Telecommunications Regulation Mode (TRM). When discussing the transformations in tariffs it is however possible to detect certain correlating structural changes and classify certain interest groups.

Pressure for radical changes in state regulation and policies gained momentum in the 1980s when it was felt that there was a growing mismatch between the techno-economic sphere, driven by the new techno-economic paradigm of post-Fordism (flexible specialisation, just-in-time production, lean production etc.) and the socio-institutional sphere governed still by the needs of the previous, Fordist paradigm (Perez 1983; Perez 1985). In the field of telecommunications academics and industrial spokesperson alike argued that in order to exploit the full growth potential of the new paradigm - which in more popular versions was labelled as the 'information society' - the socio-institutional sphere had to be transformed to meet the new requirements. This functionalistic and orthodox marxist reasoning - institutional superstructure is a function of and determined by its economic basis - was subsequently and paradoxically used in a neo-liberal discourse to 'demonstrate' the obsolescence of state monopolies. Others stated inconsistently that the fact that technology inevitably and automatically generated telecommunications liberalisation and deregulation, 'proved' that governments should undertake action to introduce such policies.

In order to avoid these contradictory, but quite common combinations of structuralistic and voluntaristic reasoning we will concentrate here on the coalescing and colliding interests and the concrete arguments, evidence and powers used by different groups against the Fordist TRM and its tariff taxonomy and in favour of (more) cost-based tariffs and pro-competition policies. Against the newly emerging background of post-Fordism this chapter will discuss these developing interest constellations within the telecommunications sector, both nationally and internationally.

6.2. The Changing Interests of Users and Manufacturers

The interests of the actors involved in the traditional, Fordist Telecommunications Regulation Mode have changed considerably in the 1980s, leading to the disintegration of the consensus, ideologies and

structures on which the Fordist model was based. With increasing success large user groups were able to voice and bundle their opposition against the old model. The old tariff structures and principles became one of their main targets.

The changes in demand of large users were mainly created by production and management innovations as well as general internationalisation. The introduction of the computer into business, first in accounting and later into other departments, and a general shift towards more flexible manufacturing and new management methodologies, created a rapidly augmenting demand for data transmission within and - later also - between companies in different regions and countries. Whereas telegraphy and telephony were unique applications with homogeneous terminals and a relatively homogenous network, data communication supported a great variety of applications and networks: terminals had to be tailored to applications and the industry class. To the great annoyance of business users it was often not possible to get new and specific equipment, due to certain national procurement policies, or the equipment was not provided nor approved by the traditional PTT which held a monopoly (ICC 1984, pp.145/146). Sometimes the PTT's networks were simply not equipped for modern telecommunication technologies; and when they started to provide new data transmission services via public data networks (analogue and later digital using circuit and packet switching) their quality was not always seen as good enough. For large companies telecommunication monopolies, PTTs, became more and more associated with lack of flexibility, lack of innovation and lack of user choice, or as a vice- president of the powerful International Telecommunications Users Group (INTUG), established in 1974, put it bluntly: "The user wants choice, and monopoly is the enemy of choice [...]." (McKendrick 1987, p.148). The head of worldwide telecommunications for the Anglo-Dutch TNC Unilever, and also member of the TMA (see below), stated at a conference of The Economist:

> "[...] multinationals are still constrained by monopoly of basic service supply in many countries. This continues to inhibit business growth and to maintain the costs of doing business internationally at an unjustifiable high level." (White 1991, p.6).

The need for change from a business user's perspective grew in the 1970s when the traditional regulatory framework did not allow for the private provision of old and new services, especially the value added and data services and mobile services for which demand grew rapidly throughout the 1980s. These changing interests were brought together in national and international business users organisations which emerged throughout the 1970s and 1980s - the years of the crisis of Fordism and the emergence of post-Fordism. On an international level business users argued that the differently regulated national monopolies formed a hindrance to their increasingly international businesses.

Confronted with a growing telecommunications need (growing need for information transmission, storage and processing) and growing ICT dependency an already existing need for low costs and service quality

and flexibility became paramount, especially in an increasing competitive environment. Besides being a costly expenditure, telecommunications could become an additional source of income for companies which had developed their own circuits or networks (leased or otherwise) and had an excess capacity or VAS to (re)sell. Pressure for regulatory change became therefore a consequence of an internal strategy of a firm (cost-effectiveness, cost-reduction) or an external strategy ((re)selling of excess capacity and/or selling of in-house expertise or entering the VANS market) (Irwin 1988; Irwin and Niman 1989).

Some users and their organisations are not in favour of tariffs which, it is argued, favour or cross-subsidise certain customers, who are not business users. As a representative of the Bank of America put it:

> "PTTs have traditionally supported the residential user, the emergency services, public telephone, etc., at the expense of the business user, and often the loss on mail and other unrelated services besides." (quoted from Irwin and Niman 1989, p.147).

This situation is particularly influenced by the fact that about 5 to 10 per cent of all telecommunications users generate half of the long distance traffic in industrial countries; use of international services is even more concentrated. Therefore relatively few large companies have a weighty economic interest in the regulation and tariffing of telecommunications (Aronson and Cowhey 1988, p.27). This means that they are not likely to be in favour of a system that supposedly 'overcharges' the services they mainly use and 'undercharges' others. Cost based tariffs or cost related tariffs, as long as they end the above mentioned cross-subsidisations and, moreover, lead to lower (business) tariffs[1], have therefore often been proposed by large user groups or employers organisations as a more 'objective' method for determining the tariffs.

Organisations like the ECTUA (European Council of Telecommunications Users Associations, founded in 1986), the Round Table of European Industrialists and INTUG lobbied for a change in regulations and tariff structures. Their lobby became so powerful that several now participate in international organisations and committees (eg. INTUG and other user groups and private operators participates in several CCITT activities).

User organisations lobby for the introduction of competition as the best way of achieving the desired changes:

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[1] It would be incorrect to assume that large users are only or even mainly interested in lower tariffs however. In-depth reviews of companies' network-based strategies revealed that cost-issues, although important, were seldom the determining factors motivating the development of, for instance, private networks. When cost was stressed, it seemed to be because it was the easiest factor to quantify, and the easiest rationale to support private network plans and liberalisation. Other factors, such as availability, capacity and transmission speed, quality and reliability and the need for tighter control, are all much harder to pin-point, are often as important as costs (Bar and Borrus 1987).

> "Customers should be free to choose from a variety of transmission services preferably from competitive suppliers. They should also be free to choose among competitive suppliers of customers premises equipment, and providers of value-added telecommunication and information services."

and

> "Public service tariffs as set by monopolies or near monopolies should be fair to customer and provider and where possible related to costs. [...] Competition usually results in prices being related to costs and ideally this principle should be the basis for public service tariffs including access charges where appropriate."(INTUG 1989, p.3 and p.5).

The continuing monopoly in the provision of services should, according to INTUG, be seen as an 'interim measure' while competition should be a 'clear objective for the policy makers' (Peter Allen, INTUG spokesperson, cited from: Gillick 1988, p.190). Organisations like INTUG, apart from organising meetings, releasing documents and providing certain argumentation, can exert their influence via participation in committees and working groups of international organisations like the EC, the CEPT, the European Standardisation Institute (ETSI) or the CCITT.

Also other international organisations such as the GATT, the EC, the ITU, the OECD and the ICC have intervened in the debates on regulatory and tariff issues. The International Chamber of Commerce (ICC) released documents proposing the liberalisation of PTT monopolies and review of tariffs (ICC 1987); it stated that:

> "The potential beneficial effects of technological change on prices have tended to be weakened or distorted in the artificial management of price structures. [...] Over the years a series of technological developments [...] have made available enormous amounts of transmission capacity and have made each unit of this capacity many, many times cheaper. Yet present-day prices strongly reflect the old cost relationships [...]. The large excess revenues that result from the sale of a now much cheaper good at the old high price typically flow into some cross-subsidy to another service that can then be priced artificially low, or into a general fund. The lack of competition also implies a lack of any incentive to reduce these prices and to pass the resulting savings to the users." (ICC 1990, p.7).

In general the ICC, as other business interest groups, would like to see competition introduced in the whole telecommunications sector, including basic (telephone) services and infrastructure (ICC 1992). Competition in a 'free market' is regarded as the best instrument to relate tariffs directly to their costs and avoid inefficient tariffs and cross-subsidies. For those services, such as (real time voice) telephony, which remain the exclusive domain of most PTOs, the ICC proposes the following cost and tariff principles:

1. Tariffs should reflect the costs of providing the service in such a way as to cause the revenue generated by the service to cover precisely, over time, the total of all fully

distributed costs (FDC), including a reasonable rate of return, only of that service.

2. All fully distributed direct and indirect cost elements that result from a use of the exclusively provided telecommunications service should be recovered solely and fully from the cost-causing user(s) (ICC 1990, p.11).

Geographical averaging and cross-subsidisations for universal service should be allowed unless it would imply a cross-subsidy to benefit a given set of subscribers or a given usage of the service; so, for instance, price discrimination between residential and business users should be abolished. Following a cost-causation principle, the ICC considers charging for unsuccessful call-setups and argues that social obligations (CSOs), such as special price schemes for the needy or emergency services, should be subsidised from sources outside the financial sphere of the PTO (eg. public funds for social programmes).

Apart from international business user groups and international organisations, national groups lobbied also for change on a national level and sometimes - via a government's foreign policy - on an international level. The position of these national user groups in the debates on regulatory change depends on the interests of their members and the structure of the national telecommunications market.

The German *Deutsche Telecom eV* (DTeV), founded in 1978, represents only the large-scale user in the FRG and predominantly those being part of a TNC. Their primarily concern is the improvement of national and international data transmission services (particularly the traditional lack of cheap German private circuits and the availability and performance of public data networks, such as the German Datex-L and Datex-P), the introduction of value-added services and lower tariffs for business users in general (DTeV 1980).

In France the AFUTT (*Association Française des Utilisateurs du Téléphone et des Télécommunications*), founded in 1969, represents the interests of both small and big users, both residential and business users. It therefore asked for a review of the tariff structures of national and international telephony, but at the same time for as low as possible connection and rental charges. With success the AFUTT protested against the introduction of volume-based tariffs for leased lines and also succeeded in lowering prices for residential users (AFUTT 1989).

The British Telecommunications Users Association (TUA) was founded in 1980 as a successor of the Telephone Users Association which was founded in 1965. Though mainly representing the interests of business users, it also deals with the interests of residential users. Remarkably it has not always defended the splitting up of the network in terms of cost allocations, something which other business groups (eg. INTUG and ICC, see above) have done consistently: in a negative reaction to the BT price increases for the residential and business users in September 1990 the TUA stated: "Local, national and international call revenues depend totally on the local loop (the exchange line connection) and those services should contribute towards the existence of the local end." (TUA Press Release, 18 July 1990). The

Telecommunications Managers Association (TMA), founded in 1967, specifically represents large industry users and is as such a member of ETSI and several EC working groups on telecommunications (eg. on Open Network Provision, ONP). Similar to other large users associations, such as INTUG - of which TMA was a founder - it maintains close contacts with several British Ministries, the OECD, the CCITT, equipment manufacturers and service providers.

The interests of small, residential users are on a European level represented by the BEUC (*Bureau Européenne des Unions des Consommateurs*) which brings together national consumer organisations within the EC to represent the interests of consumers in Community policies. The BEUC, considering neither the network infrastructure nor voice telephony as a natural monopoly, sees competition as a possible policy option that is open to the EC. Its main concern however is not the monopoly/competition issue but improving quality of services for residential consumers and an 'alignment of tariff structures with costs' especially in relation to long distance and international calls. At the same time, however, it argues that a 'rebalancing' of tariff structures should not lead to charges which benefit business users and penalise residential users (BEUC 1988; BEUC 1991).

It has not only been users of telecommunication services which have become interested in regulatory change. As demonstrated in Chapter III, equipment manufacturers were from the late 1970s onwards confronted with fast rising R&D costs which could not any longer be recouped from their, mostly limited, national home-markets. The resulting drive to internationalise operations, marketing and production was often hindered by regulatory constraints and traditional market structures and policy networks which reflected close links between the PTO, several state departments and national manufacturers (see section 2.7.). Entering these formerly closed markets proved also very difficult because of the advantages traditional suppliers gained in providing maintenance, upgrading and extension to the installed basis of the PTO's networks. The German Siemens and Bosch remained the main suppliers of the German DBP and the French PTO (DGT, later *France Télécom*) retained its close links with Alcatel. Only the US AT&T - originally via a joint venture with Dutch Philips, called APT - and the Canadian Northern Telecom - via a take-over of the British STC - were able to become important suppliers to respectively the Dutch PTT and the British PTO. The opening of national markets is nevertheless important: supplying the PTOs forms the largest demand for telecommunications equipment. The total annual investments in the EC by the PTOs amounted to about 30 billion ECU in 1990 which represents one third of their turnover and accounts for over 60 per cent of the EC's equipment market (CEC 1992a, p.10).The opening up of markets was also crucial to foreign manufacturers in order to gain contracts for supplying equipment for the fast unfolding mobile and private networks (Morelli 1992).

Although the main aim of these manufacturing TNCs was directed more towards the opening up of equipment markets and the introduction of competition rather than changes in tariffs, their interests and concepts coalesced with those of large users, neo-classical economists and conservative or neo-liberal

politicians in as far as their pro-liberalisation position was concerned.

Finally, even some traditional PTTs became interested in regulatory change in as far as this a) would lessen their state ties and dependence, particularly the restrictive financial and social constraints, political control and the strong, often highly unionised, position of their employees (mostly civil servants) and b) would improve their external and internal performances. PTTs - as we will see below - felt that they required increased elbow room to react to and anticipate these new national and international market developments. Internally deregulation and liberalisation, or at least the threat of these policies, could be used to force a shift from the traditional corporate structure and culture of bureaucracy and civil servants, towards that of a more 'flexible', 'lean', 'modern' and - in the case of the UK - less unionised commercial company.

The quest for change in the regulatory framework was thus based on a coalition of these different groups which all had their specific and often distinct interests but had in common an interest in the change of the Fordist Telecommunications Regulation Mode.

6.3. Pushing for Change: The USA Government and Industry

Just as the American government and industry played a crucial role in the development and spread of Fordism, they equally played an important role in its demise. As regards the telecommunications sector we already saw how after many anti-trust cases AT&T was divested in 1984. A powerful interest coalition of the computer industry (IBM), new market entrants (MCI, US Sprint), large user groups and neo-liberal politicians were able to demolish the consensus of the old 'Vailian' model, including its tariffing system.

In the debates on telecommunications regulation in general and tariffs in particular the issue of cross-subsidisation had always been of major relevance. In 1964 the 7-Way Cost Study, which sought to relate return by class of service to the overall interstate return, accepted a historic Fully Distributed Cost (FDC) allocation method. In 1978 the Federal Communications Commission (FCC) introduced a modified FDC approach which embodied forecasted revenues and costs but due to difficulties of reconciling forecasted and actual costs the FCC returned later to the historic FDC method. This method remained under criticism as in combination with the rate of return regulation it prompted over-investments in the network ('goldplating') in order to increase profits. Before that, in the period 1930 - 1950 the so-called 'board-to-board' methodology, which allocated all local Non Traffic Sensitive (NTS) costs to the local loop, was already gradually replaced by the 'station-to-station' principle whereby the costs of the local plant were shared by local and long distance (toll) services. This contribution of long distance to NTS loop costs - in the USA approximately 50 per cent in the early 1980s - had become firmly part of the US cost

allocation methodology. It was nevertheless increasingly criticised by business users as arbitrary and a form of cross-subsidy of long-distance to local calls (see section 4.7.). In the years following divestiture the 'board-to-board' principle was watered down and 'cross-subsidy' was lessened (or more 'balanced') by lowering the local exchange carriers (LECs) access prices by 40 per cent and increasing the access charges for the subscribers. Thus the reductions of long distance prices - often hailed as one of the beneficial results of competition - came about directly from this decrease in LECs' access charges (Schmidt 1991, p.3).

With the Computer II decisions[2] in 1980 the FCC shifted to a different method to control cross-subsidisation between regulated (basic) and non-regulated (enhanced) services. The FCC required cost division and therefore demanded that the enhanced services would be supplied through separate subsidiaries. This however created new problems of cost allocation and problems concerning the proper basis for valuing assets and other resources transferred to the subsidiary. Furthermore the bundled overall rate of return could still embody forms of cross-subsidisation. The Computer III in 1986 adopted a new strategy: apart from cost separation between regulated and non-regulated services and a FDC method, it required that dominant carriers had to offer 'open access' to independent service providers on the same terms accorded their own affiliates (Trebing 1989, pp.13-15). Out of Computer III the concept of Open Network Architecture (ONA) emerged: its aim was to create a 'level playing field' in telecommunications services between the Regional Bell Operating Companies (RBOCs) and their competitors, by ensuring that the former could not use anti-competitive practices against the latter in the enhanced services market. At the same time it tried to promote the efficiency of the network by allowing technical integration of basic and enhanced services. Under ONA, the dominant carriers (eg. the RBOCs) must offer equal access to enhanced service providers (ESPs) and to customers who want to offer services over their networks[3]. In order to prevent anti-competitive pricing and cross-subsidisations, ONA offerings would be broken down into their constituent parts. The network or service would have to be 'unbundled' into separate 'building blocs' which were tariffed individually. The 'unbundling' of the so-called Basic Service Elements and Basic Service Arrangements proved however to be extremely complicated as networks and services have become highly integrated[4].

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[2] Computer Enquiries, concluded in 1971, 1980 and 1986, mainly discussed the formulation of distinctions between telecommunications and IT/computing. The underlying idea was to restrain the Bell System, and, later, AT&T and other PTOs in some markets more than others, preventing them misusing their market power and to stimulate competition.

[3] One of the ways to realise this was to allow Enhanced Service Providers (ESPs) to interconnect their equipment through a procedure known as collocation. ESPs would be provided direct access to the network infrastructure by locating their equipment on Bell Operating Company's (BOC) premises (physical collocation), or with equivalent access opportunities to those enjoyed by the BOC, usually through a leased line (virtual collocation).

[4] ONA has also been challenged in the courts: primarily it has been a case of the State Public Utility Commissions (SPUCs) challenging the right of the FCC to interfere where it has no jurisdiction.

Another important change which affected tariffs was introduced in July 1989 when AT&T's rate of return regulation was abolished and price cap regulation initiated (see also Chapter 7). The rate of return formula (for 1990 maintained at the level of 12 per cent) will be ended in the 1990s for most of the FCC monitored services; also several states have introduced price capping. AT&T's capped services would be placed in two baskets, namely switched network services and private line services. An index of aggregate revenue weighted rates within each basket would be used to calculate an actual price index; the price caps would be adjusted by an inflation index and a productivity offset. The price cap regulation is seen as a better incentive for the internal efficiency of the company ('X-efficiency'), a better constraint to cross-subsidisation and administrative simplicity.

Tariffs were not only seen as important for issues such as equal access for and non-discrimination of competitors or new entrants, or fair prices to prevent predatory pricing, cross-subsidisation and anti-competitive behaviour, but also for the issue of universal service. Especially the division between urban and rural areas and between high and medium income groups and low income groups were regarded as important here. Historically rural areas have been subsidised by capital programmes and by price averaging of long distance lines. Since divestiture income related subvention programmes, sometimes partially funded by state means such as Lifeline, were introduced to prevent drop-off from the network by low income users (Fuhr 1990).

These radical transformations in the US regulatory framework - the introduction of competition in basic and enhanced services, competition in Customer Premisses Equipment (CPE), simple resale and arbitrage, the 1984 divestiture etcetera - spilled over into other countries via several mechanisms:

- Large US users such as Citicorp and American Express understood that for them to reap the full benefits of US liberalisation, the advantages won in the USA would have to be duplicated abroad; since many TNCs have their headquarters in the USA they wanted international networks and services which would serve their specific international telecommunications needs. Supported by computer manufacturers such as IBM, they therefore lobbied in other countries for freer competition in services, freedom to choose and connect CPE and lower (preferably 'cost-based') tariffs. On the other hand, competing companies based outside the USA regarded the telecommunication advantages US companies had as a threat (competitive edge) and therefore urged changes in their own countries.
- The opening up of the American telecommunication market attracted non- American companies; however the entrance to certain communications markets by foreign companies was restricted due to US legislation, US companies nevertheless feared increased competition from European, Japanese and other Asian companies; since the home market of these foreign companies were most protected and closed, US companies lobbied the American government to press for international liberalisation (and/or protection for their home market).
- The changing regulations and divestiture shifted the interest of the RBOCs and other American telecommunications companies to foreign markets. Especially the RBOCs at home (for a long time) barred from fast growing and profitable markets such as information services and long-distance services, sought new markets abroad to generate

new income[5]. These companies, confronted with partially liberalised home-markets, put pressure on foreign markets and governments to open up their markets further and allow (fair and/or free) competition.

The unilateral opening up of American telecommunications markets led to increased imports of equipment; in 1983 the USA had a trade balance surplus in telecommunications equipment of $1.5 billion, which turned into a $1.5 billion deficit in 1985. Together with the already existing (and worsening) US trade balance and budget problems this led to a growing awareness that domestic regulatory policies should be coordinated with American foreign economic policy (OTA 1987, p.141). In Spring 1987 the US Congress introduced major trade bills and the so-called Super 301 provision which carried the threat of punitive sanctions[6].

The US government introduced actions to protect the American market against 'unfair competition' as well as policies to stimulate the competitiveness of US companies and policies to liberalise international and national telecommunications were introduced (NTIA 1985, p.178; OTA 1987, p.123).

The US telecommunications industry is officially supported by the US government which, exploiting its hegemony in international politics, has often put pressure on foreign governments (eg. Japan and Germany) and PTOs via bi-lateral negotiations to open their markets for US industry. Confronted with an overall poor balance of payment position, the USA has been particularly interested in liberalising trade in information services, since it has a surplus in this area (OTA 1986) (for the same reason the UK's conservative governments propagated pro-liberalisation policies throughout the 1980s which in fact reflected the country's, and particularly London's, strong international standing in many services). This mercantilistic practice has also been extended to multilateral fora. The USA has often intervened successfully in the agenda and debates of international organisations such as the World Bank, the IMF, the GATT and the OECD. The liberalisation of services ('free trade'), and particularly telecommunication services, was first put on the political agenda with the Transborder Data Flow (TDF) discussions within the OECD during the 1970s, then surfaced within the GATT Tokyo Round and currently within the GATT Uruguay Round (Sauvant 1986; Hills 1988; Braman 1990). After the TDF discussions the OECD moved towards current debates on telecommunications equipment and services liberalisation and the re-structuring of national and international tariffs, demonstrating the distortive effects of cross-subsidisations and the need for cost-based tariffs (OECD 1991a; OECD 1991c). All these influential institutes and investigations - some of which are discussed in the next section - have increasingly dealt with ICT from

[5] Bell Atlantic, for instance, has its $60 billion business in the USA growing at only 2 per cent a year; it therefore started investing in networks and services in many foreign markets, especially in Europe.

[6] The US Omnibus Trade Act contains a telecommunications chapter which provides that the United States Trade Representative (USTR) will draw up a list of priority foreign countries whose telecommunications equipment and services markets are perceived by the US to be restrictive. Along with South Korea, the EC has been named (in spite of a substantial EC trade deficit with the US in this sector). If after negotiations no agreement is obtained the US president is authorised to take a large number of actions, including suspension or termination of trade.

a neo-liberal perspective.

6.4. Changing the International Tariffs: The ITU, GATT and the EC

The need to restructure and rebalance international tariffs is particularly based on the claim that international tariffs are well in excess of costs and that profits made by the traditional PTOs are enormous. A Financial Times investigation concluded that due to the 'cartel-like' cooperation between international operators within the CCITT, international phone users were paying between $10 billion and $20 billion a year more than they would have to if prices reflected 'underlying costs', which had fallen sharply in recent years. The introduction of competition, it was claimed, would plummet prices, stimulate traffic growth and proliferate services (Financial Times 3 April 1990; Cheong and Mullins 1991). This cartel jointly owned most of the international cable and satellite links, and severely restricted international private circuits (the latter were not allowed to carry public telephone traffic and resale of capacity was forbidden). Additionally, a study by Ovum found that Europe's PTTs were pricing international circuits at between four and twenty times 'real cost' (Ovum 1989).

What was of course ignored in all these calculations and accusations was the intricate issue of cost allocation and cost accounting. Most of the above mentioned findings are based on cost calculations of the international network as if it constitutes a separate network. This network 'splitting' consequently leads by definition to a lower cost calculation of international calls than an approach which includes contributions to the domestic network (see also Chapter IV). PTOs often amortise the costs of their domestic networks by revenues from their domestic and international calls. Consequently international services make a contribution to the national and local network costs as we saw in section 4.8. But just as national forms of alleged cross-subsidisation came under attack in the 1980s, so was international cross-subsidisation increasingly criticised.

6.4.1. The ITU

Tensions within the ITU tariff regulations increased in the late 1970s due to fluctuations in exchange rates which caused divergencies in accounting rates (Sissons and Solomon 1989). Additionally, differences were caused by the fact that some countries, modernising their networks, adjusted unilaterally their collection charges so that these came to reflect technological change and lower costs per unit. Since the USA originated many more calls than it terminated, its international carriers such as AT&T, MCI and US Sprint had to pay out on balance in 1987 nearly $ 1.5 billion more than they received to compensate foreign carriers for the completion of those extra calls. The imbalance was worsened by the high price foreign carriers charged for completing the US calls (Johnson 1989, p.25). The FCC published in December 1988 figures which showed that 75 per cent out of every dollar collected from US consumers

for international telephone calls made from the USA ended up with foreign PTOs and administrations (Costello 1989, p.109). This led to pressure from the US government to change the system and relate the international tariffs to 'real costs'; to achieve this, the ITU D-series Recommendations would have to be changed radically in order to allow competition in international services.

The ITU Maitland Commission however, moved in its 1984 'The Missing Link' report, which discussed the position of developing countries, in the opposite direction. It suggested that the accounting rate system provided a useful means of generating foreign capital requirements for telecommunications developments in the developing countries:

> "We recommend that Member States of the ITU consider in the light of their own circumstances a rearrangement of their international traffic accounting procedures with the aim of setting aside a small proportion of revenues from calls between developing countries and industrialised countries. The resources transferred thereby should be devoted to the telecommunications sector in the developing countries concerned, or contribute to a fund and used for example to finance pre-investment costs." (ITU 1984, p.61).

In a subsequent report, published in 1988, an ITU study group investigating costs of international telecommunications services, concluded not only that it was very difficult to get reliable cost information from PTOs, and that sometimes they even did not have an effective organisational and accounting infrastructure, but also that PTOs often used different cost accounting techniques and that developing countries were not subsidised by developed countries via international tariffs, as the former often experienced higher costs in originating and terminating calls (ITU 1988, pp.16-19).

The US government, later joined by the UK government, nevertheless increased pressure on the ITU. This governmental pressure was complemented by market pressure from the liberalised traffic corridors between the forenamed countries: for instance by lowering its transatlantic tariffs the UK attracted extra traffic from continental companies which by-passed the direct international lines from their own national PTO. Call reverse was another fast growing practice of users to escape the high international tariffs of their own PTO.

In the CCITT meeting of May 1990 the USA put forward plans to liberalise the D-series restrictions on private circuits, which, it believed, would improve services, decrease prices and stimulate growth. The US plan included four reforms:

- the introduction of resale of private circuits;
- private circuits - if demanded - should be connected to the public networks;
- telephone companies should offer private circuits at costs; and,
- private circuits should be priced on a flat-rate basis instead of customers being charged on the basis of volume (see also next Chapter for this issue) (Financial Times 15 May

1990).

Opponents of the US plan, led by France, Germany and Japan, rejected this liberalisation plan and no agreement was reached except for a statement that accounting rates should be 'cost-orientated'. In 1991 the USA came with new proposals to make all accounting rates transparent and to be made public. It advocated that by publicising the accounting rates, countries with exceedingly high accounting rates might be pressured to lower them and that it would become possible to monitor the effect of the cost-orientated principle. Initially, the US proposal received very little support, if any, because for many international carriers, bilaterally negotiated accounting rates were commercially confidential in nature. Nevertheless an agreement was reached to provide the CCITT with data in an aggregated form thus ensuring the anonymity of the data. Subsequent - and still continuing - discussions have concentrated on a definition of 'cost elements' in the concept of 'cost-orientation' (Matsudaira 1993).

As the CCITT's Study Group which deals with these issues was dominated by the traditional PTOs, the USA and other proponents of liberalisation have tried to strengthen their position and influence via other channels such as the GATT, where mostly the trade ministries are the dominant negotiators (the latter are often, by nature, more pro-liberalisation than the ministries regulating telecommunications) and via bilateral negotiations.

6.4.2. The GATT

The GATT also formed a forum where changes in international telecommunication services regulation were discussed. Most developing countries, fearing that services liberalisation would harm their infant industries, opposed the pro-liberalisation proposals from some of the developed countries. However the USA was able to isolate the opponents of liberalisation at the Punte del Este meeting in Uruguay in 1986 to the extent that it was able to gain agreement that services should be discussed separately from manufactured goods (Hills 1989, p.54). A special General Agreement on Trade in Services (GATS) was proposed which would set out common international trade rules to apply over time to all international transactions. The basic laws would require signatories to make regulations and the process of preparing them transparent, to extend any opening of a market to any other signatory (the so-called Most Favoured Nation obligation, MFN), and to accept an international system of dispute settlement. The US Citicorp, American Express, the US Coalition of Service Industries (CSI) and the European Community Services Group have been lobbying for a successful GATS conclusion along these lines (CSI 1991, p.4).

In a May 1990 GATT meeting the USA advanced plans for a freer use of private circuits and suggested that users should be able to get access to basic services at 'reasonable and non-discriminatory rates'. Some service industries however, have argued that these proposals would still allow for over-charging

and cross-subsidisation of international services. Furthermore, they proposed that - similar to the ONA principles - transparency should be required to monitor costs and control prices (Financial Times 10 May 1990).

Although the US proposed that GATS would cover every single service transaction, it later backed down from this. In line with its mercantilistic foreign policy coastal shipping was soon excluded from GATS as the US shipping industry and the US government both feared that this liberalisation might harm their relatively weak shipping industry more than it might benefit from it (Oxley 1990, pp.186/187). Subsequently, after pressure from AT&T, basic telecommunications was withdrawn from the US proposals as it was believed that an MFN obligation in this sector might harm US operators. Equally in line with mercantilist policies the US government proposed early 1992 to remove other sectors from the MFN obligation as well. The Coalition of Service Industries namely had warned that, in the absence of any commitment of other countries to liberalise, US business would be disadvantaged under the present system, which would accord the benefits of the GATS to all signatories, regardless of a country's level of commitments (CSI 1992, p.3).

Controversies over agriculture and steel have been a primary stumbling block to a successful conclusion of the Uruguay Round, although unresolved issues also remain in several other areas, including services. The US Trade Representative has consequently indicated that more emphasis will be laid on bi-lateral services liberalisation, based on reciprocity ('level playing field').

6.4.3. The European Community

The Fordist Telecommunications Regulation Mode and its tariffing system was, in principle, also challenged by another international organisation, founded already in 1957: the European Economic Community (EEC). The 1957 EEC Treaty was largely based on 'negative economic integration', that is the removal of internal trade barriers. The EEC Treaty basically embodied the ideology of liberal capitalism. It was based on the idea that the successful transition from a customs union, via a common market to a final economic and monetary union would be best guaranteed by supranational policies which facilitated a freer working of the market mechanisms. A truly common European market would be the combined result of the stimulation of competition, greater specialisation in production, increased scale economies, higher productivity and faster growth of output and strengthened competitiveness in the markets of non-Member States. The Treaty was thus mainly concerned with preventing abuses to competition and the free market mechanism rather than with providing a pan-European regulatory framework for 'positive integration', eg. the joint intervention to achieve what the market itself cannot do (Holland 1980; Dehousse 1992).

Telecommunications did not appear high on the political agenda of the EC because of the strength of the 'postal-industrial-complex' in Europe throughout most of the postwar period. The first time it did receive considerably attention from the Community was in the late 1970s when it was feared that without an adequate European answer to the 'American and Japanese challenge' Europe's Information and Communication Technology (ICT) industries would decline further. This industrial policy drive resulted, among others, in special R&D programmes for the ICT sector (eg. RACE, Research and Development of Advanced Communications in Europe) (CEC 1970; Joosten 1992a). The Community's principal policy, negative integration and pro-competition policies (which by the way clashed with the industrial policies), entered the telecommunications arena succesfully in the second half of the 1980s. After earlier common market policy initiatives for this sector had failed, the European Commission succeeded in gaining acceptance for its 1985 White Paper for completing the internal market and its 1987 Green Paper on Telecommunications. The latter specifically opted for a change in tariff structures and the introduction of cost based tariffs, or as it was later called, cost related tariffs.

Tariffs were regarded as 'not reasonable': the Commission cited a report composed by major international users which argued that charges for trans-European services were generally much higher than domestic charges (between 50 and 400 per cent more in the case of packet-switching volume charges) and that charges vary greatly and according to no self-evident logic between countries (Round Table of European Industrialists 1986). In particular, trans-European prices appeared high in comparison with US tariffs.

The Commission held the EEC Treaty's Competition Rules, in particular Article 85, 86 and 90(1), as applicable to the telecommunications sector[7] and thought that the introduction of competition would improve the development of telecommunications in general and trans-European telecommunications in particular. Its main aim was to introduce real competition in what it called 'enhanced services' (predominantly value added services, as opposed to basic services which remained part of the traditional PTO's monopoly). In order to ensure fair competition the regulatory role of the traditional PTOs would have to be concentrated in a separate, independent organisation: operation and administration had to be separated from regulation.

But most important, for the tariff issue, was the Commission's acceptance of the view of the large users and pro-liberalisation constituents that current tariffs were not 'cost based' (but needed to be) and included 'distortive' cross-subsidisation. The Commission generally adopted the prevailing arguments for cost based or cost related prices and the need for rebalancing (see section 4.7.). Slight moderations to the rule could however be made to allow for universal service obligations; it also proposed to introduce

[7] The Commission was supported in its view that competition rules also apply to PTOs by the 1985 'British Telecom case' where the British PTO was judged to have 'abused its dominant position' (Article 86).

a European ONA version, called Open Network Provision (ONP). The Commission suggested that tariff principles could include:

> "- recognition of the fact that telecommunications tariffs should follow overall cost trends and that a certain amount of rebalancing of tariffs will be inevitable, as far as compatible with public service goals. This applies in particular to tariffs for national and intra-Community long-distance traffic. A fair trade-off between cost-orientation and the aim of universal service on reasonably the same terms for all will have to be developed;
> - regarding intra-Community and international tariffs, higher transparency and convergence of accounting rates and K-values [see section 5.6.] should be sought, in order to avoid excessive divergences of tariffs and possible distortion of competition. This should show the way to the gradual emergence of a European tariff zone;
> - consensus should be achieved on general tariff principles for access by users and providers of competitive services, in the frameworks of Open Network Provision. This should include agreement on the degree of 'unbundling' of tariffs required for fair access, and general principles for the provision of leased lines." (CEC 1987, p.82).

Following the reasoning of cost based or cost related pricing it rejected cross-subsidisation as a case of distortion of competition and potential abuse of dominant position (eg. predatory pricing). Transparency should be created regarding the activities of the traditional PTOs, particularly regarding cross-subsidisation between activities in the monopoly sector (basic services such as real-time voice telephony) and the competitive services and terminal equipment sectors. However, cross-subsidisation could, according to the Commission, be allowed in certain cases:

> "- the financing of the launch of new products until demand puts supply into profit;
> - the financing of R&D, again in areas of potential future growth, obviously out of profits realised elsewhere;
> - the financing of a loss-making subsidiary or product-line by profits made elsewhere in the same group. In the case of Telecommunications Administrations, such operations may have to be carried out in order to achieve, in certain cases, certain public service goals, such as universal service for certain basic services or emergency services." (CEC 1987, p.77).

One year earlier the Council of Ministers had already released recommendations for the co-ordinated introduction of ISDN in the EC which proposed another important tariff principle: unbundling. All value-added by the network should be charged independently of the utilisation of bearer capabilities (the unbundling of bearer, physical transport, and value-added services) (Council of the EC 1986).

To improve transparency the telecommunications activities of the traditional PTO (or PTT or Telecommunications Administration) should be separated from other activities such as postal and banking services and there should be a clear financial relation between the Member States' governmental budget and their public undertakings. To make competition more equal the VAT conditions in the several Member States would have to be harmonised. One of the aims was also the convergence of the different

accounting rates used in the Member States in order to avoid excessive divergences of tariffs and possible distortion of competition. Via convergence and harmonisation gradually a 'European tariff zone' should evolve. This European, harmonised and cost related tariff zone would have a great impact on the competitiveness of European firms and thus be a major contribution to the creation of a 'dynamic European economy' (Ungerer and Costello 1988, pp.203-210).

Following the issue of the Green Paper a Resolution was endorsed by the Council of Ministers in June 1988 which stressed the importance of a 'definition of common tariff principles' (Ungerer and Costello 1988, p.252). That same year the Commission decided to implement the major policy changes by means of several broad initiatives which all would influence both telecommunications' cost and tariff structures (CEC 1988a).

In May that year the Commission issued a disputed Directive on the liberalisation of terminal equipment (CEC 1988b) using Article 90(3) of the Treaty[8]. After some lengthy discussions on the juridical basis of the Directive, a compromise was agreed in the same year. Together with the other main Directives, the ONP framework Directive and the services liberalisation Directive - which will permit leased line capacity resale in the developed Member States from 1993 onwards - these formed the basis for the creation of an open, common market for telecommunications services, particularly value-added services.

The ONP framework Directive set out the main aspects to be regulated by further, more precise Directives (CEC 1989). One of the main areas for the development of harmonised ONP conditions was the definition of harmonised tariff principles. In an Annex of this framework Directive some guidelines were given for future ONP tariffs:

- tariffs must be based on objective criteria and must not impose directly or indirectly unfair purchases or selling prices; they must be in particular cost-oriented;
- tariffs must be transparent and properly published; with regard to service elements, tariffs must be sufficiently unbundled, in order to avoid obligations and charges for users which have no connection with the subject of the uses sought; in particular, specific network service features should be charged independently of the charge for transmission via the network (bearer capability); and,
- tariffs must be non-discriminatory and guarantee equality of treatment.

Subsequent ONP Directives were issued (which are currently under debate or are still being prepared such as ONPs on mobile communications and Intelligent Networks, IN) (PA Consulting Group 1992). The first, the leased lines Directive set out in detail the principles for tariffing. The Directive did not request

[8] Article 90(3) gives the Commission the right to enforce the provisions of Article 90 (applicability of competition rules to public undertakings and undertakings entrusted with serving the public or general interest) via a Directive, and without prior consultation with the Council or the European Parliament.

the Member States to establish a structural separation between entities which carried out tasks under special or exclusive rights and entities which were engaged in competitive activities. However, in order to avoid 'negative implications' the cost accounting systems should be transparent and tariffs cost orientated:

- leased line tariffs should be independent of the service application which the users of the leased lines implemented;
- tariffs should not included volume charges, only - normally - an initial connection charge, based on the average cost in making the leased line connection, and a periodic rental charge;
- tariffs for leased lines would apply to the facilities provided between network termination points at which the user has access to the leased lines;
- cost accounting could include direct costs incurred by the PTO for setting up, operating, maintaining leased lines and for marketing and billing of leased lines;
- common or joint costs should be allocated according to a FDC method (CEC 1991a).

Several FDC systems were suggested, but an exact choice or system was left to the national regulators to decide on. A Recommendation on Packet Switched Data Services (PSDS) ONP equally referred to non-discrimination, transparency and cost orientation, but suggested an additional usage charge for the tariff components. This usage charge should normally include a fixed per call charge based either on a minimum time and/or volume charge or a call set-up charge, a volume related charge based on the use of an integral number of segments, and a duration related charge based on an interval of time sufficiently short to avoid discrimination against short type transactions (CEC 1991b). A Recommendation on ISDN ONP generally applies the same principles as the PSDS ONP (CEC 1991c). Finally, a voice telephony ONP proposed the same principles (transparency, non-discrimination, unbundling and cost orientation) but stated additionally that

- Community Service Obligation (CSO) costs should be included in the cost accounting;
- the financial accounts should be audited by an independent body;
- details of full financial accounts should be made available to the national regulatory authority on request and in confidence;
- discount schemes should be supervised by the national regulatory authority and should be in accordance with the Treaty's competition rules;
- tariff structures should allow for reduced rate night-time and weekend calls within the EC and other such features which maximise effective and efficient use of the PSTN.

Further, more detailed than in the earlier ONP Directives and Recommendations, clear guidelines were formulated for the quality of service (eg. itemised billing, directory enquiries, public telephone call-boxes etc.) (CEC 1992b).

The last voice telephony ONP Directive makes clear that - in order to ensure harmonisation and level playing field competition - the Commission and the national regulatory authorities have to go into a lot of detail. Nevertheless it still leaves considerable room for national authorities to decide on the exact cost

accounting and (FDC) allocation methodologies, the exact procedures of unbundling the service and network components and the exact content of CSOs. If drawing a parallel with the development of the US ONA is justified, then one of the great dangers for ONP is that it will lead to endless discussions over the unbundling of services and network which are becoming increasingly integrated and complicated. An ETCO (European Telecommunications Consultancy Organisation) study has also pointed out that, for instance in an Intelligent Network (IN) environment, unbundling becomes not only extremely difficult but moreover very costly (ETCO 1990). In more general terms, the division between the reserved 'basic services' and the monopoly on infrastructure on the one hand and the free-for-competition 'enhanced services' on the other is also difficult to maintain as boundaries become increasingly blurred (Kramer 1992). These unbundling and boundary problems, the adversarial interests involved and the fast developing market structures and technologies have all made the ONP process very contentious and slowed down the original time-table considerably. This has led to accusations of ONP's inflexibility and over-regulation by large user groups[9] (Allen 1991).

In the 1992 review of the EC telecommunications policies the Commission again argued for more transparency, cost orientation, tariff rebalancing, tariff de-averaging (discount tariff schemes), flexible tariff zones, off-peak reductions and lower international accounting rates, including a change of the CCITT/TEUREM and CEPT tariff principles (CEC 1992c). In a subsequent further move to liberalise telecommunications and bring intra-Community tariffs down the Commission has also proposed to allow competition in intra-Community voice traffic (CEC 1992d). In its justification it argued that the revenues from intra Community telephony represent only 4 to 5 per cent of total revenues of the European operators. That figure is however an average: some traditional European PTOs, such as the Dutch PTT Telecom, generate up to 14 per cent of their total revenue from intra-European telephony and are therefore much more dependent on international telecommunications than others. Liberalisation could mean that some PTOs end up in a 'profit squeeze' between their national political commitments and the pressure for lower international tariffs. Another factor neglected by the Commission is the general differences in development and sizes of the national markets. The Commission is not worried by the fact that countries with a large home market with a relatively low dependency on intra-community traffic will start competing with a significant advantage, while countries with a smaller home market where the dependency is likely to be higher will start with a set back. The former, stronger operators would benefit from this inequality and this would enlarge existing imbalances between the larger and smaller and between the more developed and less developed operators (Lijnkamp 1992).

The Commission's ONP stand on tariffs can further be criticised for almost uncritically adopting the

[9] Similarly, computer manufacturers, such as IBM, have criticised ONP for being too rigid; they would like to see more flexibility to allow for more intelligence in the terminal equipment (eg. desk-top switching) (Guettler 1991).

views that a) cross-subsidisations exist and b) that they are irrational, inefficient and distortive. As regards a) we would like to refer to the discussions on cost accounting and cost allocation in Chapter IV. The second assertion can also be criticised: Weinkopf and Neu have demonstrated that in case of a complementarity of demand between the non-reserved services and the monopoly service (inter-service dependency), there is a rational incentive for the PTO not only to sell a service of the first category below incremental costs, but - in some cases - also to do this for the whole planning horizon. Profit maximisation can in such cases also lead to an incentive for subsidisation of competing services from other suppliers in the non-reserved market. This form of cross-subsidisation - prohibited by the Commission - would be rational, efficient and not predatory (Weinkopf and Neu 1991). Additionally, the Commission's ONP proposals can be criticised for neglecting the need for making special arrangements for universal service provisions and CSOs (eg. preventing harmful cream-skimming by others or commanding extra intra-connection charges to contribute to the main PTO's service obligations) and a clear indication of what 'basic service' in the future should entail. Another criticism brought forward by DG IV is that 'one-stop shopping' provisions - among others part of the leased lines ONP - could be anti-competitive. One stop shopping rules could prevent competition on price as the operators (particularly the traditional PTOs) could form cartels.

On the equipment side the Commission has been trying to break the close 'policy networks' between PTOs and their national suppliers by introducing an open procurement policy, which, according to the Commission would stimulate competition and lead to lower prices[10]. According to a Council Directive the procurement of public telecommunications network equipment exceeding 600,000 ECU has to be open in most Member States from 1 January 1993 onwards (Council of the EC 1990). Some PTOs probably would like to shift to a more open multi-vendor environment, however, close and traditional links between 'national' manufacturers and PTOs will be difficult to break. There is also some concern - as in the USA after liberalisation - that foreign (non-EC) companies will profit more from liberalisation than others. Similar to the US GATS strategy, the Commission has proposed to use the (non-GATT) principle of 'reciprocity' in its multi- and bi-lateral equipment trade policies: it would search for 'level playing conditions' of competition in the world market allowing European industry access to any third country markets especially where difficulties were experienced (eg. the USA, Canada and Japan) (CEC 1992a, p.33).

6.5. Conclusion

The tariffing taxonomy which formed a crucial part of the financial and economic basis of the Fordist

[10] See also the CEC/Insead study on the costs of a non-Europe in telecommunications equipment and services (CEC/Insead 1988); a DG IV representative argued during an IIC conference in Brussels in July 1992 that due to lack of competition in network equipment, prices in Europe were substantially higher than in the USA.

Telecommunications Regulation Mode (TRM) has been under attack since the 1980s. The economic and political unravelling of the old model surfaced first in the USA where already in the 1960s extensive anti-trust suits were launched against the Bell System. When AT&T was finally divested the US government used the position of the USA as world hegemon to introduce its pro-liberalisation policies in several international organisations and in other countries via bilateral negotiations. This political force was accompanied by a growing economic pressure coming from large, multinational companies which demanded the same favourable conditions and tariffs in foreign markets as in their home market in the USA.

The assault on the Fordist TRM is directed at the political heart of the Fordist TRM: the consensus between the traditional PTO, state and national industry over the network principles which were largely based on Vail's philosophy of one network, one operator and universal service. Although due to historical circumstances, there were considerable differences in concrete tariff levels between individual countries, these common network and tariffing principles were generally applied throughout the first three postwar decades. But once the general crisis of the Fordist accumulation model was in full swing, a new, increasingly powerful interest coalition of originally neo-liberal politicians, the computer industry and large users was formed to demolish the old model. One of the effective tools to do this was to demand 'cost-based tariffs', an issue which was linked to competition (new market entrants will compete with the PTTs and drive prices down to costs), the elimination of the 'cartel-like' cooperation between the PTTs which, allegedly, kept international tariffs artificially high when costs were declining, and the splitting up of networks as far as cost accounting, cost allocation and thus tariffs were concerned.

CHAPTER VII

CHANGING THE TARIFFS: DEVELOPMENTS AND PROSPECTS IN THE UK, FRANCE, GERMANY AND THE NETHERLANDS

7.1. Introduction

As the traditional Fordist Telecommunications Regulation Mode gradually disintegrates and with it the old tariff model, new accumulation, regulation and tariff themes and principles spring up and are tested. Whilst, as in daily life, change can create new challenges and opportunities as well as threats and turmoil, its specific mixture for a particular country or a PTO differs widely, which explains the diversity in reactions and strategies. The question facing regulators, operators, manufacturers, and indeed, society as a whole is 'where do we go from here'?

This Chapter firstly compares the tariff developments in France, the UK, the Netherlands and Germany throughout the 1980s. It subsequently looks at the recent changes in the regulation of the telecommunications operators in general and the changes in tariffing in particular. Analysing the four European countries it becomes clear that while substantial differences in tariffs, strategies and policies remain, common themes such as unbundling, de-averaging, de-standardisation (flexibilisation) and tariff rebalancing have emerged.

7.2. General Tariff Trends in the 1980s and Early 1990s: Some Evidence[1]

For some concrete evidence we will look separately at the residential (telephone) market and the business market. Apart from price-discrimination, business users use additional services such as leased lines and packet-switched services and use services differently. While about 40 per cent of business calls are made within the local calling area, nearly three-quarters of residential calls are made within that same area. Almost all business calls are made at peak or high tariff periods, whilst the figure for residential calls is lower (15 - 50 per cent). Business users equally use more international lines (20 per cent of business PSTN calls are international; for residential users this figure is 3 per cent), while generally their telephone conversations are shorter than residential calls.

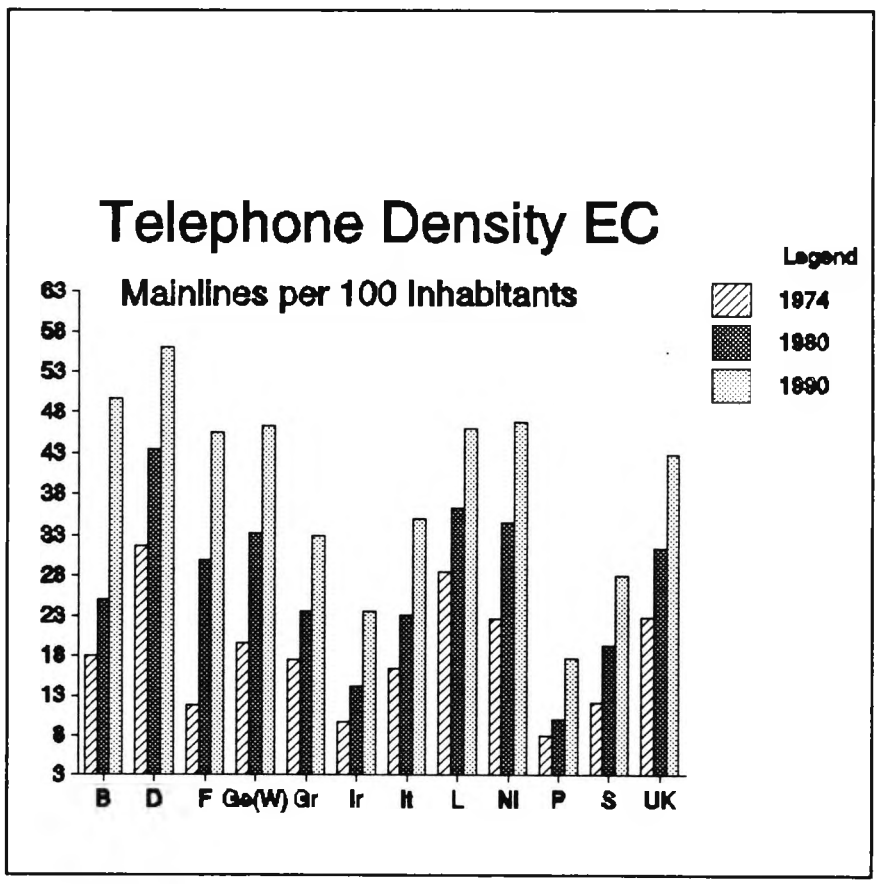
The figures provided here do not take into account other important factors such as differences in quality

[1] The data for this section have been obtained from OECD 1990, OECD 1991b, IIC 1991, BEUC 1991 and Touche Ross 1992.

7.2.1. Residential PSTN Tariffs

The public telephone network remained throughout the 1980s the most important telecommunications network, generating most of the PTO's revenues (80 - 90 per cent of total revenue) and reaching a high degree of density. France had only around 10 main telephone lines in the early 1970s (lower even than Greece and Spain) but managed to quadruple this figure within 16 years, thereby overtaking the UK. UK growth figures lagged behind France, (West) Germany and the Netherlands throughout the 1970s and 1980s, causing a shift from the country with the highest telephone density (of the four researched here) in the early 1970s to the bottom of the league in 1990. Apart from rapid modernisation and 'catch-up' plans as in France this is probably caused by faster growing Gross Domestic Products (GDP) in France, (West) Germany and the Netherlands. The average annual growth in main lines has however been declining for all four countries and has levelled off at 3 to 4 per cent since 1986.

Figure 7.1.: Telephone Density EC: 1974, 1980 and 1990

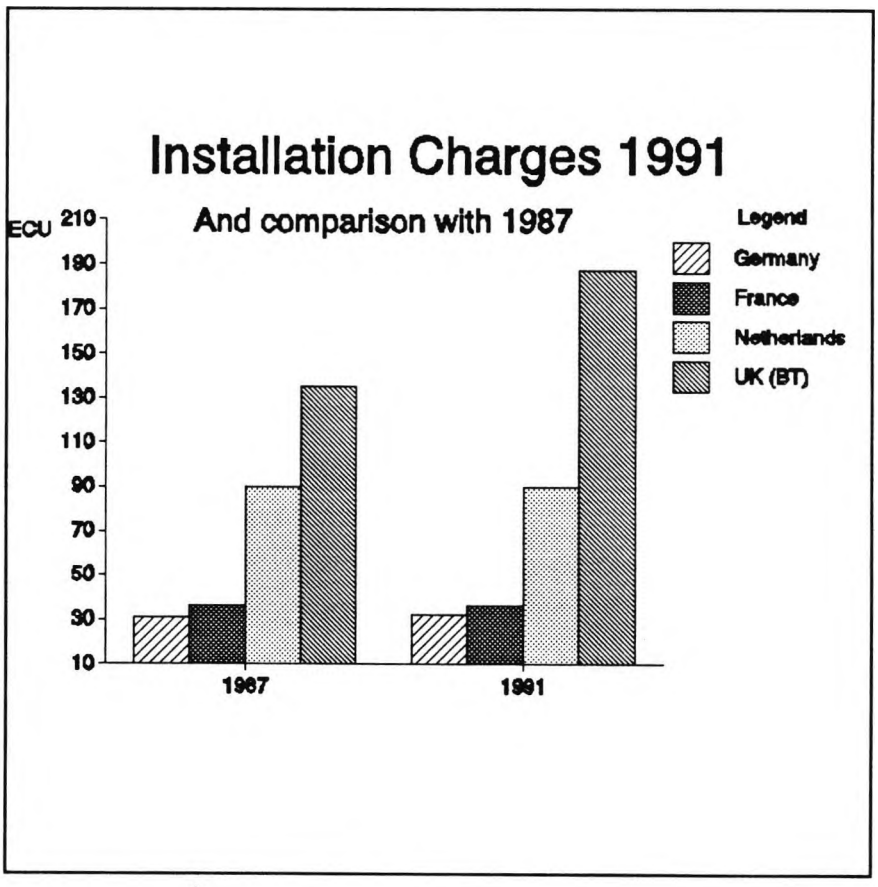


(OECD 1991)

In the four countries there is no obligation to effect connection within a certain time period. In most countries a reasonable term is indicated within which the connection will be effected: the UK (BT) 8

days, France 10 days and the Netherlands and (West) Germany 14 days. PSTN connection charges differ widely. In 1991 Germany had the lowest rate (at 32 ECU) while the UK (BT) had the highest at 187 ECU. The latter has been raising its connection charges considerably in the process of rate rebalancing since 1982: between 1987 and 1991 BT's connection charge has increased by almost 40 per cent. France and the UK (BT) have lower rates than indicated in figure 7.2. if an earlier connection in a house is present or a connection of a previous occupant is taken over. France does not make a distinction between a new connection and moving house: the subscriber pays the same amount, whether he or she moves house or wants a new connection. The figure also does not take into account discounts for consumer groups, such as senior citizens, physically handicapped people or people who suffer from social disadvantages. In the Netherlands, for example, the telephone connection may in certain cases be covered by Social Security while in the UK BT has a special low-user scheme and handicapped people are entitled to extra hearing aids etc. for no extra costs.

Figure 7.2.: **PSTN Residential Installation Charges**
(including VAT)



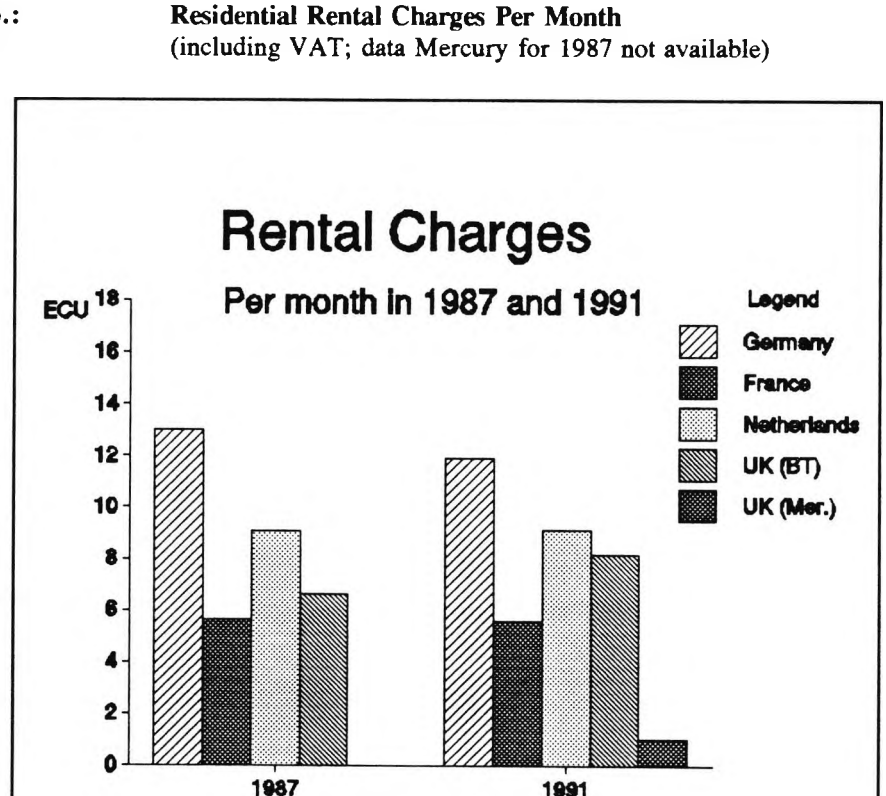
(BEUC 1991)

BT's main competitor, Mercury, has no connection charge for its service to residential customers (2300 service) since it uses predominantly BT's local loop. Mercury 2300 customers thus have to pay the

normal BT connection fee. Local cable companies offering telephone services in the UK have lower connection and rental charges - approximately 10 - 15 per cent cheaper than BT's (Joosten 1992c). With very low cable penetration[3] it nevertheless means that most PSTN subscribers have no alternative than BT.

Considerable differences also exist between the rental charges. The UK, Germany and the Netherlands have a single fixed rental charge, while France uses three rates, based on the size of the basic area, to correct for imbalances between local call areas (the larger the area, the higher the rate). Although the Netherlands has the highest subscription charges, the UK is catching up fast: BT increased its rental fee by 25 per cent between 1987 and 1991 and has raised it again since. Mercury 2300 customers, using BT's local loop, have to pay the normal BT line rental plus a Mercury charge for 'administration costs' and using a Personal Identification Number (PIN). Germany has decreased its rental charge.

Figure 7.3.: **Residential Rental Charges Per Month**
(including VAT; data Mercury for 1987 not available)



(BEUC 1991)

[3] At the end of 1992 cable operators had 100,000 telephone connections (BT had 24 million) (Financial Times 21 December 1992).

of service, security, convenience, the availability of public payphones[2] and other possibly relevant variables such as complaints procedures and general information and comfort. One has thus to be careful in drawing simple conclusions from these statistics. Further distortions can be caused by differences in Value Added Tax (VAT) rates and inflation. The UK had a VAT of 15 per cent (currently 17.5), France introduced a VAT in 1988 of 18.6 per cent, while both Germany and the Netherlands do not charge VAT on telecommunications services (yet). General inflation throughout the 1980s was high in the UK and France (81 and 86 per cent between 1980 and 1990) and much lower in Germany and the Netherlands (29 and 26 per cent). Other factors which can cause differences between national tariffs are productivity (GDP/man-hour), interest rates, density (connection per square kilometre), communications propensity (annual total traffic per person), technology (state of modernisation of the network), penetration (connections per 100 population) and - of course - cost accounting and allocation methodologies (Horton and Donovan 1987). Table 7.1. demonstrates some wide disparities between the four PTOs:

Table 7.1.: Some Performance Indicators of the Four PTOs

Country PTO	payphones per 1,000 population (1990)	size (Mil.US$) (1991)	growth (%) (1991)	access lines/ employee* (1991)	index digitalisation** (1990)
UK (BT)	1.35	25,248	11.1	115	.73
France (FT)	3.86	21,425	5.4	179	.72
Germany (DBP-T)	2.66	27,169	-6.9	125	N/A
The Netherlands (PTT-T)	0.55	6,043	-6.2	234	.43

(OECD 1990)

* Access line per employee.

** Weighted index of network digitalisation (transmission .25, trunk switching .35 and local switching .45).

This table suggests that the Dutch PTT Telecom has twice as many main lines per empoyee than BT (however the former uses much more contracting labour - outsourcing - than the latter). The Dutch PTO has much less invested in network digitalisation than its European counterparts and has considerably less public payphones.

[2] Figures from 1986 show that public payphones penetration in France was seven times as high as in the Netherlands, with Germany and the UK in between. The Dutch PTT Telecom has however started a programme to increase the number of public payphones over the next few years.

An indication of affordability could be obtained by relating the installation/connection charges and line rentals to the GDP per capita:

Table 7.2.: **Affordability Of Residential Connection And Rental PSTN Charges**
(GDP per head divided by 1990 charges, including VAT)

Country	Connection	Rental
Germany	353	71
France	289	215
Netherlands	102	84
UK (BT)	51	96

(Touche Ross 1992)

Although this calculation does not take into account the distribution of income, it demonstrates the enormous difference in affordability of connection charges between the UK and Germany; the French connection charge and rental charge are both 'very affordable'.

Particularly in the UK and - to a lesser extent - in the Netherlands connection charges have increased faster than rental charges, while in France and Germany the annual rental charges rose faster as table 7.3. demonstrates.

Table 7.3.: **PSTN Connection Charges Versus Rental Charges**
(real values expressed in 1980 ECU, excluding VAT)

Country	Connection charge as percentage of annual rental	
	1980	1990
Germany	62	20
France	146	73
Netherlands	76	83
UK (BT)	105	187

(Touche Ross 1992)

Call charges are measured according to time, distance and time of day. The former is calculated in terms of certain standard time units. If the caller puts the phone down at a moment when the next unit has started he or she will nevertheless have to pay for the whole unit. The longer the unit, the more unprofitable this may become. By using large time-units this crude time-measuring can generate extra profits for the PTOs (and extra costs for consumers). Mercury (UK) is the only PTO to measure the time of a call on the basis of actual time, measured in seconds.

As we have seen in section 5.5. the Netherlands uses a total of just two rates as regards distance: local and long distance. The other countries all use three different rates, with a certain distance measured in kilometres acting as a limit or a vague limit based on provinces or the site of the telephone exchanges.

The UK has apart from the 3 distance rates a reduced rate for high-traffic density routes (a form of de-averaging formerly uniform prices). Reduction can be as much as 0.22 ECU for a 5 minute BT call at a distance of more than 56 kilometre.

Throughout the 1980s the size of off-peak reductions has increased as well as the number of hours when an off-peak reduction applies and the number of time of day bands. Both the Netherlands and Germany have two different rates related to the time of day: per week 50 hours of high (standard) rate, during office hours, and 118 hours reduced (cheap) rate outside office hours and in the weekend. In the UK BT and Mercury customers have three time rates: 20 hours peak rate (9am - 1pm Monday to Friday), 30 hours standard rate (8am - 9am and 1pm - 6 pm Monday to Friday) and 118 hours of cheap rate for the rest. France, finally, has no less than four time rates: 49.5 hours high rate and 52.5 hours of cheap rate, with two rates in between of 23.5 and 40.5 per week respectively. Table 7.4. compares the cheapest and most expensive call charges for the first 5 minutes of local calls and of calls over 150 kilometres. There is not always a difference between cheap and expensive hours for local calls; if there is such a difference, it is hardly noticeable in the case of a 5 minute call because the length of the measuring unit for local calls is often 5 minutes or more. France has not only the greatest variation in time rates, but, as the table shows, also the greatest difference between the highest and lowest rate of 150km calls: 160 per cent. The latter is considerably less in both Germany and the Netherlands.

Table 7.4.: **Maximum And Minimum PSTN Call Charges**
(costs per 5 minutes in ECU, including VAT; figures for 1991)

Country	Local Calls		150km. Calls	
	max.	min.	max.	min.
Germany	0.11	0.11	1.67	0.89
France	0.10	0.10	1.89	0.73
Netherlands	0.06	0.06	0.45	0.26
UK (BT)	0.36	0.14	1.13	0.56
UK (Mer)	0.82	0.21	0.94	0.33

(BEUC 1991)

Only the UK has different time rates for local calls, which are both for peak hours and cheap hours dearer than the others. Long distance calls are very cheap in the Netherlands and cheap in the UK. France and Germany have a much larger difference between local and trunk calls than the UK and the (much smaller) Netherlands.

Price differences among international calls are also substantial:

Table 7.5.: **International PSTN Tariffs**
(Cost of three-minute intra-EC calls in ECU, including VAT; figures for 1990)

Outgoing from:	Incoming to: Belgium	Denmark	Germany	Greece	Spain	France	Ireland	Italy	Luxembourg	Netherlands	Portugal	BT	Mercury
Belgium	–	2.54	1.84	2.54	2.54	1.84	1.84	2.54	1.27	1.55	2.54	1.84	1.84
Denmark	1.36	–	1.36	1.62	1.61	1.61	1.61	1,61	1.36	1.36	1.61	1.61	1.61
Germany	1.69	1.69	–	1.69	1.69	1.69	1.69	1,69	1.69	1.69	1.69	1.69	1.69
Greece	2.38	2.38	2.38	–	2.38	2.38	2.38	2.38	2.38	2.38	2.38	2.38	2.38
Spain	3.20	3.20	3.20	3.20	–	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20
France	1.98	1.98	1.98	1.98	1.98	–	1.98	1.98	1.98	1.98	1.98	1.98	1.98
Ireland	2.60	2.60	2.60	2.60	2.60	2.60	–	2.60	2.60	2.60	2.60	1.99	1.99
Italy	2.53	2.53	2.26	2.26	2.53	2.26	2.98	–	2.26	2.53	2.98	2.53	2.53
Luxembourg	1.07	1.54	1.54	1.54	1.54	1.54	1.54	1.54	–	1.07	1.54	1.54	1.54
Netherlands	1.43	1.43	1.43	1.89	1.89	1.43	1.89	1.89	1.43	–	1.89	1.43	1.43
Portugal	2.69	2.69	2.69	2.69	2.53	2.69	2.69	2.69	2.69	2.69	–	2.69	2.69
BT	1.69	1.69	1.69	1.69	1.69	1.69	1.62	1.69	1.69	1.69	1.69	–	–
Mercury	1.42	1.42	1.42	1.42	1.42	1.42	1.37	1.42	1.42	1.42	1.42	–	–

(CEC 1992c)

France and Germany have rationalised their international tariffs in the past resulting in one international rate for all EC countries; intra-European rates of other EC Member States reflect historical and economic links. The UK has special, lower tariffs for calls to Ireland and the Netherlands has lower tariffs for calls to Belgium, France, Germany, the UK and (via the UK) Ireland. On average, UK's Mercury has the lowest rate for EC countries. This company, which also specialises in long distance calls, beats the other countries with its average rate for calls to EC countries at 1.42 ECU (table 7.5.).

Equally, charges for international calls outside the EC differ widely as table 7.6. shows:

Table 7.6.: **Call Charges To The USA**
(per five minutes in ECU, including VAT; figures for 1991)

Country	Full Rate	Reduced Rate
Germany	7.58	7.58
France	6.72	5.14
Netherlands	5.62	4.91
UK (BT)	5.59	4.32
UK (Mer)	5.07	3.97

(Touche Ross 1992)

The UK (both BT and Mercury) are the cheapest, with the Netherlands a close second. Both UK companies and the Dutch PTT Telecom are cheap in terms of international (outgoing) calls; in the UK case this is probably caused by competition, whereas in the Dutch case, historically, the open economy and importance of a cheap (and efficient) infrastructure has prompted governments and the PTT Telecom to position the country as a main hub in Europe. Germany is quite expensive, but has recently (April 1992) decreased its transatlantic prices by one third (due to competition from US call-back schemes). Obviously, tariffs increase considerably if crossing a national frontier: intra-EC calls or a call to the USA is charged at a higher rate than a long distance national call, because its costs are higher since - inevitably - it has to use international gateway exchanges. Nevertheless, international calls are charged at many times the price of national calls. A cheap rate intra-EC call from France, Germany or the UK is approximately three to four times as expensive as the longest national call within those countries. In the case of the Netherlands this ratio is even ten (but then the Netherlands is of course geographically a small country). In the case of calls to the USA the ratios between the longest, cheap rate national call and a call to the USA are 7.5 for France, 12.8 for Germany, 8.5 for the UK (BT) and 14.3 for the Netherlands (all figures include VAT and are from 1990).

Public pay phones are usually more expensive than private phones due to extra costs for installation and maintenance. As its irregular users cannot be charged a separate connection or rental charge, these fees have to be included in the call charge. Nevertheless, public call charges are considerably higher than private call charges and their prices differ widely. A public one unit local call in France is 40 per cent more expensive than a private call. A long distance public call in the UK (BT) can be up to 64 per cent dearer than the same call from a private phone. In the Netherlands the unit calculation for public calls differs from the calculation for private calls. A five minute local, public call costs almost five times as much as a private call. A long distance call from a Dutch public phone booth at night or in the weekend is three times as dear as that from a private phone.

In accordance with the tendency to segregate the telephone network and the telephone service into separate parts (see section 4.6.), former included services are increasingly charged separately. Directory inquiries were 'free' of charge, that is included in the rental, in the UK until 1991. With BT an information call costs now 0.63 ECU, at a maximum of two numbers per call. With its competitor, Mercury, the consumer has to pay 0.84 ECU for domestic information, at a maximum of 3 numbers per call. For international information this company charges no less than 1.18 ECU per number. In France the national information service provides a maximum of 3 numbers per call, at 0.52 ECU; for international numbers the client pays 1.05 ECU. Information concerning international numbers in the Netherlands is (still) free of charge. National information is cheap and available at 0.06 ECU, with information provided per call limited to 3 telephone numbers. Germany and the Netherlands do not provide itemised telephone bills, although the latter will gradually introduce such a service from mid 1993 onwards (with a charge for every line printed on an itemised bill). In France it is possible to get a highly

detailed itemised bill, at 1.15 ECU. If there are more than 100 calls, 1.44 ECU is charged per additional group of 100 calls. In February 1991, UK's BT introduced the optional itemised bill for clients with a connection to a digital and upgraded exchange (over 75 per cent of its customers). The specification, available at no extra charge due to pressure from OFTEL, applies to calls exceeding 10 units. Mercury provides an detailed itemised bill, free of charge, as a standard service (all figures here are for 1991 and include VAT). The provision of dialling tones, the call set-up and the party's line ringing etc. are (still) included in the connection and rental charges. Although some EC Member States (Denmark and Spain) have already introduced separate charges for these services, none of the countries studied here have announced the introduction of such separate charges.

Above we already mentioned one example of price de-averaging in the case of the cheaper heavy traffic routes in the UK. Another example is discounts for large users. For example, BT and Mercury offer reductions in the charge per unit to customers who use more than a certain number of units. In France heavy users are offered the option of a special tariff with a rental over 40 times as high as the usual line rental, in return for reductions in national unit charges of up to 50 per cent.

Generally, the UK residential customer is in absolute terms and in terms of affordability worse off than his or her French, German or Dutch counterparts. UK (BT) is expensive as regards connection and local call charges, while France, the Netherlands and Germany have cheap connection charges and cheap local calls. France also has cheap rentals. International calls are cheap in the UK and the Netherlands, while in all countries there is a considerable difference between the longest national call and an international call.

7.2.2. Business Tariffs

PSTN call charges are not differentiated according to whether the customer is residential or business. A distinction between business and residential customers is made in the UK as regards connection and rental charges (a distinction which dates from the 1920s as we saw in section 5.2.). Business charges are higher, although residential customers have to pay VAT in the UK while business users normally can claim VAT back. The UK connection charge is also a higher percentage of the rental for residential customers than it is for business. Business PSTN line rentals were in 1990 cheapest in France and the Netherlands while the UK was the dearest. Looking at the affordability of connection charges and rental charges for business users, again France and Germany have a good score due to high GDP and/or low charges.

Table 7.7.: **Affordability Of Business Connection And Rental PSTN Charges**
(GDP per head divided by 1990 charges, excluding VAT)

Country	Connection Charge	Rental Charge
Germany	353	71
France	342	255
Netherlands	102	84
UK (BT)	54	59

(Touche Ross 1992)

The variations between the four countries as regards national and international PSTN charges are also apparent in the leased line tariffs. These tariffs have normally a one-off connection charge, varying with the type of leased line and a periodic rental which may have a fixed component and an element varying with distance or destination country and type of leased line.

Table 7.8.: **Analogue Leased Line Tariffs**
(M.1040: 2-wire, M.1020: 4-wire; 200 km. link, real values expressed in 1980 ECU)

Country	M.1040				M.1020			
	Connection Charge		Annual Rental		Connection Charge		Annual Rental	
	1980	1990	1980	1990	1980	1990	1980	1990
Germany	321	125	15853	6081	642	125	20093	14732
France	276	125	10415	8430	552	250	14814	10123
Netherlands	120	290	2561	3127	241	579	3415	4570
UK (BT)	-	684	-	2733	-	1038	-	3119

(Touche Ross 1992)

While France and Germany both have decreased their analogue leased line tariffs quite drastically, the Netherlands has increased its connection and rental charges. Nevertheless, the latter, together with the UK (BT), is still among the cheapest countries. Historically BT's analogue leased lines have been very cheap due to tariff policies which go back to the 1920s (the Post Office offered attractive leased line/PABx tariffs to relieve congestion problems in the public network at the time; see section 5.2.). After liberalisation this imbalance had to be redressed in order not to distort competition and to tariff the service more in line with costs. BT - with OFTEL's approval - thus raised the prices by an average of 10 per cent to 20 per cent a year in the period 1986 to 1991; in December 1992 BT announced that it would further increase connection and rental charges for analogue private circuits, but this time to give its customers incentives of up to £20,000 to migrate from analogue to digital private circuits (Telecom Markets No.213, 10.12.92, pp.3/4).

Since the Netherlands has cheap PSTN tariffs (see above) the break-even point between using the PSTN (peak rate) and leasing a M.1040 line is quite high; for Germany and the UK this break-even point is 50

per cent lower. Both the UK (BT) and the Netherlands have a relatively high connection charge compared to their annual rental charge, whilst for France and Germany the connection charge forms a very small proportion of the total. This pattern is repeated for digital leased lines, although the variations between the four countries in the level of charging for digital leased lines is even more extreme than for analogue lines:

Table 7.9.: **Digital Leased Line Tariffs**
(200 km. link, real values expressed in 1980 ECU)

Country	64kb/s				2Mb/s			
	Connection Charge		Annual Rental		Connection Charge		Annual Rental	
	1980	1990	1980	1990	1980	1990	1980	1990
Germany	132	125	55423	34738	132	125	539218	337669
France	268	250	35257	26906	1506	1409	128445	120159
Netherlands	2280	2172	13135	12510	27365	26062	63852	60812
UK (BT)	485	639	5325	4678	57616	50613	36447	41320

(Touche Ross 1992)

The Netherlands and the UK have relatively high connection charges and France and Germany have very high rental charges. Germany uses the same connection charges for 64 kb/s and 2Mb/s leased lines, in spite of the fact that the latter's capacity is 30 times as big. Tables 7.8. and 7.9. also demonstrate that if capacity is doubled (from M.1040 to M.1020) or increased by a factor of 30 (from 64kb/s to 2Mbit/s) tariffs are raised by much less than these multipliers.

PTOs have introduced public packet-switched data networks (PSDN) throughout the 1980s. The structure of PSDN tariffs is quite similar to PSTN tariffs: a one-off connection charge, a periodic rental, a duration charge and a volume charge (instead of PSTN's distance charge). Discounts are sometimes available for high volume or long duration calls: France gives up to 70 per cent discount on both duration and volume during off-peak hours whereas the UK (BT) and the Netherlands provide much lower discounts. Again, wide variations are apparent between the four countries:

Table 7.10.: **PSDN Connection And Rental Charges**
(excluding VAT, 1 January 1990, 1990 ECU)

Country	X.25 PSDN at 9.6 kb/s	
	Connection Charge	Annual Rental
Germany	98.81	2490.00
France	520.20	2913.13
Netherlands	218.72	4461.94
UK (BT)	1278.94	4981.15

(Touche Ross 1992)

The UK (BT), which has historically promoted leased lines and has thus many more private lines than public (PSDN) lines, has both the highest connection and rental charges, while Germany, normally having high business tariffs, has the lowest. The ratio between PSDN connection charge and rental charge for the Netherlands is not consistent with those for analogue and digital leased lines: the Dutch PSDN connection charge is very small compared to its annual rental charge.

PSDN call charges also vary widely between the four countries:

Table 7.11.: **PSDN Call Charges**
(national 2500 segment, 480 minute call, peak rate 1 January 1990, excluding VAT, 1990 ECU)

Country	Call Charges At 9.6kb/s X.25 PSDN			
	Call Set-up	Duration	Volume	Total
Germany	0.02	16.60	4.08	20.70
France	-	2.08	1.55	3.63
Netherlands	0.01	5.25	2.73	7.99
UK (BT)	-	3.24	1.01	4.25

(Touche Ross 1992)

Germany is no less than six times as expensive as France as regards PSDN call charges. The French PTO decreased its PSDN duration charge by up to 30 per cent in 1988, hoping to shift more traffic from private lines to public lines. The Dutch and German PTOs charge separately for call set-up, unlike their French and British (BT) counterparts. As in the cases of leased lines and PSTN tariffs, Germany has low fixed tariffs and high variable tariffs, while the Netherlands and the UK have high fixed tariffs and lower variable costs.

7.3. Tariff Changes in the UK

Although particularly business users in the City of London had been building up pressure for deregulation and liberalisation for a long time, radical changes did not occur until the early 1980s (Hills 1986, p.90). When the Conservative government was elected in 1979 its manifesto was based on a neo-liberal ideology; one of the main goals therefore was to reduce the public sector via deregulation, liberalisation and, in the case of BT, privatisation. The latter, according to one proponent, reflected "[...] a practical side of a growing view that the state has over-extended itself and assumed roles which are incompatible with an efficient and free society." (Veljanovski 1987, p.205).

The basic paradox of the British experiment of telecommunications liberalisation is that with the abolition of the old regulatory framework a new, even more extensive and complex framework has gradually

emerged. The 'invisible hand' of free market economics proves most often to be the highly visible hand of the regulator, trying to mimic the workings of some more perfect market. Moreover and in spite of the neo-liberal outlook, industrial policy concerns were never completely abandoned: the early 1980s witnessed in fact an upsurge of increasing state interest in specific new sectors, particularly telematics, which were widely regarded as providing the new engine for economic growth[4].

7.3.1. Changes in the Regulatory Framework: Liberalisation, Competition and Privatisation

Things began to change radically in 1981 when the Conservative government separated the mail from the telecommunication side of the Post Office. Discussions started on liberalisation and competition, which would lead to lower prices, new services and better quality. One year later competition was introduced - Mercury Communications Ltd (MCL) was licensed to run a competing network - and in 1984 the Telecommunications Act established the Office of Telecommunications (OFTEL), which, as a watchdog body, monitored the competition between the privatised and still dominant BT and its competitors. That same year BT was (partially) privatised, sold as a single integrated organisation on the stockmarket. Although some, afraid of replacing a public monopoly with a private monopoly, opted for a break-up of BT - following the example of AT&T in the USA - a majority wanted to keep BT as a single entity. A break-up was judged impractical because: a) it would cause problems finding buyers for BT's unprofitable parts; b) it would have diminished BT's ability to compete in world markets; and, c) the UK needed a large company to face a liberalised home market and defend it against foreign competitors (Newman 1986, pp.11/12).

To ensure real competion would develop, a discussion was started on what a new regulatory framework should look like. In 1981 the radical and pro-liberalisation Beesley report argued that resale operations (especially of private, or leased circuits) should be allowed, since - among others - it would encourage a desirable 'cost based tariff restructuring' (Beesley 1981). His proposals led to a discussion between advocates of radical deregulation and free competition, and supporters of an effective re-regulation. The supporters of the second view argued that, in order to have real and relatively 'fair' competition, new regulation had to be introduced in order to protect the new market entrants against the incumbent giant, BT. BT's competitors had, for instance, to be protected from predatory pricing by BT (Pye 1981). After

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[4] The UK government commissioned a series of studies in the early 1980s to investigate how far the (tele)communications infrastructure policies could be conducive to its wider Information Technology (IT) policies (the Thatcher government had already set up an IT policy under the then Minister of IT, Kenneth Baker). Several reports envisioned a bright future for the then declining cable TV (CATV) networks; led by entertainment these would start a second life as high capacity, optic fibre, interactive networks providing a broad range of 'information services' (HMSO 1982). Similar policies were at the time discussed in France (*Plan Câble*), the Netherlands and Germany.

some discussion, the government chose the second, re-regulation, option.

In spite of criticism by the Labour party, the trade unions within the Post Office[5] and the Post Office itself, the government decided to implement its liberalisation policy. Firstly, it opened the VAN market: after a debate on exactly how to define value added services a general licence for VANS (involving chiefly data transfer within the UK) was issued in October 1982. However, the government chose not to allow unrestricted resale of private circuits because, it was argued, BT's prices were too low in relation to the real costs[6]. The government asserted that if these prices were not first rebalanced the pricing structure would give an 'uneconomic incentive' for the use of private circuits to bypass the switched public networks which would deprive BT of considerable revenues.

The government's second move was to develop a new, asymmetric regulatory framework: whilst many of BT's activities would have to be monitored and curtailed to prevent abuse of its (still) dominant position, new, 'infant industry' entrants would originally require some extra help and protection.

In 1983 Littlechild and the Department of Trade and Industry (DTI) published a report in which traditional regulatory models were rejected (Littlechild 1983). The rejection included the American regulation using the rate of return on capital employed because - according to the report - this required a number of detailed cost allocations and a detailed specification of a concrete rate of return, both of which are difficult to specify precisely. Moreover, rate of return regulation would stimulate inefficient and wasteful over-investments ('gold plating') of the PTO's assets and investments. It also would force the regulator to intervene directly to determine whether costs incurred are reasonable, tending to make management defensive and focusing attention not on increasing efficiency but on justifying their position before the regulator.

Littlechild concluded that while free competition was the ultimate objective for the determination of prices, in the meantime there would be a need for a regulatory scheme as a transitional measure. The scheme should be one which distorted markets as little as possible. He supported a certain system of price control (price caps) which was adopted. This price regulation - which is still in use - is based on a system by which BT is obliged to ensure that the aggregate price level of a basket of its services rises by no more than a rate to be determined by reference to the formula Retail Price Index (RPI, the general rate of inflation) minus a 'X' percentage. The constraint is on the basket as a whole and it is up to BT to

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[5] The POEU and UCW feared that liberalisation and privatisation would pose a threat to the jobs and conditions of the BT workforce (CIS 1982).

[6] Prior to liberalisation and for reasons of national economic policy, a rate structure for leased lines was introduced which did not cover the costs, and was loss making (in fact a cross-subsidisation which favoured business users).

change prices within that basket at its own discretion. The main advantage of such a system of regulation, Littlechild argued, was its simplicity in administration (no line-by-line or service-by-service pricing policy but aggregated data) combined with strong incentives for the improvement of efficiency: if BT could make larger profits by increasing its efficiency, while meeting the price formula (RPI-X), it would be able to keep these profits, to the ultimate benefit of its shareholders. The figure X - to be adjusted every several years - rests on a broad judgement of the scope for improvements in BT's productivity, efficiency and costs[7].

The price formula is for a basket of services, originally covering about 55 per cent of BT's revenues. Service prices outside the basket were expected to come down because of competition (eg. in 1989 the decision was taken to permit simple resale of capacity in domestic private circuits; one year later international simple resale was made possible in principle). Some parts of BT's business were excluded from the basket because they were in markets where effective competition was expected to develop. The government originally decided to limit the main price control to a basket of essential network services - residential and business line rentals and directly dialled local calls and national calls. If other prices, outside the basket, moved upwards as an expression of an abuse of monopoly power, then OFTEL would seek to control them also. This has indeed happened: BT raised the prices of leased lines substantially and in September 1989 the Director General of OFTEL, having received many complaints about quality of service and price rises, introduced also a price cap (RPI-0) for BT's private circuits (OFTEL 1989). In 1988 OFTEL had already decided to include operator assisted UK calls in the price-capped basket and in 1990 the prices of outgoing international calls were brought into the basket for switched services (OFTEL 1991b). So gradually, the price cap mechanism covered a larger share of BT's revenues, as the former state monopolist was inclined to raise prices outside the basket. New regulation had also to be introduced for quality of service, an issue hardly covered in the original legislation. In a drive to cut costs the quality of some of BT's services deteriorated rapidly in the mid 1980s. Culminating in 1987 and causing a public outcry, the Director General decided to introduce quality standards and to monitor BT's performance also according to concrete quality criteria (BT had ceased publishing regular quality of service reports in 1983 in response to liberalisation and competition). Later, free itemised billing and call-barring were added. The legal 'gap' between the 1984 Telecommunications Act, which predominantly concentrated on economic and financial control of BT, and OFTEL's practice of increasing quality-of-service regulation, was not filled until March 1992 when the Competition and Service (Utilities) Bill, received its Royal Assent. This Act, part of the Conservative Government's 'Citizens' Charter' initiative, assigns powers to OFTEL's Director General over BT (and Kingston Communications in Hull) to set overall performance standards and guaranteed service standards. Gradually OFTEL has also extended

[7] In the words of the former Director General of OFTEL, Sir Brian Carsberg: "The basis for the choice, in my view, is that the rule selected must be expected to produce an acceptable financial performance, including a satisfactory rate of return on capital employed, given reasonable efficiency by BT, over the period during which it applies." (Carsberg 1989, p.91).

BT's basic service package: it nowadays not only includes higher quality access to the PSTN network and free 999 (emergency) calls but also itemised billing (increasingly available), low user rebate/support lines, touch-tone dialling (increasingly available) and call-barring of information services or partial call-barring (increasingly available).

In spite of few general limitations on the markets which BT could itself enter, its performance in competitive markets is assessed on the basis of accounting separation between its operating divisions so that no-cross-subsidy rules substitute for structural separation. BT is under condition 18 of its license prohibited from cross-subsidising its CPE and other competitive services from network revenues. For entering certain markets BT also has to have a licence. DTI and OFTEL have in the past argued that because of BT's dominant market position it should not be licensed to provide certain new services. This asymmetric regulation has prevented BT from receiving a - rather unsuccessful as it turned out - CT/2 (Telepoint) licence and a PCN licence[8]. It also received no licence to transmit broadcasting services through its network[9] - something which was specifically allowed to the cable operators in 1991.

Liberalisation and competition has gradually been introduced in new markets. In 1991 there were 47 PTOs licensed: three licensed to provide fixed telecommunications services other than cable television (BT, MCL, and Kingston Communications in Hull), two cellular radio operators[10], 3 PCN operators[11], 38 broadband cable operators[12] and BT's broadband technology experiment in Bishop's.

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[8] Lord Young, Secretary of trade and industry, awarded the PCN licences to Mercury Personal Communications (MPC), Hutchison and Unitel, two months before he assumed the chairmanship of Mercury's parent company, Cable and Wireless (C&W). Lord Young denied BT's application for a similar licence, although it was envisaged that BT (Cellnet) and Vodafone's existing cellular services would migrate to PCN over time (Toker 1992).

[9] On an experimental level BT was granted a license in October 1989 to carry out a trial in part of Bishop's Stortford on the integration of television and telecommunications services over an optical fibre network. At the end of the so-called Duopoly Review in 1991 it was decided that BT would not be allowed to carry video signals over its network for a minimal period of 10 years (OFTEL 1991).

[10] In May 1983 two companies were licensed to provide cellular radio networks and associated services in the UK: Telecom Securicor Cellular Radio Ltd (Cellnet) and Racal Vodafone Ltd (now Vodafone Ltd).

[11] In December 1989 the Secretary of State identified three consortiums provide PCNs: Mercury PCN Ltd (Cable & Wireless, Motorola, Telefonica), British Aerospace/Space Communications Ltd (BAe with Matra, Milicom UK, Pacific Telesis UK, Sony) and Unitel Ltd (STC, Thorn EMI, US West, Deutsche Bundespost). July 1991 the three PCN licences were issued to Hutchison Microtel Ltd, Unitel Ltd, and Mercury Personal Communications Ltd (MPC). In order to save on the high network development costs Unitel and MPC merged their activities in March 1992. A further blow to the government's drive for competition in mobile telephony was given by reports asserting that Hutchison was expected to abandon plans to set up its PCN network (The Independent 28 October 1992).

Stortford. Non-PTO markets, such as private mobile radio (PMR), specialised satellite service operators (SSSO) and mobile data services, have been liberalised too. In 1992 some new PTOs were licensed: Millicom and Ionica will build radio based local loops ('radio tails') while National Network already has a network in place which connects some 4,000 locations (its parent being the Post Office, once part of the same state administration as BT!). The DTI and OFTEL are currently deliberating the licensing of a third international operator, while simple resale has been introduced with countries who equally have introduced competition in international telecommunications (eg. Sweden, Australia and Japan).

This changing regulatory framework has generally had the following consequences:

* BT went through some important transformations:
  - there was greater attention to cutting costs; also better costing systems were installed as well as more sophisticated accounting systems[13];
  - investment procedures were re-examined to concentrate on their net revenue effect;
  - there was greater pressure on suppliers related to costs; supply sources have in general been broadened[14];
  - there was much more interest in tariffs, with special interest in the function of tariffs for marketing[15] and the net revenue benefits of price change (Wheatley 1987, pp.11-12).
  - after several previous internal reorganisations a major reorganisation was announced in March 1990 (project 'Sovereign') which, apart from preparing BT to compete in internationalised markets, is also a cost cutting exercise; in 1992 a special and very favourable package was launched under the name of 'Release 92' to make more than 33,000 jobs redundant that year; an increasing number of activities

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[12] Of the 134 Cable franchises orginally let by the Cable Authority (whose functions were transferred at the beginning of 1991 to the Independent Television Commission, ITC) 50 were operational at the end of 1991 and were providing services to customers; 38 of the CATV companies hold a PTO license and can offer telephony (OFTEL 1991, p.18).

[13] BT's accounting and pricing systems were already modernised after the allegations of the Carter report: a more refined system was gradually introduced to have better control over and insight in cost developments. The accounting methodology was such that already before privatisation BT started with some rebalancing of its prices: connection and rental charges were increased substantially between 1979 and the licensing of MCL in 1982.

[14] After privatisation the historical relationship between BT and its oligopolistic club of suppliers (GEC, Plessey and STC) partially ended; nowadays BT purchases its equipment also from other companies, like Thorn/Ericsson and Northern Telecom (in case of the latter BT is even an important distributor of NT equipment).

[15] A good example of strategic pricing is ISDN. In the first two stages of its basic rate access ISDN service (ISDN2) the usage tariffs are at normal telephone call rates. The prices are relatively low, for reasons of: a) a relatively rapid market development; and b) ISDN2 will not offer a much better service than existing transmission media, thus putting a limit to the premium that BT can charge on the service.

are 'outsourced' to other companies[16];

- as one of the first European PTOs, BT has spread its wings internationally: it has entered the US market by buying stakes in the VANS provider Tymnet and the cellular operator, McCaw, and in Canada the equipment manufacturer Mitel (the latter two have been sold again). With its Syncordia and Global Network Services (GNS) ventures BT has moved into the world-wide network management services market. Particularly within Europe it has adopted an agressive strategy: it has entered the German satellite TV market and hopes to acquire up to 10 per cent of the French market by the end of the century (Financial Times 23 October 1992).

* The new competitor MCL concentrated itself on the more profitable segments and regions of the UK market. Because BT was forced to interconnect MCL to its own network for a special, low price, MCL was helped by OFTEL to compete with BT[17]. The new entrants have also been greatly helped by the duopoly period: between 1982 and 1991 BT, MCL and the local operator in Hull were the only three licensed PTOs (Baker 1983). MCL's competition has had a downward pressure on some of BT's prices - particularly in the business markets where competition has emerged[18].

7.3.2. Changing the Tariffs: Rebalancing, Unbundling and Flexibilisation

OFTEL saw one of its major tasks as the 'rebalancing' of tariffs, i.e. lowering the prices of some services, where costs had fallen significantly in recent years and increasing the prices of other services which did not fully cover the cost of provision; the rationale was decreasing cross-subsidisation and "[...] longer-term economic benefits by offering to consumers prices which more nearly reflected costs of provision, thereby providing better signals to motivate decisions affecting the deployment of resources." (OFTEL 1988, p.5). The consequence was that, for instance, the residential connection charges between 1984 and 1991 went up by about 85 per cent and the residential and business line rentals up by 60 per cent, all well above the inflation figures[19]. While in real terms local calls decreased only by 16 per cent over the whole period, national calls decreased, on average, by 39 per cent (OFTEL 1992b, p.7). These price increases and rebalancing have made, as we already saw in Chapter V, the UK the dearest country

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[16] From a 245,000 employees company in the early 1980s, BT wants to become a 100,000 employees company by 1998 (Telecom Markets No.213, 10.12.92, p.1). Shedding too many jobs too fast can however cause a deterioration of the quality of BT's services and consequent actions from OFTEL: BT's 6 monthly report on its quality of service, published in November 1992, showed a deteriorated performance caused by the company's rapid organisational changes (Release 92) (OFTEL 1992d).

[17] MCL argued that this price was still too high and that costs were not fairly distributed.

[18] In February 1990 Mercury and BT reached after over a year of negotiations an agreement on the interconnection of their packet-switched services. This agreement gives users of the Mercury 5000 packet-switching service access to exactly the same set of services as those offered by BT's Packet Switch Stream (PSS), but with cost savings for users of between 5% and 20%. BT has reacted by lowering its own PSS tariffs.

[19] Rentals will continue to increase above the rate of inflation: December 1992 BT announced that rental charges will increase by 10p. a week from January 1993 (The Times 03.12.92).

of the four countries investigated here. Lynk has calculated that, contrary to the general belief, rental and local call charges have, in general, exceeded their break-even values, whereas in the more competitive, long distance sector the reverse is the case. The pricing policy adopted by BT and permitted by OFTEL is thus very much in line with Ramsey pricing: the largest price increases will fall on consumers with the lowest demand elasticities (Lynk 1992).

Reflecting an originally too cautious approach OFTEL had to increase the 'X' figure for the price cap rapidly and decrease the time periods: from RPI-3 for the first period of five years (1984-1988) to RPI-4.5 for the second period of four years (1989-1991), then to RPI-6.25 for three years (1991-1993). The new figure for 'X' is a hefty 7.5 for a four year period ending 31 July 1997 (OFTEL 1992a). Furthermore the basket of regulated prices has been extended (see above) and separate charges have been introduced for services previously included in the rental charge, such as the Directory Enquiry service. BT was even more anxious to rebalance its prices than OFTEL: it increased its rental and connection charges substantially between 1984 and 1988. After complaints from consumers, OFTEL introduced a maximum for the residential and one-line business rental and connection charge of RPI+2 for the period 1989-1993. BT's pre-tax rate of return has nevertheless increased after liberalisation and privatisation: it rose from 19 per cent in 1985 to 22 per cent in 1989 (OFTEL 1991b, 21) and the percentage of this passed on to shareholders has risen from 0.7 per cent to 25.4 per cent; thus the benefits of BT's improved performance have been passed preferentially to the shareholders rather than to consumers (OECD 1990, p.103).

OFTEL has thus basically accepted BT's arguments that the PTO incurs a loss in the local network and that prices therefore have to be rebalanced. The watchdog is very much dependent on BT for detailed information on costs, prices and revenues; information which cannot be revealed and openly discussed as it might possibly harm BT. This structure of regulation has therefore been reproached for creating a too 'cosy relationship' between OFTEL and BT and neglecting the interests of consumers (Rudd 1988). OFTEL has nevertheless undertaken some 'critical' investigations into BT's cost accounting and cost allocation methodologies. As we have seen in Chapter IV cost accounting and cost allocation systems are crucial for determining the costs of providing a certain service and the degree of cross-subsidisation it might entail. BT's licence requires the production of separate accounts for apparatus supply and its services (in fact accounting separation of BT's divisions) so that OFTEL can check whether there is cross-subsidisation. For allocating the common or joint costs, BT uses a FDC system, named Financial Results by Services (FRBS) whereby common costs are allocated via a physical measure based on usage. The costs of building and maintaining the local loop are recouped from the connection and rental charges; the network is thus not regarded as one whole, as one entity. For its accounting system BT uses historic costs, a system which was introduced in 1984, at the time of its privatisation.

All these three practices can be criticised. The FDC system BT chose is quite arbitrary (see section

4.4.3.), something which even the Director General himself has admitted (Carsberg 1990). OFTEL has nevertheless accepted this system as 'reasonable': In the past Oftel has initiated several investigations into BT's accounting methods. In 1989 Oftel reviewed BT's private circuit accounts because it was

> "[...] concerned that BT's accounting methods seemed to be allocating a higher proportion of the company's fixed costs, and of overheads in particular, to private circuits than at the date of privatisation." (OFTEL 1989, p.6).

A following study, done by Touche Ross Management Consultants, found that up to 70 per cent of the costs were non specific costs (i.e. overhead costs, joint and common costs) but the 'particular allocation methods used' could not be 'faulted' and there was no 'bias' for or against private circuits 'as a result of inaccuracies in data collection', although there were 'some uncertainties' about the way in which overheads should be allocated to, for instance, the several private circuit services. OFTEL itself concluded that the accounting methods were 'broadly reasonable' (OFTEL 1989, p.7), although at the same time it complained about BT's use of historic cost accounting methods which could cause 'significant distortions' (OFTEL 1989, p.6; Hartley 1989, p.52).

The debate on valuing the company's assets has been a recurrent theme in OFTEL's investigations since it is crucial for a) determining the costs of providing a service which affects consumers, other, interconnecting operators and (potential) new entrants and b) the rate of return and the profitability for the company as a whole (OFTEL 1992b).

The gap between historic cost accounting (HCA) and the more common current cost accounting (CCA) is caused by the general level of inflation and the changes in relative prices of the assets of the company, arising, for example, from differential rates of technical progress. HCA, which was introduced by BT in 1984, inflates the company's profitability and is thus beneficial for the shareholders and functional for the floatation of shares still in the hands of the government (in 1991 a second tranche of government held BT shares was floated[20]). The prices of services tend to be lower compared to CCA. BT's competitors, having to build their networks at current prices, suffer because a) it is more difficult to attract capital as BT's rate of return is quite high and b) their costs are based on the (higher) current costs and not historic costs. The problem is that if OFTEL were to force BT to introduce CCA again, many prices will have to go up, which probably would cause a public outrage.

Valuing BT's assets also influences the interconnection issue. Due to the fact that there are now several networks, owned by different private companies, which have to be interconnected, OFTEL often has to

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[20] BT's balance sheet was first 'cleaned up' before the first shares were put up for sale in 1984 (a £4 billion state debt was smoothly 'restructured). Currently 21.8 per cent of BT's shares are owned by the British government.

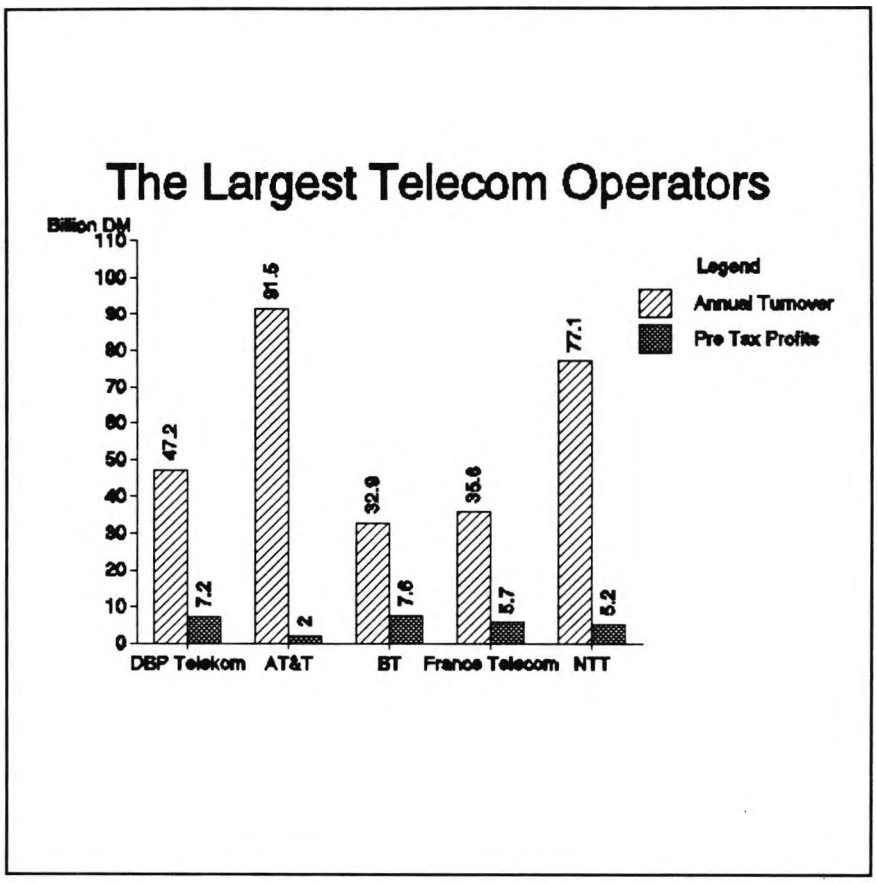
determine the financial and technical terms of interconnection. This causes problems between competing network and service providers, such as between BT and MCL and between BT and cable-telephony operators. The licences given to BT and MCL in 1984 laid down that interconnection should be charged at cost which was defined as fully allocated cost with an appropriate allowance for the cost of capital. This left however a considerable margin for interpretation and (implicit or explicit) policy by OFTEL: whereas the cost of debt is comparatively straightforward the cost of equity capital (unlike the other PTOs BT has been privatised) is a great deal more difficult and - again - different methods produce different results (OFTEL 1992c).

In the choices of cost accounting and cost allocation methodologies OFTEL has primarily been led by the principle of stimulating competition. For instance, when during the Duopoly Review in 1990/1991 BT demanded a contribution towards its losses in the local loop from competing and interconnecting operators, OFTEL decided that whilst in principle these interconnecting operators should pay this so-called Access Deficit Contribution (ADC), this could be waived so long as these (new) competitors were small and did not have a market share of more than 15 per cent. The figures for BT's loss as regards business and residential access services vary, again, according to accounting principles: OFTEL calculates a straightforward loss of £650 million in 1991, whereas BT, using exactly the same figures but allowing for a return on capital employed of 20 per cent, calculates its loss as £1.85 billion! (OFTEL 1992b, p.9; BT 1992, p.10).

BT has increasingly attacked OFTEL's price cap regulation as being obsolete and inflexible: it has pointed out that its nearest rival, MCL, has in some markets gained a share of 50 per cent (eg. in the City of London) so price caps have become redundant as competition grows. Moreover, the company has demanded more flexibility to de-average and unbundle prices and services which are in the regulated baskets, and introduce special discount-packages for certain users (BT 1991, pp.20/21).

After a public outcry in 1991 about BT's excessive profits (£3 billion), high rate of return (over 21 per cent) and the chairman's immoderate income (£0.5 million) OFTEL decided to increase the price cap to RPI-7.5 and to tighten control over BT's accounts and its investment plans. BT's profits are both in absolute and in relative figures higher than those of its main competitors:

Figure 7.4.: **The Profitability of the Four Largest Operators**
(Figures in Deutsche Marks for 1991, except for France Télécom for 1990)



(Welt am Sonntag, 25 October 1992)

As regards BT's accounts, the Director General decided that the accounts of BT's businesses should be separated radically, so that the several parts of the company would deal with each other through a contract, the terms of which would be published. In this way the watchdog would have a clearer view of the 'fairness' of BT's prices (OFTEL News August 1992, pp.1/2). It was also felt necessary to increase control over the company's investment plans as it seemed to have reduced or postponed some of its modernisation plans for the local networks[21] (Hills 1992) whilst these plans were nevertheless used for calculating a 'reasonable' rate of return. This 'reasonable' rate of return for BT is by the way

[21] This is not uncommon to de-regulated, or liberalised PTOs in developed countries: some US RBOCs have been de-investing in their networks since the mid 1980s. The UK (BT) modernisation investment per main line was already three or four times lower than for the USA, France or Germany in 1980. By 1989 BT's modernisation investments were considerably higher, but still quite low compared to Germany, Japan and Canada (Bolter 1992). In December 1992 BT stepped up its anti-OFTEL campaign arguing that the watch-dog body had assumed powers (eg. interference in the company's investment plans) that the legislator never intended it to have. This assault conveniently comes at the same time as the government is preparing for the sale in 1993 of its remaining 22 per cent stake in BT in order to reduce the government's public sector borrowing requirement (Telecom Markets No.213, 10.12.92, p.4).

three to four times as high as the 'reasonable' rate of return for the other price-capped British utilities (Dorken 1992, p.9) and has not followed either the 'all industry' or manufacturing trend downward from their respective peaks of 1987/1988 and 1988/1989 (OFTEL 1992b). BT's huge 1991 and 1992 profits and high rate of return were partially attributable to the higher than expected rate of inflation between 1988-1991; the fact that the RPI measure reflects the overall price level and not the price increases of telecommunications equipment, and that, consequently, BT benefits from high mortgage rates, has therefore been criticised (Garnham 1990b, pp.10/11). Lynk has pointed out that the causes of BT's windfall profits are most likely to be found in the FDC methods used by BT and approved by OFTEL, to apportion joint and common costs: an issue that long occupied the minds of regulators and administrators alike under the rate of return regulation in the USA (Lynk 1992). BT profits have dropped recently as it reported a 28 per cent fall in the first-quarter pre-tax profit of 1992.

The UK regulatory framework has already been criticised by some for being too 'tight' and producing 'less competition than is now possible and desirable' so that BT still 'faces insufficient pressure to reduce its costs' (Beesley and Laidlaw 1989, p.73; Pye 1990). At the end of the 1980s BT's telephone revenues accounted for 98.88 per cent of the public telephone market; these BT revenues were 73.95 per cent of the whole UK telecommunications sector (Beesley and Laidlaw 1989, p.14). The British government nevertheless expects that these figures will come down rapidly as cable telephony will take off, more PTOs will be licensed and mobile communications will gain a larger market share (OFTEL 1991a). For the moment real competition remains wishfull thinking for many a market segment as cable telephony has hardly taken off, Telepoint has flopped, PCN is still a big question mark and the 28 companies which have applied for a PTO licence will probably hurt MCL more than BT (Toker 1992; Littler and Leverick 1992). The new RPI-7.5 formula and the lowering of BT's connection charge by 40 per cent might in fact deter new entrants as their margins will decrease. Another aim of the RPI system, improving efficiency, has also hardly come true: data suggest that the incentive effects of privatisation and of price capping have not been immediate. There was indeed a trend of improvement in the growth of productivity in the 1980s by industries held in public ownership at the beginning of the decade. However, the trends observed apply equally to the industries privatised first, those privatised later and those not privatised at all. Apart from problems of measuring existing productivity[22] the most that can be said is that the price controls appear not to have been a disincentive to efficiency gains (Dorken 1992, p.13). The 'simplicity' of the RPI-X formula proved to be misleading too as not only the coverage of the regulated area has increased but also has caused the need for closer involvement by the regulator in the industry's affairs. Indeed, some of the 'detestable' problems of rate of return regulation have crept in via the back door (cost accounting, cost allocation, investment plans, cost of capital calculations etc.) (Brennan 1991). The

[22] Comparing the productivity of PTOs can be quite deceptive; distortions can arise because of differences in R&D spending, outsourcing of certain activities and population/telephone density of the area.

calculation or estimate of X encounters also difficulties as it is problematic to assess likely future productivity improvements in a regulatory environment characterised by a shortage of information concerning costs and demand. Work by Kiss has highlighted the problem of estimation and utilisation of aggregate productivity indices in this context (Kiss 1991).

7.4. Tariff Changes in France

The election of the socialist candidate, François Mitterand of the *Parti Socialiste* (Socialist Party, PS), in 1981 inaugurated a new era in the French politics of the Fifth Republic. Mitterand's programme, the *Programme Commun* was one of radical change and was the centrepiece of an uneasy alliance with the then powerful communist party, *Parti Communiste Français* (PCF). The first two years (1981-1982) of the Mauroy PS/PCF government unsuccessfully introduced nationalisation and reflation policies when other countries were following deflationary policies as a result of the second oil shock.

A trend towards a more market oriented policy had already become evident under the socialist Fabius government after the 1983 U-turn. A market oriented policy was further strengthened when in March 1986 the conservative coalition government of Gaullists and Liberal Conservatives (RPR and UDF) under the premiership of Jacques Chirac came into power[23]. In its French version of a neo-liberal programme it promised to mark a shift away from the *étatiste*, interventionist and mercantilist policy traditions[24]. But before the right-wing government could implement most of its neo-liberal policies it was defeated by the socialist party in a national legislative election. The socialists came back into power under Rocard in 1988. That same year Mitterand was re-elected for another period of 7 years. Mitterand successfully called for an end to privatisation but refrained from nationalisation (the *ni ... ni* doctrine). The habitual changes in government continued and in 1991 Rocard was replaced by Cresson who was again replaced in 1992 by Bérégovoy.

7.4.1. Changes in the Regulatory Framework: Reluctant Liberalisation

Within a general economic programme of privatisation of nationalised industries, liberalisation and

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[23] However, the socialist François Mitterand was still president (the *cohabitation* period) and had as such still considerable governmental powers: under the 1958 constitution of the Fifth Republic the directly elected president alone appoints the Prime Minister and the other members of the government and even if traditionally he/she leaves the day-to-day running of affairs to the Prime Minister, while defining the general pattern of policy, he/she can, and frequently does, intervene in a direct manner in the decision-making process.

[24] One has to see these policies in the typical French perspective however. Successive right-wing and left-wing French governments have not hesitated to implement active industrial policies. The Chirac government, in promoting a policy of privatisation between 1986 and 1988, never intended going as far as the Thatcher government in the UK.

deregulation, the Chirac government was determined to revolutionise the field of telecommunications. Impressed and put under pressure by the telecommunications reforms that had meanwhile occurred in the USA, the UK and Japan the minister for post and telecommunications, Gérard Longuet, wanted to adapt the French regulations and market structure in tune with international developments. But he and his Prime Minister, far from being Thatcherites, never intended to privatise public enterprises providing public services (Thomson 1991, p.119). As one of his first acts he removed the competence which the Fabius government had given to the DGT for directing industrial policy in the *Filière Electronique* plan (Humphreys 1990, p.10).

In 1986 an Act on the freedom of communications established, officially, the division of power between the regulation and organisation of telecommunications. It created the National Commission for Communication and Liberty (*Commission Nationale de la Communication et des Libertés*, CNCL), which would, as an independent new authority, authorise the setting up and operation of private networks, while public networks would remain the responsibility of the minister of post and telecommunications. In the Ministry of Post and Telecommunications (MPT) a Regulatory Commission was created whose function was to prepare a new law on telecommunications which had to establish rules of competition in this area. Additionally, a special Senate Commission was installed which had to study the liberalisation trends in the USA, Japan and the UK. In its report, published in 1987, it concluded that telecommunications liberalisation was very important because it would stimulate the dynamic development of the economy in general and the conquest of foreign markets and the strong growth of VAS in particular. For France the commission concluded and recommended:

- the existing telecommunications regulations hindered the economic development of this sector in general;
- the regulations generated financial distortions because the DGT had to pay certain levies to the state and via the *Filière Electronique* to other nationalised industries; the DGT budget was therefore not related to market demand;
- to be able to compete with domestic and foreign competition DGT's organisation and management should gradually acquire a more commercial culture ('*une culture d'entreprise commerciale*');
- the transformation to a more commercial public company had to be swift because of the 1992 internal market project of the EC;
- DGT's monopoly had to be changed; competition had to be introduced, especially in two markets: cellular/mobile telephony and VAS; however, the introduction of competition should not disturb DGT's tariff economics (uniform prices and public service provision);
- the whole process of changing the regulatory framework had to be implemented gradually and in a controlled manner;
- the operation of the network had to be separated from its regulation; the CNCL should apart from the regulation of broadcasting also regulate some telecommunications activities;
- on an EC level a European Telecommunications Community should be created; it would have to be a supranational regulator of European norms, type approvals and frequencies; furthermore a European telecommunications network infrastructure and a European long distance optical fibre network should be constructed (*Sénat* 1987).

So although the Senate Commission was entirely in favour of all-out liberalisation it did not mention privatisation and argued that the implementation of liberalisation policies should not proceed in all telecommunications markets immediately and too hastily. Even the separation of the regulatory bodies and operating bodies - as suggested in the 1987 EC's Green Paper - should be implemented only gradually.

The Chirac government accepted most of the conclusions and recommendations of the Commission and promised a dramatic change, drafted a pro-deregulation telecommunications law and announced that it would be enacted by the end of 1987. This law foresaw the tranformation of the status of the DGT - from early 1988 onwards renamed *France Télécom* (FT) - from that of a powerful arm of the French administration into that of a 'private' company, which, although still state-controlled, would operate with a much greater degree of commercial autonomy, rather like the French railway or electricity utilities.

In particular the Ministry for Industry pushed very firmly for liberalisation because it saw French opportunities in what it called the extraordinary potential for innovations of telecommunications liberalisation. It added that the introduction of competition was desirable in order to diversify services, bring necessary flexibility to the development of telecommunications and create lower telecommunications prices (Chamoux 1987).

In September 1987, by decree, a new legal framework for data communication networks and VANs was introduced. Under the new system any company could set up a network, using leased lines and offering communication services between third parties. Authorisation was only required for very large networks. The most important restrictions however were that the sale of voice traffic on leased lines and simple resale of traffic were forbidden. Commissions of representatives from the business world were set up to administer and advise on the implementation of these policies.

In the radio telecommunications market a separation of regulation and operating was advanced in 1986 and a year later some competition introduced: a private consortium called SFR (*Société Française de Radiotéléphone*[25]) received a license (Chamoux 1989, p.23). In practice however the Chirac government never put forward firm proposals. There were many controversies about the functioning of the new regulatory body, the CNCL. The CNCL had proved itself to be a very weak instrument of regulation and its independence from the state was highly questionable. Then there was forceful opposition from the socialist PS, the trade unions and the very powerful corps of telecommunications engineers and all of them appealed to the national mercantilist, public service and *étatiste* tradition of French politics.

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[25] SFR mainly includes: *Compagnie Générale des Eaux* (CGE), *Crédit Lyonnais*, *Télédiffusion de France* (TDF), Racal and Bell South.

DGT/FT itself wanted a combination of protection of its current and future market position and more freedom and flexibility to compete with competitors:

> "It is in the interest of the French community to keep a strong national operator. And it is our firm belief that a healthy national operator that provides 100 per cent of home and industry service coverage on an equal footing of price and delivery, cannot be maintained in the long term but has also to be supported by access to professional and value-added competitive services. [...] A more flexible method of fixing rates is badly needed in some areas, so that they are more closely related to the cost pricing structure, and give greater operational and commercial efficiency.",

and,

> "Finally, some freedom is also needed in negotiating and concluding agreements, joint ventures and alliances with partners, who offer the appropriate complementary skills as well as the right to move into the international field and take advantage of foreign opportunities." (Roulet 1988, pp.110/111).

When in 1988 the PS regained power the new PTT minister considered deregulation a fact to be integrated into French policy; he was however not willing to accelerate its pace (Chamoux 1988). The intention of the new Rocard government was to abandon the transformation of FT into a commercial company. Nevertheless some form of liberalisation went on. In April 1989 the Prévot commission published a report on behalf of the government on FT in which a complete separation of post and telecommunications was recommended. The commission also suggested the creation of a national council for telecommunications which would include the minister and representatives of the research arm and of the trade unions. The complete financial autonomy and its own legal personality were seen as essential for FT to enable it to respond to competition in France and abroad. Finally the Prévot commission did not regard privatisation as a possibility.

In December 1988 a new broadcasting regulatory authority was created (CSA, *Conseil Supérieur de l'Audiovisuel*) which took over broadcasting regulatory powers originally attributed to the CNCL. In 1990 a new bill was accepted which made a clear separation between the regulation of telecommunications and that of the audiovisual sector, attributing the former to the *Direction de la Réglementation Générale* (DRG, created in 1989) and the *Direction du Service Public* (DSP, created in 1991)[26] in the MPT and the latter to the CSA. That same year the traditional link between FT and the French state was broken and the company became a more independent operator.

FT's new regulatory framework is basically formed by several laws passed in 1990, a social contract

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[26] The DRG advises the Minister on international and national legal and political affairs and is responsible for licensing telecommunication networks and services and approving terminal equipment. It also manages public and private radio frequencies. The DSP oversees the technological, economic, financial, commercial and staffing affairs at FT (MPT 1991a).

between several unions and FT of that same year and a planning contract (*contrat de plan 1991-1994*) signed in 1991 (MPT 1991b). This framework differs considerably from the UK framework:

- France has not gone further than what was laid down in the EC Directives, thus the basic or reserved services (telephony, telex and public telephones) remain under FT as well as the network infrastructure. Competition has been introduced in cellular network services, paging, VANS, CPE and satellite communications.
- FT is forbidden to bundle services together and will be checked on cross-subsidisation between its reserved services and non-reserved services; however its accounts do not have to be completely separated and disaggregated as OFTEL has asked from BT.
- The DRG and DSP are part of the Ministry (unlike OFTEL which as a Ministerial agency has more independence).
- The assignment of the DSP is also quite different to OFTEL, which has mainly concentrated on stimulating competition. The DSP oversees the technological, economic, financial, commercial and staffing affairs at FT. It verifies that FT is fulfilling its obligations as a provider of public service as defined in the company's charter. It is also responsible for drafting the long-term contract and statement of objectives concluded between the state and the PTO. Moreover, the DSP supervises the company's personnel policy and draws up reports on international and industrial developments for the Minister.
- In spite of FT's 'independence' the planning contract sets some very detailed targets for the company not only in fields such as the quality of service and tariffs, which are quite similar to OFTEL's rules, but also in fields such as R&D (minimal 4 per cent of total revenue), general investments, network modernisation (further introduction of ISDN, digitalisation, IN and optical fibres) and social policies (improved functions classification and higher salaries for all). The planning contract sets even targets for the international activities of FT (5-10 per cent of its total investments) (Remy and Maitre 1992; Bresson 1992).
- The state is also involved in the debt repayment of FT: during the years of rapid network modernisation the French operator has built up a total debt of FFr120 billion which gradually has to be paid back to several state institutions (Poirier 1992; MPT 1991a).

FT has used its new 'independence' to expand its international presence: it participates in network consortia in countries as diverse as Argentina, Mexico, Thailand and Poland. It participates in services joint ventures such as Global European Network (GEN, with Spanish PTO Telefónica and Deutsche Bundespost Telekom), Infonet (with several European PTOs) and Transponet (Transpac subsdiary, with US West), and it also offers its X.25 Transpac service in many OECD countries as well as its ISDN (*Numéris*) and other services.

7.4.2. Changes in the Tariffs

In the early 1980s a framework of an overall tariff policy direction was developed by a Tariff Modernisation group. The main principles of this direction were:

- to reduce the distance element in tariffing;
- to reduce tariffs generally, relative to inflation;
- to increase the time element in metering;

- to introduce a greater variation in tariffs by time of day to smooth peak hour usage;
- to diversify the choice of tariffs, eg. by offering the alternative of bulk traffic services at lower tariffs (Pautrat and Hurez 1986).

A DGT policy to become a cheap telephone country caused a further fall in prices (and profits) in the second half of the 1980s. In 1987, in agreement with the EC Green Paper, a VAT of 18.6 per cent on telecommunication services was introduced. The DGT did not put a tax on tariffs but nonetheless paid the tax to the authorities. This meant that business users, claiming back the tax, in effect were getting a tariff cut. Residential users carried on paying the same price as before the VAT introduction. Due to competition via third-country-routing or call-back schmes, transatlantic tariffs were cut in 1988 and again in 1992 (-18 per cent) while that same year all other international calls decreased by 13 per cent.

In 1988 FT introduced a new accounting system based on historic costs[27]; for the allocation of charges a FDC method was introduced and the cost causation principle for the allocation of costs. Using (long run) marginal costs and average costs, cost prices were formulated for FT's management which subsequently decided on the final tariffs before they would go to the Minister and Parliament for approval (Giry 1989). However, as in the case of BT and OFTEL, details of FT's internal cost accounting system and especially its cost allocation methodology are not made publicly available (Lewin, Rogerson and Johnson 1989, p.90).

Since 1990 FT's tariffs have to fit in with the new price-cap system. Similar to OFTEL, the French regulators also use the RPI-X price cap model, only this time the basket includes all basic PSTN tariffs (call charges, rentals and connection charge). The 'X' figure is 3 per cent per year, so that by 1994 the prices of the regulated services will have fallen by 12 per cent (Pautrat and Perrot 1992). At the same time FT, supported by its regulators, has started a rebalancing programme: following the conventional belief of 'cost based tariffs' and the 'commercial need' to end cross-subsidisations, FT has started to increase rental charges and local calls and to decrease long distance and international calls (Pautrat and Perrot 1991). Additionally FT will:

- end the differences in rental charges and gradually introduce one uniform rental charge;
- the introduction of sliding zones or extended local call zones (*zones locales élargies*) by 1994;
- reduce the distance element in the tariff structures; and,
- diversify the tariff options (special discounts for larger users) (Pautrat and Perrot 1992)[28].

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[27] Probably the company anticipated future competition; another reason could be to give a boost to its profitability which would be beneficial to the issuing of bonds (in June 1991 FT issued bonds FFr2.5 billion worth).

[28] France Télécom has, for instance, recently launched its *Offre sûr Mesure* (Made to Measure) scheme of customised tariffs for special service offerings.

While the - rather late - introduction of extended call zones could partially redress an imbalance between rural and urban areas it is as yet too early to assess the effects of rebalancing for the median residential bill and - more important - for certain poorer areas and classes. As in the UK there is no notion of 'affordability' in the planning contract as regards the tariff policy; the contract nevertheless demands that FT will 'facilitate' the access to the PSTN for everybody. Special discount schemes for low users do not exist and are not required.

7.5. Tariff Changes in Germany

When in 1982 the liberal FDP traded its social democratic coalition partner (the SPD) in for the christian-democrats (CDU and CSU) the new government introduced a more conservative course of tax cuts and considerable, federal budget cuts. Nevertheless, the room for manoeuvre of the conservative-liberal coalition government, which won subsequent elections in 1983, 1987 and 1991, was often limited because of some SPD ruled states (*Länder*) and the strong consensus on the social market economy (*soziale Marktwirtschaft*). A strong corporatist political culture and constitution-anchored state responsibilities for public utilities, all made it more difficult to introduce radical pro-liberalisation policies.

Nevertheless, in spite of fierce opposition, the new German government introduced in July 1989 new legislation which formed the first step in transforming the telecommunications sector.

7.5.1. Changes in the Regulatory Framework: Liberalisation in Phases and the New Länder

Already in 1964 a request for a DBP reform was put forward by the Deutsche Bundestag. The West German parliament asked for an investigation into the functioning of the DBP and for proposals for organisational reform so that 'the DBP could meet its tasks in the future in an optimal way and without a loss' (BMPT 1989, pp.10/11). At the beginning of the 1970s again a discussion started on an organisational reform but a proposed law did not get a majority because of disagreements between the liberal and social-democratic coalition partners.

The conservative-liberal governement of Helmut Kohl already declared its willingness to reform the DBP in policy statements in 1982 and 1983 (Grande 1986, p.2). In 1985 an expert committee, the Government Commission for Telecommunications was formed - the Witte Commission. This commission, composed of representatives from trade and industry, trade unions, science and politics, worked more than two years analysing the telecommunciations sector in the FRG and relating it to international trends. The Commission's mandate was focussed on preparing recommendations for a reform of the regulatory policy

structure of the German telecommunications sector and an organisational, economic and legal adaption of the DBP to the market requirements necessary to ensure that it could fulfill its tasks efficiently. The reforms however whould have to remain within the confines of articles 73 and 87 of the German Constitution.

The final report was presented to the Federal Chancellor in September 1987 (Witte Commission 1988). In general the report stressed the urgent need for action in the FRG to avoid the country losing its ability to catch up with new technical developments and foregoing the resultant growth potential of the economy as a whole. Of the 47 recommendations, 29 referred to the new telecommunications regulatory structure. The main elements of this new regulatory structure, proposed by the Witte Commission, were:

- the establishment and operations of the telecommunications network and the telephone service (real time voice telephony) should for reasons of infrastructural requirements be left under the DBP's monopoly; all other services as well as all terminal equipment should be subject to free competition in which the DBP should also participate according to its own enterpreneurial interests;
- there would still be the possibility of assigning the provision of so-called 'mandatory' services to the DBP to ensure that certain infrastructural requirements would be fulfilled;
- the report recommended the introduction of competition in CPE and in fringe areas of technical systems to expand the cable-based network infrastructure in line with demand (especially satellite networks and closed cable networks for intra-company use).

The other recommendations dealt with the structural consequences the reform should have for the DBP itself:

- organisational separation of regulatory and entrepreneurial tasks on the one hand and of posts and telecommunications on the other; and,
- the introduction of up-to-date management methods in the DBP.

In its reaction to the Commission's proposals and in its proposed legislation, the federal government recognised the need for a regulatory restructuring of the telecommunications market in the FRG because of:

- the hindrances the old regulatory framework caused to the technical and commercial development opportunities of new, fast growing and innovative telecommunications markets (services and equipment);
- the growing international competition in telecommunications following the introduction of regulatory reform in other major markets; and,
- the requirements of the EC Law and especially the guidelines of the Green Paper as well as the principles of the EEC Treaty in the planned restructuring of the telecommunications market (BMPT 1988).

The government's subsequent reaction and proposals were much less radical. Its two guiding principles

were first, the advancement of more competition; this would offer private and business users a greater variety and a more demand-oriented quality of services and terminal equipment as well create the prerequisites for lower prices and costs. Second, the infrastructural responsibilities of the DBP should be maintained, i.e. the creation of equal opportunities of use and the task of expanding and developing telecommunication systems in line with future infrastructural requirements. Unlike the UK government the German federal government rejected network competition: the network monopoly would be maintained for reasons of costs and efficiency, the prevention of 'cream-skimming', industrial and regional policy concerns and the public service provision. Only in satellite and mobile radio communications private operators could be licensed to build their own networks (BMPT 1988, pp.39/40).

As an essential first step the regulatory and entrepreneurial tasks of the DBP were to be separated: the regulatory and controlling tasks would remain with the federal Minister of Posts and Telecommunications (the regulator) whilst the entrepreneurial activities in the telecommunications sector would be undertaken by *DBP Telekom*. The postal and banking services of the former DBP would to to the *DBP Postdienst* and *Postbank* respectively. DBP Telekom's tariffs, accounting principles, quality of service and the degree of unbundling of its basic services would be strictly regulated (BMPT 1991a).

What influenced the telecommunications reform considerably and what ran contrary to the principle of cost based tariffs was the decision not to change article 73 of the Constitution (unity of the DBP): thus the possibility of financial compensation or cross-subsidisation among the three enterprises would be maintained. Equally, the use of financial surpluses of the monopoly services to compensate for the additional costs or revenue losses resulting from Telekom's infrastructural obligations in the competitive areas would be allowed. Nevertheless, special accounting guidelines and annual control methods would be developed to ensure 'fair' conditions of competition between DBP Telekom and its future competitors; the regulatory body could intervene if the opportunities of other competitors were impaired by the transfer of surpluses from Telekom's monopoly sector without any justifiable reason (being public interest obligations).

Discussions in parliament led to a consolidation of social aspects in the new DBP (especially related to its employees). Outside the parliamentary debates there was a special meeting between the federal government and the DBP union (Deutsche Postgewerkschaft) where agreements were made on labour issues and the instalment of a council with certain decision rights on labour issues. The new legislation and policy was approved by parliament in May 1989 and came into force January 1990.

In December 1989 a consortium led by the West German engineering group Mannesmann, called Mannesmann Mobilfunk, won the 15 year licence to run a competing GSM network (called D2). One

year later satellite service operators[29] were licensed and again two years later the Minister announced the tendering of a further licence for PCN/DCS 1800 (E1) (BMPT 1992a)[30]. The DBP Telekom has - unlike BT - not been excluded from new emerging mobile markets; on the contrary and unlike OFTEL's asymmetric regulation, the German operator is automatically entitled to mobile licences. Following the EC Commission's Green Paper on Satellites, German satellite communication has been radically liberalised.

The fall of the Berlin Wall and the East German state in 1989 incited the DBP to advance an extensive investment plan in the so-called *neue Bundesländer* (new states) of more than DM60 billion between 1990 and 1997 which makes the German operator the single largest investor in the former German Democratic Republic (GDR)[31]. The underdevelopment of telecommunications in the former GDR prompted the government and the DBP Telekom to embark on an extensive programme to rebuild the obsolete network. These investments have subsequently plunged the DBP Telekom into the red for the last financial year and has prompted the German government, itself pressed for capital, to press for a second reform of the DBP (*Postreform Teil II*, a second postal reform). A privatised DBP Telekom would enable the company to raise its own money for the required investments for former Eastern Germany, would turn the current civil servant structure and culture into that of a much more flexible and commercial company and finally, it would permit the company to unfold international activities more freely[32]. However, a change of the German constitution requires a two third majority in both chambers of the parliament, which means that cooperation of the opposition (SPD and the unions) will be needed.

The aim of privatisation is to raise DM20 billion from floating just under half of the company. However, DBP Telekom's 1991 profits plunged to a loss of DM124 million following a profit of DM1.25 billion in 1990. These results are complicated by a number of extraordinary items, in particular an increased tax charge of DM237 million, increased transfers to the federal reserves, transfer of 'equalisation payments' to cover the losses in mail and state banking services, and the on-cost of modernising the former East

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[29] Satellite licencees cannot provide interactive voice connections. One exception, however, is that licence holders are authorised, by virtue of a special licence, to offer telephone service, ie. the switching of voice for third parties, for traffic in and with the new federal states until 1997.

[30] Two consortia have applied for a licence: E-Plus Mobile (Thyssen AG, VEBA AG, Vodaphone Group Plc, BellSouth and others) and E-Star (Bayerische Motorenwerke AG, MAN AG, GTE Mobile Communications, US West and others).

[31] Not surprisingly and in accordance with the continuing close ties between European operators and European manufacturers, Bosch and DeTeWe were awarded the main contracts to supply DBP Telekom with the required equipment for developing the networks in the new *Länder* (Handelsblatt 9 October 1992).

[32] Article 87 of the German Constitution impedes international activities of the DBP heavily and explicitly forbids the DBP becoming a private company.

Germany where the DBP Telekom invested DM5.5 billion and installed over half a million new connections.

7.5.2. Changes in the Tariffs

In the new regulatory framework the *Bundesministerium für Post und Telekommunikation* (BMPT) monitors DBP Telekom's tariffs to prevent Telekom from taking undue advantage of its monopoly. A Council of Infrastructure (*Infrastrukturrat*) participates in decision-making processes concerning the definition of mandatory services, monopoly tariffs and other decisions of infrastructural relevance. This Council is a rather political element in the regulatory framework since it consists of representatives of the federal Parliament and federal Council (*Bundestag und Bundesrat*). Tariffs should be founded on terms of overall economic efficiency and Telekom would be stimulated to work at the lowest costs possible; the regulator approves the tariffs for the monopoly services and has the authority to oppose the tariffs of the mandatory services.

The German PTT cut its intercontinental telephone charges by 25 per cent between 1988 and 1991 as part of a major reform of tariffs. It also tried to increase the volume tariff component of leased lines in the mid 1980s as it was faced with a potential diminution of revenue when digitisation of transmission proceeded. This touched a very sensitive spot of business users who had already complained about the lack of 'cheap' private circuits (see sections 5.4. and 6.2. explaining the traditional hostility of the German PTT against private circuits). After much opposition from larger data-communications users the DBP Telekom backed down and decreased the volume-sensitive component of its leased line tariffs (Gottschalk 1991, p.156). InApril 1992 the BMPT decided to lower the DBP Telekom's leased lines: within three years they have to be reduced to an international average level (the German PTT had originally suggested increasing leased line tariffs by 6-7 per cent annually in order to stimulate the use of the public switched network via which it would generate more profit) (BMPT 1992b). It is the policy of the regulator to decrease most tariffs to bring them into line with other countries' tariffs. No price-cap system has been suggested, although the BMPT has expressed the need for a tariff rebalancing to bring tariffs in line with costs; this will mean that gradually local calls will become dearer and long distance calls cheaper (BMPT 1991b). Furthermore, charges for long distance calls were decreased by up to a third and charges for local calls, coin-box telephones and directory enquiries were gradually increased (Fintech 1 - Telecom Markets, 106/9, 02.06.88). Transatlantic calls have again been cut by one third in 1992 because of increased competition from call-back schemes (Financial Times 17.02.92). While its connection charge is among the lowest in Europe and local calls are cheap compared to the UK, rental charges and most business charges still rank among the highest in the major European countries. PSTN charges in the new *Länder* were decreased in July 1991 in order to harmonise tariffs in the whole country; some tariffs in the Western part of the country were therefore increased.

A major tariff reform, called 'Tariff 90', was already announced in 1990 and was aimed at adapting the telephone tariffs gradually to the 'actual cost structures'; in doing so DBP Telekom hoped to ensure its medium-term future income since there was a real danger that in an ISDN environment telephone services could not be separated from other services and others could provide the service cheaper than the DBP Telekom (Tenzer 1989, pp.38/39). The main aim of a new tariff policy will be ensuring 'fair competition' by formulating special conditions for DBP Telekom's accounting methods and tariff policy. Similar to the EC's guidelines, transparency, accounting separation and non-discrimination are the central principles. The current cost accounting methodology will gradually be changed so that in 1993 a new system will be fully introduced. The current methodology is based on FDC and a cost allocation method based on pro rata use (physical) of resources. The new system, developed since 1983 and called DELKOS (*Dezentrale Leistungs- und Kostenrechnung*), will obtain results for the regional and local organisational units for all the accounting requirements of a modern cost account. Cost accounting will therefore be more decentralised, less aggregated and more atomised. However, DBP Telekom acknowledges that in the DELKOS system assessment problems of cost allocation of joint and common costs remain (Strohbach 1989).

7.6. Tariff Changes in the Netherlands

The shift towards neo-liberal policies in the 1980s was less radical in the Netherlands than in the UK and the USA. Subsequent centre-right coalition governments of the dominant christian-democratic party (*Christelijk Democratisch Appèl*, CDA) and the much smaller liberal party (*Volkspartij voor Vrijheid en Democratie*, VVD) only gradually introduced policies to 'roll the state back' and curb general state expenditure. Unlike France and the UK, the Dutch state had never nationalised large industries nor had it introduced extensive planning policies. Most neo-liberal efforts therefore concentrated on the costs of the welfare state which had increased rapidly in the second half of the 1970s and early 1980s. Similar to other governments, new neo-liberal policies were mixed with increasing concerns about the country's competitiveness in what was regarded as an increasingly post-industrial or information based international economy. Reports published in the late 1970s and early 1980s stressed the importance of telecommunication and telematics technologies and spurred the Dutch government to stimulate these new growth sectors (*Adviesgroep Micro-electronica* 1979; *Adviescommissie inzake het Industriebeleid* 1981). Special programmes have been set up to promote the country as a 'gateway to Europe', not only for physical transport and distribution but also as main hub for international telecommunication services.

The Dutch state and industry (including the PTT) cooperate on many levels and in many fora to

implement such policies[33]. The Netherlands has been quite successful in becoming an European distribution centre for many international transport and distribution activities, even though many of the products concerned do not pass Dutch territory physically. Momentarily 40 per cent of all European Distribution Centres of the large TNCs (Fortune top-500) are based in the Netherlands (Commissie Molenaar 1992, p.6). The continuation of the country's open economy and dependence on some large TNCs explains its low tariffs in the past and - in the face of increasing competition via foreign carriers - the pressure to lower particularly international tariffs further.

7.6.1. Changing the Regulatory Framework: Slow Liberalisation

Similar to its European counterparts most of the history of the Dutch PTT has been influenced by its continuous struggle to increase its independence from the traditional administrative structures and political and parliamentary control and interference. Although it was able to set up its own commercial accounting system in 1905 and received its status as a separate state company already in 1915, the tensions between political control, administrative procedures and civil service on the one hand and the running of a business on the other continued. The PTT's aspiration to control its own budgets and have its own employees (not civil servants) continued to meet with stiff opposition from the Dutch parliament, the Home Ministry and the Treasury throughout the 1950s, 1960s and 1970s (Hogesteeger 1989). The perceived importance of a modern telecommunications infrastructure and the shift towards liberalisation in the USA and UK prompted the van Agt government (CDA & VVD) in 1981 to commission a study on the future of telecommunications technology and the PTT. One year later the Swarttouw Commission, which consulted both industry and the PTT, published its report which stated the impossibility of developing a separate and independent Dutch telecommunications policy and included the following recommendations:

- the PTT's telecommunications infrastructure monopoly should remain intact;
- the markets for terminal equipment and value added services should be liberalised, with equal opportunities for the PTT;
- the PTT should become an independent organisation, keeping government at arm's length;
- direct political influence on the setting of PTT tariffs should be diminished (Commissie Swarttouw 1982).

A reply from the government did not come until 1984 since the social-democrats (PvdA) had become a new coalition partner in a second van Agt government (CDA & PvdA) between 1981 and 1982 and opposed liberalisation and greater independence of the PTT. A new centre-right government led by Ruud

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[33] A good example is the Municipal Harbour Company of Rotterdam (*Gemeentelijk Havenbedrijf Rotterdam*) which as a semi-state organisation, operating the largest harbour in the world, tries to make the harbour a crucial node in VANS related to transport logistics.

Lubbers published a White Paper in 1984 which broadly followed the Swarttouw report but left traditional terminal equipment, public telephony, public telex and public data transmission services to the exclusive domain of the PTT; leased lines are not to be used to offer basic services to third parties and simple resale of excess capacity is equally forbidden. The extensive cable TV systems, which had been developed throughout the 1970s, were not allowed to provide services in competition with the basic services provided by the PTT under an universal service obligation (Hins and Hugenholtz 1988, pp.26/27). In fact the government opted for the gradual integration of all wire-based electronic information networks into one optical fibre, interactive broadband network; a scenario which was documented in another report by the Zegveld Commission published in 1986 (Commissie Zegveld 1986).

A separate study which was commissioned to advise on the future status of the PTT reported one year earlier, recommended separate regulation from operation and suggested the establishment of an independent PTT corporation, taking the legal form of a limited liability company. The annual PTT contributions to the Treasury could be replaced by introducing VAT on telecommunications services, corporate taxes and dividend payments to the state (the state would be the sole shareholder of the PTT Ltd.) (Commissie Steenbergen 1985). Supported by industry and user organisations, and opposed by the trade unions and a consumer organisation closely linked to a union, the government agreed to transform the PTT into a limited liability company as of January 1, 1989. An independent, but government owned holding company, PTT Ltd., would be divided into separate post and telecommunications departments. The 1985 Steenbergen Commission had also proposed the splitting of the telecommunications department into a public utility and a commercially oriented company to increase the transparency of the two functions and monitor eventual cross-subsidies. This was particularly opposed by the PTT as it argued that both functions were often physically integrated in one switch and were difficult to segregate. To the relief of the PTT the centre-right government decided not to divest the PTT Telecom into two separate companies for mercantilistic and industrial policy reasons, arguing that the PTT Telecom in order to compete internationally, would need a strong and direct link with its home base (Koninklijke PTT Nederland 1992a, p.45); a decision on the introduction of VAT was postponed indefinetely (Slaa 1987, p.145).

The new set of telecommunications bills was introduced in parliament in 1987 and came into force two years later when the PTT was restructured as the Royal PTT Netherlands Ltd (*Koninklijke PTT Nederland NV*) which formed the holding company of the PTT Post BV and PTT Telecom BV (both private companies). A new institutional framework for advice, consultation and monitoring was created consisting of the independent Advisory Council for Post and Telecommunications (*Raad van Advies inzake Post en Telecommunicatie*, RAPT), the Consultative Body PTT, in which the major stakeholders of the PTT administration and other interest groups involved in telecommunications policy were represented and the Directorate-General Post and Telecommunications (*Hoofddirectie voor Telecommunicatie en Post*, HDTP) of the Ministry for Transport and Public Works as a supervisory and regulatory body. The latter has been

criticised for being too close (or captured) by the PTT, partially because of an information asymmetry between HDTP and the PTT, partially because of a contradictory mix of regulatory aims (stimulating third party access to the networks, to boost the company's international position and to produce high and stabile profits for the Treasury through dividends and taxes) and partially because of a lack of pro-competition (anti-cartel) policies in the Netherlands (Hulsink 1992; Slaa 1992).

The 1989 laws however proved to constitute only a first phase of liberalisation. The planned integration of CATV and the local PTT Telecom's networks has been abandoned as the two parties could not agree on the integration conditions and the Minister seems to have moved towards allowing limited competition between both. Some CATV operators are anxious to offer interactive and data-communications services and want to integrate and interconnect their networks on a regional and national level (most CATV networks are local and small and are operated by municipalities or local or regional public utility companies). Since many a CATV network has been depreciated new investments have to be made and some operators might chose to upgrade their distributive topologies with interactive systems (TNO 1991). The PTT Telecom fears that a forthcoming review of the 1989 telecommunication laws will 'liberate' cable which, having a high penetration (more than 85 per cent of all Dutch TV households), could lead to creamskimming activities, particularly in the market for business data-communications. CATV operators (which are still very much divided at the moment) after a second liberalisation wave, spurred by the EC Commission's 1992 review, could possibly link up with other new entrants in the national and international markets in order to extend the by-pass of the PTT Telecom's networks. The PTT Telecom could then be facing a double 'squeeze', that is increased competition on its home market and its international market[34] (the latter is of great importance for the Dutch PTO, see Lijnkamp 1992).

In the mobile market the PTT Telecom still has a confortable position as it has exclusive licences for a mobile carphone network (partially also used for hand-mobile) and a CT/2 network. However by 1993 competition will be introduced by the licensing of two GSM operators, one of them being the PTT Telecom and the other probably a consortium of Dutch banks (ABN Amro) Britain's Cable & Wireless, US Pacific Telesis and Dutch electricity distributors.

The PTT Telecom has continued its internal reorganisation which was started already in the second half of the 1970s and caused a gradual shift from the more traditional civil servant and electric engineering culture to a much more commercial, corporate culture (Slaa 1987, pp.91-93). Its European gateway policy (low tariffs and quality services) has more recently been complemented with increasing

[34] PTT Telecom is facing competition from AT&T and BT who regard the Netherlands as an attractive target due to the presence of numerous TNCs and the relatively small size of the PTT Telecom; although the Netherlands is Europe's number four supplier of international telecommunications services in terms of turnover, each of the three largest EC suppliers (BT, DBP Telekom and FT) has a turnover of five to seven times larger. Moreover their domestic markets are far bigger than PTT Telecom's.

international activities: a network of foreign offices and contracts with foreign operators have been set up, the company participates in Infonet (international VANS operator), Transponet (subsidiary of Eucom, a joint venture of FT and DBP Telekom), Vesatel (VSAT services together with Swedish Telecom International, a subsidiary of Swedish Televerket), Global Fon (providing VPNs with UK C&W and Canadian Teleglobe), Unisource (joint venture with Televerket offering international services) and it participates with AT&T and DBP Telekom in a programme to modernise the Ukrainian telecommunications network.

7.6.2. Restructuring The Tariffs

Compared with France, the UK and Germany, Dutch tariffs have generally remained low throughout the 1980s (see Chapter VI)[35]. While between 1980 and 1990 the retail price index in the Netherlands rose by 25 per cent the monthly PSTN rental and PSTN connection fee changed hardly at all. For inland calls the price per pulse was raised in 1983 and a time-based local charge was introduced in 1987, with one pulse per call being replaced by one pulse per five minutes or one pulse per ten minutes at off-peak hours. International calls have decreased in these ten years by up to 60 per cent (PTT Telecom 1991, pp.14-16). In the period 1986-1991 the tariffs for reserved services developed below the retail price index; in the case of a so-called small-consumer basket the prices were 7.8 per cent and in case of all reserved services 8.5 per cent below (Koninklijke PTT Nederland 1992b, p.57).

The tariffs which average users pay for the services provided under the terms of the telecommunications concessions (the basic services) have been linked to and limited by the RPI. Between 1989 and 1994 the overall price of the basket of basic services may not increase by more than the rate of inflation, thus the price-cap effectively is RPI-0. Within the basket of price-capped services the PTT Telecom has the freedom to change its prices for individual services by varying percentages within the limits set by the tariff control system and on the basis of market considerations. PTT Telecom has argued that it wants to introduce cost-based tariffs but feels unfairly limited in doing this by legal conditions to provide a universal service and averaged prices (uniform tariffs). According to the PTT tariff rebalancing is deemed necessary: local call rates and rentals will have to be increased as international tariffs will decrease further and special discount packages for large consumers are introduced. Early 1992 the PTT Telecom indeed raised its local charges well above the rate of inflation (although within the price-cap regulation). However, international comparisons show that the Netherlands remains one of the cheapest telephone countries in Europe (Koninklijke PTT Nederland 1992c, p.57). Nevertheless the Dutch PTO is eager to

[35] Contrary to what one would expect on the basis of the scale economies argument, some small developed countries, such as the Netherlands, have lower tariffs than large countries; see also the OECD study on performance indicators of PTOs which demonstrates that economies of scale are not necessarily the only or most powerful variable explaining the performance of PTOs (OECD 1990).

restructure its tariffs by further decreasing the distance components, increasing fixed charges (connection and rental) and unbundling the service (eg. introducing charges for call-set-up). According to the operator this restructuring would only be possible if the current price-cap mechanism were to be reformed after an evaluation which takes place at the end of 1992 (Koninklijke PTT Nederland 1992c, p.59). The Dutch government meanwhile seems to be more interested in increasing the company's revenues and profits than decreasing the regulated tariffs (RAPT 1991, p.13).

Unlike BT, PTT Telecom did not change its current cost accounting system to historic cost accounting at the time of its pseudo-privatisation. In fact the company decided that in order to guarantee its normal continuation it would continue to use its traditional current cost accounting system. The transactions between the several divisions of the company, particularly between the exclusive services and the competitive services, had however to be changed in compliance with directives laid down in the 1989 telecommunication law. Transactions between these divisions are in 'real values', mimicing a transaction between two independent companies (Koninklijke PTT Nederland 1992b, p.85). The problem - which is also apparent in the other countries - is that there is no real market within the dominant PTO, that is between its several divisions. The issue of (hidden) cross-subsidies and the allocation of joint or common costs looms large here. The Dutch regulator however has never initiated large-scale independent research into the specific problems of cost allocation and accounting separation as OFTEL has done, although this might change as network competition is introduced after the forthcoming review of the 1989 laws.

7.7. Conclusion

Germany, France, the Netherlands and the UK have all embarked on some form of liberalisation of their telecommunications sector in the last decade. Particularly the UK has gone far down the road of liberalisation and has now built up 10 years of experience. Many of the early promises of pro-competition and deregulation policies have up to now not materialised: deregulation turned out to be highly political, contentious and complex re-regulation, not all tariffs have come down (in fact connection charges, local call charges and rentals have gone up) and (in the UK case) it turned out that it is very difficult to make competition stick in all parts of the network. The improvements liberalisation claims to have generated are sometimes caused by stricter re-regulation rather than 'free markets': for instance the expansion of BT's basic service package with free itemised billing and call barring. Other improvements in performance were sometimes caused by network modernisation programmes introduced before liberalisation started. The sharp decline in PTT employment, the reductions of their R&D budgets and the further weakening of the position of European manufacturers seem to underline further the negative aspects of liberalisation. Nevertheless, there are also some positive sides to the new policies: new companies have entered the telecommunications market, offering new, improved and taylor-made services for (mainly) business users, the tariffs mostly used by business have come down (long-distance,

international, leased lines and public data networks) and new national and international services have been introduced. In the middle of this turmoil and contradictory developments it is probably (still) too early to make an overall assesment.

Particularly the tariff front seems to be in a flux, if not chaos. Tariffs on international routes where some form of competition is working are reduced on a piece-meal and ad-hoc basis. As competition spreads via official liberalisation on both sides (simple resale) or via call-back schemes or third-country routing, other international tariffs are under pressure too. At the same time political pressure and/or competition is driving private circuit prices down; or, alternatively, if the PTO wants to shift private circuit users to its public network, the public switched data network prices or the Intelligent Network/Virtual Private Network prices are decreased more. This stimulates operators to shift increasingly costs to those network parts and those groups which are not yet exposed to competition (particularly the local loop and residential customers and small businesses). This development is closely related to the 'splitting' of the network in political and accounting terms. Contrary to Vail's philosophy and the Fordist TRM, the elimination or reduction of international and long-distance contributions to the local loop will cause local tariffs to rise. This 'splitting' or 'unbundling' is supported by allegedly 'objective' cost accounting, cost allocation and accounting separation methodologies. Further elements of a restructuring of tariffs in a Post Fordist environment are (the pressure to) the de-averaging of costs, the flexibilisation of tariffs (special tariff packages for special customers)

The speed with which these developments occur differs widely among the four European countries. Equally, the concrete levels of tariffs (as well as the services on offer) continue to show great variations because of differences in networks, established traditions, practices and interests and the continuing, different politico-economic constellations of the four countries. This makes clear that the concrete tariff development and the underlying cost accounting and cost allocation methodologies are mainly determined by the wider political environment in general and the strategies of the regulator and operator in particular.

CHAPTER VIII

SUMMARY AND OUTLOOK: TOWARDS A NEW TELECOMMUNICATION REGULATION MODE AND A NEW TARIFF REGIME?

The general theme of this research has been the influence of national and international politico-economic factors on the evolution of telecommunications tariffs. Its main argument is that in the past, as in the present, tariffs have been heavily influenced by these politico-economic factors, not just because of the administrative and public character of the Public Telecommunications Operator, nor just because of the monopolistic market structure, but mostly because there is no 'objective' way to determine costs and link them to a tariff for a certain telecommunications service. In other words the influence of politico-economic factors does not 'scratch' the surface after accountants and economists have done their 'neutral' work, but these factors go as 'deep' as accounting methodologies and ideas about what constitutes a network. Tariffs are thus, inevitably, an outcome of the wider societal environment. Current efforts to abandon forms of cross-subsidies and introduce so-called cost-based or cost-oriented tariffs largely function as an ideological veil to redistribute costs, revenues and profits between user groups and operators, nationally and internationally. This political dimension of economics should not come as a surprise as Herman has pointed out: virtually all of the great theoretical advances in economics from the Physiocrats in the 18th Century France to J.M. Keynes in the 1930s were intimately tied in with very specific policy arguments and political interests (Herman 1982, p.277).

Such a sweeping, and general statement is however not specific enough to crystallise the causal processes in this wider environment. What is needed is a 'causal and analytical ordering' of these wider 'environmental' factors. We therefore used several, distinct disciplines studying national politics, economics, telecommunications technology and international relations. The latter, main object of the science of International Relations (IR), has formed the main theoretical outlook in which elements and concepts of other disciplines have been incorporated. IR matters, and is fruitful for the study of telecommunications, because by analysing the relations between states, societal formations, capital and labour, and international organisations it is better equipped to understand the paradoxical and contrary tendencies history and current affairs show us and to avoid the seductive pitfalls of concepts such as globalisation. Undoubtedly, there is internationalisation (or better: transnationalisation), (inter)dependence and integration on several levels (politics, economics, culture etc.), but that does not mean there are no counter-tendencies, that states and national politics have become totally obsolete, that there are no hegemons, or that internationalisation is itself not full of contradictions and frailties (eg. the absence of an effective world state or world monetary system). IR could explain to hot-headed believers in a 'global electronic village' that, for instance, the unevenness of national and international development and problems of international trade, rather than a 'deviation' which will be overcome by globalisation and global networks, might turn out to be just 'the other side of the same coin', to use A.G. Frank's expression.

Nevertheless the IR scope has to be extended with other disciplines as well in order to study telecommunications. A subsequent challenge is to incorporate all elements (IR, national politics, technology and economics) into one theory or model, without making the model so encompassing that it tries to explain everything but ends up explaining nothing by merely summing up facts and figures. The French 'regulationists' have tried to create a meaningful model, or theory, which enables us to study all these interrelated elements in a historical perspective. We applied their model to the telecommunications sector and constructed the concept which lead the rest of the research: the Telecommunications Regulation Mode (TRM). The TRM was to be studied in a logical fashion (the logical working of the model) as well as in a historical fashion, that is, how did the model historically develop. Who was fighting for its introduction and who opposed? And, most important, how did the concrete struggles nationally and internationally lead to specific variations in the model? Chapter II has thus consequently demonstrated the close connections between finance capital and industrial capital in Germany, the typical British distance or hostility between these two fractions, the statist tradition of Colbertism in France and the strength of trade and finance capital in the Netherlands. The absence of a strong and modern state and a Roman law tradition are as important for understanding the British telecommunications regulation policies as the idiosynchrasies of Thatcherism in the 1980s.

We have also given many examples of the entanglements of the national and the international level, and politics, technology and economics. For instance, the post-war period - until the 1970s - entailed the introduction and diffusion of Fordist accumulation and regulation modes in Europe and Japan, via the targetted policies of the new world hegemon, the USA, as well as increased foreign direct investments by US TNCs. Within this internationally dominant Fordist Telecommunications Regulation Mode, every country developed its own form of Fordism according to its own historically constituted political, economic and social orders, structures and power relations. Equally, the internationalisation of domestic telecommunications policies by the USA in the 1980s can be understood as the specific outcome of a politico-economic struggle within the hegemonic societal formation which was transforming towards a neo- or post-Fordist accumulation and regulation mode. These new social and regulatory innovations were subsequently introduced in Europe, via actors such as large users (TNCs, VANS providers and computer companies such as IBM) and neo-liberal politicians as well as structurally generated by the emergence of a new accumulation regime. The 1980s changes in telecommunications policies are thus the outcome of the general introduction of post-Fordist production processes, coinciding with a shift away from allegedly failed European Keynesian intervention policies to policies of 'rolling the state back'. But again, these developments were mediated and formed via the specific power relations and traditions in each country. Whereas the UK embarked on radical liberalisation policies and a subsequent 'sale of the family silver' (flotation of state industries such as British Gas and BT), France and Germany only very gradually and reluctantly relaxed the close ties between their telecommunications industry and the state (Duch 1991).

The Fordist telecommunications regulation mode (TRM) was built on some correspondence between the technologies of the PSTN network, the state-administrative form of the operator (PTT), and the consumption of a (gradually) mass-produced, highly standardised and basic telephone service[1]. As we saw in Chapter III, this changed with the shift towards post-Fordism which required more irregular, flexible telecommunications traffic, more (seamless) international, intelligent, value added and data communications. This post-Fordist TRM needed a much more flexible and specialised ('tailor-made') service provision which, in Europe, the traditional PTOs were often unable to provide. The increasing internationalisation[2] of production processes required the same high quality service conditions also abroad: 'seamless' and thus highly integrated international telecommunications systems had to be developed. In terms of political struggle the pushers for change were often the same actors (large users and neo-liberal politicians) but their specific position and strength differed per country. The City in London, for instance, was much more a fervent proponent of change than finance capital in Germany which was much more integrated in the country's industrial base, and thus also its telecommunications manufacturers which feared change might erode their close ties with the German PTO.

The general evolution of tariffs reflects the changes in the production and regulation modes: highly standardised and monopolised under the Fordist TRM and much more flexible and specialised under the post-Fordist TRM. Because the shift towards a post-Fordist TRM has often taken the form of liberalisation and the introduction of competition, networks were increasingly split up between their constituent parts and treated as separate entities. This network 'splitting' was also structurally caused by new demands for specific connections, which could not be made via the existing networks or parts thereof. This 'splitting' led subsequently to a simple splitting of the network costs and thus, for instance, the allocation of the local loop costs (including the local exchange) to the rental, connection charge and local calls. Whereas in the USA, due to political struggles, long distance calls contributed to the maintenance of the local plant, this cost-sharing notion was absent in Europe. The network-splitting led thus to a potential sharp increase in local tariffs - the actual implementation of this so-called 'tariff rebalancing' policy being dependent on political forces and traditions of universal or public service notions. The gradual introduction of competition also required the unbundling of the network costs in

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[1] The Fordist Telecommunication Regulation Mode did entail some flexibility in tariffs although this was the result of 'under the table' deals for some larger companies who negotiated favourable tariffs. The effectiveness of this escape route for an increasingly defective tariff system was nevertheless limited as it could not prevent the destabilisation of the Fordist TRM.

[2] Internationalisation has proceeded rapidly: almost all major North American and some South East Asian telecommunications companies have now subsidiaries in one or more European countries. Their interest in Europe is spurred by liberalisation and the telecommunications' growth potential. Both Western and Eastern Europe have a large potential for telecommunications growth. In comparison with North America, the population of Europe is somewhat larger (7 per cent of the world population compared to North America's 5%), has the same share of the world's GDP (26 per cent), but only 30 per cent of the world's telecommunications revenues (North America: 50) (Jones 1992).

order to make the costs of providing a certain service more transparent and avoid cross-subsidies and abuse of market power of the former state-administration-PTO which under the post-Fordist TRM increasingly became a much more independent, commercial corporation. Deregulation, liberalisation and privatisation have set some of the European PTO giants 'free' to enter the markets of their former colleagues who now have partially become competitors and partially colleagues. Strategic alliances, joint ventures and consortia have been formed to follow main customers, reduce risks and capital costs, form an exclusive cartel, attain a strategic position in an international services market or gain market access.

If cost allocation methodologies are crucial for the setting of tariffs because of high joint or common costs in a telecommunications network, so are the methodologies for evaluating and depreciating the huge sunk investments equally important. The shift towards a post-Fordist TRM caused not only a shift towards more flexible, de-averaged tariff packages but also changes in the valuation and depreciation of existing and future plant. BT, for instance, responded to the specific UK telecommunications policies by introducing historic cost accounting which changed the accounted costs considerably and distorted the cost calculations made by the regulator and potential market entrants. A careful juggling with the valuation and depreciation of their assets will usually allow a company to arrive at a combination which will deter competitiors and satisfy (or fool) the regulator and shareholders. Changes in cost allocation and cost accounting thus often reflected tactics, strategies and market structures too. The newly emerging network technologies also caused problems for both operator and regulator as their valuation and depreciation was difficult to calculate in an environment in turmoil.

Again, one has to stress the continuing differences in tariffs between the four countries in spite of an overall, new post-Fordist TRM. Chapter V demonstrated the differences between national and international tariffs for the first hundred years of telecommunications. Chapter VII illustrated that these differences have continued throughout the 1980s in spite of internationalisation, liberalisation and rebalancing policies. Again, these differences generally relate to the countries' historically mediated national and international politico-economic situations. National and international positions of states, economies, regulators and PTOs differ, causing differences in policy networks, telecommunications policies and, finally, tariffs. Tariffs are an outcome of all these variables, rather than an 'objective' outcome of a sophisticated econometric calculation. Classical marginal cost pricing theories and many of its variations are impossible to apply as marginal costs are extremely low or even impossible to calculate in the new high capacity digital networks.

Making simple tariff comparisons as the European Commission and others have done many a time only scratches the surface of the real issue, which is the considerable political-economic differences between the EC member states. Equally, the EC Commission's and large users' quest for 'cost based tariffs' or 'cost related tariffs' does not addres the real problems, it merely hides them, as costs themselves are not an a-historical and objective category but a socio-political construct, serving certain interests. Large users

and their organisations have been perfectly clear about why they support 'cost based tariffs': for them it means lower tariffs (particularly long distance, international and leased lines tariffs). If however 'cost based tariffs' would entail that most of the costs incurred by the network modernisation since the 1960s (improvements particularly for data-communications) would have been allocated only to them, then their support for de-averaging and unbundling would probably never have emerged. PTOs themselves might also oppose this variant of cost-based tariffs as unaware PSTN users have not only been (co-)financing the network upgrading for the large business users, but also have been (co-)financing most of their current international ventures. Finally, a direct correspondence between costs and prices can also be detrimental for introducing new services and the unfolding of networks (externalities).

In the current transition phase to a new post-Fordist TRM PTOs, their competitors, regulators, politicians and large and small users are all faced with similar questions:

- As the PTOs, still the key players, are increasingly targetting their strategies and tactics towards a small minority of their customers (mainly large, international firms) which generate most of their profits, will they leave their residential, rural or poorer customers behind? The traditional PTOs have tried to regain some of the markets they lost to new entrants via improved marketing, tariff rebalancing, the introduction of flexible service level agreements (SLAs) and Special Tariff Packages (STPs) and investment programmes (eg. the failed ISDN and, more recently, IN/VPN). The question is how this affects universal service and how the costs and benefits of the current and future network upgradings will affect the respective user groups (and eventual shareholders). How are these customers best served: by capturing a 'fair share' of the productivity gains solely in the form of lowered prices? Arguably, customers might be at least as well served if productivity gains were (partially) reinvested in more or faster plant improvements (Robinson 1991, p.2). This could be problematic if an increasing share of investment is made abroad.
- Tariff structures tend to become unbundled and de-averaged as networks are split up and greater transparency is required. The increase of traffic insensitive costs could prompt larger lump-sum tariffs (higher connection charges and rental charges) which could be detrimental for the access to networks for socio-economically deprived groups in society. Could these groups be supported by new, special tariff packages (eg. the US Lifeline programmes) and how should these programmes be financed (via the UK Access Deficit Charge, in principle paid by all PTOs, or via the general state tax revenues)?
- How can a balance be struck between liberalisation and the stimulation of competition and national and European harmonisation? Competition and liberalisation clearly leads to a proliferation of new networks, different standards and technologies and thus incompatibilities. Obviously national and international communication would break down if it had to be based on a patchwork of incompatible networks and technologies. On the other hand however, increased flexibility for (large) users would be beneficial for technological and management innovations required for the general improvement of productivity and creation of new markets.
- If greater transparency is required in order to monitor or even prevent so-called cross-subsidisations, how will this be implemented? In Chapter III we already saw how difficult it is to determine cross-subsidisation and how much such calculations depend on basic assumptions about network economics and politics. Whilst within the traditional national framework regulators have some influence over cost allocation and pricing, their jurisdiction stops at the border. In principle the EC could take over from there but it still lacks jurisdiction if the service goes beyond the EC borders. Moreover,

> following the swing towards 'subsidiarity' it might be inclined to leave allegations of international cross-subsidisation to the respective national regulators, itself only providing some vague, general guidelines. Similar to transfer pricing by TNCs, European PTOs have indeed been accused of international cross-subsidisation: BT has been accused of cross-subsidising its global activities with income from selling reserved services in the UK (ETS 1992, p.6). Again, the issues of cross-subsidisation are very intricate: if the VANS provider Infonet offers services much cheaper than its competitors, are its shareholders (European and American PTOs) cross-subsidising or making use of scale and scope economies?

In general terms these questions can be rephrased as to how a new balance between public and private, national and international interests will be struck? As such, the current transition phase resembles transitions made in the past (eg. the nationalisation debates in the 19th century). The cyclical nature of many a telecommunication debate can however, only be acknowledged via a historical analysis based on a politico-economic analysis of societal formations in their wider international environment. Unfortunately this is less trivial than might look as most telecommunications policy research is still deprived of a comprehensive understanding of the historically mediated interactions between politico-economic actors and structures. A genetic-structural analysis would have warned academics in the past not to speak too easily of a completely 'new' 'information' or 'post-industrial' society, just as it would warn us now against using new 'buzz words' such as 'globalisation' and 'cost-based tariffs'.

Some Policy Recommendations and Issues for Further Research

In the Introduction we pointed out that a large number of people live outside the 'charmed circle' of access to advanced or sometimes even basic telecommunications services. What has been called the age of universal service (Sichel and Gies 1975) and largely coincided with the Fordist TRM, did in fact not constitute of 'universal service' to all communities. As pointed out before, high penetration levels were not reached in many a (West) European country until the late 1970s. But even then, these figures only represented a national average, thereby hiding regional and social variations and inequalities (OECD 1991b). Research has shown that 'universal service' is still a farce for some communities even in developed countries (Milne 1990). The late 1970s also witnessed a growing awareness of social issues, such as the distributive implications of public utility regulation (Gormley 1983). Paradoxically, this was also the turning point in many developed countries towards neo-liberal politics, away from the traditional concerns and interventions of the welfare state. The continued dominance of these 'free market' policies in the field of telecommunications could easily marginalise people outside the 'charmed circle' further and/or cause some within this circle to drop out (that is, drop off the network). The proposed replacement of state regulation by the 'free' market mechanism and the consequential equation (sometimes even replacement) of citizens with (by) consumers, could easily worsen this situation further (Hills 1993). The 'free market' only caters for interests in as far as they are translated into purchasing power.

The current proposals of so-called 'cost-related' rate rebalancing, which, contrary to the commonly held belief, will further discriminate against residential subscribers, subscribers in rural areas, or those who are dependend on state benefits or have a small income, should therefore be terminated. If politicians, regulators and intellectuals agree that society is or should move towards an 'information society' where (access to) information is not only a crucial element in consumption and production processes, but equally crucial for citizens for their participation in society and democracy, than these same politicians etc. should also guarantee the citizens' rights to (tele-)communicate. Politicians should criticise and discard the false, damaging and distorted concept of 'cost based tariffs', which, again, functions as a thin veil for the promotion of specific interests. Breaking away from the so-called neutral ground of micro-economic price theory they should encourage a public and well-informed debate in which all interest groups participate. In order to guarantee maximal participation and prevent information a-symmetry the weaker (often larger) groups of residential subscribers would probably need special support[3]. Only via a such a public and political debate a much more balanced decision could be made on the issue of future telecommunications in general and tariffs in particular.

Further research has to be conducted too. This thesis operationalised and analysed only some of the many variables within the subsequent Telecommunications Regulation Modes (TRMs). Particularly the influence of some social interest groups such as consumer organisations and unions remained underexposed in this thesis[4]. Equally underexposed are the structures, processes and concrete actors which have spread the subsequent TRMs on an international and national level. Finally, and most importantly, there is the still largely unanswered question whether the post Fordist TRM really constitutes a new, stabile and lasting regulation mode, or whether the current, mostly destabilising era proves to be a transitional period.

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[3] Olson has argued that consumers are less likely to be represented in the policy-making process than for instance producers as the costs of collective action rise with thenumber of interested individuals. Where interests are highly concentrated, as in the case of telecom manufacturers or large users, the benefits forming coalitions are much higer for any single shareholder; with more diffuse interests, spread over a much larger group, there is a strong incentive for shareholders to act as 'free riders' (Olson 1971). Additionally, the large users, manufacturers etc. are much better equipped to participate in 'public' and private debates on telecommunications.

[4] Within the 'regulationist' tradition Lüthje has recently tried to link the demise of the Fordist Telecommunications Regulation Mode in the USA with concrete developments in communications' unions movement (Lüthje 1993).

LIST OF ABBREVIATIONS

ABS	Alternate Billing Services
ACD	Automatic Call Distribution
ADC	Access Deficit Contribution
AFUTT	*Association Française des Utilisateurs du Téléphone et des Télécommunications*
ARP	*Anti-revolutionaire Partij*
ATM	Asynchronous Transfer Mode
BEUC	*Bureau Européenne des Unions des Consommateurs*
B-ISDN	Broadband ISDN
BMPT	*Bundesministerium für Post und Telekommunikation*
BT	British Telecom
C&C	Computers & Communication
C&W	Cable & Wireless
CAD/CAM	Computer Aided Design / Computer Aided Manufacturing
CATV	Cable Television
CCA	Current Cost Accounting
CCITT	International Consultative Committee on Telegraphy and Telephony
CCSS	Common Channel Signalling System
CDA	*Christen Democratisch Appèl*
CDU	*Christlich Demokratische Union*
CEPT	*Conférence Européenne des Administrations des Postes et des Télécommunications*
CGE	*Compagnie Générale d'Electricité*
CGP	*Commissariat Général du Plan*
CHU	*Christelijk Historische Unie*
CNCL	*Commission Nationale de la Communication et des Libertés*
CSO	Community Service Obligation
CSU	*Christlich Soziale Union*
CEC	Commission of the European Communities
CGCT	*Compagnie Générale de Constructions Téléphoniques*
CNET	*Centre Nationale d'Études des Télécommunciations*
CPE	Customer Premises Equipment
CT	Cordless Telephony
DARPA	Defense Advanced Research Projects Agency
DBP	*Deutsche Bundespost*
DBS	Direct Broadcasting Satellite
DECT	Digital European Cordless Telephony
DGT	*Direction Générale des Télécommunications*
DRP	*Deutsche Reichspost*
DTeV	*Deutsche Telekom eV*
DTI	Department of Trade and Industry
EC	European Communities
ECSC	European Coal and Steel Community
ECTUA	European Council of Telecommunications Users Associations
ECU	European Currency Unit
EDI	Electronic Data Interchange
EEC	European Economic Community
EFTPOS	Electronic File Transfer Point of Sale
EPU	European Payments Union
ESP	Enhanced Service Providers
ETCO	European Telecommunications Consultancy Organisation
ETSI	European Telecommunications Standardisation Institute
Euratom	European Community for Atomic Energy

FDC	Fully Distributed Costing
FCC	Federal Communications Commission
FCR	*Groupe France Câbles et Radio*
FDM	Frequency Division Multiplexing
FRG	Federal Republic of Germany
FT	*France Télécom*
GATS	General Agreement on Trade in Services
GATT	General Agreement on Tariffs and Trade
GDR	German Democratic Republic
GDP	Gross Domestic Product
GEC	General Electric Company
GEN	Global European Network
GNS	Global Network Services
GOS	Grade of Service
GSM	*Groupe Spécial Mobile*
HCC	Historic Cost Accounting
HDTP	*Hoofddirectie voor Telecommunicatie en Post*
HIJSM	*Hollandse IJzeren Spoorweg Maatschappij*
IBCN	Integrated Broadband Communications Network
IC	Integrated Circuit
ICC	International Chambers of Commerce
ICT	Information and Communication Technologies
IGO	International Governmental Organisation
IIC	International Institute of Communication
IMF	International Monetary Fund
IN	Intelligent Network
INGO	International Non-Governmental Organisation
INTUG	International Telecommunications Users Group
IO	International Organisation
IR	International Relations
IRC	Industrial Reorganisation Corporation
ISDN	Integrated Services Digital Network
ISO	International Standardisation Institute
IT	Information Technology
ITO	International Trade Organisation
ITU	International Telecommunication Union
JIT	Just in Time
KVP	*Katholieke Volkspartij*
LAN	Local Area Network
LEC	Local Exchange Carrie
LTT	*Lignes Télégraphiques et Téléphoniques*
MAN	Metropolitan Area Network
MC	Monopolies Commission
MCL	Mercury Communications Ltd.
MFN	Most Favoured Nation
MiTT	Minutes of Telecommunication Traffic
MMC	Mergers and Monopolies Commission
MNE	Multinational Enterprise
MP	Member of Parliament
MPT	Ministry of Post and Telecommunications
MVDS	Microwave Video Distribution System
NATO	North Atlantic Treaty Organisation
NCU	National Communications Union
N-ISDN	Narrowband ISDN
NIT	New Information Technologies
NTC	National Telephone Company

NTS	Non Traffic Sensitive (costs)
OCC	Opportunity Costs of Capital
OEEC	Organisation for European Economic Cooperation
OECD	Organisation for Economic Cooperation and Development
OFTEL	Office of Telecommunications
ONA	Open Network Architecture
ONP	Open Network Provision
OSI	Open System Interconnection
OTA	Office of Technology Assessment
P&T	Post & Telegraph
P(A)BX	Public (Automatic) Branch Exchange
PC	Personal Computer
PCF	*Parti Communiste Français*
PCN	Personal Communications Network
PIN	Personal Identification Number
PO	Post Office
POTS	Plain Old Telephone Service
POUNC	Post Office User's National Council
PROA	Recognised Private Operating Agency
PS	*Parti Socialiste*
PSDN	Public Switched Data Network
PSDS	Packet Switched Data Services
PSTN	Public Switched Telephone Network
PTO	Public Telecommunications Operator
PTT	Post, Telegraphy and Telephony Administration
PvdA	*Partij van de Arbeid*
R&D	Research & Development
RBHC	Regional Bell Holding Company
RBOC	Regional Bell Operating Company
RPI	Retail Price Index
RPR	*Rassemblement pour la République*
RPTV	*Reichs-Post und Telegraphen Verwaltung*
SAC	Stand Alone Cost
SDH	Synchronous Digital Hierarchy
SDP	*Sozialdemokratische Partei Deutschlands*
SDR	Special Drawing Rights
SFR	*Société Française de Radiotéléphone*
SGT	*Société Générale du Téléphone*
SLA	Service Level Agreement
SMDS	Switched Multi-megabit Data Services
SPC	Stored Program Control
STC	Standard Telephone Cable
STP	Special Tariff Package
TA	Telecommunications Administration
TCP/IP	Transmission Control Protocol / Internet Protocol
TDF	Transborder Data Flow
TDM	Time Division Multiplexing
TMA	Telecommunications Managers Association
TNC	Transnational Corporation
TRM	Telecommunications Regulation Mode
TUA	Telecommunications Users Association
UDF	*Union Démocratique Français*
UK	United Kingdom
UPTS	Universal Personal Telecommunications Services
USA	United States of America
USTR	United States Trade Representative

UTC	United Telephone Company
WEU	West European Union
VANS	Value Added Network Services
VAS	Value Added Services
VAT	Value Added Tax
VLSI	Very Large Scale Integration of Integrated Circuits
VPN	Virtual Private Networks
VSAT	Very Small Aperture Terminals
VVD	*Volkspartij voor Vrijheid en Democratie*
WAN	Wide Area Networks

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