MAIN REPORT

Adapting the EU Regulatory Framework to the Developing Multimedia Environment

A Study for the European Commission
(Directorate General XIII)

Squire, Sanders & Dempsey L.L.P.

Analysys

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The opinions expressed in this Study are those of the authors and do not necessarily reflect the views of the European Commission.

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This Study was prepared by Squire, Sanders & Dempsey L.L.P. and Analysys Ltd. in execution of Contract No. 48415. The opinions expressed in this Study are those of the authors and do not necessary reflect the views of the European Commission.

All the information contained herein has been assembled in good faith and to the best of the ability of the study team. The information and views expressed do not constitute a legal opinion, and they should not be acted upon without independent confirmation and professional advice. We cannot accept any responsibility for loss arising from decisions based upon this Study.

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APPENDIX A Excerpts from the Terms of Reference
APPENDIX B Glossary of Terms

Background to Study

This Study, entitled *"Adapting the EU Telecommunications Regulatory Framework to the Developing Multimedia Environment"*, presents an analysis of the legal and regulatory issues surrounding the development of a multimedia market in the European Union. On the basis of this analysis, the Study puts forward recommendations regarding the manner in which the regulatory framework governing the provision of telecommunications ("telecoms") services should be adapted to promote the development of a European multimedia market, while preserving public interest objectives.

Context

The need for a comprehensive review of the current telecoms regulatory framework stems principally from three factors:

- the full liberalisation of telecoms services in most Member States in 1998;
- the convergence of the information technology ("IT"), telecoms, broadcasting and publishing sectors at both the technological and market level; and
- the emergence of the Internet as a viable communications medium for multimedia.

The development of a multimedia market is intimately related to the convergence of the IT, telecoms, broadcasting and publishing sectors. Convergence on a technological level has been taking place for more than ten years and, since the early 1990s, market-based convergence has been fuelled by mergers of some of the giants in the broadcasting, publishing and telecoms sectors. It has only been comparatively recently, however, that the convergence of service offerings has begun to achieve consumer acceptance.

Terms of Reference

Having observed convergence and the development of the Internet, the Commission has sponsored a series of studies to examine the impact of convergence on the

audiovisual, IT and telecoms sectors.[1] This Study, which is timed to coincide with the release of the Commission's *Convergence Green Paper* in the Winter of 1997, focuses on the changes that need to be made in the medium term to the telecoms regulatory framework to accommodate convergence and the development of the multimedia sector.[2]

To this end, the Terms of Reference for the Study require a thorough understanding of how the multimedia market will develop in the medium term , and the implications for the IT, telecoms, broadcasting and publishing markets (as they are currently constituted). More specifically, the Terms of Reference require that the Study pursue the following lines of enquiry:

From an economic/commercial perspective:

⇒ *Current Market Trends* and how they may evolve with respect to network or other delivery mechanisms, including:

- The role of, and the relationships between, the various market actors in multimedia
- The current multimedia strategies of fixed and mobile telecoms operators
- Particular technological factors, such as the decreasing cost of broadband communications, the growth of the Internet and the multiplication of capacity channels made possible by digitalisation.

⇒ *Market structure issues*, including the impact of alliances and vertical integration, especially as regards access to networks and services.

⇒ *Impact of digital technologies on telecoms networks*, especially in terms of their impact on network competition and access to networks

⇒ *Pricing issues*, with respect to consumer tariffs and interconnection charges, as well as for transport and content.

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1 For example, *Public Policy Issues Arising from Telecommunications and Audiovisual Convergence*, Report for the European Commission/KPMG, September 1996; see also *Competition Implications in Telecommunications and Multimedia Markets (Cable Review)*, Study for the European Commission DGIV/Arthur D. Little, July 1997.

2 See Open Call for Tenders, OJ (1996) C 168/18 of 12 June 1996. The operative part of the Terms of Reference is enclosed as Appendix 1 to this Study.

⇒ *Standards issues* with respect to interfaces, software and hardware, and, in particular, the influence or control potentially resulting from proprietary standards.

From a regulatory perspective:

⇒ *The impact of changes in the current definitional boundaries between telecoms, broadcasting and other services*, especially as regards:

- Whether current definitions found within national and/or Community law should be maintained and are appropriate for the development of multimedia services.

- The impact of possible changes in the existing definitional boundaries within the control of the existing regulatory framework.

- Whether, even within current definitional boundaries, the development of a multimedia market requires extension of the current telecoms regulatory framework (separation of regulatory and operator functions/open access principles) to other non-telecoms services.

⇒ *The role of regulatory authorities and principles for control of multimedia services,* in particular:

- The relationship between the authority or authorities responsible for network regulation and those responsible for content regulation, as well as the appropriate level of such regulation.

- The impact of the globalisation of multimedia services.

⇒ *Pricing and resource allocation issues*, especially the regulatory aspects of the pricing of multimedia services (*e.g.*, applicability of principles of cost-orientation/affordability) and the allocation of underlying physical resources.

⇒ *Competition issues* in terms of the regulatory supervision of market dominance in the market for multimedia services and especially the cross-subsidisation of vertically integrated organisations.

⇒ *Asymmetric regulation of telecoms and broadcasting*, particularly in light of line-of-business restrictions.

Approach

A two-phased approach has been undertaken in preparing this Study:

⇒ The first phase focused on the development of an accurate picture of the marketplace, in terms of its technological, commercial, legal and regulatory requirements. This involved extensive desk research, interviews with senior personnel responsible for multimedia from a representative cross-section of market players, and detailed surveys carried out by legal experts in all EU Member States.

⇒ The second phase focused on the development of a conceptual framework to analyse the evolution of multimedia. The Study Team has used the information gathered in its empirical research to give substance to the conceptual framework. This has allowed us to explore the implications of the current legal and regulatory framework for the development of the multimedia market and the implications of potential market developments for the evolution of a future legal and regulatory framework.

"Multimedia" is understood by the Study Team to incorporate several types of information (*e.g.*, text, sound, fixed and moving images and data), made available by the same medium, with which the user can interact. By "interactivity", we mean the ability of the user to alter, in real-time, the content (s)he receives.

Structure of the Study

The Study consists of six parts:

First, Chapter I provides an overview of the current market sectors that will comprise the future multimedia market. This discussion looks at the current status of multimedia technologies, services and activity, and at the trends which can already be seen to be shaping the marketplace.

Second, Chapter II builds on the information presented in the earlier sections of the chapter and, with additional supporting evidence, examines the key medium term developments in market structure, pricing and standardisation. This discussion also addresses regulatory problems that could arise as players seek to build market share in the new market(s).

Third, Chapter III reviews the evolution of multimedia markets in terms of a series of key regulatory themes ranging from pricing practices to public service goals. The

Chapter concludes with the formulation of an alternative regulatory model which reflects the market realities of convergence in light of the distinctive regulatory traditions of the Member States.

Fourth, Chapter IV synthesises the preceding analysis (and the comparative overview conducted in Annex I) into a set of options and recommendations for adapting the telecoms regulatory framework in the European Union to a future multimedia market.

Fifth, Annex I to the Study provides a comparative overview of the current legal framework governing key regulatory issues affecting multimedia in each of the Member States of the European Union, current as of 1 October 1997. It examines how barriers are breaking down between the hitherto separate sectors of telecoms and broadcasting and identifies variations in the treatment of multimedia companies across the European Union in terms of market entry and operation.

Sixth, Annex II to the Study provides a detailed review of the Member States ' laws relevant to convergence issues and regulatory governance in a multimedia environment, current as of 1 October 1997.

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Chapter I
Overview of the Current Multimedia Market

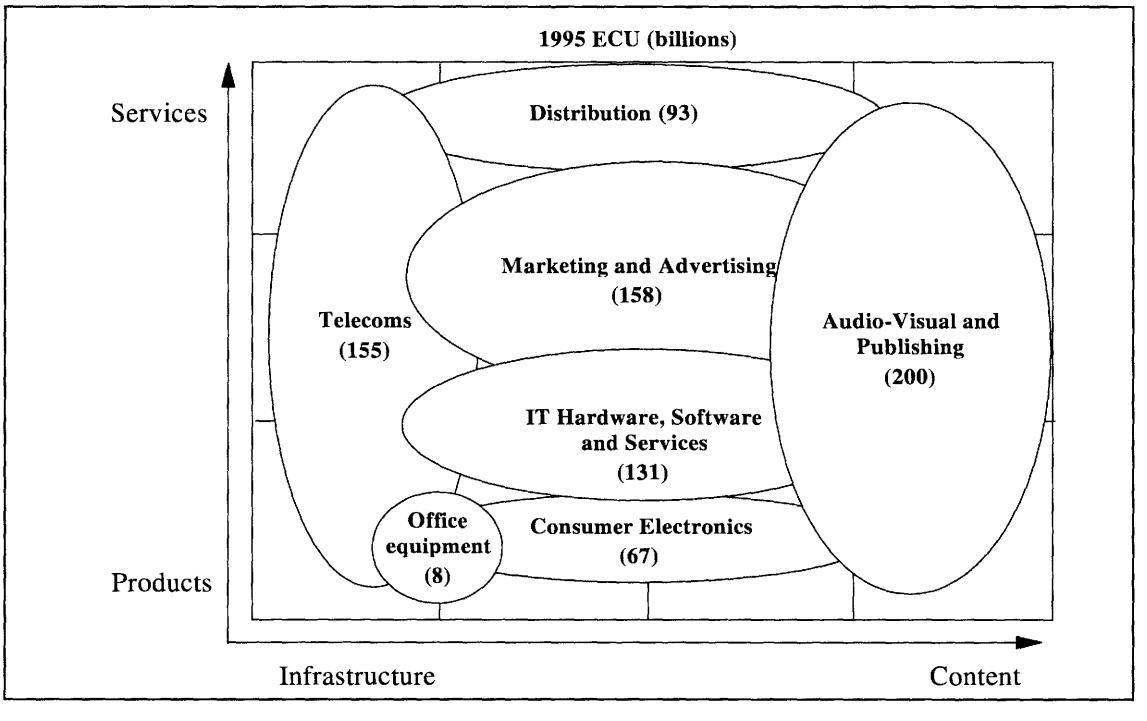
This report contains an overview of the current trends in the multimedia market in Europe. It forms part of the report of a study to examine the options for adapting the EU telecoms regulatory framework in the light of the developing multimedia framework undertaken by Analysys and Squire Sanders and Dempsey for DGXIII of the European Commission. A review of the current legal situation in each of the EU Member States forms the other part of this report.

This Chapter looks at the development of the multimedia market from the perspective of communications networks which includes telecoms networks, cable TV networks and broadcasting networks which can be equipped with a return channel. The definition of a multimedia service used in this study is a service which incorporates more than one type of information (*e.g.* text, audio, images and video) on the same delivery mechanism and which gives the user the ability to interact with or manipulate the information. This definition does not restrict the concept of multimedia services to any particular delivery mechanism, whether traditional telecoms networks, broadcast networks or the Internet.

Convergence in the IT, telecoms and broadcasting industries is driving the emergence of a multimedia market, and these sectors represent an important part of the overall EU economy. The turnover of these sectors and their related activities reached ECU812 billion in 1995, as shown in Exhibit 0.1 (overleaf).

The multimedia market is currently small, but as it grows, and as convergence continues, it could potentially subsume all the sectors shown in the Exhibit and in addition create new areas of economic activity. We believe, furthermore, that multimedia services will have an impact on the whole of the economy, through its use in every-day business processes and through electronic commerce. The significance of the multimedia market, therefore, will extend far beyond the sectors illustrated in Exhibit 0.1.

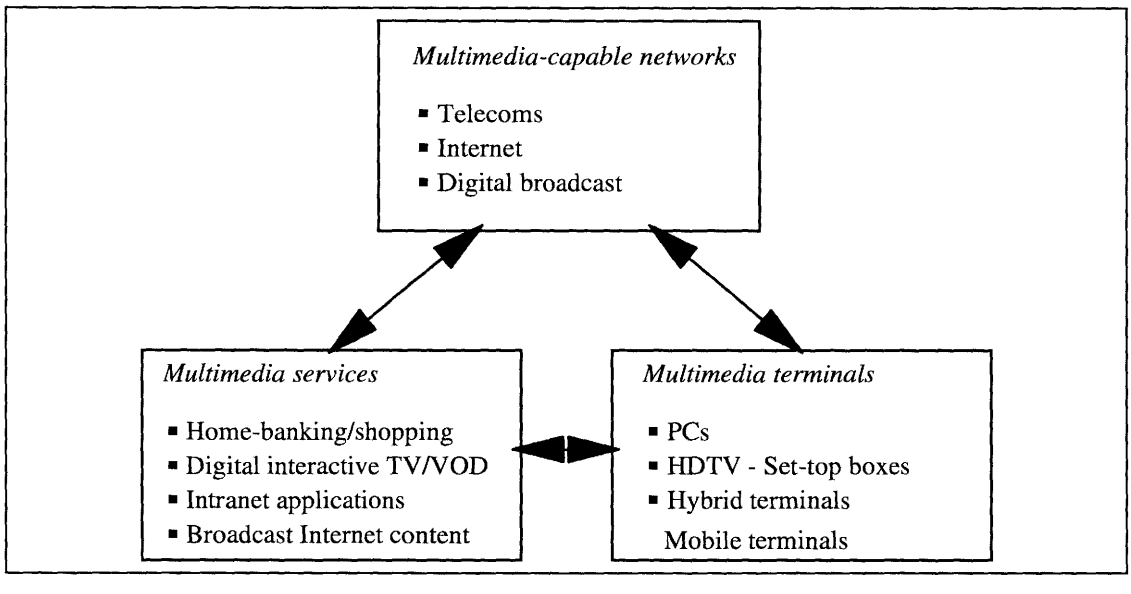
EXHIBIT 0.1: Turnover in the Converging IT, Telecoms and Broadcasting Sectors, 1995 [Source: EITO]



However, the multimedia market today is still at an early stage of development and it is difficult to identify a firm evolution path for multimedia development. Our approach has therefore been to break the market down into several segments with the aim of providing a better understanding of likely overall market development. As shown in Exhibit 0.2, the different sections of the multimedia market are inter-inked to each other in a series of complex relationships. Multimedia development is pressing ahead in all the areas detailed in the diagram and we have endeavoured in this study to determine how much development is going on independently in each area and how much is related to developments in the other areas.

These changing relationships and blurring of boundaries within these sectors, particularly the startling success of the Internet, are beginning fundamentally to change the market structure in each industry. In Section 2, the key issues arising from the fundamental changes are examined in the context of their effect on the roles and relationships between the players in the converging IT, telecoms and broadcasting sectors.

EXHIBIT 0.2: Elements of the Multimedia Market [Source: Analysys]



Section 3 develops this analysis by examining the impact which convergence in the form of alliance and merger activity is having on the positioning strategies of the major players in the telecoms, IT and broadcasting industries. This provides a valuable perspective on the commercial forces driving multimedia development in each area of the market, the degree of interaction in the market, and where market power will be concentrated in the multimedia market. We then focus on the networks used to deliver multimedia services and the applications that run over them.

As the Exhibit shows, multimedia development will be affected by the technologies which are deployed in a variety of communications networks. Section 4 of this report reviews current and planned network developments capable of supporting multimedia traffic, analyses their diffusion across Europe and the degree of competition and complementarity between alternative network technologies.

Services are also a crucial part of the multimedia market. In describing the current market situation we use a broad definition of the term service provider. This covers players such as Internet service providers, who may operate networks in order to provide the service of connectivity to their users, and players such as the *Pointcast Network* whose continuous information stream represents a service packaged to specific user needs. In describing the future evolution of the market we believe that two distinct type of player will be established which we divide into service/connectivity providers and content packagers/integrators.

The activities of both types of player will develop in response to both user needs and network capabilities, but will also feed back into the development of network capacity and functionality. The development of multimedia services is discussed in

Section 5. The relationship between service and network development also affects the market structure of the industry, however these issues are more fully explored in Chapter II, Section 1.

The diffusion of terminals and telecoms access technology is another important factor for the multimedia market. The cost and availability of terminals for the business market is not likely to constrain the development of the business multimedia market, therefore Section 6 discusses:

- the current diffusion of multimedia-capable technologies into the home
- anticipated developments in multimedia-capable technology
- the expected impact of technical developments on the future diffusion of these technologies.

It also considers whether multimedia development in this area is a revolutionary or an evolutionary process, *i.e.* whether wholly new products will be required in order to be able to use multimedia services, or whether multimedia terminals will evolve from existing products.

1/ Context

This section presents an overview of the development of the multimedia market. In it we set out our definition of multimedia and then go on to explain the forces which are shaping the development of the multimedia market and the implications of multimedia for the current IT, telecoms, broadcasting and publishing markets. [3] The definition of multimedia which we are employing in this study is:

> *a service which incorporates more than one type of information (e.g. text, audio, images and video) on the same delivery mechanism, and which gives the user the ability to interact with or manipulate that information.*

The key elements of the definition, therefore, are two-way communication or interactivity, and the combination of different types of information. Electronic publishing, home banking and home shopping services thus fall within our definition, as do video conferencing, computer-aided group working and remote working applications. Outside the scope of our definition are non-interactive media such as text-based on-line information services, Internet email, and CD-ROMs. Although we do not consider these services or products to be part of the multimedia industry, they are nonetheless important either because they are early precursors of multimedia services, or because, as in the case of CD-ROMs, they are so close to multimedia services that the innovations developed for them, and the experience gained in producing them, can be easily transferred to the multimedia market.

Until recently, the development of the multimedia market had been progressing very slowly, in response to developments in digitalisation and the creeping convergence of the IT, telecoms and broadcasting sectors. Convergence itself is a multi-faceted phenomenon which has taken place in these industries at three levels:

- At a technological level, convergence has been taking place for many years and has largely been driven by digitalisation.

[3] The audiovisual market is encompassed by these sectors.

- Convergence at a service level has been slower to develop, perhaps because of uncertainties over demand for new combined services.
- At the market level, a significant degree of convergence has taken place over the past five years, although it has not always closely matched the scope which has emerged in terms of technology and services.

The conditions for the emergence of a multimedia market were created by the progress of convergence, but it was not until the appearance of the commercial Internet, and in particular the World Wide Web, that expectations for the rapid development of a multimedia market began to form.

For a number of reasons digitalisation and convergence were necessary pre-conditions for the emergence of multimedia services. Digitalisation allows a wide range of content to be delivered electronically in the form of digitally encoded text, audio and video traffic. This means that any multimedia communication can be transmitted over the same network infrastructure provided it is digital. This has been part of the incentive for telecoms companies to upgrade their networks to digital transmission and to develop digital broadband transmission systems (such as those based on ATM[4]). It has also had a major influence on broadcasters' decisions to develop digital television and digital audio broadcasting, which is more efficient in terms of spectrum usage than analogue broadcasting, allowing pictures and sound with better quality, and the possibility of interactive services (with an upstream channel).

Convergence has itself been affected by digitalisation, which permitted technical convergence between IT, telecoms and broadcasting. This increased the range of services that could be offered by players in each of these industries, by combining the different functionality of their particular areas. On the service level, however, convergence was slower to develop and players from each of the converging sectors set up trials to explore the potential for offering multimedia services. To their detriment, many of these trials were too dominated by technology. Services were pushed at customers, without first considering what they wanted, in the hope of finding killer applications that would establish the viability of certain new technologies such as fibre in the local access network, or ATM.

While these trials were being carried out, the sudden extension of Internet usage had a dramatic impact on the commercial market and totally transformed the prospects of the multimedia market. For the first time, users had some influence over the development of quasi-multimedia applications, and service providers were

[4] Asynchronous transfer mode, a high bit rate transmission technology discussed in Section 2 on multimedia capable technology.

encouraged to innovate and experiment by the relatively low costs of participating in the Internet market, and by the ease of access to it. The only limitations on the development of the Internet as a multimedia network were the low bandwidth at which users could access the network (even now only 28.8kbit/s for the majority [5] of residential users). However, consumers are able to use rudimentary versions of Internet services, and the development of intranets in the business market will free many business users from this constraint when using applications on an intra-company basis.

The combined effect of these three factors has been to create a great potential for players within and outside the IT, telecoms, broadcasting and publishing markets to offer a new range of communications services, and to offer existing services and products in different ways, perhaps at lower cost than the existing alternatives. New core network infrastructures and technologies are being developed both to deliver existing services more efficiently and to provide a platform from which to develop new multimedia services. There has also been a great deal of investment in the telecoms and cable TV industries in developing and implementing low-cost, high bandwidth local access technologies both to enable new higher value services to be offered and to increase traffic load on the core transmission networks.

However, in order to participate in this new market and to offer new services, players are finding that they have to gain new skills and establish new relationships with other players in the market. More importantly, the economics of providing new networks and delivering multimedia services over existing networks will not be the same as current network economics in the telecoms and broadcasting industries. Digitalisation and the Internet are changing the cost basis of the converging sectors, but more importantly they are allowing new players - particularly content and service providers - to enter the industry. Many, *e.g.* News Corporation and Bertelsmann have significant strength in the core markets and hope to leverage this to gain influence in the multimedia industry. The network operators, therefore, cannot exploit their traditionally pre-eminent position in the market and their control of the customer in the face of this challenge. The rules of the game are changing and even if the former monopolists change with them they cannot re-establish their former dominance.

These changes in the relationships between players are leading to the development of a different market structure in the new multimedia markets from that of the old IT, telecoms and broadcasting sectors. The functions which were previously bundled up

[5] The Graphics and Visualization Unit at the Georgia Institute of Technology found that the modal or large group of modem used was the 28.8kbit/s modem accounting for one third of all modems used by respondents to its survey. However, the actual throughput achieved is often much less than this because of congestion elsewhere in the Internet.

within one type of provider in each market sector will form separate levels of the multimedia value chain. Thus the value chain will comprise content origination, content packaging and service integration, service provision, infrastructure provision and terminal equipment supply. As this market develops, some firms are trying to transfer their existing market dominance into the new multimedia market and others will try to create market power by exploiting bottlenecks or early mover advantages.

There is a need, therefore, to examine the application of regulation both in the transitional phase while the new market structure is emerging, and in anticipation of the market structure which is likely to emerge. It is also necessary to examine the scope of regulation given that it has traditionally been linked to sectors which have been distinguished on a technological basis which is fast disappearing. The issues of the scope of existing regulation and the problems created by new technology also have to be addressed.

2/ Industry Relationships and Roles

It is clear that a new value chain is emerging as the multimedia market in Europe develops. Players are re-defining their roles and establishing new relationships with others across the IT, telecoms and broadcasting industries in order to exploit the opportunities which are emerging. In such a fast-moving environment, the position of the established market leaders is vulnerable, particularly if those companies positioning themselves early in the market are able to gain first mover advantages by their actions. This chapter explores these emerging relationships and roles, focusing on four key areas of interest:

- open access to networks – this extent to which networks are 'open' determines the relative influence which service providers and network operators have in service design and creation. It also affects the number of firms which can provide services, and thus has an impact on the rate of innovation.
- relationship of content providers to other players – content providers entering the multimedia market will have to decide where to position themselves in the market and the level of risk they wish to take.
- multimedia terminal development (business and consumer) – the battle between TV receivers, personal and network computers for dominance in the multimedia terminal market will affect the balance of power in other parts of the value chain.
- control of the customer – a new multimedia value chain is emerging which will allow players direct access to the customer through a number of routes other than through the telecoms or broadcast network operator, as is currently the case. This will have a major impact on the relative market power of the different players in the market.

2.1 Open Access to Networks

Since 1995, the Internet has emerged as an alternative communications network. Service innovation has progressed very quickly and created the potential to deliver multimedia services. The critical difference between the Internet and traditional communications networks (analogue broadcast and the PSTN) is the fact that the

Internet is much more open to companies who do not own or operate networks but wish to sell goods or services to the public. Factors contributing to this openness include:

- the costs of setting up value-added services using the Internet can be very lower than would be the case if telecoms networks were used
- the Internet has standard and open interfaces for value added-service providers
- ISPs do not exercise any control over billing the customer for additional services. This section examines the impact of open network access on the development of the multimedia market.

2.1.1 The Internet

The Internet's open approach to the development of new protocols and services, and to interconnection between networks has given many firms the opportunity to innovate in technology and create new multimedia services such as Internet personal banking, audio and video multicasting, virtual auctions etc. Limitations on network capacity still exist both in the Internet backbone and the local access network, but a clear evolutionary path exists from the current Internet to a full multimedia network. The combination of this open approach with the fact that it is also relatively cheap to provide services on the Internet – both in terms of developing software protocols and in connecting servers to the Internet – has ensured relatively low entry and exit costs for companies trying to create new services, reducing the risks associated with offering experimental services.

The open standards approach pursued by most companies in the Internet market has also reduced the importance of first mover advantage, but companies have sacrificed these potential advantages for the ability to access a wider market than would be possible when using proprietary standards. For example, in electronic commerce initiatives, typified by CommerceNet in the USA, by the Memorandum of Understanding on electronic commerce supported by the EU, banks, IT and telecoms companies have decided to share the risks in developing new services over the Internet (often supported by national or regional governments).

However, there is a danger that some groups of companies will fragment the global Internet by establishing higher performance closed networks within the Internet, because they cannot wait for the general performance of the Internet to improve. For example, Integrion, a grouping of 15 banks in the USA, is offering home banking services using IP but over a private network which users dial in to. Some commentators, however, view these trends as a positive development, assuming that they will allow Internet service providers better to match quality of service to users' needs.

2.1.2 The PSTN

It has traditionally been difficult or very expensive for most service providers to use the PSTN, except for providers of premium rate audiotext services. Value added service providers and ISPs who wanted to create their own service platforms independently of the TOs had to use leased lines to form the networks which supported their services., This began to change, however, with the liberalisation throughout the EU of value added services in 1990. It will be a major step for TOs, in implementing the legislation following the full liberalisation of telecoms in 1998, to adopt an open network model, giving service providers full access to switching/routing and intelligent network functions and allowing service providers to connect servers and run their own transmission protocols over their network.

TOs gain considerable advantages from operating the PSTN rather than an open network, because they control access to the customer and the extent to which other providers can use their network in order to provide value-added services. The more service providers depend on the intelligence embedded within the TOs ' core network, the more difficult it is for them to gain direct access to the customer and develop innovative services. As a result, the TOs can command larger revenue shares from the service providers using their networks.

This factor, taken together with the legacy of TO investment in intelligent networks, means that TOs have a considerable incentive to maintain the closed network model for multimedia services although that may be difficult in the liberalised environment post 1998. This has been reflected in TO multimedia trials: the TO has usually designed the service delivery platform, leaving service providers less scope for innovation or design. However, since the beginning of 1996, most major TOs have changed their approach to follow a multimedia strategy in which they try to cover all the potential technological options:

- they are becoming involved as significant players in the Internet market, which ultimately involves accepting the open network model.
- they are developing and implementing 'full service networks', *i.e.* enhanced telecoms networks capable of delivering broadcast quality video as an alternative proprietary platform to the Internet.
- they are creating server technology to enable service providers to deliver multimedia services, either over the Internet or over the full service network.

2.1.3 Broadcast Networks

In the past broadcasting has been treated as a quasi public good [6] and the focus of open access was to ensure access of all types of opinion to the network. Although private broadcast channels have existed for some time, change will accelerate with the development of digital television and the potential creation of hundreds of new channels. The concept of public broadcasting now coexists with the concept of broadcasting as a private good, thus raising the issue of allowing open access to broadcast networks for all types of service providers. The most important factors to consider are:

- potential scarcity of channel capacity
- the implications of the need to stimulate market demand by subsidising the cost to the user of purchasing a set top box.

Digitalisation will increase channel capacity, most dramatically for satellite broadcast networks, so there should not be a shortage of capacity for current uses of broadcast networks. For example, given current spectrum allocations for digital satellite broadcasting, the equivalent of 200 analogue terrestrial channels could be carried by satellite. It is therefore possible to imagine that transponder capacity or digital cable TV capacity could be resold on a fair and non-discriminatory basis to companies who want to provide alternative services over digital TV networks. However, it would be unreasonable, given the constraints on current analogue networks, to require capacity to be made available on them for interactive services such as electronic commerce, home banking etc.

However, spectrum management authorities may have to reconsider the amount of spectrum given to broadcasting (or to other civilian or military users) in the light of the potential for new services to be transmitted over broadcast networks. Satellite broadcasters such as *Kirch* and *Canal Plus* intend to offer a range of new services beginning with sport-based pay-TV and (near) video on demand which will consume more channel capacity, but the impact on scarcity of resources if satellite and terrestrial digital broadcasters also offer this range of services is unclear. Moreover, in digital cable and terrestrial TV, less channel capacity is likely to be created under current plans than for digital satellite television and this may further constrain the extent to which capacity can be made available to third party service providers.

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[6] A 'public good' is a good which is so abundant that one person can consume without affecting the ability of another person to consume the same good, or the utility derived from it. A 'quasi-public good' is a good which is also in plentiful supply, but is not inexhaustible. The two are often treated as being the same.

The largest hurdle to be overcome in providing open access for service providers is likely to be the degree of control which broadcast network operators currently have over every aspect of the market. Currently the network operator such as Canal Plus are involved in every part of the value chain apart from the provision of satellite infrastructure. If network operators subsidise set top boxes to stimulate the market they are likely to want to exploit all their channel capacity, rather than lease it to third parties. For example, *Deutsche Telekom* is currently in dispute with the DF1, the digital satellite TV operator, over which of them operates the subscriber management element in the delivery of digital satellite TV programming over *Deutsche Telekom*'s cable TV network. However, recent indications are that network operators are adopting a more open framework in the light of agreements to develop dual function set-top boxes in *Germany*,[7] and open specifications in the *United Kingdom*[8] and, to some extent, in *France*.[9]

2.2 RELATIONSHIP OF CONTENT PROVIDERS TO OTHER PLAYERS

Content, in our multimedia concept, embraces both pure information and entertainment. It is a vital element in all parts of the multimedia market from interactive digital television to the Internet, and in electronic commerce. This immediately gives content providers (including broadcasters, publishers, and individual artists and authors) a degree of market power, and presents them with choices as to:

- how to position themselves in the multimedia market
- what scope they have for determining the format in which their material reaches the end-user, and
- what share of the revenue generated by a particular customer they will retain.

The most important issues in market positioning for content providers are:

- opportunities in other parts of the value chain
- the degree of exclusivity of alliances with network operators or service providers
- the degree to which they can control the customer.

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7 Between Kirsch and News Corp's DF1 digital satellite TV service and that of Bertelsmann.

8 After strong intervention from terrestrial broadcasters, BSkyB has agreed to make its set top box specifications open.

9 Lyonnaise Cable and France Telecom's satellite TV service will provide digital services using common set-top box technology.

The first two issues are discussed in this section, and the last in Section 2.4 below. Note that the ownership of intellectual property rights is also an important issue for content creators, and it may affect content creators ' decisions on how they enter the multimedia market. This concern is more fully discussed in the legal section of this study, but is mentioned here because of its importance in market development.

2.2.1 Opportunities for Content Providers in Other Parts of the Value Chain

Some large media companies such as *Canal Plus*, *News Corp* and *Bertelsmann* already operate their own communications networks, and are therefore poised to enter the multimedia market at several levels of the value chain. However, their technological advantages only relate to the delivery mechanism with which they are familiar. Forming alliances seems to be the most common strategy for securing a more diverse entry strategy into the emerging multimedia markets: this trend is exemplified by, for example, the alliance between *NBC* and *Microsoft* in the USA to provide rolling news over the Internet, and *Bertelsmann*'s linkage with *America Online* to set up the *AOL Europe* online service. An alliance strategy can also be a good way of sharing the risks of investing in new markets and choosing a partner whose core skills are in technology or network provision can make it possible to avoid alliance with a direct competitor. For example, the *BBC* is working together with *ICL* to launch *BBC Online*, an online and Internet access service.

However, some content providers are cautious about moving into service or network provision in the multimedia market. In particular, the costs of establishing the technical capability to provide service or operate networks, and the potentially low margins on operating networks in a competitive environment (as illustrated, for example by the dramatic falls in long distance telephony prices of 40-60% in the *United States*, the *United Kingdom* and *Sweden* following the introduction of competition) have led some content providers to eschew backward integration in the value chain in favour of exploiting their core abilities, in contrast to the approach adopted by the *BBC*. This means that they have to rely on other parties to develop the necessary technical facilities through which they can offer multimedia services, although they can benefit from leaving the burden of innovation to the network operator and service provider. This leaves content providers with the choice of whether or not to have an exclusive relationship with one provider as discussed in the next section.

2.2.2 Exclusivity

The degree to which alliances between content providers and network operators are exclusive depends on several factors:

- the degree of competition in network and service provision

- the relative costs of self-provision
- uncertainty over future demand
- the bargaining power of the content provider relative to the network operator.

In the digital TV market, the level of competition in national markets is expected to be very low, and as yet the issue of open access for other service providers has not been considered. Content providers therefore, have few alternative routes to the market, and network owners are prepared to pay a high premium for exclusive content with a proven mass market appeal because it minimises the risk of low demand for services.

However, where there are alternative routes to the consumer, non-exclusive deals are more likely. For example in the Internet, a number of content aggregators have established strong brand names, but in addition content providers can achieve high visibility by setting up their own presence on the Internet. The costs of establishing a WWW presence are also much lower than using digital broadcast services either by self providing or leasing capacity. This also makes it easier for small content providers to establish their sites on the Internet. In particular, small companies may choose to sell their goods directly over the WWW and through virtual shopping malls.

The multimedia market will be segmented by various delivery mechanisms, and content providers may wish to vary their approach to each segment. For example, in addition to maintaining its production of hand-held gaming consoles, *Sega* is involved with *Flextech* in the *Sega* Channel for distribution of its video games via cable TV networks and is also involved with *BT* in an experimental service to provide networked videogames. Similarly, several *United States* film studios signed exclusive deals with digital satellite broadcasters in 1996 [10], but adopted a non-exclusive strategy in advertising and distributing related merchandising on the Internet, both using content aggregators such as *CompuServe* or *America Online* and establishing their own WWW sites. Content providers ' decisions to enter multimedia markets will be strongly affected by the amount they have invested in existing distribution arrangements, and the degree to which those arrangements are integrated into their current ways of doing business.

2.2.3 Summary

Exhibit 2.1 summarises the main factors which will affect the nature of content providers' relationships to network operators and service providers. Content

[10] For example, Canal Plus secured deals with Universal and Columbia film studios for distribution of their films in France.

providers fall into three groups: integrated content provider-network operators (*e.g. BBC*); large providers not owning networks (*e.g. Reed Elsevier*); and small independent providers.

EXHIBIT 2.1: Factors Affecting Content Provider Relationships [Source: Analysys]

	Network Provider Relationship	*Service Provider Relationship*
Integrated network and content provider	Protect existing markets by not supporting providers in new market Leverage power in existing for advantage in new markets Share technological risk and expertise with different networks Capture first mover advantages	Increase market power – control another part of value chain Relatively low barriers to entry Share market risk
Large content provider	Low cost alternatives available High barriers to entry Low long-term margins in network provision Technological risk borne by operators	Availability of alternative delivery channels Low barriers to entry Higher revenues for exclusive deals Market risk borne by service provider
Small independent content provider	Inadequate financial resources Potential to lease networks	Benefit of service provider brand name Superior technical knowledge of service provider Need for flexibility and control

2.3 MULTIMEDIA TERMINAL DEVELOPMENT

The two most important issues in multimedia terminal development for both business and residential services are:

- identifying what form the multimedia terminal or terminals of the future will take
- identifying the best transitional path to get there from the current situation.

The precise functionality which a future multimedia terminal will require can currently only be speculated upon, because this is inherently connected to the types of services consumers and businesses will want in the future. However, terminals will probably have to have a range of features including high definition displays screens, communications capability, computing power and mobility.

2.3.1 Alternative Development Paths of Multimedia Terminals

As discussed in Section 4, the personal computer and the television are the main alternatives currently proposed for accessing multimedia services, although neither is widely established as a multimedia terminal as yet. In the IT market, the rapid rise of the Internet, combined with a growing demand for PCs as educational tools, has created a demand for PCs with a higher level of multimedia capacity. In the broadcasting market, the development of digital services is leading to the introduction of more computing power into the television receiver through developments in set top box technology, and the launch of high definition television sets should provide the necessary picture quality for accessing a full range of multimedia services.

Another factor which will affect the route which multimedia terminal development takes is the installed base of PCs and TVs (as discussed in Section 4). If the Internet proves more successful as a means of delivering multimedia services than digital broadcasting, this will favour the PC in the consumer market rather than the TV, and vice versa. Although the WWW can now be accessed with a TV set (as detailed below), multimedia services delivered this way will have a different functionality to those enabled by digital broadcast television. These services may be incompatible if they are not platform independent and this will limit the growth of the overall market.

The relative success of the PC or TV format will affect some players in the market more than others. Content providers may be unconcerned with how the transition is made to a universal multimedia terminal, and may pursue an approach that is consistent with both media (e.g. *Sega* which makes games available over the Sega Channel in Europe and is participating in *BT*'s 'Wireplay' interactive games service in the *United Kingdom*). The transition is important, however, to manufacturers, software developers and network operators. If one system is eventually dominant, those backing the other will not regain their investment.

2.3.2 Potential Convergence in Terminal Capabilities

Companies are responding in various ways to this uncertainty. Some which are involved in PC-oriented multimedia, such as *Microsoft*, are also branching into

content areas which can be delivered to consumers via digital broadcast systems. Similarly, satellite broadcasters such as *BSkyB* are considering the development of set top box technology to allow selected WWW content to be viewed on a TV screen, distributed via the satellite network. *DirecTV* has launched a low cost one-way satellite data communications service - *DirecPC* - in the USA and (in partnership with *Olivetti*) in Europe. This system is also being used for high speed (384kbit/s) Internet access. New start-up companies such as WebTV ™ in the US, are securing agreements with international consumer electronics makers such as *Phillips* and *Sony* to manufacture set top boxes which display WWW content in a format specially designed for television.

These arrangements highlight how the basis of retailing terminal equipment may change from one where consumers buy the terminal as a product separately from the service, to one where the purchase of a terminal is linked to subscription to a service. This would mean that an equipment manufacturer's business plan for a new product would be closely linked to the business plan for the associated service.

Ultimately, convergence at the service level may leave manufacturers no option but to produce terminals combining TV and PC capabilities. Even now, some major terminal equipment manufacturers have begun to develop hybrid PC-TVs, including PC manufacturers such as *Compaq*, and television and set top box manufacturers such as *Phillips* and *Thomson*. However, prospects for PC-TVs are mixed at present: initial demand for PC-TVs in the USA has been strong, but in Europe, demand has been very low and product lines have been discontinued, and even in the USA hybrid PC-TVs account for a very small proportion of the total number of PC and TVs in the market.

2.3.3 Location of Intelligence in Multimedia Terminals

In addition to these moves towards integration, separate developments are also taking place in the PC and TV set markets which affect where intelligence is located in the terminal or the network. In the PC market, much interest has arisen in the development of cheaper PCs: high purchase cost is a major constraint to expanding the use of the PC as a multimedia tool in both the consumer and business markets. The network computer (NC) has been proposed as a solution to this problem. An NC is a low cost, basic functionality computer terminal linked to a server on a public or private network. Additional intelligence and functionality is stored on the server and can be downloaded to an NC on demand giving similar functionality to the PC. If the NC is successful it will change the dynamics of the computer terminal and operating system software markets which is partly the objective of its major backers, Oracle and Sun. In autumn 1996, a group of PC technology vendors, including Compaq, Microsoft and Intel announced plans to develop a low-cost personal

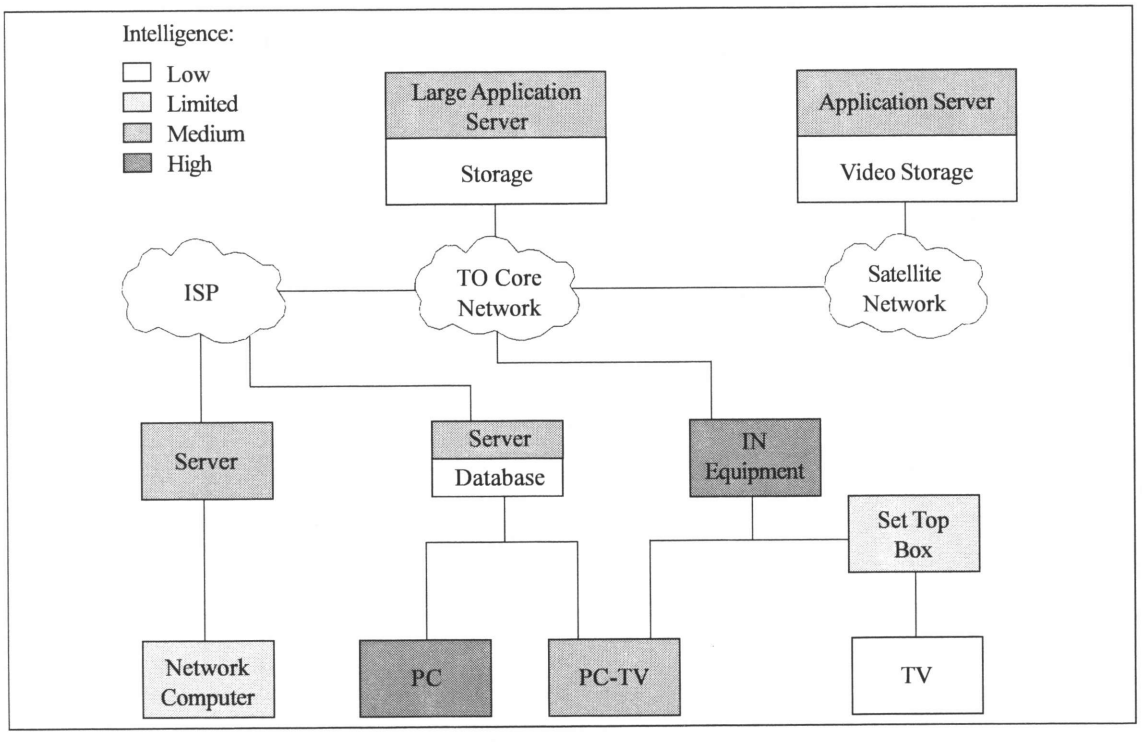
computer, the NetPC, in response to the potential threat of the network computer to their markets.

In digital broadcasting, one key area of development is the set top box which is adding intelligence to the basic television set. This allows TV sets to progress from dumb terminals to having some interactive capabilities. As more services are developed for digital satellite and cable TV networks, the intelligence embedded in set top boxes is bound to increase[11]. Standardisation problems do exist at the moment, although the effects of this are reduced by the fact that many satellite broadcasters now operate over several European countries. For example, *Canal Plus* and *Nethold* have merged to create an organisation covering nine EU countries directly and also have stakes in other digital TV markets *e.g. Sogecable* in Spain.

Cable modems will also increase set top box intelligence, adding communications capabilities. Cable TV operators hope that cable modems will allow them to catch up with digital satellite broadcasters in the multimedia market by allowing them to enter the market for high-speed consumer Internet access. However, cable TV operators will have to consider carefully the overall amount of money which consumers will be willing to pay for additional service, particularly if they want to introduce conditional access to digital television and cable modems at the same time.
One of the key questions which emerges from the above discussion on the design of the future multimedia terminal may be that of where the intelligence lies. In the case of the PC the intelligence lies, (as illustrated in Exhibit 2.2) in the terminal itself, whereas with television plus set top box or with the network computer, most intelligence lies in the server. This has implications for the relative control which the different players in the value chain can exert over the consumer, as discussed in the next section.

[11] For example the latest version of the WebTV set-top-box the WebTV Plus device gives the user substantial disk storage capacity - 1.1Gbytes - and features which can support video on demand.

EXHIBIT 2.2: Location of Intelligence in Different Multimedia Terminals [Source: Analysys]



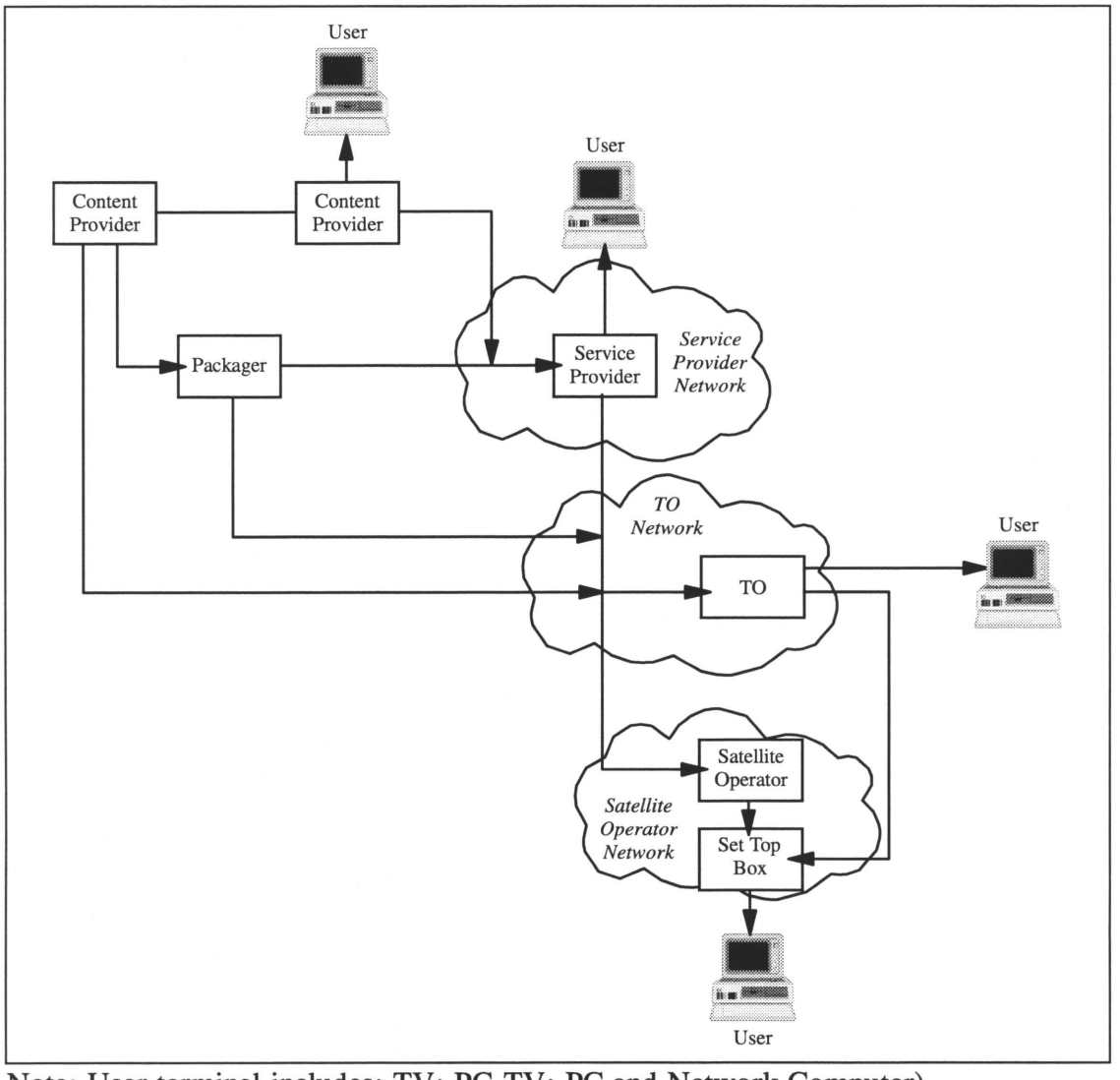
2.4 CONTROLLING THE CUSTOMER

As the multimedia market evolves, and a new converged market structure emerges, players will fight to maintain or increase their market power through control of the customer. Until recently, in most EU countries public network operators in both the telecoms and broadcasting sectors have had exclusive rights to offer services, and have bundled infrastructure, service and content provision together. Moreover, in telecoms, the public network operators were the major billing point for the customer. They controlled access to the customer and controlled the technological development of the public network, which in turn determined the type of services which could be offered over it.

This situation is changing with the introduction of competition in both telecoms and broadcasting, and with the development of new multimedia services and the Internet. A number of different routes to the consumer are developing as shown in Exhibit 2.3. In the rest of this section we explore:

- the probable effect of these developments on the relationship between the network operator and the customer
- the new types of relationships between players and customers that will develop.

EXHIBIT 2.3: Alternative Routes to the Customer [Source: Analysys]



Note: User terminal includes: TV; PC-TV; PC and Network Computer)

2.4.1 Multimedia Service and Content Providers

For many content providers, choosing whether and how to distribute their content over electronic media raises a range of issues concerning how much, if any, control they would like to have over the customer. For example, in the broadband communications trials that have taken place in Europe since 1994, they had to give up part of that relationship to the telecoms companies running the trial; this was one consequence of their choice to adopt this delivery mechanism.

The more powerful content companies such as *Disney* and *Bertelsmann* have sought to control the use of their content across a range of different product types including multimedia. In addition, some owners of rights to content will have the choice of

selling the rights to use their content at a high price to digital satellite and cable television. This is because certain types of entertainment such as popular sporting events and major films are considered essential to the development of digital pay television. Securing exclusive rights to this content is a critical competitive weapon: for example, in the German market, *DF1*'s purchase of many major Hollywood film rights nearly pushed its rival, *Bertelsmann*, out of the digital satellite television market before it had even taken off. This arrangement is attractive to many content owners because the broadcasters are willing to pay large amounts for the right to their content.

If content owners wish to use the Internet as a delivery mechanism for multimedia services, they have a choice between self-publishing their content (designing the technical elements specific to their product) or using a content aggregator like *America Online*, *T-Online* or *Minitel* which provides a standard platform for delivering content to their customers. In the latter case the customer has the billing relationship with the content aggregator and not the originator.

The degree to which content aggregators have been able to exploit their closer relation to the customer has depended on the volume of material on the public Internet, the ease of finding that material, and the cost of using content aggregators services in relation to the public Internet. In the *United States* and the *United Kingdom* the market power of aggregators such as *AOL* and *MSN*, has been tempered by the fast development of the public Internet. In particular, content providers have given their material to aggregators on a non-exclusive basis, many starting their own WWW based services. In *Germany* and *France*, in contrast, the public Internet has been slow to develop in terms of the range of commercial content available and until recently many more people have had subscriptions to the online services of content aggregators (*e.g.* Minitel) than to services giving full access to the Internet.

2.4.2 Network Operators and the Internet

The Internet has reached a position where it has the potential to seriously disrupt the traditional model of the network operator 'owning' the customer. This section considers how the Internet and intranets are driving a wedge between infrastructure and service provision and turning them into increasingly separate markets. A vital part of this change is the Internet service providers ' ability to gain control of the customer by managing the billing relationship with the customer, thereby establishing service provision as a separate good from infrastructure provision. In addition, content providers can bill the customer directly for access to their material (or derive money from advertising), again circumventing the network owner.

These changes will affect both multimedia services and basic services such as voice telephony, although business multimedia services are likely to experience the impact of these changes first through the development of intranets. If intranets continue to develop as they have in 1996, network operators will lose control over a large part of the data communications market. IT networking companies and systems integrators would establish a direct relationship with customers allowing them to gain a significant part of the value in intranet provision. Network operators may be able to re-capture some of the value in the intranet market by offering fully managed intranet services of the type announced by *Concert* and *AT&T*, but this would involve moving into a largely unfamiliar section of the market.

The TOs' control of the customer in delivering basic telecoms services is also being challenged by developments in the Internet, in particular the establishment of protocols for transmitting real-time voice and video. Although the quality of service of voice and video over the Internet does not currently stand comparison with that delivered by the PSTN, these services are already being used by a small proportion of Internet users. Should these services be widely adopted, the TO would only accrue the revenues for the local access component of the call, and lose the revenues it currently receives in a long distance phone call or a videoconference, as it would effectively be handing over control of routing and delivering the call to an Internet service provider and the developer of the Internet telephony software package. In an attempt to protect its revenue stream, Telecom Finland itself launched an Internet telephony service for long distance phone calls within Finland in December 1996.

2.5 CONCLUSIONS

A major shift in the balance of power between content providers and network operators is occurring as the multimedia value chain emerges from the converging IT, telecoms and broadcasting sectors. A wider range of ways in which to deliver content to customers is opening up for content providers, enabling them to take greater control of the relationship with the customer. TOs and broadcast network operators are fighting these developments in order to maintain their influence into the multimedia market. In particular they are developing proprietary platforms for delivering multimedia services over their networks in order to gain a higher share of revenue in the market. However, two factors suggest this will be only partially successful:

- the open model represented by the Internet is now seen as a viable mechanism for delivering multimedia services and most network operators have accepted that they too must be involved in the Internet market.

- the spread of IP, its related protocols and software such as Java have given content providers the ability to create platform independent services. This allows them to deliver the same content irrespective of the delivery mechanism or terminal which the customer uses to access it.

3/ Multimedia Alliances

This chapter discusses the trend towards alliances and mergers in the IT, telecoms and broadcasting sector and examines the motivations behind this activity. In particular, it is important to examine how far alliances and mergers have been motivated by the opportunities created by multimedia and the technological and service level convergence in the IT, telecoms and broadcasting markets. This will suggest to what extent alliance and merger activity in the sector is an indicator of how the multimedia market structure will evolve in the future.

Merger and acquisition activity in the IT, telecoms and broadcasting sector is continuing to rise rapidly in both Europe and the USA. The total value of deals more than quadrupled in the first half of 1996 compared with the same period in the previous year:

- in Europe, a total of 160 transactions amounted to more than $9.6 billion compared with $2.2 billion from 130 transactions in the first half of 1995.
- in the USA, a total of 153 transactions amounted to more than $10.5 billion compared with $2.6 billion from 109 transactions in the first half of 1995.

The figures also show that, despite a general feeling among industry commentators that the USA is leading Europe in terms of the dynamism of its IT and telecoms sectors, the amount of merger activity in the two regions was broadly similar, measured in terms of value of transactions.

A shift in the focus of merger activity has also occurred in the past two years. The Internet, which accounted for no more than a handful of M&A deals in 1994, has grown to represent almost half of all the deals which took place in the first half of 1996 (equaling ECU5.75 billion in Europe and ECU6.25 billion in the USA).
In general terms, this activity has been driven by two major objectives:

- diversification (vertical mergers and alliances) - players seek to reposition themselves by developing mergers or alliances with companies whose activities complement their existing revenue streams
- consolidation (horizontal mergers and alliances) - firms merge or ally with other players in similar markets to cut costs and increase market presence.

Within these two broad objectives, however, companies have pursued a number of other goals which are explained in more detail in the rest of this section. For greater clarity, we have divided the mergers and alliances into horizontal relationships and vertical relationships. Some of the mergers and alliances to which we refer have already reformed during the course of this study, illustrating the volatility of mergers and alliances in this area.

3.1 Horizontal Mergers and Alliances at One Level of the Value Chain

Activity within this category is generally prompted by one or several of the following five rationales:

- gaining minimum efficient scale
- high cost of new (digital) technologies
- uncertain demand for new services
- internationalisation
- opportunities arising from regulatory change.

Exhibit 3.1 provides examples of mergers formed for these reasons. They are discussed in more detail below.

EXHIBIT 3.1: Rationale for Horizontal Mergers and Alliances [Source: Analysys]

Rationale	*Examples*
Increasing market power/gaining minimum efficient scale	Vebacom - Urbana Systemtechnik, Cable and Wireless Communications, AoL - CompuServe
High cost of new (digital) technologies	Canal Plus - Nethold
Uncertain demand for new services	Multimediabetriebsgesellschaft (Kirch, Bertelsmann, etc.)
Internationalisation	BT-MCI (WorldCom?, GTE?), Global One, UUNet - Unipalm Pipex
Opportunities arising from regulatory change	MFS - Worldcom, Telenet Flanders (17 Belgian cable TV companies and US West), NYNEX- Bell Atlantic

3.1.1 Gaining Minimum Efficient Scale

In industries where economies of scale are fairly pronounced, it is not possible to operate a profitable business below a certain threshold of demand. This has led some companies, particularly those trying to enter new markets, to use mergers as an option for gaining a sufficient minimum scale in order to be both profitable and competitive with the leading market players. There are many examples of this strategy in Europe, particularly in the cable TV and Internet markets, such as:

- the merger of *Bell Cablemedia*, *NYNEX CableComms*, and *Videotron* with *Mercury Communications Ltd.* to form *Cable and Wireless Communications*
- the expansion of the Internet service provider *UUNet* into Europe through the acquisition of *Unipalm PIPEX* in the *United Kingdom* and *Oleanne* in *France*.

3.1.2 High Cost of New (Digital) Technologies

The cost of introducing digital broadcasting services is very high and companies may wish to establish mergers or alliances to allow the costs to be spread over a wider base of customers. Examples of mergers and alliances motivated by this rationale are plentiful in both the media and distribution (network) sectors. For example, in October 1996, two of Europe's leading pay TV operators – *Canal Plus* and *Nethold* – announced plans for a $1.5 billion merger. The two companies have complementary subscriber bases: *Canal Plus* has a total of 7 million subscribers in *France*, *Spain*, *Belgium*, *Germany* and *Poland*, while *Nethold* has 1.5 million subscribers in *Scandinavia*, *South Africa*, the *Middle East*, *Greece* and *Cyprus*. The merger offers them not only the opportunity to spread the costs of new technology, but also the possibility of increased negotiating power for new content.

3.1.3 Uncertain Demand for New Services

Uncertainty over demand has also been a motivation for alliances in the digital satellite broadcasting industry. However, alliances faced by high levels of uncertainty tend to be characterised by low levels of commitment from the relevant parties and are thus often unsuccessful. A leading example of this was the *Multimediabetriebsgesellschaft* venture, which involved Kirch, Bertelsmann, and BSkyB in the creation of a platform for providing digital satellite services in *Germany*. The alliance broke up in 1996 because of internal differences over the direction of strategy.

3.1.4 Internationalisation

In the networking and distribution part of the multimedia business, mergers and alliances lie at the heart of the strategies being pursued by many of the largest operators in a bid to establish their positions in the market for global service provision. The largest announced to date has been that of *Worldcom*, *BT* and *MCI*, valued at up to $30 billion, which outbid *BT*'s offer of $20 billion. The deal is aimed at providing a critical mass in the increasingly competitive market for international communications services, ensuring that the company is able to compete with rivals including *Global One* and *Unisource*. Other examples include the creation of *MFS WorldCom* and the *BT* alliance with French new entrant *Cégétel*.

3.1.5 Opportunities Arising from Regulatory Change

Many of the smaller CATV operators are now recognising the need to consolidate if they are to participate in the provision of the next generation of interactive multimedia services. For example, following the implementation of the Commission's Cable TV Directive by the Flemish Assembly in order to allow liberalisation of alternative infrastructure in Flanders (*i.e.* to allow cable TV and other utility network to provide telecoms services), 17 cable companies joined together with operator US West to form a new company Telenet Flanders, which has plans to invest up to $1.2 billion in new facilities to exploit the new market opportunity.

Exhibits 3.2 to 3.4 illustrate the scope and range of horizontal alliances and mergers in the telecoms, broadcasting and multimedia content sectors.

EXHIBIT 3.2 *Illustrative Horizontal Alliances and Mergers in the Telecoms Sector [Source: Analysys]*

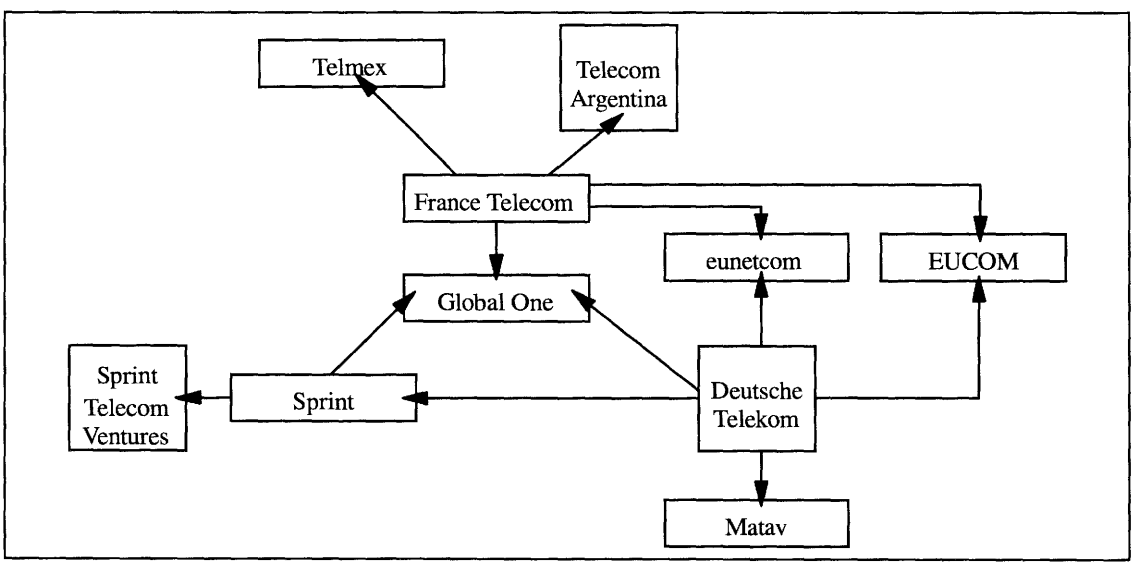


EXHIBIT 3.3 *Illustrative Horizontal Alliances and Mergers in the Broadcasting Sector [Source: Analysys]*

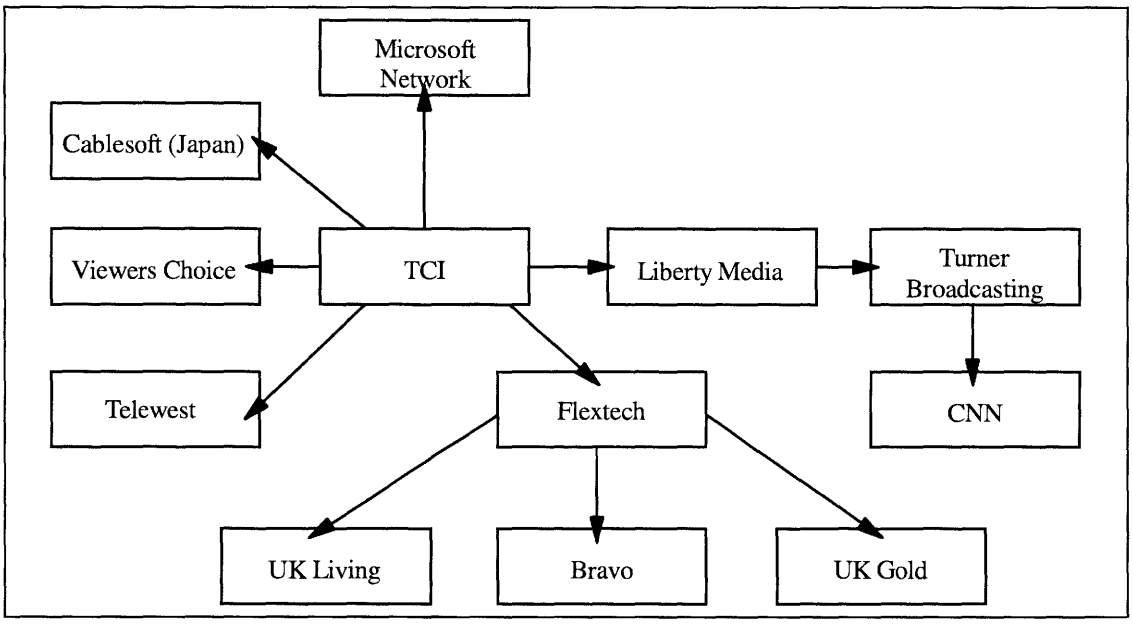
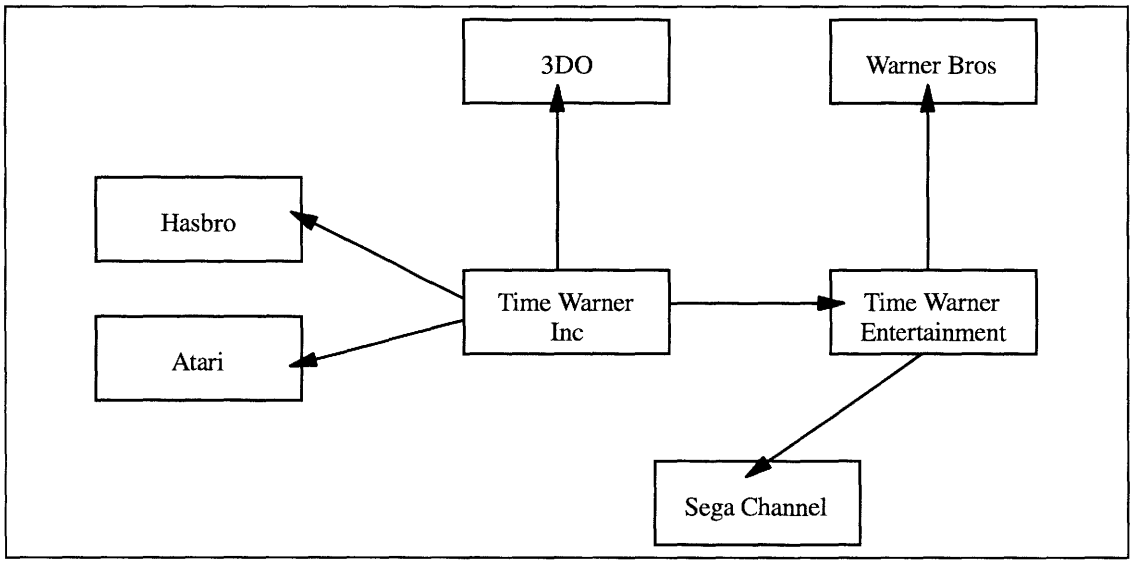


EXHIBIT 3.4 *Illustrative Horizontal Alliances and Mergers in the Multimedia Content Sector [Source: Analysys]*



3.2 VERTICAL MERGERS AND ALLIANCES

Vertical alliances and mergers reflect the way in which we expect the multimedia value chain to develop, *i.e.* along vertical lines rather than the current horizontal level. As such, current examples provide an essential insight into how convergence and the development of a multimedia market are affecting market structures in the

IT, telecoms and broadcasting industries. Vertical mergers and alliances in these sectors have typically been motivated by the following concerns:

- the uncertainty of market demand
- market positioning and access to new skills
- control of channels to the customer
- moving into higher value areas of the value chain
- competition from companies in other parts of the value chain.

Exhibit 3.5 provides mergers formed for these reasons. They are discussed in more detail below.

EXHIBIT 3.5: Rationale for Vertical Mergers and Alliances [Source: Analysys]

Rationale	*Examples*
Uncertainty of demand	Hughes Olivetti Telecom (DirecPC), @Home
Market positioning and access to new skills	Bertelsmann - AOL, BBC WorldWide - ICL, STET - IBM
Gaining control of channels to the customer	BT - BSkyB, Disney - ABC - Capital Cities
Moving into higher margin areas of the value chain	Microsoft Network - NBC (MSNBC Internet news channel)
Stave off competition from companies in related markets	US West - Time Warner, Oracle - Sun - Netscape (Network Computer)

3.2.1 Uncertainty of Market Demand

Uncertainty over future demand is an inherent risk that has to be faced when investing in new markets. Consequently many companies have sought either to merge or build an alliance as a way of sharing these risks. One example is the formation in 1996 of Hughes Olivetti Telecom, a joint venture to operate a satellite data communications and Internet access service to residential and small business customers. The fore-runner of this service, DirecPC (operated by Hughes in the USA) had only two years of experience, therefore in the face of uncertain demand, Hughes has shared some of the risk with Olivetti. However, uncertain demand and rapid change in the market tend to produce short-lived alliances. For example TCI, sensitive to the threats posed by increasing competition in the telecoms sector, joined with Microsoft to help develop the Microsoft Network concept. While there was a clear match between the skill sets of the two organisations, the final product failed to

secure the critical mass necessary to ensure its survival and the project was terminated less than a year.

In order to position themselves in segments of the multimedia market which they believe to be strategically important, many companies have used mergers or alliances as a way of acquiring the skills necessary to establish a credible position in the market. For example, *Bertelsmann* (which has publishing and pay TV interests) formed an alliance with *America Online* to set up *AOL Europe*. This allowed *Bertelsmann* to gain technical expertise in operating networks and providing services over the Internet which it can subsequently use in other ventures as the Internet market develops. Similarly, the *BBC* has developed its own Internet service provision and online information service in conjunction with *ICL*, which provided the IT skills necessary to give the service credibility.

3.2.2 Control of Channels to the Customer

A number of companies have used mergers and alliances in order to gain more control over the customer and thus increase the share of revenue they get from selling their products or services. *The Disney Corporation* gained access to a number of different delivery channels for its highly successful range of content by taking over *ABC* and *Capital Cities* in 1995, giving it access to both terrestrial and cable TV distribution channels. *BSkyB* has investigated a number of opportunities for delivering new services in conjunction with *BT*. The benefits for *BSkyB* are twofold: it can add interactivity to services delivered by broadcast satellite, and it potentially gains access to *BT*'s installed base (covering 97% of *United Kingdom* households in contrast to 17% of households covered by *DTH* satellite). Similar advantages have motivated *Bertelsmann* to co-operate with *Deutsche Telekom* in *Germany*.

3.2.3 Moving into Higher Value Areas of the Value Chain

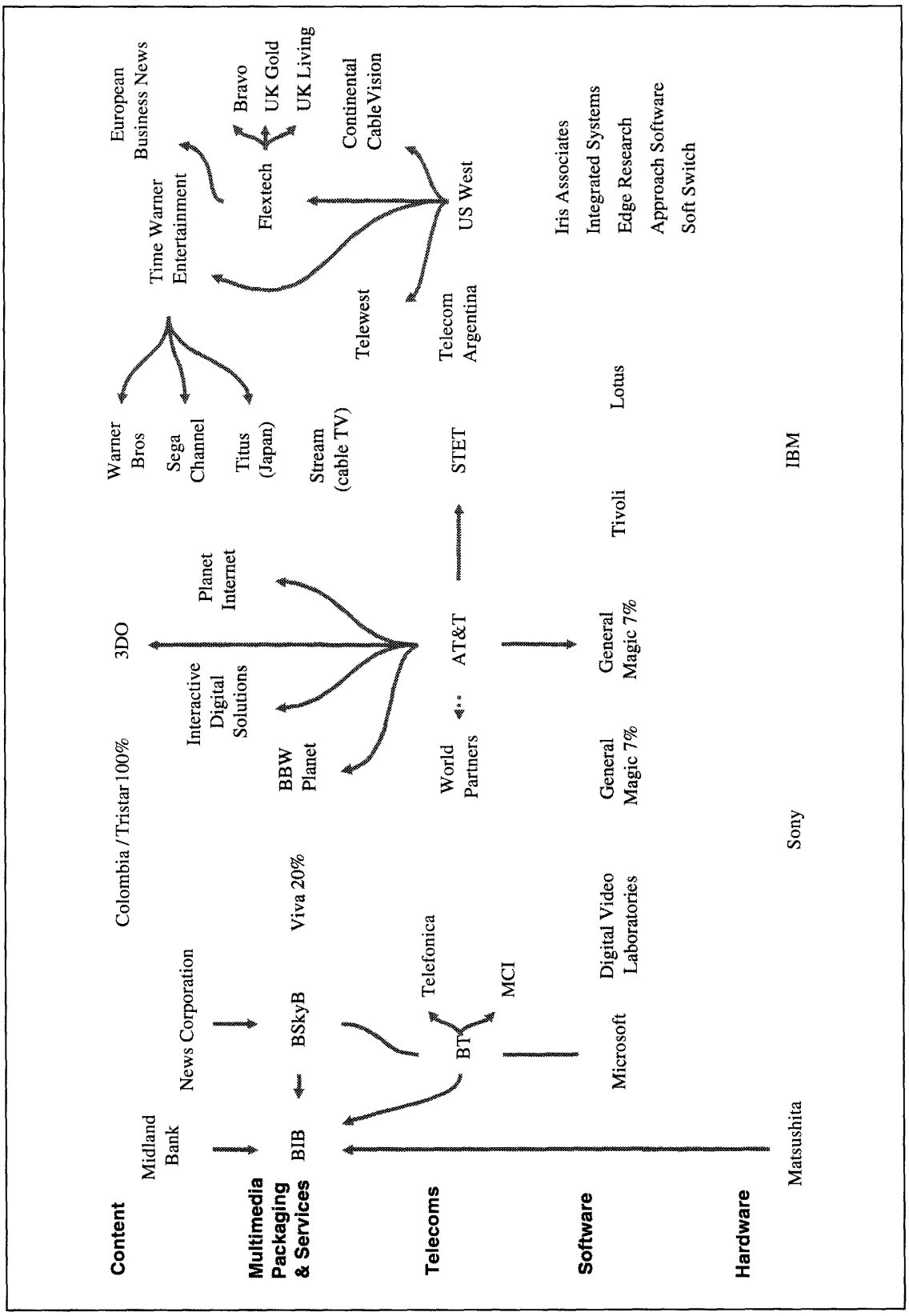
This motivation is evident in many of the non-exclusive alliances formed between companies operating in the Internet market and in other parts of the value chain. Mobile telephony providers such as *Cellnet* and *Orange* in the *United Kingdom* have recognised that, although mobile telephony is currently a high margin service, they need to move into other communications services such as Internet service provision (in conjunction with *UUNET*) in order to remain profitable as the overall communications market develops. Other companies such as *Microsoft* and *NBC* have formed joint ventures to exploit their complementary skills. Their joint venture, the Internet "news channel" *MSNBC*, allows *NBC* to add value to its basic broadcasting activities through the Internet and allows the *Microsoft* (through the *Microsoft Network*) to become a content provider.

3.2.4 Staving Off Competition from Companies in Other Parts of the Value Chain

Finally, some mergers have been motivated at least partly by the desire to combat competition from companies in related sectors, such as the players in the consortium backing the development of the network computer (who are seeking to undermine the dominant position of the leading players in the PC industry) and the investments by US RBOCs in cable television (seeking to prevent competition from cable TV companies entering the telecoms market).

Exhibit 3.6 illustrates the scope and range of vertical alliances and mergers in the IT, telecoms and multimedia industries: because of the complexity and shifting nature of vertical alliances a comprehensive illustration was not feasible.

EXHIBIT 3.6: Illustrative Vertical Alliances and Mergers [Source: Analysys]



4/ Review of Network Technologies for Multimedia

The current state of development of telecoms networks capable of supporting multimedia services raises two key questions:

- whether these services will be carried on networks running the Internet Protocol (IP), on Asynchronous Transfer Mode (ATM), or on both.
- what access technologies will be available to users.

The answers to these questions will have a fundamental effect on the architecture of telecoms networks and on the market structure of the telecoms sector. In particular, it will influence the relative market power of dominant telecoms operators, new entrants, Internet service providers and other value added network providers, and will have an impact on the degree of success of IT-based equipment manufacturers such as Sun and Ascend in competition with manufacturers of more traditional telecoms equipment. (These issues are explored in Chapter 2 of this report).

This chapter focuses on evaluating the state of preparedness of Europe 's telecoms networks for the transport and delivery of multimedia services, in particular analysing the current trends in network development which will influence the way in which multimedia services are transported and delivered in the future. Network readiness for multimedia services is not an easy concept to measure, partly because multimedia services are currently at a very early stage of development and partly because of the variety of different network technologies which can carry multimedia services. We have explored two measure of network readiness:

- the ability of the core network to transport, switch and route the multimedia traffic generated by the user groups
- the proportion of potential users with suitable access facilities to broadband, interactive (not necessarily symmetrical) core networks.

To capture these two measures we have assessed a number of proxies for each country (subject to availability of data):

Core network	• availability of public and private ATM services (core network criteria) • number of IP hosts
Access technologies	• number of IP hosts • number of digital subscriber loop ("xDSL") access modems in use or on trial • level of cable TV penetration, concentrating on hybrid fibre coax ("HFC") rather than purely analogue connections.

An overview of these technologies and their relative levels of deployment in telecoms networks in the EU Member States is provided in Section 4.1 (core network) and Section 4.2 (means of access). Conclusions on their significance for the development of multimedia services are provided in Section 4.3.

4.1 MEANS OF SUPPORTING MULTIMEDIA IN THE CORE NETWORK

The debate about technologies in the core network to support multimedia services is currently focusing on IP and ATM, as these are the most appropriate for reaching a multimedia mass market.

- IP, which has developed into the de-facto network protocol for the Internet, is able to transport and route all the elements of a multimedia service (text, image, motion-video and sound). IP is also used in intranet products, providing an infrastructure for multimedia applications within a company or a closed user group.
- ATM is of considerable interest as a multimedia transport technology. It is a high-speed (Gbit/s) cell relay technology, capable of transporting telecoms traffic of different characteristics (*e.g.* voice, data and video) over the same network and has been nominated by the ITU as the basis for broadband ISDN, the TOs ' favoured networking service for the future. ATM on the public network is currently available as a permanent virtual circuit service (PVC), which has limited routeing capabilities and is mainly used to provide a point-to-point link (analogous to a leased line) between fixed sites. However, as end-user demand for ATM transport rises, users will not want to be constrained by point-to-point links, so players in the telecoms industry are developing switched virtual circuit (SVC) services to provide full routing flexibility.

However, it is possible that the distinctions between these two scenarios will fade: elements of ATM switching technology are already being used by Internet service providers because of its high-speed switching capabilities, while ATM networks can also support the Internet protocol. Thus, the Internet could be carried over a world-

wide broadband ATM network. Indeed, it can be argued that if the Internet is to overcome its current capacity constraints and become a global multimedia network, installing ATM technology is a necessary next stage in its evolution.

4.1.1 ATM

ATM in Public Networks

It is likely that ATM will eventually be provided in a number of forms depending on the applications the TO is addressing. However, currently TOs can only supply PVCs and deliver multimedia services on point to point connections in the same way as providing a traditional leased line. This limits the use of ATM for multimedia services to those companies which can afford to lease a whole PVC. Full networking facilities with ATM can be gained in this way, but this approach requires the company to obtain separate switching facilities to complement the ATM PVCs, at greater expense.[12]

Standards bodies including ETSI and the ATM Forum are in the process of defining signalling protocols across the User-Network Interface (UNI) which will enable full ATM switching, *i.e.* an SVC service. It will then be possible to provide ATM on the public network on a seamless end-to-end basis. Time and bandwidth-related tariffing should further ensure that a wide range of users adopts it as a cost-effective means of transporting multimedia. Countries where these intermediate arrangements persist will move more slowly to full multimedia than those in which full ATM switching is introduced. From a purely technical viewpoint, leaving aside market considerations, full availability of this service would have the greatest impact of any current technology on telecoms networks' ability to provide multimedia.

As Exhibit 4.1 shows, Finland is leading the way in ATM deployment, followed by the bigger EU Member States. In many countries no public service has yet been announced, although most operators have at least trialled ATM. However, although the data was collected at the end of 1996, developments in this market occur very rapidly and the data may be quickly superseded. However, it will take time to roll out ATM networks and, in our view, if ATM does emerge as a key technology for multimedia the countries lagging behind in ATM deployment will be at a disadvantage.

[12] Frame relay technology is the most commonly used platform for switching at present.

EXHIBIT 4.1: Public ATM Services Offered by Incumbent TOs in EU Member States [Source: Company information]

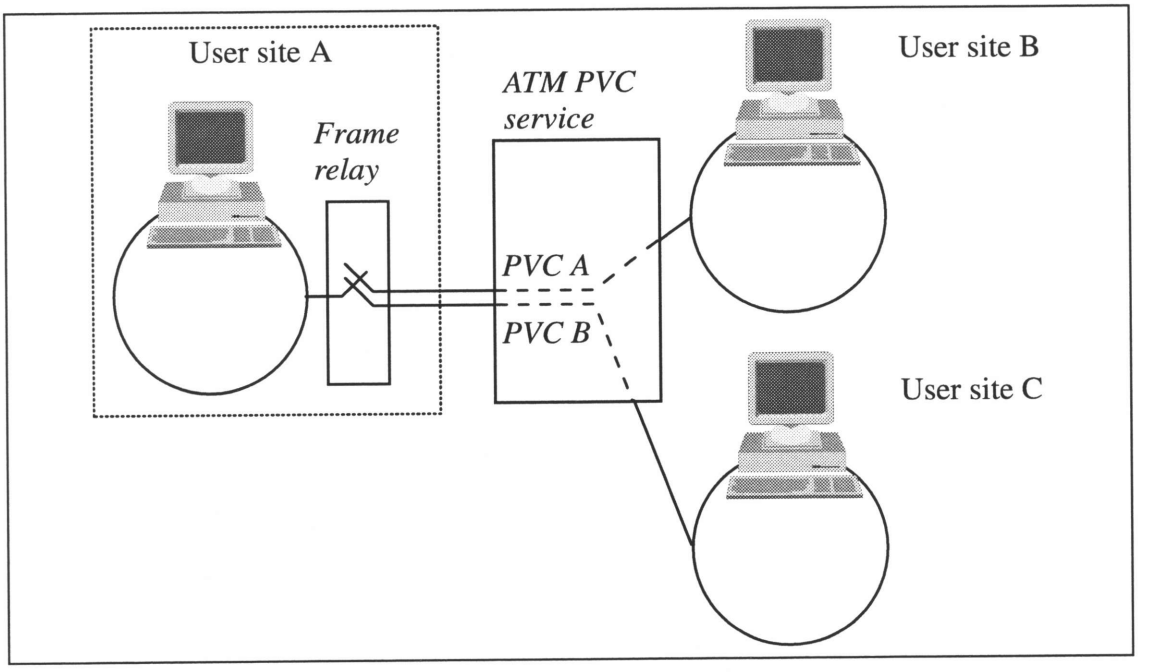
	Launch of Public PVCs	*Likely Launch of SVCs*
Austria	data not available	data not available
Belgium	data not available	data not available
Denmark	1996	data not available
Finland	1994	1997
France	1996	1997
Germany	1995	1997
Greece	data not available	data not available
Ireland	data not available	data not available
Italy	data not available	data not available
Luxembourg	data not available	data not available
The Netherlands	1996	1997
Norway	1996	1997
Portugal	1996	data not available
Spain	1996	data not available
Sweden	City Services, 1996	1997
United Kingdom, BT	Cellstream 1996	1997
United Kingdom, Mercury	Datalink 1996	1997

ATM in Corporate Networks

ATM is also being deployed, though very slowly, in the local and wide area networks of those large corporations and organisations which generate sufficient traffic from a variety of different types of application to make the installation of a single ATM network cost effective. For organisations wishing to migrate early to ATM, a wide range of switching products is now available: the role of the ATM service is to provide specific PVCs between sites (as illustrated in Exhibit 4.2 overleaf).

Due to the long legacy of frame relay services in corporate networks in some countries, these ATM enterprise switching products typically operate 'behind' frame relay interfaces. This arrangement allows the user to continue to use legacy switches in order to extract the maximum financial return, thereby smoothing the transition to ATM. However, those limitations relating to access bandwidth, burstiness, or latency which were previously experienced with frame relay will still apply.

EXHIBIT 4.2: ATM PVC Service in a Multi-site Environment [Source: Analysys]

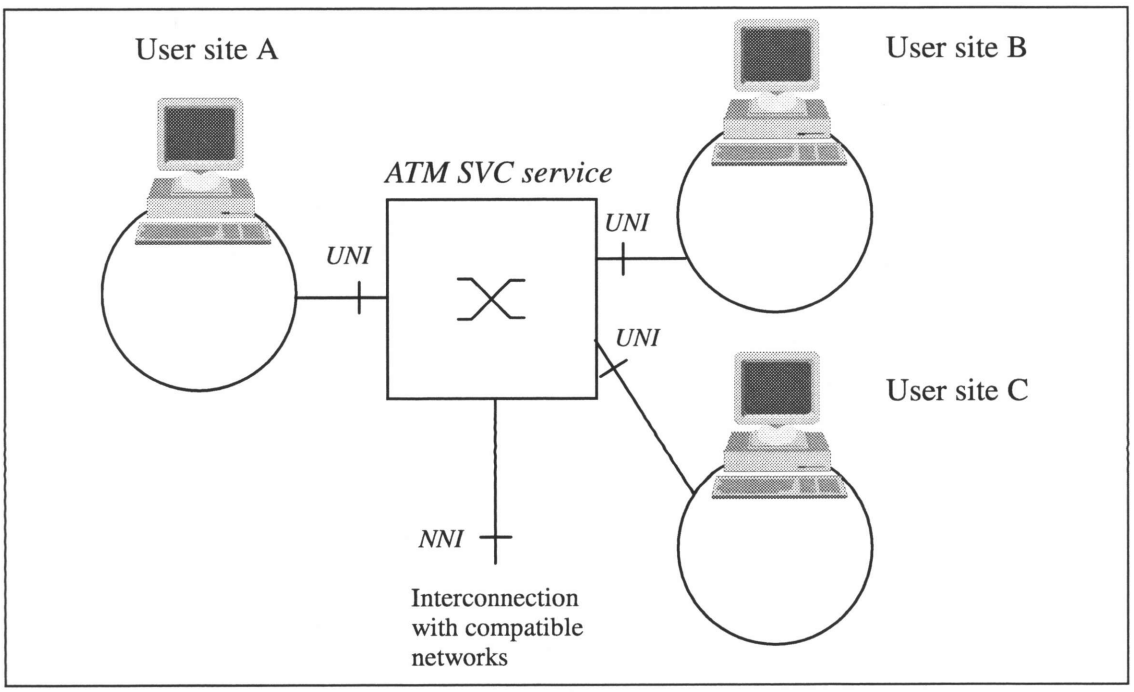


This is predominantly a market for international corporations, and ATM therefore currently represents a limited solution for introducing multimedia services into Europe. Evolution to a full SVC service could subsequently be accomplished as indicated in Exhibit 4.3, although there is a risk that other technologies such as IP may supplant ATM while companies are waiting for it to become cost effective. Moreover, many companies are still unsure of the benefits which ATM could give them, which makes the prospects for ATM very uncertain at this stage. However, if demand for ATM in the local network grows, this will stimulate further deployment of ATM in the core network by TOs.

International Compatibility

An important recent phenomenon is the interconnection of national ATM networks. Regional and global TO alliances are targeting international corporate users with seamless data and voice communications facilities based on ATM virtual private networks (VPNs). One of the first examples of this is BT 's Cellstream Service which was recently interconnected with MCI 's ATM service to provide transatlantic ATM PVCs without intermediate Frame Relay conversions, thus making the service more efficient for data and voice traffic and especially multimedia traffic.

EXHIBIT 4.3: ATM SVC Service can Replace Frame Relay Switches [Source: Analysys]



4.1.2 Internet Protocol

The Internet can best be described as a network of networks interconnected on an open basis using IP, usually running over transmission links leased from TOs. It has evolved very rapidly over the past decade from a largely academic- and government-sponsored network with a backbone capacity of 56kbit/s in 1986. In 1987 this capacity was fast being exhausted, and Merit took over running the *United States* backbone (under licence from the US National Science Foundation - NSF) increasing the capacity to 1.5Mbit/s. In 1993 its capacity was again increased to 45Mbit/s by ANS still under licence from the NSF. Finally the operation of the main Internet backbone was handed over to the commercial operators (including most of the major TOs in the world) with a backbone capacity of 155Mbit/s in 1996 and the NSF backbone was decommissioned. This huge change in the capacity of the Internet's infrastructure has been accompanied by similar changes in the number of people using the Internet and the range of applications and software tools developed for it.
The number of Internet users is difficult to measure directly, although the number of Internet and online services users world-wide is estimated to have grown from approximately 2 million in 1991 to 65 million by the end of 1996 (effectively doubling every year), and is projected to grow to 200 million by 2000.[13] However

[13] EITO Task Force.

the number of 'hosts' (computers connected to the Internet) can be directly measured and is related to the number of Internet users. Exhibit 4.4 shows that the penetration of hosts in the EU Member States in July 1997 varied greatly, with the Scandinavian countries far outstripping the rest of the EU, and even the United States, in terms of hosts per 1000 people. High Internet access charges have been particularly influential in slowing the rate of take-up in other countries such as France and Italy [14]. This is discussed further in Section B3. However, the growth rate of Internet hosts is now faster in those EU countries where penetration is lower, and the fact that the Internet is still at an early stage of development throughout the EU means there is no major first mover advantage to be gained in the Internet at the moment.

Through the development of the World Wide Web (WWW) as a graphical interface, the Internet can now support text, sound and video transfer, and interactivity (using Java 'applets'). In addition, the Internet is able to support video and audio conferencing, real-time transmission of audio (including Internet telephony) and even transmission of television programmes. However, the degree of interactivity and ability to support video communication is limited for many users by the bandwidth of their access link. As mentioned earlier access using a 28.8kbit/s/s modem is the most common form of access for residential users. The Internet is not universally regarded as a fully functional multimedia network today, but there are two areas of development in which the Internet shows great potential to be a transport medium for multimedia communications in the near future:

- innovation in developing protocols and software applications to support multimedia services
- further improvement in the capacity and reliability of the core Internet.

Moreover, in the past year, the intranet has begun to emerge as a viable corporate infrastructure for multimedia applications within a company or closed user group. The growth in net-based commerce has been marked, for example, both *Cisco* and *General Electric* in the *United States* have carried out $1 billion worth of trade in business to business electronic commerce in 1996. The European Commission has predicted that revenues are set to increase to ECU200 billion worldwide by the year 2000. The implications of all three areas of activity for the evolution of multimedia services are discussed below.

[14] See for example *Information infrastructure convergence & pricing: the Internet,* OECD Working Paper No 63, Paris 1996.

EXHIBIT 4.4: Internet Hosts in the EU Member States, July 1997 [Source: Network Wizards, http://www.nw.com]

	Internet Hosts	*Hosts per 1000 of population*
Finland	335 956	65.9
Norway	209 034	48.6
United States	11 829 141	45.4
Sweden	284 478	32.3
Denmark	137 008	26.3
The Netherlands	148 028	22.2
Switzerland	341 560	21.1
United Kingdom	878 255	15.0
Austria	87 408	10.9
Germany	875 631	10.7
Luxembourg	3 854	9.9
Ireland	33 031	9.2
Belgium	86 117	8.5
Japan	955 688	7.6
France	292 096	5.0
Italy	211 966	3.7
Spain	121 823	3.1
Greece	18 147	1.9
Portugal	19 711	1.8

New and Improved Protocols

The open, non-proprietary approach to standards for the Internet has made it easy for companies to take advantage of, and build on, the advances made by others in the industry. For example, the rapid development of the capabilities of the WWW has been enhanced by the open approach to browser development taken by vendors such as *Netscape*, *Microsoft* and *Sun*. The Internet will be further enhanced as a vehicle for multimedia transport by the development of several improved or new protocols which Internet service providers expect to implement in the next three years:

- IP version 6 has been developed but as yet has not been implemented by many Internet service providers. The first version of IP to have flow labelling capability, it will allow customers to be billed according to their usage (traffic) and the priority they give to different types of communication, revolutionising the Internet's ability to deal with real-time services on a commercial basis.
- the Resource Reservation Protocol (RSVP) will enable the use of applications which require a virtual path to be reserved between one user and another over the

Internet, or an intranet. This will also speed the introduction of real-time services.

- the implementation of multicasting protocols by Internet service providers will offer a much more efficient way of transporting data in any one-to-many or many-to-many communication, allowing higher-quality videoconferencing, for example.

Capacity and Reliability of the Internet

As previously noted, the capacity of the Internet 'backbone' (core network) has already increased dramatically in recent years and, as more and more TOs recognise the potential impact of the Internet on the telecoms industry, there is now scope for dramatic improvements in the capabilities of the Internet. Operators and alliances such as *AT&T*, *Concert*, *Global One* and *Unisource* have announced commitments not only to increasing the capacity of the backbone, but also to increasing the standards of reliability and security that underlie its performance. This is an important step in the final evolution of the Internet away from the academic sector and towards the commercial sector: the fear of poor network security and reliability has been a key constraint on business use of the Internet to date.

In addition, an impetus for a more efficient system of resource allocation is being created by the consolidation of the Internet service provision market, as a result of the entry of TOs into Internet service provision, the acquisition of service providers by TOs (*e.g. MFS*'s purchase of *UUNET*), and the merger activities of major Internet service providers such as *NETCOM* and *PSINet*. This consolidation is encouraging fundamental changes in the basis of interconnection charges and end-user tariffs for Internet services. The industry is moving from a system where service providers charge each other a flat rate for interconnection and subscribers are charged a flat rate for access, to a system where interconnection payments between ISPs are based on their relative use of each other networks and end-users ' charges are related to their traffic. These issues are explored in more detail in Section B3.5. These developments will create a more sound commercial basis for the Internet, improve the ability of the Internet to meet increases in demand and thus its potential as a delivery mechanism for multimedia services.

One possible consequence of these developments is that access to high-reliability Internet backbone transmission may be charged at a premium rate leading to the creation of a 'two-tier' Internet. This would provide higher quality of service for business users who could afford to pay premium rates for Internet access, and improve the prospects of the Internet as a medium for business multimedia services. However, most consumers would settle for a lower reliability, and slower Internet

access than the premium rate service, which would constrain the development of consumer multimedia services over the Internet.

Intranets

Intranets were probably the fastest growing area of the Internet in 1996. Their value as a low-cost, easy-to-implement way of running a variety of corporate information services has been rapidly recognised and it is estimated that deployment of intranets among Fortune 500 companies grew from nothing in 1995 to some 70% in 1996.[15] Corporate IT managers can install company-wide solutions using a common platform which is independent of user terminal type (*e.g.* PC, Macintosh or Unix) and has a ready developed suite of application tools.

Most companies using intranets have confined usage to basic management information systems such as document storage and retrieval systems and company discussion fora and secure trading within a closed user group either within company or including regular suppliers. However, companies are now beginning to run more complex applications such as collaborative working packages as they become more comfortable with the technology. Many possibilities for running multimedia services within companies have been created by intranets because intranets run over private networks, which can provide relatively high bandwidth to the user. This means that services such as Internet videoconferencing and application sharing for which Internet software has already been developed, become viable as commercial services for the first time.

Internet Standardisation

Standardisation of Internet protocols and software applications is an activity largely organised by the **Internet Society (ISOC)**. The ISOC is a professional society that is concerned with the growth and evolution of the world-wide Internet, with the way in which the Internet is and can be used, and with the social, political, and technical issues that arise as a result. The main institutions involved in Internet standardisation are as follows:

The **Internet Engineering Task Force (IETF)** is a loosely self-organised group of people who make technical and other contributions to the engineering and evolution of the Internet and its technologies. It is the principal body engaged in the development of new Internet Standard specifications, although it is not itself a part of the Internet Society.

[15] Zona Research.

The **Internet Engineering Steering Group (IESG)** is responsible for technical management of IETF activities and the Internet Standards process. As part of the Internet Society, it administers the Internet Standards processes which have been accepted and ratified by the Internet Society Trustees.

The **Internet Architecture Board (IAB)** is a technical advisory group of the Internet Society. It is chartered by the Internet Society Trustees to provide oversight of the architecture of the Internet and its protocols, and to serve in the context of the Internet Standards process as a body to which the decisions of the IESG may be appealed.

The **Internet Research Task Force (IRTF)** is not directly part of the standards process. It investigates topics considered to be too uncertain, too advanced, or insufficiently well-understood to be the subject of Internet standardisation. When an IRTF activity generates a specification that is sufficiently stable to be considered for Internet standardisation, the specification is processed through the IETF using the rules in this document.

4.2 METHODS AND CHARACTERISTICS OF ACCESS TO MULTIMEDIA TRANSPORT

The candidate technologies for delivering multimedia services to end-users are:

- the xDSL family: asymmetric digital subscriber line (ADSL) at present and very high rate digital subscriber line (VDSL) in the future [16]
- cable modems
- ISDN.

We also consider digital satellite technology in the form of one-way services combined with a telephony return channel (the high cost of two-way VSAT systems rules them out as a widespread means of access for multimedia services). These services have emerged over the past year as an important potential delivery mechanism for asymmetric multimedia services because of the high bandwidth they offer to the user and their cost competitiveness with other services.

All the access technologies considered in this section have different characteristics and unit costs, moreover potential access speeds and unit costs are changing continuously as research and development progresses and production volumes increase in response to growing demand. Exhibit 4.5 below clearly shows that cable

[16] High speed digital subscriber loop (HDSL), a symmetric 2Mbit/s access service, has now been superseded by VDSL. Although VDSL is asymmetric it can offer at least as much capacity as HDSL from the consumer to the network and much greater capacity in the other direction.

modems and ADSL offer the best trade-off in terms of unit cost and access speed which partly explains the degree of interest in these two technologies in particular. Moreover, different technology options are being pursued by different types of operator to protect their position in the market: for example, ADSL is critical to the TOs' ambitions to provide broadband and multimedia services to the mass market, whereas the cable TV operators competing for the same market will be looking to cable modem technology to provide the necessary interactivity. This diversity should help to promote the development of the multimedia applications which will lead to significant growth in multimedia services.

EXHIBIT 4.5 *Current Annualised Unit Costs and Typical Access Speeds for Alternative Technologies [Source: Analysys]*

Technology	*Unit Costs (ECU)*	*Typical User*	*Typical Access Speed*
Optical fibre	1000-1500	Business and residential	2Mbit/s and above
Satellite	1000-1200	Residential, SME	128-384kbit/s
Cable TV modems	500-700	Residential	2Mbit/s to 10Mbit/s (one-way)
ADSL	400-600	Business	2Mbit/s to 6Mbit/s (one-way)
BR-ISDN	350-450	Business and residential	64kbit/s to 128kbit/s
Dial-up PSTN + modem	100-200	Residential	9.6kbit/s to 56kbit/s
Wireless Local Loop (WLL)	400-500	Residential/small business	144kbit/s[17]6
GSM	300-400	Business and residential	9.6kbit/s

[17] Different WLL systems deliver different access speeds. Ionica claims its Proximity system can deliver 144kbit/s but there is no proof yet whether this can be delivered on a wide scale.

4.2.1 ADSL

TOs are interested in ADSL technology because it will allow delivery of multimedia content over copper pairs which are still used to serve almost all telephony customers. ADSL is capable of transporting 8.192Mbit/s in the downstream direction and around 500kbit/s upstream on twisted copper pair cables (transmission distance and maximum bit rate may, to an extent, be traded). For example see Exhibit 4.6 below

EXHIBIT 4.6 *Relationship of Access Speed to Subscribe Line Length for ADSL [Source: Analysys]*

Access Speed	*Subscriber Line Length*
1.544Mbit/s	18 000 feet
2.048Mbit/s	16 000 feet
6.312Mbit/s	12 000 feet
8.448Mbit/s	9000 feet
12.960Mbit/s	4500 feet
25.920Mbit/s	3000 feet
51.840Mbit/s	1000 feet

ADSL is quick to deploy, but suffers from high start-up costs (variously quoted as ECU400–ECU600 per end).

A majority of the countries in the EU have trialled ADSL, but none have announced public deployment. The initial impetus behind ADSL trials was the perceived potential of the market for video on demand (VOD). However VOD proved expensive to implement during trials in Europe and in the USA, largely because of the high cost of the servers required to store the films and the focus of ADSL development has turned to high-speed Internet access. A number of *United States* and European TOs have commissioned orders for ADSL modems – customer and exchange end – during the previous year.

Developments in ADSL technology (such as coding methods, increasing upper bandwidth limit, silicon implementation) are ongoing, resulting in a promising but presently rather unstable technology. As a result of the stalling of the VOD market, ADSL has suffered some credibility problems, although these are less to do with the viability of the technology than with the politics associated with those interested in delivering services. However, one outstanding issue which needs to be addressed is the limited distance that today's *xDSL* technologies can extend from the exchange. The distance from the exchange to the user varies between Member States and will be a key factor in determining which countries can take-up, and benefit from, ADSL.

4.2.2 Cable Modem

Cable operators would like to be able to carry two-way communications over their coax and Hybrid Fibre Coax (HFC) networks, and the cable modem is currently viewed their preferred solution. The cable modem allows symmetrical 10Mbit/s transmission on the network, but with limited availability: around 10% of users may have simultaneous use because the typical capacity of the primary distribution network, which all customers share, imposes this constraint. Cable TV operators can add more capacity in this part of the network, but are likely to do so only when they have enough cable modem users to justify doing so. Capacity higher up in the cable TV network (primary distribution network) will have to be upgraded from today's typical levels if cable modems become widely used on CATV networks. Cable TV networks can also provide asymmetric transport by using the downstream channel capacity (at say 500kbit/s) in a 'narrowcasting' mode and their narrowband telephone capability (where permitted) in the up-stream direction, providing the interactivity necessary for multimedia services. The cable modem is said to be currently somewhat cheaper than ADSL modems at ECU500 -ECU700 per line.

Cable modem technology, therefore, is a relatively inexpensive way of upgrading cable TV networks, particularly HFC networks, to enable the delivery of multimedia services. Those networks in which only a small proportion of the infrastructure is HFC will have to invest substantial resources to upgrading their networks. Exhibit 4.7 (overleaf) shows the pattern of analogue and digital cable TV network penetration in Europe in 1996. Typically, there is an inverse relation between the proportion of network infrastructure which is HFC (therefore multimedia capable with cable modems) and the overall penetration in terms of all cable TV subscribers. The potential for cable TV networks to become multimedia service delivery networks therefore depends on the determination of the majority of cable TV operators to upgrade their networks, and the size of the additional costs versus the additional revenues they can gain from doing so.

EXHIBIT 4.7: Cable TV and HFC Penetration in the Member States, 1996 [Source: Cable and Satellite Yearbook 1996, Analysys]

	Total Cable TV Penetration (%)	*Of which estimated HFC Penetration (%)*
Austria	36	5
Belgium	94	0
Denmark	55	5
Finland	42	2
France	7	80
Germany	48	5
Greece	0	N/A
Ireland	45	1
Italy	0	N/A
Luxembourg	90	2
The Netherlands	93	2
Portugal	1	100
Spain	5	90
Sweden	46	5
United Kingdom	6	100

4.2.3 ISDN

Basic rate ISDN provides a symmetrical capability of 144kbit/s including a 16kbit/s signalling channel on existing copper pairs over distances of about 5km. Standardisation activity by the ITU and ETSI has resulted in a closely-defined set of bearer services, tele-services and supplementary services within a Euro-ISDN framework.

Implementation of ISDN is making uneven headway in the Member States, as illustrated by Exhibit 4.8. The primary reason is the variation in access prices charged to the consumer. In countries such as *Germany* where the rental charge is low, take-up of ISDN has been much higher than countries such as the *United Kingdom*, where rental charges are still relatively high: some operators have decided to control the diffusion of ISDN services through tariff policy.

However despite this uneven level of penetration there are signs that take up of ISDN is really taking off in Europe. Operators are reporting growth rates of 50-100%, some of which can be ascribed to marketing and price changes, and some of which may be due to demand for Internet access, particularly from SMEs migrating from dial-up PSTN Internet access.

EXHIBIT 4.8: Basic Rate ISDN Subscribers in Some EU Member States [Source: Analysys]

	1995	*1996*
Austria	8500	16 800
Belgium	25 300	45 500
Denmark	11 400	20 500
Finland	400	7500
France	300 000	550 000
Germany	900 000	1 500 000
Ireland	2000	5000
Italy	17 500	43 500
The Netherlands	7200	10 500
Spain	48 000	81 500
Sweden	10 000	19 000
United Kingdom	100 000	180 000

Once implementation of Euro-ISDN is complete, it will be possible to set up seamless international ISDN calls (within Europe) featuring a common set of supplementary services as well as all bearer and tele services. However, if differences in ISDN penetration, particularly in high-speed access, persist beyond the turn of the century, it could affect the development of the multimedia market. Primary rate ISDN is typically used for connecting corporate sites to wide-band public networks and is well-established in some Member States. The service can use the whole 2Mbit/s bandwidth for each end-user. This provides two-way symmetrical wide-band communications, with a range of supplementary services suitable for corporate inter-site communications such as LAN-LAN communications.

4.2.4 Digital Satellite Access

Since 1994, *DirecPC* has been providing relatively high bandwidth data communications services (384kbit/s downstream with 28.8kbit/s upstream link via the PSTN and modem) in the USA using very small aperture terminal (VSAT) satellite technology. In 1996, its parent company *Hughes* launched a similar service in Europe in partnership with *Olivetti*. The price of the equipment varies between ECU600 and ECU800 and the average usage charge is ECU500 per year. This is competitive with the full cost of basic rate ISDN.

The attraction of satellite access for providing multimedia services is the high downstream bandwidth available. *DirecPC* currently offers users a 384kbit/s service, but downstream bandwidths as high as 40Mbit/s are technically possible, although prices will increase with bandwidth. In addition to the *DirecPC*-style

satellite access services, a number of satellite television broadcasters announced their intentions in 1996 to provide Internet access at bandwidths of 10Mbit/s over their existing networks, (though the customer would require specially-developed set top box technology to decode the signals). This too would require the use of the PSTN to provide a return channel, but would offer the prospect of even cheaper access to multimedia services carried over the Internet, for the price of a satellite TV dish and set top box.

4.2.5 Dial-up PSTN, GSM and WLL

As shown in Exhibit 4.5, the access speeds of dial-up PSTN, GSM and WLL are fairly low in comparison to those using ADSL and cable modem technology. Higher access speeds may be possible with dial-up PSTN and GSM access if the networks supporting them are upgraded. The most likely upgrade to dial-up PSTN is, however, ADSL technology, as discussed above in Section 4.2.1. The prospects of such an upgrade will increase as more fibre is installed from the local exchange towards the subscriber. This reduces the average length of copper pair over which ADSL has to work, and as a result ADSL is easier to introduce.

GSM networks may be upgraded by deployment of General Packet Radio Networks (GPRN) as overlays on existing GSM networks. This would enable access speeds of 115kbit/s which might be fast enough for cellular communications users.

The future development of WLL technology is very uncertain , as these networks are still in their infancy. Currently, increasing the local access bandwidth is not a priority for WLL operators who are more concerned with rolling out their networks and gaining subscribers.

4.3 Conclusions

- From a purely technical viewpoint, full availability of switched ATM at an affordable price would have the greatest impact of any current technology on the provision of multimedia services. However, many TOs are delaying implementation of switched ATM because future demand is too uncertain to justify widespread commercial deployment.

- Deploying switched ATM in the public network is a lengthy process (perhaps two to three years depending on the size of country and the level of infrastructure development). If ATM does emerge as a key technology for multimedia, the countries lagging behind in ATM deployment will be at a disadvantage.

- Developments in the Internet and related protocols are enabling the provision of multimedia services over public and private networks, and represent a serious challenge to the use of ATM. If these are fully taken up in the Internet (and if local access speeds increase), the Internet could emerge as the medium for consumer multimedia services in the next five years. In the business market, development has been faster and intranets (running IP over corporate networks), are likely to become a major way of providing business multimedia services over the next three years.

- Given that the deployment of the IP and associated protocols is at an early stage of development in Europe, and that Internet usage is growing rapidly, those countries who are behind in development should be able to catch up with the leading countries if they fully embrace the Internet.

- Affordable high speed local access capacity is essential for the development of multimedia, particularly in the consumer and SME markets. The leading solutions to this problem are ADSL and cable modem technology. Both of them are incremental upgrades to existing networks which are already widely deployed. However, in each case technical and network provisioning issues have to be solved before either can be considered a viable mass market technology, making predictions of their future importance for multimedia services difficult.

- ISDN has a greater capability to support multimedia services than cable modems or ADSL, and the number of ISDN users is increasing, but at current growth rates ISDN will still represent a small part of the market in five years ' time. TOs can only make ISDN available at a price affordable to the mass market if demand is sufficiently high for revenue to cover costs (unless the TO is willing to make a loss). However, current levels of demand are not high enough to enable TOs to supply ISDN at mass market prices, therefore demand stays relatively low and price relatively high.

5/ Demand for Multimedia Applications

This chapter examines the trends which are influencing the demand for multimedia applications in both the business and the residential sectors. It aims to provide a context for the supply-side analysis of potential multimedia infrastructures in Section 4 above. We do not attempt to predict the future diffusion of these applications in any detail, as this will be contingent both on future changes in the capabilities of communications networks, and on pricing policies, marketing and promotion strategies.

5.1 Driving forces for Multimedia in Business

Traditionally new telecoms services are initially taken up by the business sector before being widely used by private individuals. This was clearly demonstrated in the case of mobile telephony where mobile operators waited for the imminent saturation of the business market before targeting their services at private individuals through consumer tariffs. In addition there are a wide range of telecoms services which, for reasons of cost or because of their specialised nature are of little interest for private individuals.

It is arguable that the business sector will account for the bulk of the take-up of multimedia services in the short term and medium term because of the financial resources available to business and the competitive advantage those services will provide. In the longer term the residential market may challenge the business sector because of the scale of the customer base.

There are a number of important forces which will drive the demand for multimedia services in businesses in the developed world. We examine a number of these in the following sections.

5.1.1 Internationalisation

Large businesses operating on several sites want to be able to communicate across all parts of their company (and even with collaborating partners) as though they were on a single site, ignoring national boundaries. As a result, there is increased demand for bearer services which can provide connectivity for closed user groups (CUGs) and VPNs (*e.g.* Frame Relay, Switched Multi-megabit Data Service) regardless of geographic location. In order to support this 'virtual single site' service, service providers must offer number portability, terminal and personal mobility, CUG numbering plans and intelligent networking capabilities, particularly in relation to the ability to efficiently manage the various facets of service creation.

End users want to be able to send text, voice, data, files, and still and moving images without having to differentiate them and transmit them by different means. However, multimedia communications make specific demands on the behaviour of the physical medium (transparency, bandwidth, geographic reach) and on the network protocol which is responsible for routing and for ensuring that all components of the multimedia message are correctly delivered. Other important factors include predictable transit delay over the network and correct sequencing and synchronisation of information as the components of multimedia are assembled at the destination. Finally, the desktop application must ensure that while the technology is largely transparent to the user, he retains the ability to manage both short-term and longer-term aspects of the multimedia communications, including security and resilience, session and call management, charging and quality-of-service contract. These user requirements can now be supported by ATM and, to a lesser extent, by ISDN bearer and supplementary services.

5.1.2 Electronic Commerce and Intranets

Business to business electronic commerce is already well established. A few leading companies, *e.g.*, General Electric, claim to have carried out over $1 billion of transactions using electronic commerce in the past year, whilst DELL computers claim to be doing $2 million sales per day. Major companies are adopting Internet based electronic commerce (usually over a private network running the Internet Protocol) enables them to make significant cost reductions in their transactions with suppliers or producers. Unlike earlier attempts at electronic commerce through EDI, for example, electronic commerce over the Internet has taken off because the incremental costs of using it are very low. It relies on the standard software interfaces - web browsers - and programming tools of the Internet which reduces complexity, cost and training needs.

5.1.3 Better Prospects for Teleworking

Multimedia services can provide an improved opportunity for people to work from home or from local centres without having to travel to the major cities on a daily basis. Despite the apparent economic and personal advantages of teleworking, the growth of such arrangements has proved slower than anticipated by many observers. A key obstacle has been the experience that the teleworking employee feels, and is perceived to be, relatively isolated from the organisation. There is a real prospect that by allowing eye-contact through video-links and improved collaborative working with remote colleagues, Multimedia services will help to reduce this sense of isolation, and improve the effectiveness of remote working.

An enhancement of the appeal and efficiency of remote working could have significant consequences, as there are important incentives for encouraging such arrangements both at the level of businesses, and at the level of public policy. The key issues are those of direct and indirect costs, particularly those related to transport and office space, environmental policy, and the economic health of rural areas. The environmental concerns and the arguments about indirect cost focus on the increasing congestion of many economic centres. In addition, this concentration of employment in urban centres contributes to the depopulation of rural areas.

There have been some attempts to alleviate the problems of large numbers of people seeking access to restricted areas at the same time. The increasing prevalence of flexi-time has helped to reduce the requirement for people to travel to and from work at the same time. However the effect of these measures has been overwhelmed by the rate at which the problem is increasing. Remote working enhanced by multimedia may provide better opportunities for people who process information to be based in rural parts of the country which previously were unsuitable locations for that type of business

Although the issues described in this section are likely to seem matters for private individuals, most of the communications service and equipment costs will be met by employers or businesses. The welfare of employees (as well as the efficient use of their time) as well as a desire to be seen as a "good corporate citizen" will stimulate businesses to invest in multimedia for their employees.

5.2 DRIVING FORCES FOR RESIDENTIAL MULTIMEDIA

Although residential multimedia is likely to lag behind business multimedia in the short and medium term, the longer term is likely to see a strong market develop. There are a number of driving forces which will cause this market to grow. We examine the most important of these in the next sections.

5.2.1 The Growth of Multimedia in Business will Stimulate Home Use

The residential market for multimedia services will not be isolated from the business multimedia market. People using multimedia services in their professional lives will have their expectations raised in their private lives. This will create a desire for multimedia services for personal use which is likely to be targeted by multimedia service providers when growth in the business market becomes sluggish as that market saturates.

Another way in which business multimedia will stimulate residential multimedia is that there will be many households with terminals installed for business purposes which will use those terminals for personal purposes outside business hours. This will reduce the barrier to entry to multimedia services for residential customers who can use terminals supplied by their employers or businesses, whilst use at work or within the educational system will mean users are both familiar with and conformable using new services. In addition, the television set, enhanced by the use of a set-top box, will be able to support an increasing range of multimedia services. This will encourage the development of digital television platforms (both satellite and cable) for services such as home banking and video-on-demand.

5.2.2 Electronic Commerce

The usefulness of the Internet is largely limited at present to gathering freely available information. When it will be possible to operate small transactions over the Internet then enormous multimedia shopping opportunities will arise. Already the *United States* based *First Virtual Shopping Mall* is setting up an operation in Europe. Already retailers are setting up servers which allow customers to make larger purchases using credit cards *e.g.*, *WH Smith,* a *United Kingdom* bookseller. The possibilities of extending such services are enormous *e.g.*, online stock trading. The catalogue shopping industry is very large in Europe. The experience in *France* is that where it is possible to do so many catalogue customers place their orders using *Minitel* terminals because the order will reach the supplier almost immediately in contrast to ordering by post. There is scope for most of these transactions to be done via multimedia in the future, using a PC or an enhanced television set. Even retailers such as supermarkets which deal in perishable goods and rely on a high proportion of impulse buying for their profits could find multimedia delivered over the Internet to be a valuable route to their customers.

5.2.3 Entertainment

Entertainment is an area well suited to multimedia applications. In the late 1980 's and early 1990's video-on-demand became over-hyped as the killer application for

multimedia. There is no doubt that the problems of immediate access to huge video servers offering a wide selection of video entertainment on demand are significant. However, some video on demand is available over the Internet if the user is prepared to wait for the download time. As Internet performance improves with increasing bandwidth access (possibly via cable TV modems), video-on-demand will expand into a more useful service with more significant quantities being available in a reasonable download time.

An imminent multimedia entertainment application is audio-on-demand whereby music is downloaded to be stored and listened to by the customer. There already exist organisations which allow customers to download CD-quality music over the Internet, dispensing with the need to manufacture and distribute physical media such as CDs or cassettes. Improvements in the Internet infrastructure mean that downloading music no longer requires inordinate amounts of time. In fact "the artist formerly known as Prince" recently announced that he will make his future recordings available only over the Internet.

As well as video and audio entertainment, interactive entertainment of various kinds is emerging. Clearly multimedia computer games will interact across networks to allow anything from remote chess to simulated war games. Cable TV users in the *United Kingdom* can already download electronic games via existing cable networks, and digital networks will permit interactive gaming. Additionally, browsing the Internet is now a regular passtime for many of those who have access. New interactive entertainment forms are emerging as players begin to explore the possibilities of the Internet and other multimedia communications.

5.2.4 Education

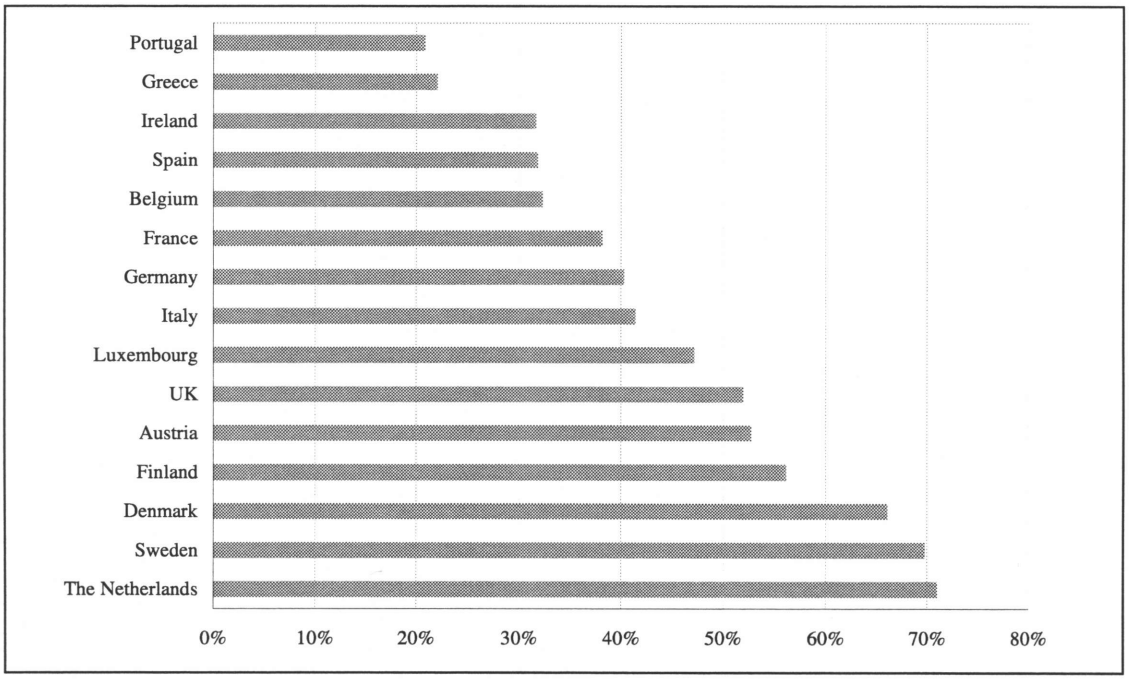
The role of computers in education is becoming well established. Submission of hand-written work (particularly in tertiary institutions) is becoming marginalised, and is not always tolerated. The availability of computers in places of education means that possibilities for computer-based learning are being explored. This is particularly useful for distance learning.

As society changes the need for people to continue education into adult life is becoming greater. More employed people are taking courses to advance their skills. Distance-learning tools are becoming increasingly computer/multimedia based as more students have access to computers and the multimedia approach increases. Developments in set-top box technology will also enable a high proportion of the population to access multimedia education services via television sets equipped to receive digital television.

6/ Multimedia Compatible Technologies in the Home

Chapters 4 and 5 discussed current trends in the development of multimedia services, and transmissions technologies to support them. However, the development of the multimedia market will also be affected by developments in terminal equipment and user purchasing behaviour, particularly in relation to high-technology consumer goods. Currently the business multimedia market is larger than the residential market and may continue to be so for 2 or 3 years. As Exhibit 6.1 below shows the use of PC's at work is fairly widespread and significantly higher than the penetration of PCs in the home. However the consumer market is not substantially smaller than the business market and has great potential for future growth through the development of interactive entertainment and electronic commerce. This chapter focuses, therefore, on the consumer market as trends in the purchase of multimedia-capable terminal equipment will be much more important in the successful development of the consumer market than they will be in the business market, which is generally less constrained by cost concerns.

EXHIBIT 6.1: Proportion of Workforce Using PCs at Work [Source: Eurobarometre]



By analysing the current state of the consumer market and the trends which are visible, it is possible to assess:

- the extent to which consumers' terminal equipment can already support multimedia, and the immediate limitations this places on the spread of multimedia services
- the need for further development of consumer terminals and the extent to which this can be achieved incrementally
- indications of households' propensity to spend on new types of terminal equipment.

Several relevant types of technology are discussed:

- PCs
- terrestrial TV
- satellite TV
- cable TV.

6.1 HOME COMPUTING

The penetration of home computing grew steadily in Europe during the 1980s, but the rate of growth slowed during the recession of the early 1990s. This led some commentators to suggest that the potential home computing market was limited, and given its low penetration in comparison to terrestrial television, they argued that television had to be the starting point for consumer multimedia. However, three factors have subsequently given impetus to the growth of the consumer PC market and strengthened its position as the consumer multimedia tool of the future:

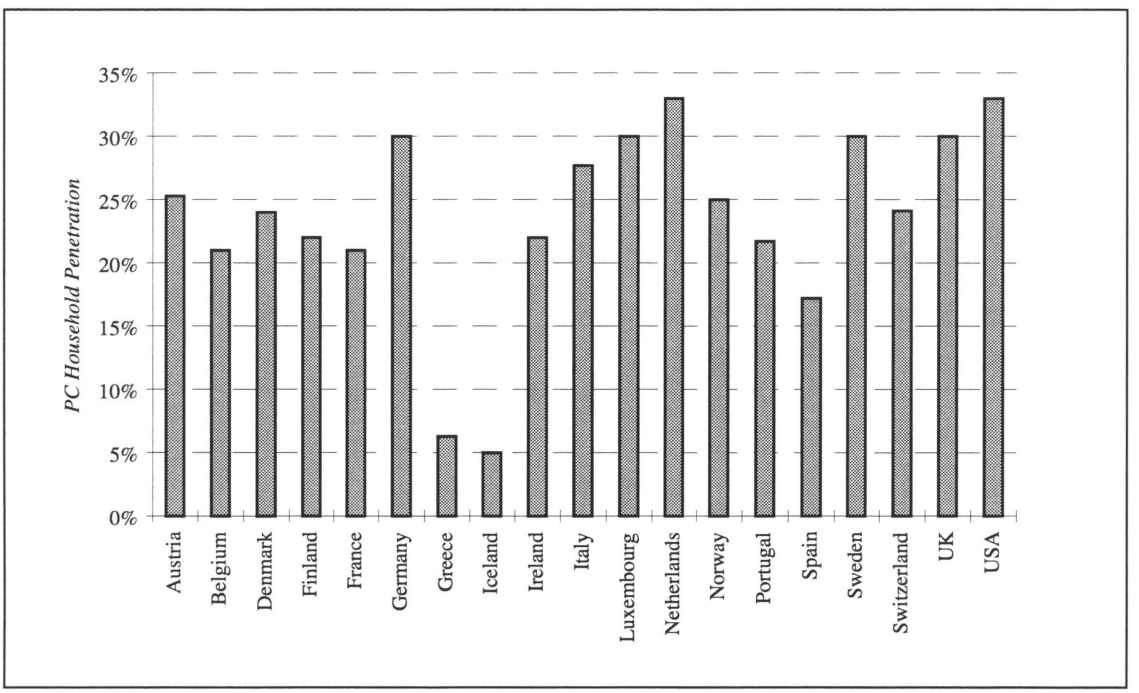
- rapid growth of the Internet
- public perception of the value of the PC as an educational tool
- development of increasingly powerful PCs, leading to the incorporation of CD-ROM technology in what are loosely described as 'multimedia PCs'.

Added to these factors there is a growing belief in some quarters that the Internet and the PC offer a viable evolutionary path to the development of multimedia services. Current trends in home PC ownership are therefore an important indicator of potential future household demand for multimedia.

Penetration varies widely within the EU as shown in Exhibit 6.2. Average PC penetration across the EU Member States in 1995 was 18% compared to 33% in the USA. The IT sector in the USA is generally believed to be about two years ahead of Europe, which suggests that Europe too could experience similar levels of

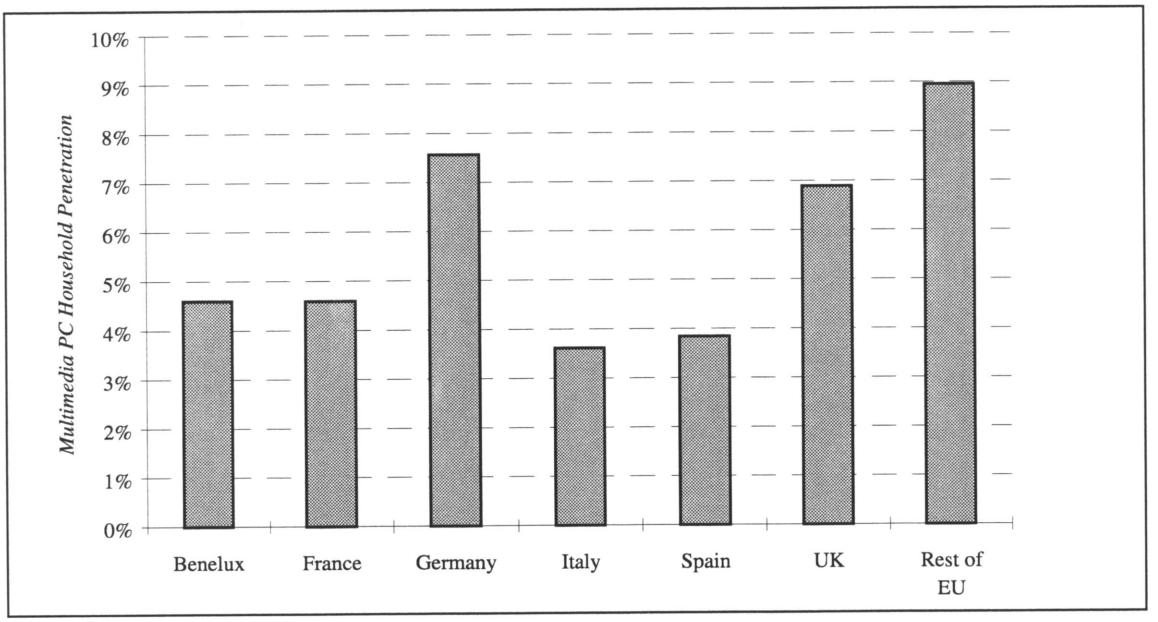
penetration. However, cultural factors, particularly the acceptance of new technologies, do vary between the *United States* and *Europe* and this may limit the extent to which developments in the *United States* Internet market can be applied to *Europe*.

EXHIBIT 6.2: PC Household Penetration, 1995 [Source: NTC European Marketing Pocket Book 1997, Analysys]



It is also important to consider the composition of the installed base of PCs in Europe, as older PCs will not be able to run multimedia applications. As shown in Exhibit 6.3 (overleaf), the penetration of multimedia PCs is well below that of PCs as a whole, although developments in PC technology are so fast that it is quite common for home PC users to upgrade a PC every three years. This will mean that in three years' time the majority of PCs are likely to be multimedia capable, assuming that all current users conform to the three yearly upgrade path.

EXHIBIT 6.3: Penetration of Multimedia-Compatible PCs in the Household, 1995 [Source: European Audiovisual Observatory 1997]



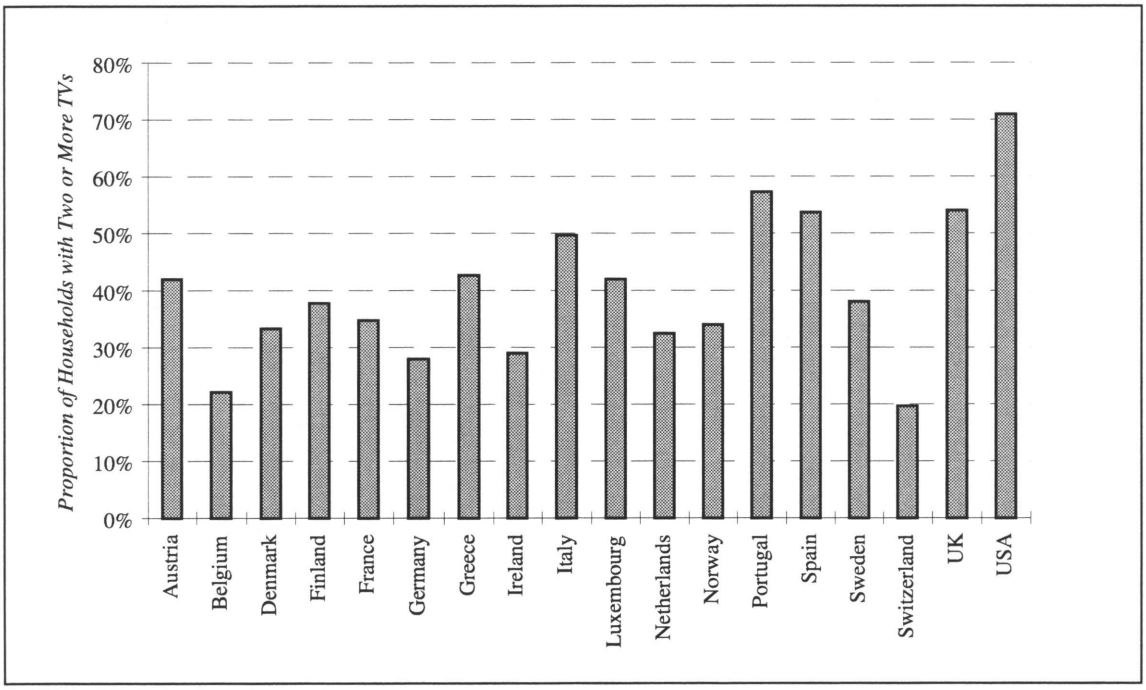
6.2 TERRESTRIAL TELEVISION

The penetration of TV sets across the EU is uniformly high as shown in Exhibit 6.4, but the TV set has limited potential as a multimedia tool. For example, the resolution of TV screens is currently considered inadequate by video games producers for playing interactive video games; comparable quality to that of dedicated handheld consoles will only be achieved with high definition TV.

What television does have in its favour is its near universal household penetration (higher than the telephone in all EU countries) and the fact that consumers are used to periodically replacing their television sets. Thus despite the current limitations of TV sets, they are the benchmark against which other terminals for consumer multimedia must be measured when considering which other technologies, in particular the PC, will be used for mass market multimedia.

In this sense the functional limitations of TV sets are likely to be a constraint on the rate of take up of multimedia services in the home. Web TV and others have developed technology to allow Internet access via the TV set, but there is still a question mark over whether the quality will be sufficient to generate a rapid take up of Internet access and following that, multimedia services. This path is attractive though as an incremental route to developing multimedia terminals for residential users. TV sets are periodically replaced every seven years on average, making the diffusion of new technologies in television receivers relatively slow but not infeasible.

EXHIBIT 6.4: Proportion of Households with Two or More Television Sets, 1995 [Source: European Audiovisual Observatory 1997]



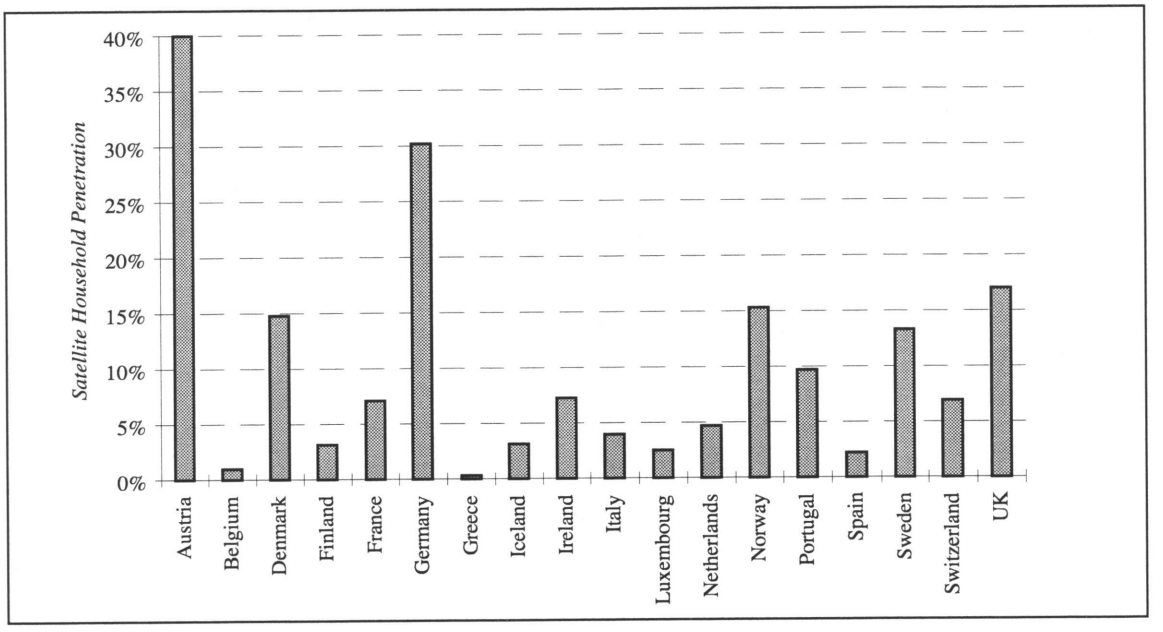
Another important element of television set penetration is the proportion of households with two or more television sets as shown in Exhibit 6.4. This gives an important indication of the potential for development of TV-based consumer multimedia: multimedia is unlikely to replace pure television viewing in the medium term, therefore households are likely to require more than one receiver. The proportion of multiple TV set households varies much more widely across the EU and this gives a more accurate picture of the relative rates of development of TV-based multimedia across the EU than looking at television sets alone.

We should, however, remember that the diffusion of PCs in the residential market and the development of multimedia services will also be affected by what is happening in the business market. Although PC penetration in the home is much lower than TV set penetration, it will be given additional impetus by the earlier development of PC-oriented multimedia in the business market.

6.3 SATELLITE TELEVISION

Direct to home (DTH) satellite broadcasting is a relatively new service in Europe, and the proportion of households subscribing to satellite television is low compared to the proportion receiving terrestrial television and, in some cases, cable television. The position in individual Member States varies considerably as shown in Exhibit 6.5 (overleaf).

EXHIBIT 6.5: Proportion of Households Subscribing to Satellite Television, 1996 [Source: Cable and Satellite Yearbook 1997]



This variation is to some extent due to variations in household penetration of cable TV in the EU, as market development of DTH satellite has tended to be slower in those countries where similar content has been available via widely-distributed cable TV networks. The price charged for satellite dishes and conditional access devices to the consumer has also strongly influenced the rate of development of the satellite TV market. The decision on how much to subsidise the cost of this equipment has been vital to the success of satellite TV in terms of building up market share.

The rate of growth of satellite television penetration is faster than that for television receivers or cable TV, and may be given a boost with the development of more services (over more channels) through digital satellite broadcasting. Digital television will require the adoption of another series of conditional access decoders and in some cases may require different receivers. However, the low installed base of DTH satellite subscribers means that relatively few subscribers ' systems will be made obsolete by the introduction of digital technology.

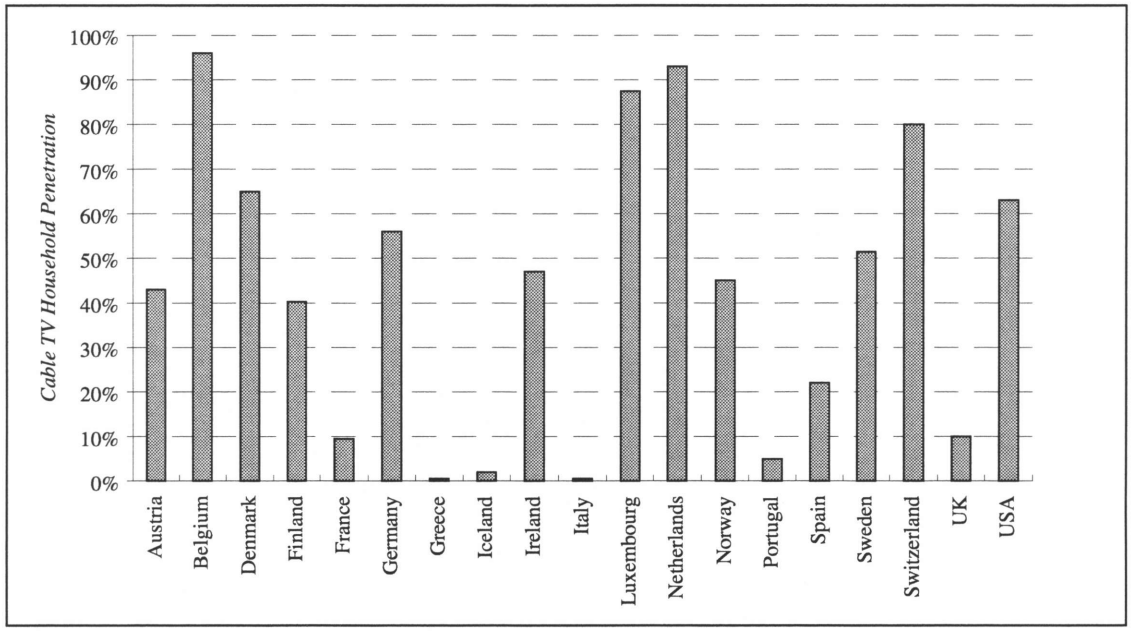
6.4 CABLE TELEVISION

Cable television is potentially a very interesting household technology for multimedia, because of the broadband characteristics of cable TV networks. High speed Internet access (currently up to 10Mbit/s) is one of the leading sources of the interest in cable TV networks as a medium for consumer multimedia. The other is

digital television, which some cable TV operators are considering introducing in 1997/8.

However, simply looking at the household penetration of cable TV today (illustrated in Exhibit 6.6) gives a misleading picture of cable TV networks' multimedia potential. As explained in Chapter 2, the majority of cable TV viewers subscribe to analogue cable TV particularly in those countries where penetration is highest, such as the Benelux countries. Analogue networks will have to be substantially upgraded in order to be able to deliver multimedia services.

EXHIBIT 6.6: Proportion of Households Subscribing to Cable Television, 1996 [Source: Cable and Satellite Yearbook 1997, Analysys]



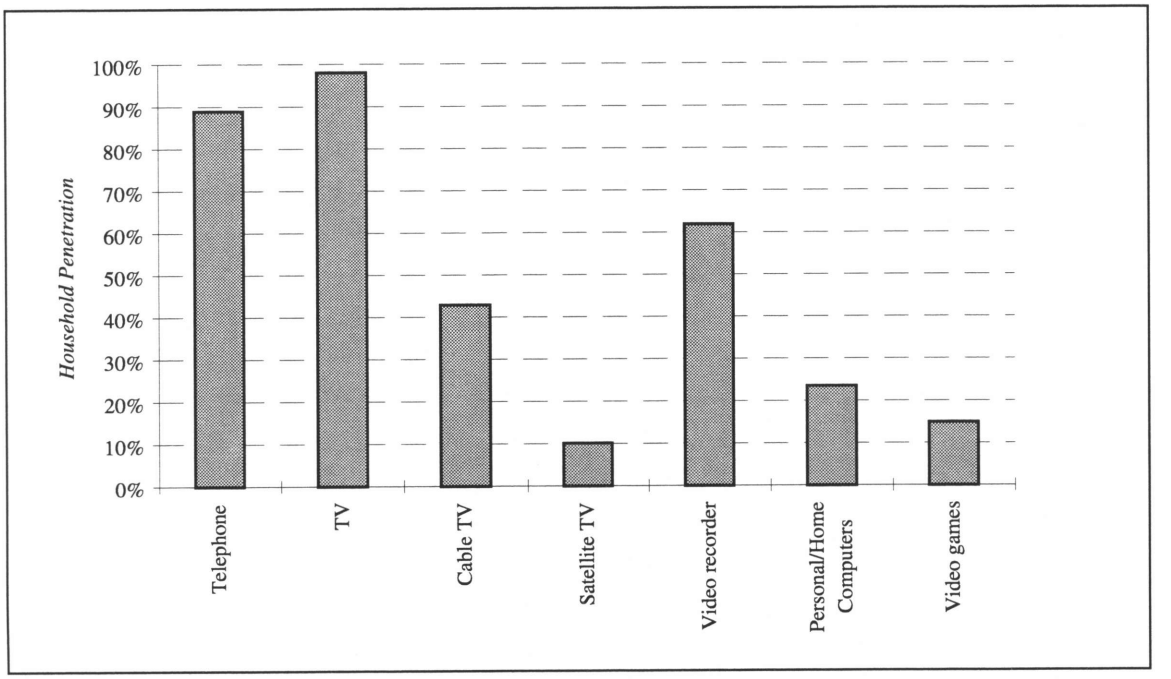
If cable TV subscribers need to purchase conditional access decoders or cable modems in order to receive multimedia services, this will require a major change in mindset over traditional consumption of cable TV. Consumers will need to be relatively sure of the benefits of high speed Internet access or digital TV before spending substantially more on cable television than they are currently used to spending.

6.5 CONCLUSIONS

Exhibit 6.7 (overleaf) compares the average EU penetration for all the products/ services covered in this section. Across the EU, penetration of PCs is increasing faster than most other household technology products, but there is a large price differential between the middle of the range PCs and other consumer products in this

category. Once the costs of modems are added the equipment for Internet access appears very costly compared to that need for television based multimedia. Recent IT developments such as the network computer have been identified as a means by which this concern could be addressed. However, if the pricing difference is not resolved, PC penetration may well reach a plateau, limiting PC-based multimedia services to only a part of the population.

EXHIBIT 6.7: *Comparison of Average EU Penetration Rates for Household Technologies, 1995/6 [Source: Analysys, NTC, Cable and Satellite Yearbook, European Audiovisual Observatory]*



The pace of development in multimedia-related technologies is very rapid, and this has created a degree of uncertainty. It also means that many of the entertainment and computing products which consumers are currently using will at least have to be upgraded, if not replaced, in order to take full advantage of these new developments and be able to access true multimedia services. In particular, developments such as:

- digital broadcasting
- delivery of WWW content by DTH satellite
- network computing
- recordable digital videodisc players

will offer consumers a much wider range of multimedia functions than are currently available.

The competing claims of PCs and televisions, the impact of price on the potential for convergence of PC and television technology, and the impact of the type of terminal on the way in which consumer multimedia services develop are discussed further in Chapter 2 on Industry Relations.

7/ How Will Services and Technology for Multimedia Evolve?

More than in any previous phase of information technology, multimedia services require a quantum leap in technology. The evidence in Chapter 1 showed that the multimedia revolution is getting off to a slow start, and further technological advances are required to build sufficient momentum to ensure the delivery of multimedia services across the market sectors. Some examples are:

- image compression and efficient filing
- high-quality stereo sound compression
- movement detection and compression
- security (RSA BSAFE etc.) and biometrics
- voice recognition
- fault disaster recovery systems
- quality-of-service parameter standardisation and display
- network routing modes (*e.g.*, distributive, interactive, collaborative)
- neural terminals (user-adaptive, personality adaptive terminals).

Moreover, all aspects of multimedia service creation will have to be addressed to enable service providers sufficient flexibility to handle service churn, terminal diversity, customer queries, tariffing and billing problems. This requires an intelligent networking environment in which the functions of service creation, database access and protection, and billing are integrated.

Exhibit 7.1 summarises our expectations of the evolution of the various technologies which will contribute to the development of the multimedia market over the period to 2005.

EXHIBIT 7.1: Projected Evolution of Technologies Needed for the Development of Multimedia Capability [Source: Analysys]

	Units	1996	1998	2000	2002	2005
Basic Digitalisation	% of all lines	80		90		100
Q-sig Access	% of all ports	10		70		100
Euro ISDN	% of all ISDN users	0		30		70
Frame Switching	% of Public Datacomms	40	50	40	30	10
Frame Switching	% of Private Datacomms	60	50	40	30	10
ATM (cell) Switching	% of Public Datacomms	2	10	20	40	60
ATM (cell) Switching	% of Private Datacomms	5	15	30	50	80
-PVC	% of total ATM	5	5	8	10	12
-SVC	% of total ATM		5	10	20	30
-Other forms	% of total ATM			2	10	18
FITL (Bus & Res)	% of interactive accesses	10	15	20	25	30
X-DSL	% of interactive accesses		1	2	3	5
Cable Modem	% of interactive accesses		1	3	6	9
ATM LANs	% of LAN ports	2	6	20	50	80
100-base LAN	% of LAN ports		2	10	15	20
V5.X Interface	% of public switched ports	10	25	50	75	100
IP v6	% of MM terminals using	10	30	70	100	
DTB with STBs	% of all receivers		5	15	60	100
DVD	% of MM terminals using	1	30	60	100	
MM Terminals	% of all PC terminals	5	15	30	45	60

- As the exhibit shows, by 2005 digital networks will have entirely replaced analogue technology. This is a key milestone, since digital networks are the basis for the pervasive and cheap transmission capacity used, for example, by the Internet.
- The adoption of Q-sig and other prerequisites of Euro-ISDN should be almost complete by 2005 providing seamless Europe-wide networking. Frame switching is forecast to make way for cell switching (ATM) in the next few years, first as

PVC then as SVC technology, which will enable operators to leverage the benefits of media sharing for multimedia services.

- Fibre-in-the-loop access will increase, as will xDSL and cable modem technologies, taking advantage of the existing physical access media available to TOs.
- The functioning of the open market will be reinforced by the adoption of V5 interfaces at switch interconnection ports.
- Network protocols will increasingly be based on TCP/IP and its derivatives as de facto standards in the future.
- The development of versatile, low-cost multimedia interactive terminals using innovative screen and intelligent human interface designs will be a priority.

Multinational research projects in the general domain of multimedia abound. Examples include the Medea and Commend projects within the Eureka framework operated by the European Commission, and the Global Multimedia Mobility (GMM) initiative by ETSI, which is designed to pull together the expert groups active in the support fields of mobile communications, intelligent networking, and multimedia terminals. If the latter is successful, it will deliver the independence of multimedia applications in terms of geography, distance, source and destination networks, international inter-connection, fixed or mobile terminals.

Exhibit 7.2 provides details of the characteristics of a range of multimedia applications. Examples have been provided for each of the main NACE sectors to illustrate the diversity and differentiation of applications. The applications should be considered in the light of the following examples of forces driving user needs and service provision world-wide.

EXHIBIT 7.2: Characteristics of a Range of Typical Multimedia Applications [Source: Analysys]

Application	*One-way, two-way*	*Online, Distributive, Interactive, Collaborative*	*File access, browse, email, attach, search, transfer, etc.*	*Session structure, traffic model*	*National/ international*	*Transmission peak bit-rate*	*Connection service*	*Picture file definition*	*Burstiness*	*Network Technologies*	*Terminal technologies*
Retail and Distribution Sector											
Centralised stock control	Weekly shipments orders, billing acknowledgments	Online stock list, interactive graphic shelf stock order,	Access central order facility, download forms, fill in and return/save	Weekly 0.5 hour , occasional daily look-up	National	64kbit/s two-way	BR-ISDN	not applicable	low	ISDN access to corporate network	Standard PC running commercial or proprietary MIS
Vehicle fleet control	One-way	Distributive dispatch system, GIS-based vehicle location	Email-based dispatch orders with GIS attachments for directions	Hourly, 2 minute duration	National and international	9.6kbit/s GSM or 128kbit/s Mobitex	BR-ISDN	GIF or JPEG image	medium	ISDN access to corporate network, connected to GSM and/or mobile data network	Standard PC running commercial or proprietary GIS program with SVGA screen
Electrical/electronic manufacture											
LSI CAD	Symmetric two-way	Collaborative graphic design, online templates	Conference-based document download, save	Two projects per year, daily sessions of 2-3 hours for 3-4 weeks per project	National	368kbit/s two-way	n*64kbits/ ISDN	GIF	high	ISDN access to corporate network	Silicon Graphics terminal running commercial software and SVGA screen
Inventory control	Monthly (A-B), daily (B-A)	Online templates, interactive goods-in/ out and WIP control	Download inventory control system, fill in and transfer	2 daily sessions of 5 minutes to central server, weekly sessions of 20 minutes	National	28kbit/s two-way	PSTN dial-up	GIF	low	PSTN access to corporate network	Standard PC terminal running proprietary MIS
Travel and transport											

Application	*One-way, two-way*	*Online, Distributive, Interactive, Collaborative*	*File access, browse, email, attach, search, transfer, etc.*	*Session structure, traffic model*	*National/ international*	*Transmission peak bit-rate*	*Connection service*	*Picture file definition*	*Burstiness*	*Network Technologies*	*Terminal technologies*
On-line timetables	One-way look-up	Online and distributive	Search, access, browse	100s of daily query sessions of five mins each	National and international	28kbit/s two-way	PSTN dial-up	GIF	low	PSTN access to Internet	Standard PC with dial-up access to the Internet
Holiday booking system	Mainly A-B, less B-A	Online look-up, interactive booking	Search, browse, email secure payment	Seasonal, 100s of daily sessions, each of 1/2 hour	National and international	64kbit/s two-way	BR-ISDN	GIF	low	ISDN access to Internet	Standard PC with dial-up access to the Internet
Government											
Central purchasing	Two-way	Distributive stock sheets, interactive purchase orders	Access and download stock sheets, place order	Regular monthly sessions of 1 hour by all departments	National	128kbit/s two-way	BR-ISDN	GIF	low	ISDN access, government closed user group (CUG)	PC terminal with proprietary MIS
Online publication (HMSO)	Asymmetric two-way	Online browsing and purchasing, distributive delivery	Browse, email purchase order, download file	Several daily sessions of 0.5 hours	National	128kbit/s	BR-ISDN	JPEG	low	ISDN access to agency CUG	Standard PC-based terminal
Remote voting	Asymmetric two-way	Distributive ballot papers, interactive voting	Access and download ballot paper, mark, authenticate, save	Infrequent, huge traffic load, 1 min sessions	National	28kbit/s	PSTN dial-up	GIF	high	PSTN access to government CUG	PC or interactive TV

Application	*One-way, two-way*	*Online, Distributive, Interactive, Collaborative*	*File access, browse, email, attach, search, transfer, etc.*	*Session structure, traffic model*	*National/ international*	*Transmission peak bit-rate*	*Connection service*	*Picture file definition*	*Burstiness*	*Network Technologies*	*Terminal technologies*
Chemical, pharmaceutical, oil											
3D molecular modeling	Mainly A-B, less B-A	Online image library, collaborative modeling	Access, transfer, conference and download	Two projects per year, daily sessions of 2-3 hours for 3-4 weeks per project	National and international	2Mbit/s	X25, Frame Relay	JPEG	high	Leased line access to public frame relay service	Silicon Graphics terminal
On-line energy prices	One-way	Online look-up	Browse	Large number of daily sessions of five minutes	National and international	28kbit/s	PSTN dial-up	N/A	low	PSTN access to private network server	PC-based terminal with proprietary data processing software
Health care											
Remote diagnosis	Two-way	Collaborative image-based high security application	Access, transfer, conference and save	Daily session of 1 hour covering several patients	National and international	128kbit/s-2Mbit/s	n*64kbit/s ISDN	JPEG	high	ISDN access to private network server	Silicon Graphics terminal
Medical imaging	Two-way	Distributive, interactive graphic comms	Access, download, conference and re-load	Daily sessions of several hours between operating and lecture theatres	National	10Mbit/s two-way	Frame Relay	MPEG-2	high	100-base or FDDI LANs interconnected with SMDS or ATM with leased line access	Silicon Graphics terminal
Central patient records	One-way	Online lookup, high security application	Browse, download	10s of sessions of 5 minutes per day per hospital	National	64kbit/s	BR-ISDN	GIF	low	ISDN access to private corporate network	PC-based terminal

Application	*One-way, two-way*	*Online, Distributive, Interactive, Collaborative*	*File access, browse, email, attach, search, transfer, etc.*	*Session structure, traffic model*	*National/ international*	*Transmission peak bit-rate*	*Connection service*	*Picture file definition*	*Burstiness*	*Network Technologies*	*Terminal technologies*
Education											
Online course booking	Mainly A-B, less B-A	Online lookup, interactive booking	Browse, access, email	Seasonal, daily 100s of sessions of 10 minutes	National	28kbit/s	PSTN dial-up	GIF	low	PSTN access to Internet server	Standard PC
On-line league tables	One-way	Online lookup	Browse, access	Seasonal, 100s of daily sessions of 20 minutes	National	28kbit/s	PSTN dial-up	GIF	low	PSTN access to Internet server	Standard PC
Aerospace, automotive, engineering manufacture											
Interactive engineering design	Symmetric two-way	Collaborative graphic comms	Transfer, download, conferencing, save	One project per year, daily sessions of 1 hour	National and international	2Mbit/s two-way	Frame Relay	GIF	medium	Leased line access to public frame relay service	Silicon Graphics terminal with CAD software
Just-in-time manufacture scheduling for multisite company	Mainly A-B, less B-A	Online templates, interactive scheduling	Access, download, save	2-3 sessions of 10 minutes per day	National	64kbit/s	BR-ISDN	N/A	low	ISDN access to corporate network server	PC-based terminal with in-house MIS
Entertainment, printing and publishing											
Interactive editing	Symmetric two-way	Collaborative text and graphic publishing	Access, transfer, download, conferencing, save	Daily 2-3 sessions of 1 hour	National	128kbit/s two-way	BR-ISDN	GIF	medium	ISDN access to private corporate network	PC-based terminal with commercial publishing software
Remote stage-set design	Asymmetric two-way	Online lookup, interactive graphic comms	Access, transfer, download, save	Weekly sessions of 2-3 hours	National	368kbit/s	n*64kbit/s ISDN	JPEG	medium	ISDN between terminals	Silicon Graphics terminal

Application	*One-way, two-way*	*Online, Distributive, Interactive, Collaborative*	*File access, browse, email, attach, search, transfer, etc.*	*Session structure, traffic model*	*National/ international*	*Transmission peak bit-rate*	*Connection service*	*Picture file definition*	*Burstiness*	*Network Technologies*	*Terminal technologies*
Financial											
On-line equities trading	Asymmetric two-way	Distributive, interactive application	Browse, search, transfer download email	20-30 sessions of 10 minutes per day	National and international	28kbit/s	PSTN dial-up	GIF	low	PSTN access to corporate dealer network	Standard PC
Insurance and re-insurance quotations	Asymmetric two-way	Interactive high-security application	Browse, search, transfer, download	10-20 sessions of 20 minutes per day	National and international	28kbit/s	PSTN dial-up	GIF	low	PSTN access to corporate dealer network	Standard PC
Consumer/residential											
Pay-per view	Asymmetric two-way	Interactive, local billing	Browse, email	Daily sessions of 10 minutes	National	upstream 28kbit/s, downstream broadband TV	Cable network	MPEG-2	high	HFC or coax cable TV network	Interactive TV
Home banking and finance	Asymmetric two-way	Online, interactive	File access, transfer, download, save	Weekly sessions of 10minutes	National	28kbit/s two-way	PSTN dial-up	N/A	high	PSTN	PC or network computer
On-line games	Asymmetric two-way	Online, distributive interactive, collaborative	File transfer, software download, email,	5 minute sessions for software download, hours for on-line games	National and international	28kbit/s	PSTN dial-up	GIF	high	PSTN	PC or network computer
Remote Education	Near-symmetric two-way	Online, distributive interactive, collaborative	File transfer, software download, email,	5 minute sessions for software download, hours for teaching	National	128kbit/s	BR-ISDN	GIF	high	ISDN	PC or network computer

Chapter II
Future Market Trends

In *Chapter I* we presented an overview of the multimedia market, focusing on its current level of development, and the key short-term drivers. In this section we explore the medium term prospects for the market. We outline the probable features of a mature multimedia market, and consider the transitional processes through which such a market could emerge as a significant sector of the economy. In particular we attempt to identify factors which will either promote or constrain the development of a mature market.

In particular, we examine four key aspects of the market:

- market structure
- the impact of digital technologies
- pricing strategies
- standards and interworking
-

Two themes prove central to future developments in every component of the potential multimedia market:

- the formation of new relationships amongst industry players as the market matures
- the expansion in the number of channels which players can use to get to the customer.

0.1 New Relationships Between Players

New relationships will have to be forged in the multimedia market because new types of services will be created, new players will enter the market and existing players will have to adopt new methods to compete in the multimedia market. This will have some profound effects on the market structure of the industry.

Changing relationships will also necessitate different pricing strategies both for goods and services traded between companies, and for those sold directly to the customer. Finally, the establishment of new relationships in the multimedia market will need to be accompanied by solutions to the problems of interoperability either by standardisation or industry agreement.

0.2 New Routes to the Customer

The second major theme, that of new routes to the customer, will also have a profound effect on the structure of the multimedia market, and on the relationships between players in the value chain. In particular, digital technology will open many new channels to the customer by allowing digital services to be delivered on a wider range of networks (telecoms and broadcast) than is currently possible. Finally, pricing will be one of the major ways in which players try to exploit their channel to the customer and capture market share.

1/ Market Structure

1.1 INTRODUCTION

Companies are investing in convergence. The development of the multimedia market is driven by digitalisation, and by the convergence of different services and markets which digitalisation makes possible. Technological convergence between the IT, telecoms, and broadcasting sectors has been under way for at least five years (see Section 2). It is only recently, however, that convergence has begun to exert significant pressure on services, players, and the structure of the market. The investment in the digital interactive entertainment by *United Kingdom* cable TV companies, *France Telecom* and *Deutsche Telekom* and the formation of *BIB* (British Interactive Broadcasting) is the first real evidence of a commitment of funding by major players in telecoms and broadcasting to take advantage of convergence. Further evidence is now being provided by digital satellite television operators in *France*, *Germany*, *Spain*, and the *United Kingdom* who have started to consider the range of services which they will offer over their new systems from pay TV to interactive services.

1.1.1 New Services and Delivery Mechanisms

The emergence of new services and new delivery mechanisms is a key element in the potential for a well-developed multimedia market. The *United States* for example has seen the successful of launch of public companies such as *Yahoo* and *Lycos*, whose Internet navigators are an entirely new kind of commercial product. In electronic commerce, *Amazon.com*, a which sells books over the Internet has been so successful that, *Barnes and Noble*, a major book retailer in the *United States* has been forced to follow suit.

The structure of the telecoms sector, and prospects for the delivery of multimedia services, are being strongly affected by rapid growth in Internet usage. Precise data

on Internet-generated traffic is difficult to find, but in the *United Kingdom* in 1996 10% of BT's local calls were estimated to be Internet related, and in the US Pacific Telesis reported a corresponding figure of 16%. Digital broadcasting may have a similarly profound effect on the multimedia sector in the next few years.

The creation of new digital routes to the customer (and the prospect of new high-value services) points strongly to an imminent transformation of the existing market structure, with significant changes in the current relationships between players. Convergence of the IT, telecoms and broadcasting sectors is creating new patterns of competition and alliance, and opening opportunities for new types of player. It is this transformed market structure which will shape the development of a mature multimedia sector.

Convergence in services and distribution technologies is likely to mean convergence and transformation of whole value chains. Players now active at particular points in the traditionally separate value chains of IT, telecoms, broadcasting and publishing will need to adapt their roles, develop new strategies, and form new relationships with other players.

1.1.2 Business and Residential Markets

A key strategic factor in the evolution of the multimedia market is the distinction between business and residential sectors. Each of these is attracting the interest of powerful companies: satellite broadcasters in particular are targeting entertainment and transactional services at the residential market, whereas TOs and IT companies are focusing on the development of solutions for corporate intranets and business to business commerce. The business sector is currently regarded as the more important component of the Internet market. *CompuServe*, for example, has recently announced a change in policy to target business customers more effectively. In terms of revenue we estimate that the business and residential Internet access markets are roughly equal in size, and the intranet market may be anything from 50-100% of the value of the business Internet market. Estimates of the value of the world-wide Internet market vary greatly but Analysys estimates the total to be in the region of ECU20 billion (including equipment, infrastructure, Internet service provision, value added services and commerce).

1.1.3 Changing Market Structure and Value Chains

This section explores the impact of changing market structure on the multimedia market, and considers potential structural constraints to the development of the market. We focus on the following issues:

- the transition to the new market structure
- the organisation of the new value chain
- the relationship between players operating in different levels of the new value chain

In the first part of this section we describe the current value chains of the IT, telecoms and broadcasting sectors, and then describe the kind of adjustments which we would anticipate as the multimedia market matures. We also discuss how the relationships between players in different parts of the value chain are changing. Finally, we analyse the characteristics, strategies and the potential actions of each of type of player in the industry, identifying:

- likely levels of concentration
- potential barriers to entry
- possible anti-competitive linkages to other parts of the value chain
- potential bottlenecks in the new multimedia market structure.

1.2 THE TRADITIONAL VALUE CHAIN AND THE NEW MULTIMEDIA VALUE CHAIN

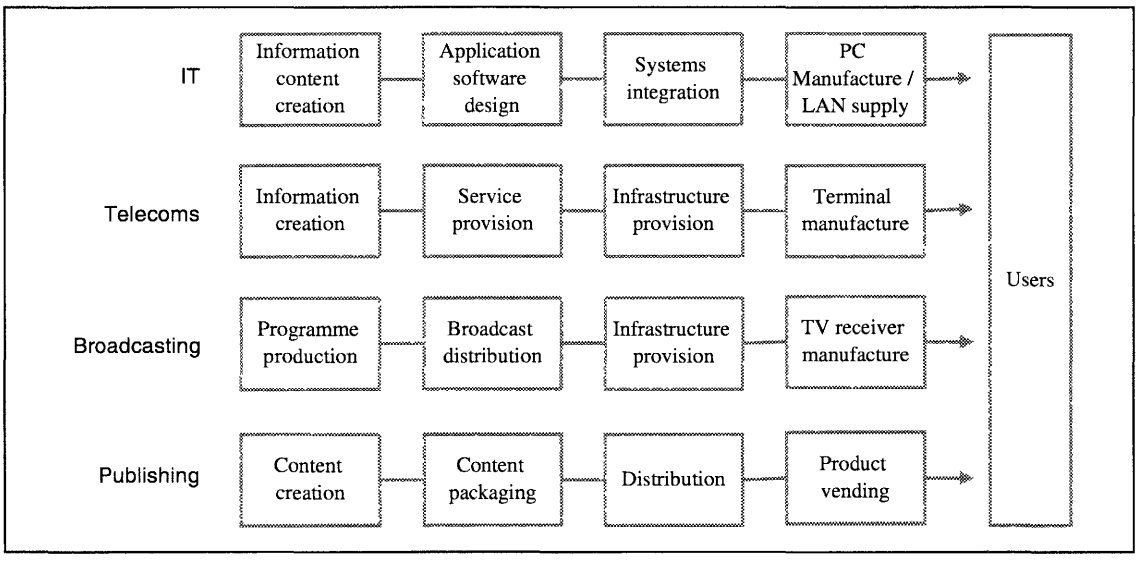
The value chain that has existed in the traditional IT, telecoms and broadcasting sectors is shown in Exhibit 1.1 (overleaf). Before digitalisation and convergence began, these sectors existed as separate markets in which monopoly providers often dominated several levels of the value chain and, in the case of telecoms and broadcasting, infrastructure owners also controlled the direct relationship with the customer. Even since the liberalisation of telecoms, particularly at the service provision level, the former monopoly infrastructure owners have still maintained a great deal of their market dominance through:

- control of the billing relationship to the customer
- control of the delivery mechanism to the customer
- access to databases of information *e.g.*, calling patterns and customer spending
- leveraging their position as (usually) the only ubiquitous national infrastructure provider in other markets such as service provision or packaging of content.

For the following reasons, these value chains will not retain their current separation or structure in the new multimedia market:

- **Platform independence of digital material.** Digitalisation is enabling telecoms and broadcasting to carry the same services, thus eroding the distinctions between the separate markets, particularly in the development of new multimedia services.

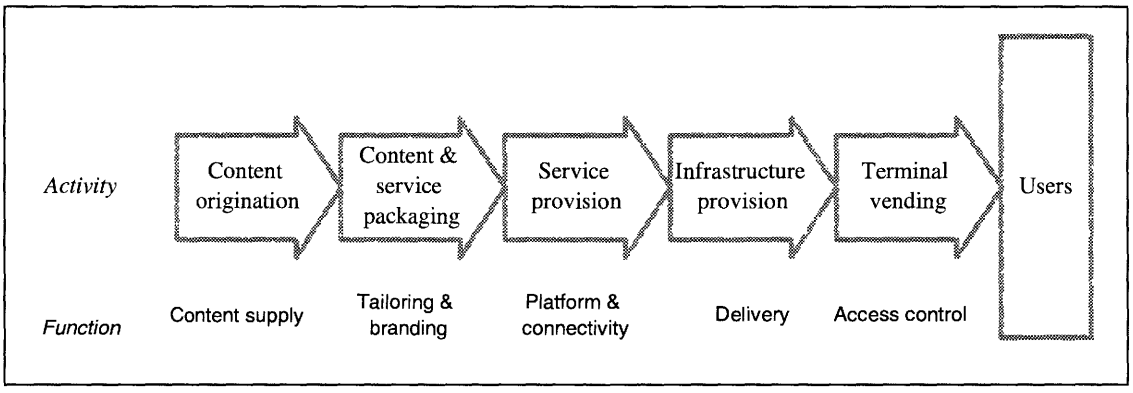
EXHIBIT 1.1: The Traditional Value Chain in the Converging Sectors [Source: Analysys]



- **Unbundling of services and packaging from infrastructures.** The development of open network architectures, as exemplified by the Internet, is freeing service providers and content packagers - *e.g.*, ISPs, providers of audio multicasting, electronic commerce platform providers - from the control of infrastructure owners; *i.e.* service provision is becoming unbundled from infrastructure provision. This has allowed new entrants to the communications market to develop new services, particularly using the Internet.
- **Direct routes from content originators and packagers to customers.** Through the emergence of the multimedia and Internet markets, new routes to the customer have been created. For example, content providers can establish a direct relationship with the customer through electronic commerce which is increasing the market power of content originators and packagers.
- **Re-grouping for access to new skills.** Multimedia services are not simply an extension of existing services, but often require new skills. Players are therefore having to establish new relationships with both existing and new players in order to be able to exploit the opportunities offered by the multimedia market in services as diverse as home banking and translation services (as shown by the merger and acquisition activity analysed in Chapter I, Section 3).

Exhibit 1.2 illustrates the form we believe the value chain will take in the mature multimedia market, based on the key trends we have identified above. Players may occupy more than one part of the value chain, and may also establish contractual links with players in other parts of the value chain.

EXHIBIT 1.2: The Value Chain in the Mature Multimedia Market [Source: Analysys]



Terminal equipment vending, the area of the value chain closest to the consumer, will remain a commodity market, although there may be some important links between players in this section of the value chain and others, depending upon the level of intelligence embedded in terminal equipment. The more intelligence is located in the terminal equipment the easier it will be for the consumer to access content through different platforms. Infrastructure is also tending towards a commodity market[18], with high levels of concentration and low margins. It will remain a viable market for those companies large enough to gain the necessary economies of scale, but smaller companies may have to find niche opportunities in order to survive.

Service provision, hitherto often bundled together with infrastructure, will become a distinct category in itself. This development is already visible in the use of the Internet and related software, which have provided a major breakthrough in allowing firms to provide services without owning a complete telecoms network. Audio broadcasting, for example, has become possible with the development of *Progressive Network's RealAudio* software. Players in this category will self-provide or lease the infrastructure facilities they require in order to provide connection to a service delivery platform (which may simply be enabled by a set of transmission protocols). This connection will allow the user to communicate, or access content and information. Information management software such as electronic programme guides may also form part of the platform and would thus be included as a part of service provision. However, some information management tools may be provided independently of a service provision platform *e.g.*, directories such as *Yahoo*, personal information filters such as *Firefly*. These would then be included in

[18] The introduction of competition, the associated breakdown of the current set of cross-subsidies from long distance to local services and the collapse of the international accounting rate system are the driving forces behind this change.

packaging, the next level in the value chain. This is a higher margin activity which we have separated into two areas: service integration and content packaging.

- **Service integrators** *e.g., EDS, IBM, Sun Corp.* will package together infrastructure, connectivity, and software applications in order to create platforms which allow consumers to use specific applications. Business customers will be the main target for these players.

- **Content packagers** *e.g., T-Online* will create platforms which arrange content and information in an ordered fashion. Some packagers will tailor data to individual preferences, others will put together a standard package of information into channels addressed at the mass market. This market will be mainly focused on residential customers. Increasingly packagers may include push media components in the range of services they offer allowing them to control the information which a user can access more closely.

Another category of packagers, who facilitate online commerce, such as *First Virtual* and *CyberCash* will address both of these areas. The former is creating a system which will offer security and verification features to customers and vendors, and creating an architecture through which private and business consumers can trade and transact. The latter is creating a type of electronic money that can be used in micro and other transactions over the Internet for vendors and consumers.

The final level in the value chain illustrated in Exhibit 1.2 is that of content creation. This level will typically be high margin, and there will be several large players operating nationally and internationally. Smaller players may also flourish because the multimedia market will enable them to establish direct relationships with the consumer. Players at this level of the value chain will have strong links to content packagers, especially through electronic publishing and on-line commerce.

It is unlikely that the TOs, broadcasting companies and major IT manufacturers will automatically carry over the same degree of market power that they currently have into the new value chain because relationships between players are changing. The positions of today's leading players may, therefore, become very different in the mature multimedia market. As a result, companies will try to leverage their core skills in the new multimedia market, and use alliances with other companies where their range of skills is lacking as detailed in Chapter I, Section 3.2. on vertical mergers on alliances.

It is likely that no one firm will try to span the value chain from infrastructure provision to content creation because the skills required to compete in the many sections of the market are too dissimilar. Nearly all companies interviewed during

the course of this study reported that they do not currently envisage becoming vertically integrated across the whole industry. Instead, their strategy is to seek alliances of the kind established between *Microsoft* and *Disney*, or between *Bertelsmann* and *BT* and *BSkyB*, in order to expand out of their core areas in the multimedia market. Both content and infrastructure providers are however, likely to compete in packaging, where they will also have to compete with many specialist companies. Competition in this part of the value chain, therefore, is likely to be particularly intense.

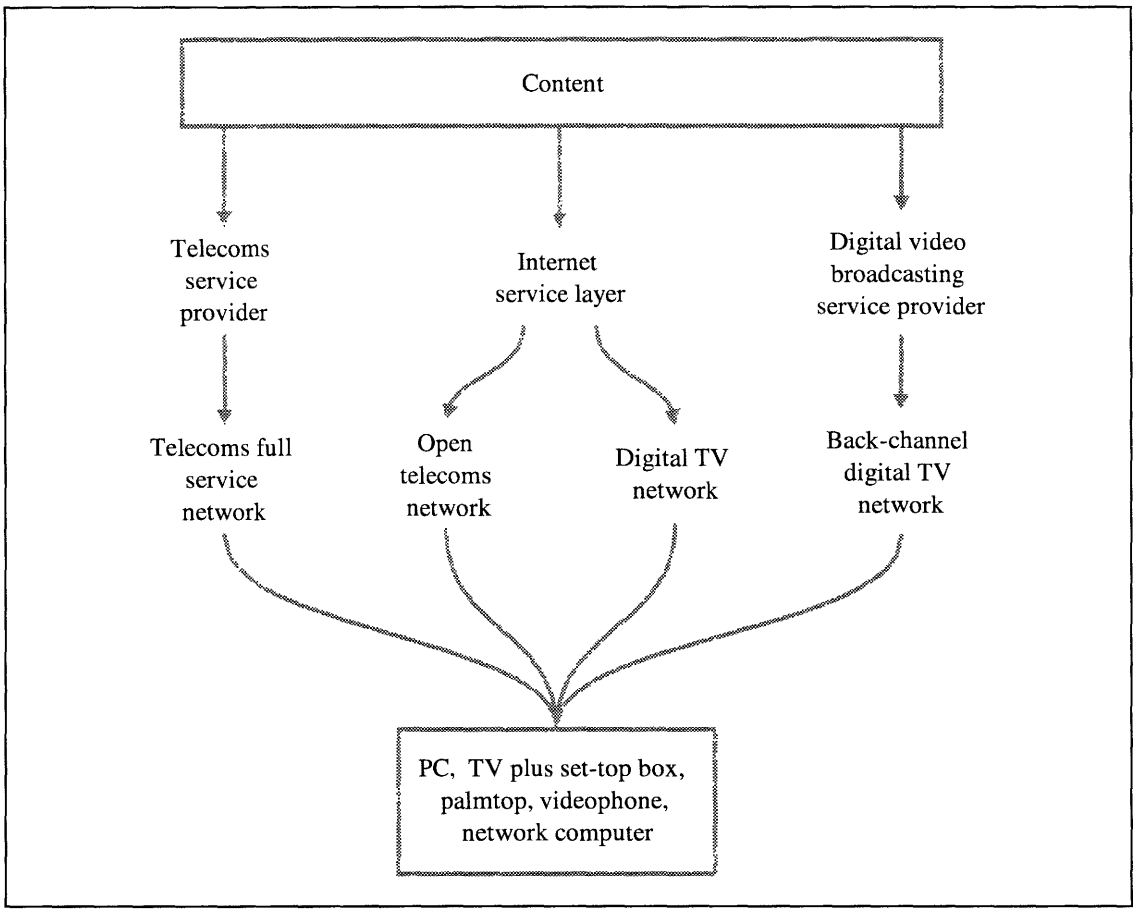
The above analysis establishes a part of the framework for examining potential structural constraints to the development of the multimedia market. A further key issue is that of platform independence, which will affect all the players in the industry.

1.3 PLATFORM INDEPENDENCE

Digitalisation and the success of the Internet Protocol have already had a fundamental impact on the structure of the multimedia market. Together they enable a wide range of multimedia services to be delivered to the customer independent of what platform the customer is using, and independent of whether the customer's terminal is a PC, TV, or a multimedia mobile handset. This concept, which we call platform independence, is illustrated in Exhibit 1.3 (overleaf), which makes the point that content and information providers will have a variety of platforms through which to distribute their work or carry out transactions. IP and related protocols are rapidly becoming the standard set of tools (though not the only ones) for carrying multimedia applications because they can work with all the platforms and delivery mechanisms shown in Exhibit 1.3 They are also attractive to content providers because they can deliver information to the consumer in a relatively standard form, with little adaptation to a wide installed base of users, and regardless of whether the user has a TV, PC or other type of terminal. The importance of platform independence has been recognised by firms operating at all levels of the value chain, from PC manufacturers such as *Apple*, to content providers such as *Bertelsmann*.

Platform independence will therefore have a major impact on the structure of the multimedia market. No one combination of delivery mechanisms, networks and packagers is likely to dominate the industry, because alternative means of gaining access to the consumer will always be feasible. Only in the unlikely event that one company establishes domination of telecoms, digital broadcast infrastructure, and Internet access will this situation change. Platform independence is also leading the major players to consider all potential means of delivering multimedia services, rather than exclusively supporting one particular technology.

EXHIBIT 1.3: Platform Independence in the Multimedia Industry [Source: Analysys]



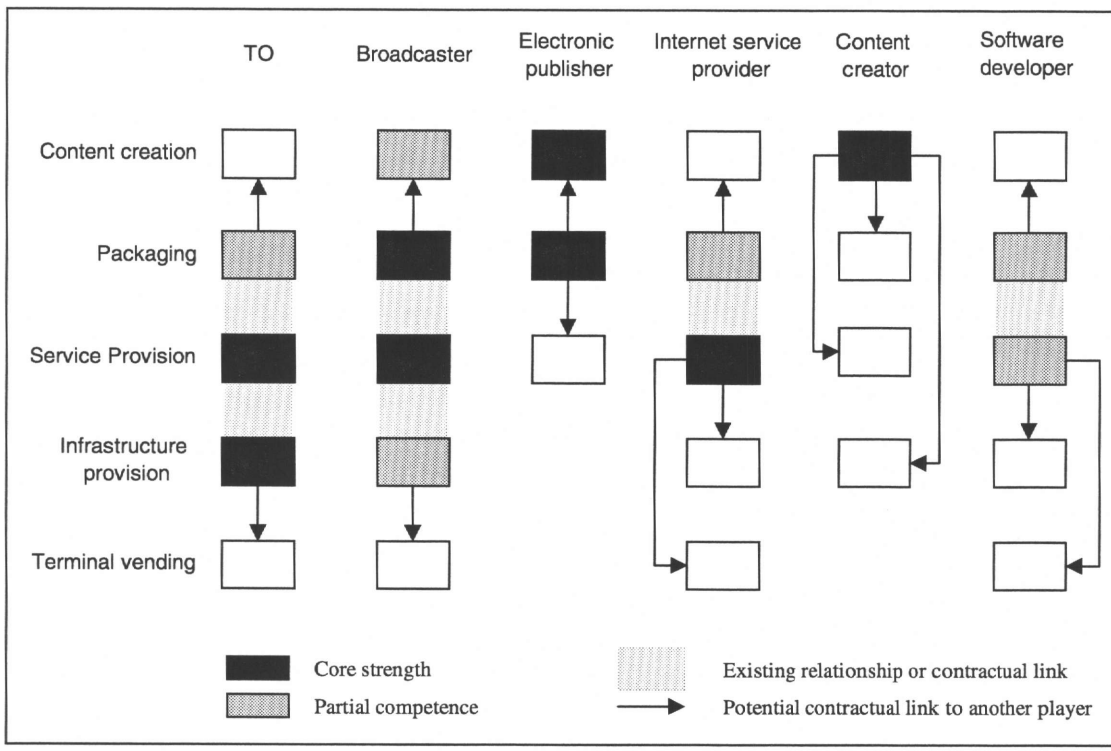
1.4 Positioning and Activities of the Major Players in the Value Chain

Exhibit 1.4 shows where we believe the major types of player will be located in the value chain for the mature multimedia market. We have focused on what we consider to be the five key areas of the value chain: content, packaging, service provision, infrastructure and terminal manufacture. The simple mapping of functions to areas in the value chain helps us to focus our analysis of the major player's positioning in the value chain on the potential constraints to the development of the market that may arise from the player's actions and the structure of the market. The types of constraints that may arise are as follows:

- control of the customer relationship, customer billing databases and of distribution channels to the customer
- leverage of dominance of one area of the value chain upstream or down stream

- use of bargaining power to extract exclusive contracts either through market power or control of bottlenecks
- discriminatory access to exclusive facilities and control of scarce resource particularly in interconnection, unbundled access and radio frequency spectrum

EXHIBIT 1.4: Locations of the Major Players in the Value Chain and Relationships between Them [Source: Analysys]



1.4.1 Content Originators

In this section we distinguish between companies who focus on content creation and companies who create and package content. The first group will usually be willing to use the platforms provided by content and service packagers to distribute or publish its material. For example, numerous deals have been signed between owners of rights to sporting events, film studios, and digital television broadcasters for pay TV services. This group will only be interested in the proportion of its potential market it can reach and the costs of doing so, and not the underlying technology. Some players, typically smaller in size, will bypass the packagers altogether and self-publish, or will set up their own online transaction systems. Others will negotiate periodically renewable contracts with content packagers. The larger the content originator, or the more popular its material, the greater the bargaining power it will have with content packagers.

Integrated content originator-packagers may have a weak incentive to favour the content which they originate themselves, but this will be strongly mitigated by the sheer scale of the expansion of channels which online publishing and distribution will allow. The problem for many of the players in this section of the market, *e.g.*, the television broadcaster/producers, will be to find enough marketable content to fill their greatly expanded channel space.

1.4.2 Packagers

In this section we look at content packagers and service integrators separately. Although they share the same main functions for tailoring products to individual customer tastes and provide consumers with the guarantee of a trusted brand name, their impact on the structure of the market will differ because each activity requires a distinct type of technical expertise.

Content packagers include broadcasters and electronic publishers, *e.g.*, new organisations such as *America Online* or traditional publishers such as *Hachette* who also have interests in on-line publishing. Most recently, push media has emerged as a new way of publishing information on the Internet. Push media means that the information is sent to the user over the Internet connection on a regularly updated basis. Typically, users leave their Internet connections open for a long period of time, but the service differs from broadcasting in that users can interact with the service for example, requesting additional information. *PointCast*, which provides news updates over screen savers has been one of the most successful exponents of push media so far.

Although the majority of content packagers' customers may be residential users, there will also be a substantial market in distributing business information electronically. The level of control which content packagers are able to exert in the market will always be limited because of the possibility of disintermediation, *i.e.* content originators dealing directly with the end-consumer and by-passing packagers.

Downstream, *i.e.*, towards content origination, packagers (even the traditional broadcasters who also create content) will have incentives to provide open platforms through which the material of other content originators can be distributed, because of the increased competitive importance of content in the multimedia market.

There may be public policy concerns about the creation of mass market multimedia channels whose content is set at the level of the lowest common denominator, but the structure of the multimedia market will also encourage the promotion of specialist content and interests. This is because the costs of distribution are very much reduced through digitalisation of content and delivery and this elevates the importance of

delivering what the customer wants above that of having access to large scale distribution facilities as a key determinant of success.

In the upstream direction, however, content packagers who also carry out service provision and control infrastructure facilities (*e.g.*, broadcasters) may have incentives to artificially limit the access of other content packagers. In the transitional phase, as the multimedia market is becoming established, this may be important because telecoms networks will not be able to or may not be permitted to act as alternative transmission networks. The level of the competitive disadvantage will also be related to the relative bargaining power of content packagers in relation to service and infrastructure providers.

In the **service integration market** we expect that convergence and the rapid rate of technological innovation in multimedia, particularly in the Internet, to lead to a vibrant market. The market will include innovative, independent, specialist companies who are agile enough to keep up with the rapid pace of technological development. It will also include players who are dominant in infrastructure and service provision, particularly the TOs, large IT manufacturers (*e.g.*, *IBM*, *Sun*, *Cisco*), major software producers (*e.g.*, *Microsoft*, *Oracle*, *Netscape*) and Internet access providers. Competition in this market will be particularly strong, but service quality will be as important as price, and margins will therefore remain high.

Barriers to entry into this part of the market will be low for firms with the right specialist skills, (*e.g.*, in security mechanisms, transactions processing, application design). Telecoms companies in particular will be attracted to this market because it is both a higher value area than their core infrastructure business and it allows them to maintain contact with and control of the customer. The TOs will try to use their dominant positions as providers of subscriber lines to the majority of business customers in any one country to gain control of the service provision market. For example *US West*, *Concert* and *Sprint* are already investing in infrastructure to be able to offer managed intranet services to business as part of an overall business communications package. They are creating logically separate infrastructures from the PSTN and optimising the use of routers and high bandwidth transport. Independent service providers will not, however, be disadvantaged as long as TOs or other companies do not try artificially to exploit this barrier by packaging their services in a way which makes it difficult for users to purchase individual elements, or which blocks third parties from participating in the market.

Software vendors will also try to capture as large a share of this market as possible by applying a "mass customisation" approach to the integrated software platform which they are currently developing for the Internet and multimedia markets. Application platform developers such as *Netscape*, *Oracle* and *Microsoft* aim to build

into their software as many as possible of the functions necessary to enable a user to self-provide an application or service, thus missing out the service integration function completely. For example within the next year *Microsoft* and *Netscape* are likely to have brought out web browser software which incorporates Internet telephony software, virtual reality viewing capabilities and application-sharing functions. While this option may be attractive to those who have the technical capability to carry out the final adaptation of the software to their needs, the complexity and rate of change of the market is likely to provide a continuing role for service integrators.

The largest software vendors are also establishing links with and acquiring companies in other parts of the value chain. This has been a feature of the terminal equipment market for some time. The latest manifestation of the trend is the development of the network computer[19] and the network PC[20] (a scaled down version of the PC using a proprietary operating system, in contrast to the network computer concept). Companies have also formed alliances both upstream with infrastructure and Internet access providers and downstream with content providers.

There are fears about software companies, *e.g.*, *Microsoft* and *Oracle*, extending their current dominance of their part of the IT market into the multimedia market, but in view of the level of competition in the service provision and packaging areas of the value chain, these fears are appear to be overstated. It is more likely that these companies will use their links to players in other parts of the value chain to strengthen their position as software providers. It is in this context that constraints on competition in the market are more likely to occur. For example if a large proportion of service providers and content packagers were to distribute one software developer's products to the exclusion of other providers.

1.4.3 Service/Connectivity Providers

Service provision is an activity that has traditionally been strongly linked, upstream, with infrastructure provision. Only recently, with service liberalisation in the telecoms industry and the development of the Internet and Internet access providers has service provision really been established as a separate activity together with packet-switched applications for voice and videotelephony. As the multimedia industry develops, independent Internet access providers will have to change their

[19] This has chiefly been sponsored by Sun, Oracle and Netscape, which also have an interest in introducing more competition into the PC market dominated by Microsoft Windows and Intel-based technology.

[20] This has been sponsored by Microsoft, Hewlett Packard and other PC manufacturers and is seen by some commentators as a response to the development of the network computer.

business model (and many are doing so), because of the advantages which TOs have in providing Internet access services. For example *UUNet* (now part of *Worldcom*) and *Netcom*, two of the leading ISPs world-wide, have decided that to focus their activities on targeting the business market. The keys to success in the market are changing from low price connectivity to quality of service, backbone capability and connectivity to other major providers. TOs are making large investments in the two latter areas and will be able to exploit economies of scale in infrastructure provision to provide Internet access.

The long-term opportunity for independent providers of Internet access and other service is more likely to lie in retail than in wholesale service provision, *e.g.*, *Virgin Internet* in the *United Kingdom* has very successfully exploited its brand name strength in the entertainment field to market its Internet access retail service. However, the continued existence of a separate retail market will depend on two factors:

Firstly, continued unbundling of network operators' infrastructure and service provision functions, so that separate wholesale and retail markets develop.

Secondly, the existence of an appropriate framework to allow independent service providers access to wholesale infrastructure on fair terms with respect to the network operator's own connectivity provider.

There may be opportunities for service providers to participate in the delivery of multimedia services over broadcast networks. Service provision, in terms of providing connectivity[21], has not evolved much in broadcasting because it is not an interactive service. However, the promise of new multimedia services delivered using digital television does create possibilities for service provider involvement. Current indications are that broadcasters will follow a collaborative route in producing and marketing interactive services, partly because of the risk involved and partly to gain access to additional skills. In the early stages of development of these services, such contractual arrangements would not seem to be a constraint on the development of this market. However, if these services become established, it may be necessary to consider whether a wider framework for access by service providers would benefit the development of the market.

[21] Connectivity is the function of enabling the user to access a particular range of services rather than the transmission and delivery of those services over a core network and local access infrastructure.

1.4.4 Infrastructure Providers

Infrastructure providers will be tempted to create links both upstream into the terminal market and downstream into the higher margin service provision and packaging markets. Their main motivation is that infrastructure provision on its own is tending to become a commodity market (albeit a valuable one) in the medium term. The specific issues in the links between infrastructure and service provision have been discussed in the previous section, however network operators are likely to want to offer users an integrated package incorporating delivery with packaged content or integrated service. We also include cable TV operators within the class of telecoms operators as far as infrastructure is concerned because cable TV either have the potential to become or are two-way communications networks. The technologies employed by cable companies differ from TOs, but conceptually they are very similar.

Telecoms Infrastructure

The extent to which the TOs' bundling of service and infrastructure provision constrains the market will depend on the degree to which competing infrastructures are available. In the absence of competition and alternative infrastructures there could be a need for provisions to ensure that TOs make facilities available to third parties on a non-discriminatory basis. This will also depend on how effectively the full liberalisation of telecoms services in 1998 is implemented across the EU, although many countries, such the *United Kingdom*, *France*, *Germany*, *Sweden* and *Denmark*, are already ahead of the de-regulatory timetable.

TOs have decided to become important players in the Internet connectivity market because the Internet and its supporting systems have opened up a completely new channel to the customer. By introducing a system of Internet addressing, the Internet community effectively superimposed a completely new numbering scheme for services delivered over the Internet on top of that existing for telephony. Control of Internet addressing remains outside the authority of the TOs and their regulators and the more that multimedia services develop over the Internet, the more irrelevant the existing TO numbering system will become. Cable TV operators, in contrast have been slow to seize the opportunity afforded by the Internet and the development of cable modems, potentially a very important source of new revenue, has been rather protracted.

TOs, therefore have an incentive to gain control of the market for providing Internet connectivity so that they can regain some control over the customer. With this goal in mind, the TOs with major international facilities, such as *Concert* and *Global One* may try to fragment the Internet in order to carry the most valuable flows of

information over their own IP enabled infrastructure. These companies have already announced their intentions to develop managed intranet services for business and offer premium quality of service for those customers who are prepared to pay for it. This might consign lower value users to a lower quality "economy" Internet while those who were prepared to pay more would have "first class" Internet connectivity.

The TOs' chances of success in this venture would depend upon:

- the quality differential between the "economy" Internet and "first class" services
- the terms under which other connectivity providers would be able to get access to basic infrastructure, and especially dark fibre
- whether other providers were able to obtain fair interconnection deals with the TO's own Internet connectivity providers.

TOs also have an incentive to try to limit the adoption of intelligent terminal and server technologies as much as possible and instead centralise as much advanced functionality as possible within their networks. This would give the user less freedom to take advantage of service level innovations developed by companies other than TOs. It would also reinforce the position of telecoms service provision as a bottleneck for the delivery of multimedia services.

Broadcast Infrastructure

The issues of fair access to packagers and service providers are also relevant to the broadcast infrastructure market. However, the issue of links downstream into the terminal equipment market are perhaps more important. The set-top box necessary at the moment for owners of ordinary TV sets to receive digital TV and other services is a very important bottleneck as it allows the designer to control access to the customer. Many countries, *e.g.*, the *United Kingdom* and *France* have reached agreements on standard technology or at least open access to specifications which allows set-top boxes to interwork with a variety of different digital services and service providers.

The set-top box is not, however, the only bottleneck. If the company which specifies the set-top box is also to be the service provider and content packager, the subscriber management, information navigation[22] tools and billing systems are likely to be oriented towards the same company services. The amount of information which a user can process is limited, therefore content packagers would want to be able to

[22] At the moment these navigation devices are programme guides, but their functionality may increase in the future.

design their own modular devices, *e.g.*, smart cards, which would be easily interchangeable with the other information and tools stored in the set-top box.

Electronic programme guides and information navigation tools in general are likely to be key enabling technologies for mass market multimedia services because they will enhance the user-friendliness of multimedia services against a background of proliferating channels and sources of information. When the design of these tools is linked to the provision of a related service, then the potential for abuse of a dominant position does occur. However, it is necessary to balance calls for developing standardised tools against the incentives to develop new technology and the rights of companies to exploit early mover advantages gained by investment in research and development. The treatment of computer reservation systems (CRS) may provide a model for regulation in this area. In 1993 the European Commission passed a directive to rectify market distortions such as those arising when travel agents give automatic preference when searching for flight information to airlines who used the same CRS. In many cases CRSs were owned by individual airlines and sometimes travel agents were given financial inducements to use a particular CRS.

Two examples of areas for concern are where navigation tools and programme guides are used in set-top boxes (which can be used with a range of different multimedia delivery mechanisms) and where they are used to control access to a number of different service providers, as was the case with the D-box digital satellite television decoder introduced in *Germany*. Some degree of standardisation or open collaboration will promote the growth of the multimedia market in these cases, particularly if incompatible systems develop, and the market becomes dominated by the leading system.

External constraints such as spectrum allocations and licensing will also limit the opportunity of new infrastructure providers to enter the industry, and will in turn limit the channels to the customer which are available to service providers and packagers.

Spectrum has not been allocated on an efficient basis in the past in the EU, little attempt has been made to establish how highly alternative users value spectrum and allocate it on that basis. Current allocations of spectrum may constrain the ability of broadcasters and service providers to exploit fully the potential of digital broadcast multimedia delivery platforms. The overall benefit to the economy derived from the use of the radio frequency spectrum, may also be constrained. Spectrum is a scarce resource and in many cases, the way in which spectrum is currently divided amongst alternative uses, *e.g.*, military broadcasting, and private mobile radio systems, owes more to the order in which their demand for spectrum arose than to the economic value which they derive from using it; some broadcasters effectively got their current

spectrum allocations for free. A market based system of spectrum allocation, such as valuation of existing and future uses, auctions, etc. would take into account not only the relative value of digital broadcasting as opposed to other uses of spectrum, but also the value of new interactive services such as home banking which companies such as *BIB*[23] are intending to deliver. There are also problems in the auctioning process such as the information asymmetry between regulators and bidders which allows some applicants an advantage over their rivals and the regulator.

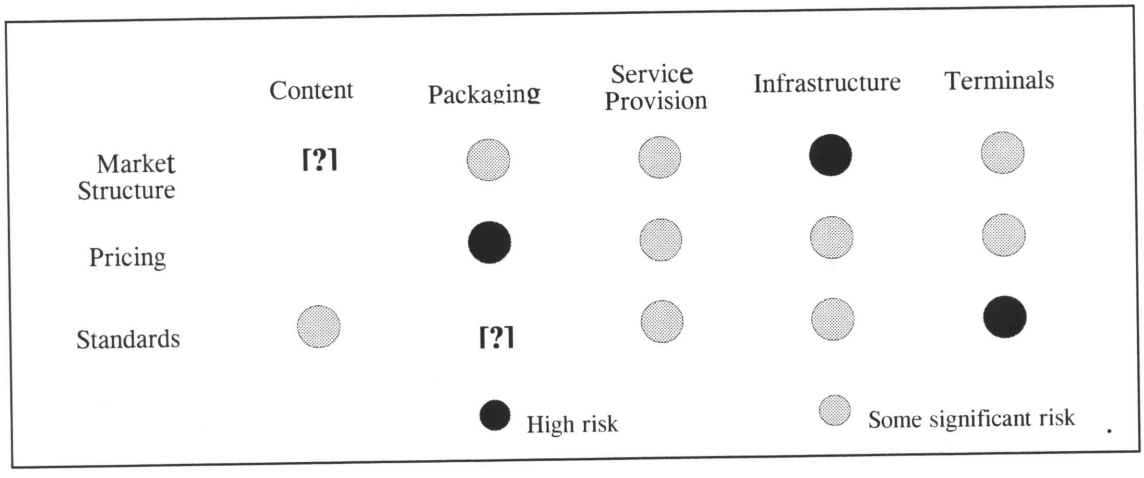
The potential to offer new services will also be increased because of the spectrum efficiency of digital broadcasting compared to analogue broadcasting. This will eventually (within perhaps 10-15 years) free up a substantial part of the existing allocation of spectrum because currently the equivalent of six analogue channels can be broadcast digitally in the same amount of spectrum used to broadcast one analogue channel today. This presents broadcasters with 3 choices:

- to provide more television channels
- to introduce high definition TV which uses more spectrum than existing TV formats
- to introduce multimedia services

Broadcasters will assess the potential risks and returns from following the above strategies and act accordingly. We believe that an efficient spectrum management regime is likely to favour the use of digital broadcasting for developing of multimedia services and have an important effect on the overall multimedia market by creating more alternative channels to the user for service providers and packagers. In conclusion we can examine the emerging multimedia value chain and identify the areas where the risk of abuse of market power or dominant position is high or low. This is illustrated in Exhibit 1.5 (overleaf).

[23] British Interactive Broadcasting, an alliance between British Telecom, BSkyB, Midland Band and Matsushita Corp.

EXHIBIT 1.5 *Risks of Constraint in the Multimedia Market [Source: Analysys]*



The areas of greatest concern are in the linkages between terminal manufacturers and infrastructure providers on the one hand and service providers and content packagers on the other. The reasons for this are three-fold.

- the greatest opportunities for abusing market dominance arise in this area
- infrastructure provision is an essential supporting element in the multimedia value chain and from that all else flows, however if margins in infrastructure provision fall as we have predicted because of competition and platform independence, these providers will have every incentive to bundle infrastructure provision together with service provision and packaging and attempt to squeeze out independents
- we believe that the service provision and content packaging areas are going to be the areas which are most influential in pushing forward the development of the multimedia market.

2/ Impact of Digital Technologies on Network Infrastructure

2.1 INTRODUCTION

In Section 1 we have highlighted the importance of the infrastructure providers as the basis on which companies can deliver multimedia services cheaply and efficiently to the end-user. The most important element of this is the full adoption of digital technology by the infrastructure providers and the completion of convergence at the technological level so that service level convergence is free to occur. That is the subject of this section.

By bringing a range of digitally encoded material to substantial numbers of end-users, the Internet has allowed service providers to carve out a new market which is a precursor to multimedia. The potential of digitalisation to increase network capacity has been applied to the trunk and distribution networks of Telecoms and broadcasting since the early 1970s. Before the explosion of Internet usage, however, the lack of a demonstrable market for multimedia services severely limited scope for investment in broadband digitalisation down to the level of the end user. Now that demand for multimedia services looks real, traditional TOs and broadcasters are in urgent competition to develop digital broadband routes to potential consumers of new multimedia services as explained in this section.

In this section we consider the capacity to deliver multimedia services which is emerging from the adoption of digital technologies in telecoms and broadcasting. We also examine the critical importance of the emerging multimedia market to the future of existing players in telecoms, broadcasting, and content provision. In Sections 2.3., "Telecoms development towards Multimedia services", and 2.4., "Broadcasting development towards Multimedia services", we look at the technical milestones along the TOs' and broadcasters' routes to competitive provision of Multimedia services. Finally, in Section 2.5., "A plethora of digital platforms for Multimedia services", we briefly consider the range of platforms that will be competing to bring multimedia services to the end user.

2.1.1 Digital Technologies in Telecoms

The arrival of digital technologies was timely as well as important for the telecoms sector. In the early 1970s there was concern that increasing telecoms demand would over-stretch the world supply of copper, and that the price of telecoms services would be forced up dramatically. Digital technology allowed operators to use optical fibre for communication.

Optical fibre allowed huge quantities of information to be sent along single fibres. Small bundles of optical fibres were able to carry the traffic equivalent of thousands of copper cables and the quality of digital transmission improved the quality of long distance and international transmission as digital signals could be accurately reconstructed at the receiving end.

The increase in capacity on national and international links caused a dramatic fall in the costs (if not in the prices[24]) of providing these services. The benefits of digitalisation were rolled further out into telecoms networks. Local switches were connected to trunk exchanges using optical fibre, and this resulted in improved quality and lower costs. Sophisticated signalling systems were defined, and services with greater flexibility than "plain old telephone services" such as freephone, premium rate services, calling cards, VPNs etc. were introduced. Digital leased lines became available for business customers, and a range of services based on this form of access were launched.

Digital access for switched services has had a long incubation period, both in terms of digitalising the local switch and in allowing customers to subscribe to another line in the form of ISDN. However the market for this and other such services is growing rapidly and the benefits of end to end digital communication are becoming apparent in the form of services such as video-conferencing, switched data communications and Internet access.

In the short to medium term, as discussed in Chapter I, Section 4.2, TOs and cable TV operators are looking to technologies such as ADSL and cable modems to deliver very high bandwidth to residential and small and medium-sized business subscribers. This should allow significant expansion of the type and quality of services to this type of customers. Larger corporations are already using ISDN, frame relay and leased line services for Internet access and current multimedia services. Intranets also have great potential for enabling the delivery of high-bandwidth applications within

[24] As costs of providing international communications fell, so too did the prices charged to customers. However, as there was little competition in international telecoms there was little incentive for operators to pass all of the fall in costs on to the customer.

organisations. The new capacity will allow experimentation with new services, and permit delivery of familiar services such as video over telephone lines. The mixture of new and familiar services delivered over the telecoms network will undoubtedly be an important part of a market loosely described as Multimedia.

2.1.2 Digital Technologies in Broadcasting

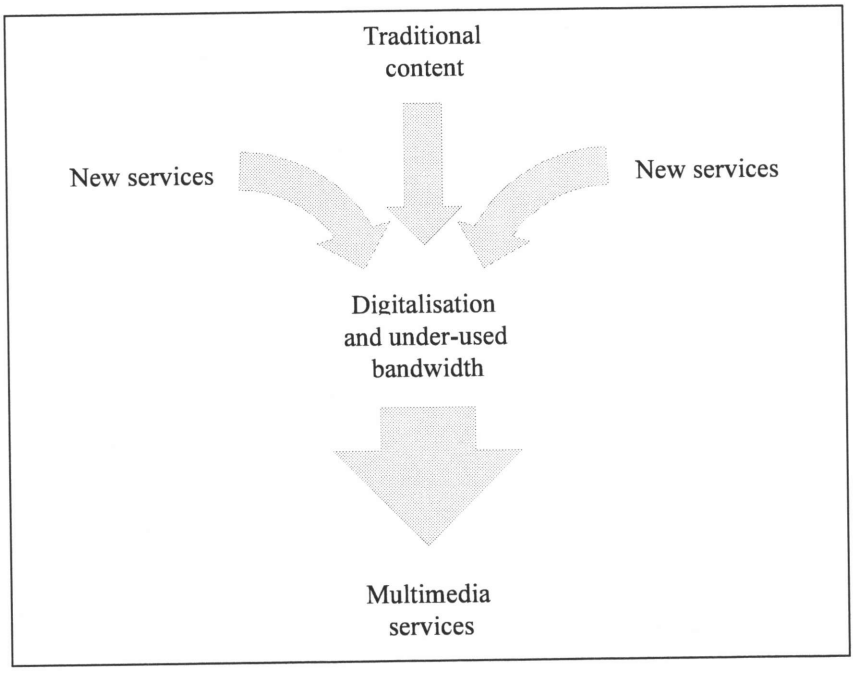
Digital technology for broadcasting was first adopted in the recording equipment and editing room, allowing improvements in quality, and reduction in the cost and size of equipment. Technology to digitalise the distribution of content to the transmitters and satellites was subsequently developed, making it possible to raise the quality of the broadcast signal, since digital channels require less bandwidth and lower power than equivalent analogue signals. This has been deployed in satellite networks and within the next year will have been deployed in cable and terrestrial broadcast networks in Europe.

Greater efficiency in the use of bandwidth also permits the creation of additional channels. In the case of digital satellite broadcasting, the use of hundreds of additional channels becomes possible, depending on the allocation of spectrum - generally 200 channels are available in EU countries and one operator, *Echostar* in the *United States* has a capacity to broadcast 500 channels. The broadcasting of digital signals directly to the receiver, both from terrestrial transmitters and from satellites, has begun introducing the need for decoding at the viewer premises, since television sets are still analogue devices. Such devices can potentially create bottlenecks, as discussed in Section 1.

2.1.3 Multimedia Services Become Possible

Digital technologies have greatly increased the network capacity available for telecoms and broadcasting. This expanded capacity significantly exceeds the requirements of traditional telecoms applications such as voice telephony and national television channels. Telecoms and broadcasting operators are therefore driven to look for new services which can be used to exploit spare capacity and enhance the business position of their organisations. Exhibit 2.1 (overleaf) shows the process by which digitalisation is broadening the capacity of the "pipes" in telecoms and broadcasting and creating a pull effect for new services.

EXHIBIT 2.1: Scope for New Services is Created as Capacity Outstrips Content [Source: Analysys]



In addition to increasing network capacity, computer processing of the digital signals also makes networks multi-functional, ending their traditional specialisation in particular types of content. Examples of the interchangeability of digital formats are numerous: offerings of video over the Internet *e.g.*, enabled by software from Israeli company *VDONet*, telecoms services being offered over cable TV networks, even recently German broadcaster *ARD* trialled broadcasting television over the telephone network. With an increased range of transmissible content types comes the distinctive characteristic of the new multimedia services: combinations of different data types in a single service.

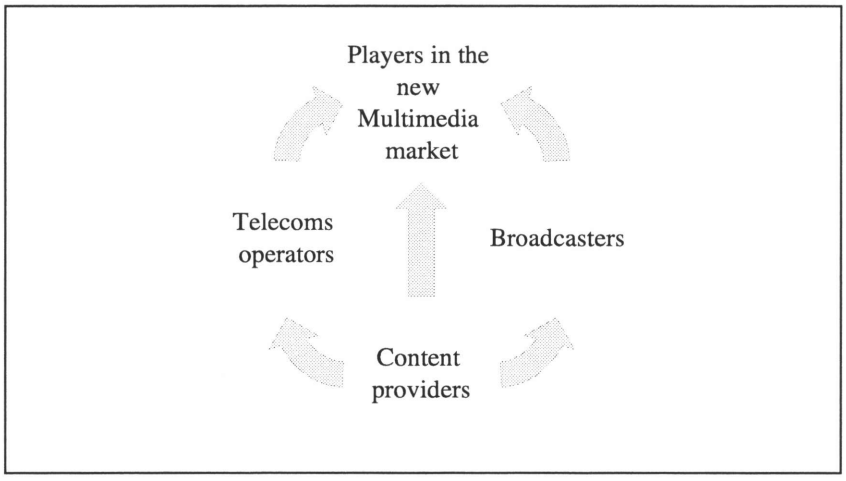
Increased network capacity and the potential for combining content-types will lead to the growth of a large range of multimedia services in the next few years.

2.2 The Emerging Multimedia Market – a Prize for Telecoms and Broadcasting Companies

Telecoms operators and broadcasters are driven towards the emerging multimedia market by differing dynamics, but both types of provider have said during interviews that they are attracted by the prospect of rapid growth. We believe that content providers (originators and packagers) will also have an important role to play in the emerging multimedia market. They will be supported by new types of service provider, in addition to today's ISPs, who provide the platforms which the content packagers will use to reach their market. In the competition to provide new services including information services, electronic commerce interactive entertainment, and electronic publishing a distinct multimedia market will emerge, as described in the

previous Section 1, and will be divided largely between these players, or between new alliances of players of these kinds, as shown in Exhibit 2.2.

EXHIBIT 2.2: Multimedia will Emerge as a Distinct Market [Source: Analysys]



2.2.1 Why Multimedia is Attractive to Telecoms Operators

Increased competition, combined with digitalisation, leaves operators with large amounts of surplus network capacity, particularly in the trunk network and declining margins on their traditional voice telephony services. The potential for a market in multimedia services is appealing to telecoms operators because of a number of factors which are discussed below (moreover the first three are already happening):

- Multimedia services will increase traffic and utilisation of networks, indeed the international capacity allocated to Internet traffic has already passed that allocated to PSTN traffic according some sources interviewed.

- Margins on multimedia services will be higher than those on traditional voice services.

A new market represents an opportunity for business growth and adding shareholder value. Where increasing numbers of telecoms companies are partially or wholly privatised shareholder pressure is causing these companies to look for new business opportunities. Multimedia services will be strongly branded in a world where basic telecoms are becoming a commodity because of competitive pressure

Multimedia is a new market in which telecoms operators can take advantage of skills they have acquired in providing basic communications services, managing complex networks, integrating different network protocols, matching growth of capacity to demand and installing high capacity infrastructure.

2.2.2 Why Multimedia is Attractive to Broadcasters

Digitalisation down to the end user creates the possibility of interactive broadcasting. Digital data-streams moving directly from user to back to broadcaster have the potential to transform the relationship between broadcasters and their audiences. All of the major terrestrial and satellite broadcasters seem to be aware of this. *CNN* and the *BBC*, for example, are both launching online services over the Internet to try to exploit the synergy between their information and archives and the Internet. Evidence from the USA suggests that World Wide Web pages related to broadcast programmes are already attracting significant numbers of viewers, particularly on the Discovery Channel.

The possibilities for broadcasters arising from a multimedia market would therefore include:

Adding value and competitive advantage to existing services

- multimedia services may well be required by customers as part of future broadcast service packages
- they may also become significant differentiators of such packages and services.

Establishing an interactive relationship with audiences

- an interactive relationship with audiences raises the possibility of new types of service, and new revenue streams
- scope for interactive services will also be attractive to public service broadcasters, particularly in the field of education.

2.2.3 Why Multimedia is Attractive to Content Providers

Fewer Distribution Constraints and Independence from Distributors

Multimedia promises to change the balance of power between content providers and distribution networks. In the past, the distribution of content has been constrained by the schedules of broadcasters, and controlled by the distributors of CD-ROMs and video tapes. In a future multimedia market content providers will be able to choose from a range of distribution channels, all competing to support instant delivery.

Delivery on Demand

In particular, digitalisation down to the end user, combined with the interactive character of digital links, will enable delivery on demand. Instead of waiting for a scheduled broadcast, or going out to buy a CD or rent a video, consumers will be able to request instant delivery of multimedia content over broadband digital links. This will have profound effects on the market for multimedia content transforming the ease with which users can gain access to information and services, and allowing or perhaps forcing content packagers into providing a more rich multimedia experience.

2.2.4 Angling for Position

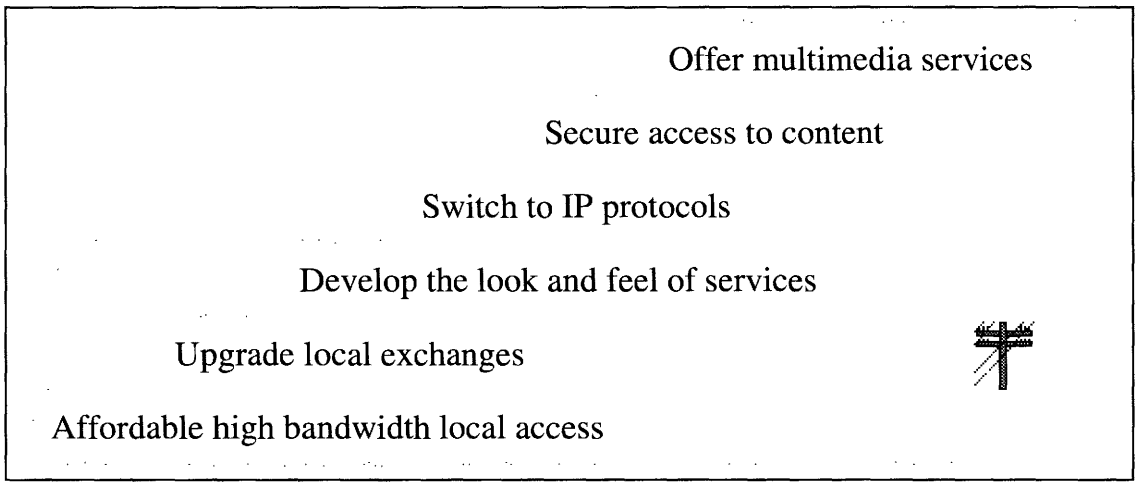
The evidence presented in Chapter I, Section 2 on the emerging multimedia market structure suggests that content providers, broadcasters, and TOs will all be competing for share in the emerging multimedia market. The value of multimedia services is concentrated in content, rather than in distribution, and this will clearly put content providers in a strong position. To the extent that they are already content providers, many broadcasters will also find themselves in a strong position. Telecoms companies would seem to be more narrowly restricted to the distribution part of the value chain. However even telecoms companies have opportunities when it comes to packaging content for distribution.

All three types of organisation will compete for market share in multimedia. It is possible that different types of multimedia services, or different segments of the multimedia market, would be better served by the different types of organisation. Broadcasting companies, for example, have a high penetration of the residential market. It is also possible that most multimedia services for the residential market will be highly asymmetric, and would therefore well served by broadcast digital links. On the other hand, multimedia services for business could well require much more symmetry – at least video telephony and video-conferencing would be required – making telecoms companies better positioned to establish themselves in the business multimedia market. Indeed, videotelephony may be seen as a natural extension of the present telephony service and users may be unwilling to pay a premium for it.
The following sections examine a possible progression for telecoms companies and broadcasters from their current position to that of being able to offer new multimedia services.

2.3 TELECOMS DEVELOPMENT TOWARDS MULTIMEDIA SERVICES

Multimedia has attracted significant investment in research and development, and most telecoms companies are involved in multimedia trials. There is, however, a substantial amount of work to be done before multimedia trials can be converted into full scale commercial services. Exhibit 2.3 shows some of the steps that will need to be made by telecoms companies in order to offer wide scale multimedia services.

EXHIBIT 2.3: Telecoms Companies Steps Towards Multimedia [Source: Analysys]



2.3.1 Affordable High Bandwidth Local Access

Nobody disputes that in an ideal multimedia world all customers would have unlimited bandwidth capacity via optical fibre. However the cost of replacing the copper access network and the terminal equipment with fibre is reckoned to be prohibitive[25]. Alternative technologies, which offer high bandwidth over the existing copper infrastructure, are currently being developed. It is not certain whether these developments will be a transition to an all fibre network, or whether the capacity provided by such technologies will be sufficient for multimedia services in the long term.

Expectations of the cost of providing ADSL and similar services vary according to the source. Costs per subscriber connected fall from US$4000 to US$1500 according to the exact solution used and the nature of the local access network. While cheaper than fibre deployment the cost of ADSL deployment cannot be described as negligible. Strategies will need to be employed by telecoms operators to

[25] On average, Analysys has estimated the annualised cost at over ECU3500 per customer in the EU, based on a limited deployment strategy.

spread this cost over a number of years if ADSL deployment is to be perceived as economic.

It is already the case in some countries that customers with telecoms requirements above a certain threshold are provided with optical fibre access as a default. It is frequently the most economic option for larger customers.

2.3.2 Upgrading Local Exchanges

In order to provide multimedia services are to the customer over the access network telecoms operators in the *United States* and Europe are focusing development on the need to provide one of two things:

- the means of delivering the services at each local exchange
- high bandwidth access to central services so that broadband services can be downloaded to the local exchange when requested by a customer as mentioned in Chapter I, Section 4.2.

These options are not mutually exclusive, and depending on the requirements of the service, a combination of solutions is likely. The nature of the equipment that will need to be provided is uncertain for some types of services. A purely Internet service as it is currently understood would not require specialised equipment in the local exchange. However a video on demand service could be implemented using large video servers located in local exchanges.

The gradual development of the intranet as a platform for multimedia services has also forced some TOs to alter their strategies in order to capture some of this market as discussed in Section 1.4 In this case local access bandwidth is not a problem because corporate networks already offer sufficient capacity for multimedia services. The challenge for TOs and their competitors is to create a market for develop IP based multimedia applications and corporate network solutions rather than seeing companies self-provide these services.

2.3.3 Develop the Service Look and Feel

There is a great deal of work to be done in developing services which can be used by the general public. Familiarity with user interface standards can only be assumed at the lowest common level. Familiarity with windows or browser user interfaces cannot be assumed. Even apparently simple user interfaces such as those on video cassette recorders are viewed with trepidation by many customers. A user interface

which allows customers to get the most from the services available will be critical to the success of multimedia services.

Service branding will also be important. It is likely that multimedia services will be available to customers via a number of sources. Broadcasters have an advantage over telecoms companies in the residential market as they have the attention of large proportions of the population for significant blocks of time each day for their conventional entertainment services. In the business market, telecoms companies do not suffer the same disadvantage because they already have strong links to their business customers. TOs will face an increasing challenge from IT companies who also have a relationship with many large and medium enterprises. Telecoms companies will need to devise ways of bringing their package of services to customers in a way which will cause the customer to recognise their strengths.

2.3.4 Move to Packet-switched Technology

Multimedia applications have different requirements to traditional telecoms services such as voice telephony and fax which still account for the majority of most TOs' revenues. Unless a completely parallel network is deployed for multimedia services, circuit and packet switched services will have to co-exist on the same networks and some solutions will have to be found to facilitate the problems which arise from this.

Circuit switched technology has been traditionally used for the access network because individual lines are required for each premises served. In the past this has been perfectly adequate as the only use for most telephone lines was for speech communication which has been regarded as an inherently circuit switched application. If multimedia applications are to succeed, then low cost communication for small quantities of information will be required. Otherwise usage of services will be deterred as each time a small quantity of information is uploaded a call needs to be made.

One option is to adopt flat rate charges for local calls, but this has caused some problems for the local telephone companies in the USA, with heavy Internet usage placing significant strain on local networks. Another more cost-effective option is to monitor all lines for packets of information which could be uploaded at a very small price per packet. Technology which would facilitate this is being trialled at moment, but not TO or ISP seems close to releasing a product onto the market yet. This would allow small quantities of information to be uploaded for a very small charge and would also allow the line to be shared by a number of applications.

Ultimately however, even the telephone call itself could become a transfer of packets which would obviate the problem. New providers such as *Delta3* and *Global Link*

are offering phone to phone voice telephony service over the Internet at much lower rates than the TOs, and this is an issue of concern for the TOs. The outlook for voice telephony is very uncertain at the moment however. The market for voice over the Internet is relatively small and it is currently of interest because there is a short term arbitrage opportunity between voice over the Internet prices and existing TO telephony prices. This may disappear if demand were to reach substantial levels because the costs of providing it should move closer towards those of the telecoms network, through upgrading capacity and quality of service. Therefore, the market for the pioneers of voice over the Internet may ultimately lie in licensing their products to the telecoms operators.

2.3.5 Secure Access to Content

Unlike broadcasters, telecoms companies have very little content that is of interest to customers. In fact, directory information of various forms, and details of charges for calls could be the total extent of in-house content that most telephone companies can offer customers. Telecoms companies will therefore need to look outside their own organisations for content, as for example *BT* did in the *BIB* alliance with *BSkyB*, the *Midland Bank* and *Matsushita* to develop interactive services over a digital satellite platform. It will be necessary for them either to ally or to compete with broadcasters and other organisations such as record companies for access to content that will make people choose their services. Lack of experience in content acquisition may place Telecoms companies are at a significant disadvantage when compared with broadcasters.

2.3.6 Offer Multimedia Services

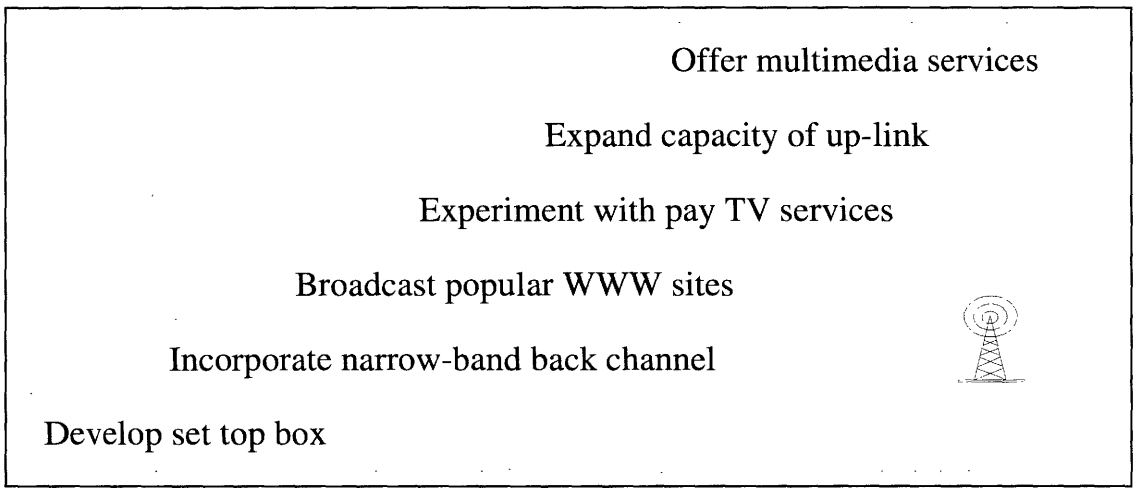
A telecoms company which has completed the steps detailed above will be in a position to offer multimedia services. They will not, however, be alone in the market. Other organisations will be in competition for the same customers, and may well already be well established in the market. Significant market share will be required to justify investment in developing multimedia capacity, and telecoms operators may find the level of competition quite challenging.

2.4 BROADCASTING DEVELOPMENT TOWARDS MULTIMEDIA SERVICES

The launch of satellite digital television services happened in 1996 in *Germany*, *France* and *Spain* and is now expected in 1998 in the *United Kingdom* along with digital terrestrial broadcasting. This has focused the minds of broadcasting companies on grasping the opportunities presented by the increased capacity.

Exhibit 2.4 shows some of the steps that will need to be taken by broadcasters who wish to offer multimedia services.

EXHIBIT 2.4: Broadcasting Companies' Steps Towards Multimedia [Source: Analysys]



2.4.1 Develop Set-top Box

If digital television is to be successful it will need to be possible for customers to view the programmes on conventional analogue televisions. Therefore devices have been created to convert the digital signals into signals which can be interpreted by a conventional television set. In *Germany* where prices were not subsidised until recently, take up has been slow, whereas in *France*, *Canalsatellite* and *TPS* had sold some 400,000 set top boxes for digital satellite by mid-1997.

The simple translation of digital signals to analogue is not, however, the only function of the set-top box. Adding a smart card reader also allows the set-top box to be used as a gateway to premium services. The functionality of the set-top box should be further enhanced by the recent decision by Europe's two leading manufacturers, *Schlumberger* and *Gemplus* to make smart cards Java compatible. This would allow software enabling new features or services to be downloaded onto the smartcard from a server greatly increasing its power. Special channels can be restricted to subscribers. Pay-per-view services become possible with customers required to purchase a special card for the pay per view event. The importance of digital broadcasting lies in the increased capacity allowing channels to be used for services other than conventional broadcasting, *e.g.*, out of a channel capacity of 200, 50 may be used for providing near video-on-demand for films.

2.4.2 Incorporate Narrowband Back Channel

A further refinement of set-top boxes is will be the incorporation of a back channel. Initially the back channel will need to be narrowband because broadcasters believe the cost of a broadband back channel would be too expensive for most end-users. In the case of terrestrial and satellite broadcasters the back channel will need to be carried by a completely separate network. The most likely solution is a modem link over a telephone line. The *BSkyB* set-top box specification contains a high-speed modem as standard.

Cable TV operators will be able to use a back channel through their own network, thus avoiding additional costs associated with the telephone network. However it is not necessarily straightforward to do this, particularly with older cable television networks, *e.g.*, amplifiers in older cable TV networks tend to be one-way and have to be replaced by two-way amplifiers.

2.4.3 Broadcast Popular WWW Sites

As the number of channels increases with the onset of digital broadcasting there will be a shortage of content, if television production levels remain at or near today's levels. However, the potential gap may stimulate some new programme making and more important create a sizeable opportunity for the owners of archive material to re-package and re-purpose their material (as we have already seen with analogue satellite broadcasting). It is likely that broadcasting information such as popular World Wide Web sites in the manner of teletext broadcasting today could be offered as a service. More advanced interactive World Wide Web services in the manner of full high bandwidth Internet access might also be offered in the manner of *DirecPC* services on offer from *Hughes Olivetti* in Europe[26].

2.4.4 Experiment with Pay TV

Another use for spare channels is to broadcast films repeatedly at periodic intervals allowing the delivery of something approaching a video on demand service. Such a service could be implemented using the pay per view special smart card which is currently used by analogue broadcasters. However the challenge will be to use the

[26] In the DirecPC service, a user requests information via a telephone link. The return address specified however is replaced with the address of a satellite earth station. The information requested is sent up to a satellite and broadcast. It is addressed so that it is picked up only by the requesting party's satellite receiver. This service exploits the inherent asymmetry of traffic on the World Wide Web.

back channel in an interactive manner which will allow customers to choose a programme at short notice and be able pay for it without inconvenience.

Such experimentation with pay-TV will involve identification of the types of programmes that viewers will be willing to pay for in this way. For instance there is little doubt that major sporting events will attract large audiences willing to pay a fee to view that event. However access to films is much less certain. It is possible that there may be a market for pay-TV access to specialist channels also. The issue of what type of programmes viewers will be willing to access in this manner will need to be the subject of experiment as well as testing of any technology developments that will be required. In the telecoms sector the experience of video on demand trials *e.g.* in Berlin and Colchester, has been disappointing and widespread deployment has not followed. Although users appeared to want the service, the costs of video-servers made the price TOs would have to charge for the service too high to be viable.

2.4.5 Expand Capacity of Up-link

Once pay TV is established in the digital market and its market understood, it is likely that broadcasters will experiment with services requiring greater interaction than a signal that a viewer is willing to pay to see a specific programme. Initially the services will be simple and will require little capacity in the up link. Services such as home shopping might fall into this category.

However in order to offer more advanced services, such as interactive computer games, the capacity of the up-link will need to be increased. A constraining factor will be how much data can be sent on a telephone line. This will depend on the advances in telephone technology that will happen in the medium to long term. As discussed in the previous section it is possible that telephone companies will opt for packet switched technology for the local loop. If that happens then it is possible that this will increase the capacity of the local loop removing this bottleneck.

2.4.6 Offer Multimedia Services

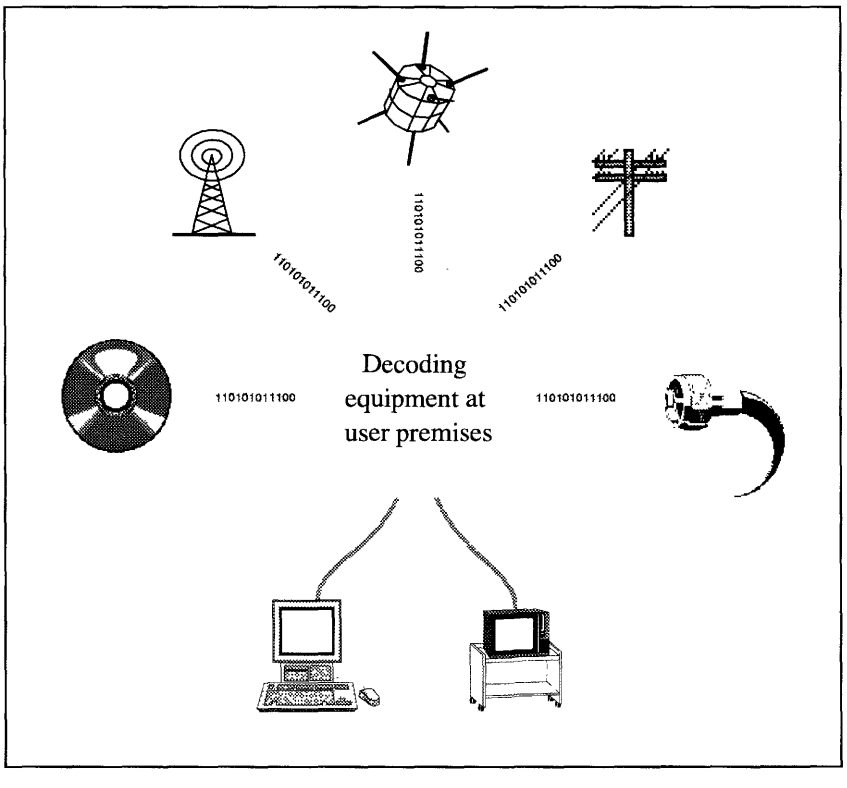
Broadcasting companies will be in a strong position to offer a limited number of multimedia services to customers once they have undergone the described steps or a similar process. In comparison to other sectors such as telecoms, the broadcasting sector has a great deal of experience of procuring and packaging content. In addition the broadcasting industry has moved further than the telecoms sector towards the goal of providing multimedia services.

2.5 A PLETHORA OF DIGITAL PLATFORMS FOR MULTIMEDIA SERVICES

A result of the different approaches to providing multimedia services is that there will be a number of different platforms for delivery of multimedia services. These platforms will be divided between broadcasters and telecoms companies with information and content companies being able to access the customer directly using CD-ROM and other storage media such as video disks. Because of platform independence, content providers will be able to choose whether to use one or many channels to market such as *America Online*, *Pointcast*, direct selling via the web, or a proprietary telecoms solution such as *BT*'s wireplay system for distributing videogames.

At the moment there is no clear picture of which of these platforms (if any) will dominate the infrastructure segment of the multimedia value chain. In the short term capacity difficulties in the access network will ensure that CD-ROM is an important alternative to interactive multimedia. There is already some overlap between CD-ROM distribution and Internet distribution, as some CD-ROM software can use the Internet to download supplemental information. Being able to download all of the information required offers greater flexibility and will almost certainly become the preferred route in the future.

EXHIBIT 2.5: A Range of Competing Multimedia Platforms [Source: Analysys]



Neither broadcasters nor telecoms companies can afford to ignore the challenge posed by digitalisation and emergence of a multimedia market. Platform independence means that each network can carry the same range of services, making each one a threat to the other in the multimedia market. However, more importantly, if neither acts the companies who have successfully driven forward the Internet through the early stages of commercial development will take the spoils. There is already significant evidence that both broadcaster and TOs are responding to these challenges particularly through the involvement of TOs such as *France Telecom* and *Telefonica* in digital satellite broadcasting and alliances between broadcasters, TOs and IT companies which bring together the necessary combination of skills to address the multimedia market as discussed in Chapter I, Section 3.

IT companies, publishers and content packagers appear content to let the broadcasters and TOs develop these platforms because:

- there are higher margins in service provision and packaging
- they would be at a severe cost disadvantage in developing competing platforms with the TOs and broadcasters
- and they realise that they will have considerable choice in the means of delivering services to users because of platform independence.

3/ Pricing of Services and Payment

3.1 INTRODUCTION

The pricing of services to end-users and to companies in the multimedia sector will have an important impact on the development of the multimedia market. Firstly, we consider the current mechanisms of charging within the telecoms, broadcasting, and electronic publishing sectors and what this may mean for the development of the multimedia market in the transitional phase. The appropriateness of continuing to apply the ONP framework to the telecoms sector as it changes and converges with other sectors is also a very important factor in this transition.

We also consider what approaches to pricing are likely to be used in the new multimedia value chain, and how these will be affected by new relationships between different types of players. In particular, we examine the degree of flexibility that may be required to market new multimedia services successfully.

3.2 THE TELECOMS SECTOR

Pricing of services in European telecoms is subject to the general rules of Open Network Provision (ONP) where regulation is being used in the transition of full liberalisation as a proxy for competition in driving prices towards underlying costs. Firstly ONP requires EU Member States to ensure that the prices of operators enjoying significant market power are cost oriented and non-discriminatory. This would apply to all services, and in particular to interconnect, leased lines and public voice telephony services. Secondly, Member States must also ensure that the services considered to be part of universal service[27] are delivered at an affordable price. As effective competition develops after the full liberalisation of telecoms on

[27] Currently, the provision of a voice telephony services over a line supporting the use of a fax of low-speed modem at an a affordable price.

1st January 1998, markets should exert pressure to bring prices into line with costs and there may be scope to relax some of the rules of ONP.
In addition to the ONP requirements, in many countries prices for telecoms services are subject to a price cap which forces the price of a basket of services to fall in real terms. This mechanism is an attempt to ensure that the benefits of technology improvements in terms of falling unit costs are passed on to telecoms customers (as they would be in a competitive market) rather than resulting in higher profits for telecoms operators.

The pricing of telecoms services to other market players and to the customer is thus strongly regulated. Where independent regulators have not yet been established the price of telecoms services is usually subject to ministerial control. In an emerging multimedia market, such close regulation of service pricing for new services may serve to deter investment in the infrastructure required to deliver services. Telecoms operators could view investments where the returns are subject to regulatory fiat as unattractive. Therefore careful consideration will need to be given to the services whose prices are subject to control.

Another aspect of telecoms services pricing is bundling of services. We are already seeing differing approaches to bundling of telephony services such as call-waiting and call forwarding. Some operators regard these services as additional and charge for them separately. Others offer these services as an integral part of their basic telephony service. In the future as the range of services broadens to include multimedia services there will be considerable scope for bundling of services in creative ways. Again regulation of the price of some services could make this process more complicated.

The structure of tariffs can also have a dramatic effect on the uptake of new services. An excellent example of this can be found in the differences between European and North American approaches to the pricing of local calls, which have had strong effects on the take-up of private Internet usage. In the USA there has been a long tradition among local telephone companies of applying a flat rate charge for local telephone calls irrespective of usage. In Europe timed local calls are the norm, with customers paying more in proportion to the number and duration of their local calls. As a result, Internet access in the USA far outstrips that in European countries. This has not brought unmitigated benefits to TOs in the USA, as intensive Internet usage is causing quite severe overloading of local telephone systems. However it has resulted in far greater and more sophisticated use of the Internet.

In addition to the effect of local telephony prices on the take-up of Internet services, the charges made by the Internet service providers also have a dramatic effect on take-up. Within Europe, the charges levied by Internet Service Providers (ISPs) vary

considerably. Some ISPs charge for the time connected while others have only a flat rate monthly charge. Comparisons done by the OECD[28] show that the price charged for 20 hours Internet access in a month varied greatly from $14.37 in the *United Kingdom* to more than $200.00 in Spain in 1995. High charges such as those levied in Spain have a significant deterrent effect on residential take-up. However, operators have begun to recognise the importance of the Internet for their business and the economy. Volume-based pricing has also given way to flat-rate charging in many of the more expensive countries, and in 1996 the OECD[29] records that the cost of 20 hours Internet access in Spain has fallen to $20 versus $11.8 in the *United Kingdom.*

As well as pricing relationships with customers, telecoms operators have intricate pricing relationships with other operators for handing over traffic. In the traditional European telecoms model, with national monopolies providing most services, the most important relationships were with other national monopolies through the international settlement arrangements. In recent years the rates used for settlement have borne no relationship to the cost of providing international services, as these have been falling dramatically. As more competition arises in European telecoms and traditional correspondent relationships are replaced by interconnection agreements in the EU, the relationships between operators providing international telecoms is changing and the international settlement regime is beginning to crumble. Already we see that the price for telephone calls between the *United Kingdom* and the USA is lower than the price for telephony between the *United Kingdom* and *France.*

Increasing competition has introduced the need for interconnection of operators within countries also as competitive operators set up their networks and need access to the customers of the incumbent operator. There is general consensus that operators who enjoy significant market power should offer interconnection to competitive operators of cost-oriented prices which represents; a significant discount to the equivalent charge to the end customer. Now regulators are examining whether a distinction can be drawn between termination of calls where market power may be quite considerable and origination of calls where competition (once introduced) is eroding market power.

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[28] *Information infrastructure convergence & pricing: the Internet,* OECD Working Paper No 63, Paris 1996.

[29] Communications Outlook 1997.

3.3 THE BROADCASTING SECTOR

There are currently two main mechanisms for funding broadcasting organisations. One mechanism is through special taxes levied on all households having a television set. The other is to sell advertising time. These mechanisms are not mutually exclusive although taxation normally benefits only state broadcasters. However, most state broadcasters also carry advertising as a source of revenue. The size of the special taxes are usually heavily regulated by the government, while the commercial terms for advertising sold by broadcasters are usually set by the market, and broadcasters are free to set the rates they estimate the market will bear.

In addition to these two main mechanisms, there are channels that are available to viewers who pay a subscription to private broadcasters. These tend to be film, sport or specialist channels and are available usually over cable or satellite TV systems. These channels offer an all or nothing approach – a customer pays for access to the channel for a block of time (usually of the order of several months) or has no access. Access is controlled through the set-top box associated with the cable or satellite service. The pricing of the channel is a matter of determining the willingness to pay for the content available on the channel.

With developments in technology it is becoming possible to give customers access to individual programmes on a pay-per-view basis. This requires a means of communication which will allow a customer to choose to pay for a programme at any time up to the end of its broadcast. Such a mechanism will allow pricing of services on a programme by programme basis. Special events such as major sporting events or film premieres could command very high premiums under such a system, allowing broadcasters to extract the maximum value from their content.

Such an approach could, however, have a counter-productive result. There is already a degree of political concern at the exclusivity of access to certain events which commercial broadcasters have secured. Exclusive access for certain sporting events is considered to be against the public interest by some politicians. It is possible that attempts by broadcasters to extract maximum value from such events could provoke the passing of legislation restricting the freedom of broadcasters to do this.

A possible outcome of the advances in technology and the activity of commercial broadcasters could be that the importance of public broadcasting will diminish in European countries, or that there may be a change in conceptions of how public service missions can best be accomplished in the digital television era.

Pricing models for multimedia services such as video on demand services are not clear at the moment. The availability of films/programmes on demand (rather than as scheduled by broadcasters) will allow experimentation with differing pricing schemes. Peak rates for recently released programme material, and lower prices for older material, would be one possibility. The price of a programme might, for example, be held high until the next episode of a series is made available and lowered thereafter. Pricing could also be varied according to the amount of advertising interspersed in the content. Programmes could be made available without advertising at a premium price. It may be possible to access the programme at a variety of prices according to the frequency and duration of advertising which the viewer is willing to tolerate.

3.4 THE INTERNET

In order to access the Internet, end-users have to pay an Internet access charge and a price for the telecoms facility they use to connect to their Internet Service Provider. Internet access charges have traditionally been flat rate, *i.e.* not varying with usage. This, combined with the simplicity of the charging structure was a major factor behind the rapid growth of the Internet. For residential or dial-up users, the price for telecoms services was either fixed (included in the rental fee for *United States* users) or charged at local call rates in Europe. Some commentators have attributed part of the faster growth of home Internet usage in the *United States* compared to Europe to the fact that telecoms charges were fixed instead of usage based. For those with leased line access the price of Internet access varies with the capacity of the leased line, as this affects the capacity requirements of the ISP (modem and routers).

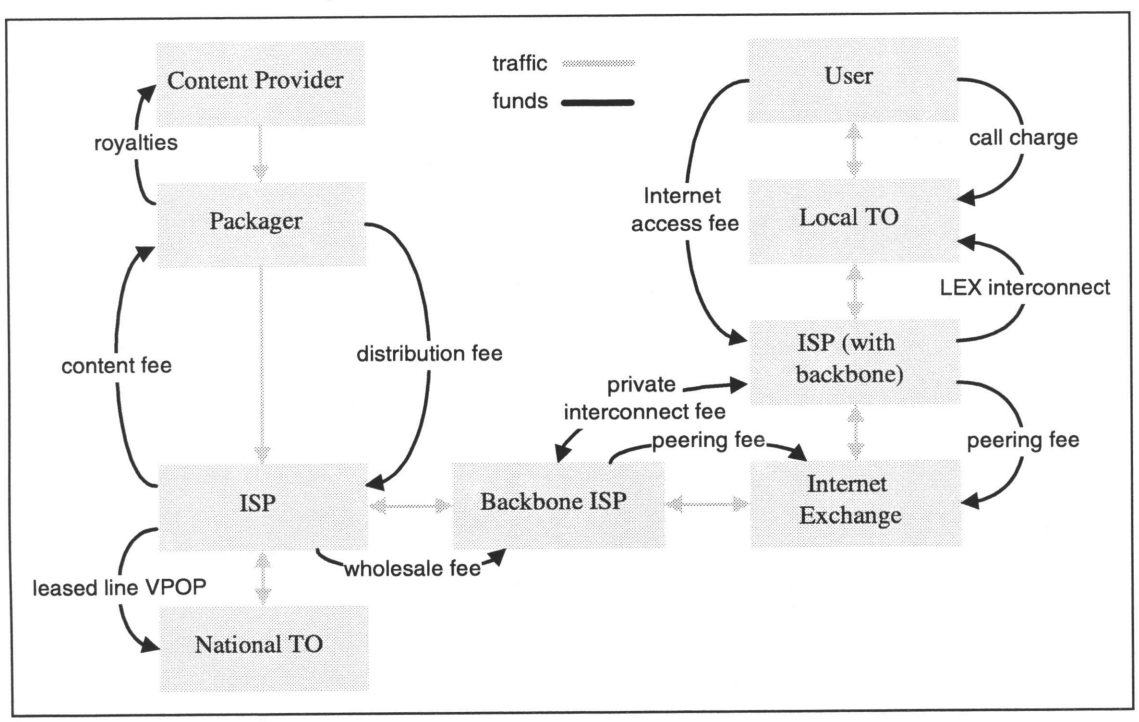
ISPs generally lease their networks from telecoms operators. In the past this has caused significant regional variations in the price of Internet access, because ISPs passed on the leased line prices directly to end-users. For example, in 1996, the price of comparable 2Mbit leased lines was over 5 times higher in *Belgium* than in *Sweden*. However differences in Internet access prices have been eroded by the entry of the TOs into Internet access provision (leased-line prices do not then enter into Internet access pricing) and in some cases, changes in operators pricing policy towards ISPs.

In general most interconnection between ISPs is done on a peering basis. Most smaller ISPs avoid even this by paying larger ISPs who then choose to establish peering relationships with other large ISPs at Internet exchanges. As a result is the number of Internet exchanges is relatively small. By agreeing to peer, the ISPs carry each other's traffic for free and not on the basis of the volume of traffic carried. The interconnect facilities are usually managed by a separate organisation which charges a flat fee to cover the cost of the facilities. Recently, as mentioned above, this

system has begun to change, as some of very largest ISPs now seem to be moving towards an interconnect system based on the volume of traffic interchanged. At present this is only being applied to the smaller operators (still through the public exchanges) who are not true peers in terms of the volume of traffic handled.

The flow of funds and traffic between various types of player in the Internet market is illustrated in Exhibit 3.1 below. In principle payments may flow in both directions between content providers and packagers and between packagers and ISPs. In practice the flow of funds is likely to be greater from packagers to content providers and from packagers to ISPs.

EXHIBIT 3.1: Payments in the Internet Market [Source: Analysys]



3.5 The Electronic Publishing Sector

Electronic publishing is a rapidly expanding area of business. There are four main payment mechanisms used for services from electronic publishers at the moment:

CD ROM Distribution of Content

Distribution through CD ROM is relatively straightforward. A manufactured CD-ROM and accompanying material is sold to a customer in the manner of a book. The purchaser keeps the disk and thus has access to the content. The pricing model is similar to that operated in conventional publishing and the content is priced to cover

the costs of manufacturing and distributing the physical medium and give a satisfactory return for the content provider and publisher. In our interviews content providers saw CD-ROM as an effective distribution mechanism now, but believed online access would become much more important in the future

Online Access by Subscription

Online access by subscription is also widespread. Business information services such as those provided by Reuters or Bloomberg offer information to customers who pay a fee for access to that information. The information may be packaged, combining, for example, stock and commodities prices with business television. In fact these services can already be classed as true multimedia service packages.

Advertising

Advertising is also a mechanism by which services can be offered. For instance many conventional newspapers make their content available free to readers on the Internet, selling advertising space on the Internet version of the newspaper targeted at readers likely to access the service. In relation to newspaper advertising however, online advertising is estimated to be just over 1% of the total in the US. Very few publishers are covering their costs by advertising at the moment on the Internet. It also the case that the companies with the largest revenues from WWW advertising are also those who spend the most on advertising on other WWW sites. However, the need on the part of newspapers to keep abreast of developments on the Internet will ensure that this form of publishing will continue.

Payment per Transaction

Payment for access on a per transaction basis over mechanisms such as the Internet is expected to grow significantly. For example, *First Virtual* Holdings has created a sizeable business (in the *United States* originally and latterly in Europe) operating a system for vendors and buyers of a wide range of goods and services, (not only information) which works with a variety of different forms of online payment: debit and credit cards; electronic cash smartcards. There are many obstacles to transaction based charging such as security and prevention of fraud. However a great deal of effort has been invested to ensure that these obstacles are overcome and to a large extent the technical problems have been resolved. Confidence that the systems are safe and secure now needs to be built up among businesses and individuals.

Transactions involving micro-payments will require special attention. Here special provision will need to be made by organisations to handle transactions on behalf of

multiple publishers. This is an area where electronic commerce can make a real change to the way goods are sold, because the transaction costs are much lower than alternative means. For example the transaction cost for a digital transaction may be in the range of a hundredth to a thousandth of an ECU whereas for a credit card transaction it will be in the tenth of an ECU range. Information and entertainment can therefore be sold in much smaller packages than before. This gives publishers greater flexibility in packaging together information from different sources, and allows them to get more value out of their products if they can effectively segment the market to a greater degree and price discriminate[30] on that basis.

Clearly, combinations of the above payment mechanisms can be used to charge for services in the future. The mechanism chosen will be determined by factors including the volume of information required, the value of that information, the frequency of access, and the customer's willingness to pay.

3.6 Approaches to Pricing in the Established Multimedia Value Chain

Pricing of interconnection between networks is only one aspect of a series of pricing issues which arise between players in the multimedia market. Exhibit 3.2 summarises the main issues which arise in the terminal equipment, infrastructure and service provision levels of the value chain. These are the areas in which pricing policy is most likely to have an impact on market development. Packaging and content origination will be significantly more competitive, because economies of scale and, as a result, barriers to entry will be low and potential margins high. This will encourage many firms into the industry which will reduce the impact that any one player's pricing behaviour could have on overall market development.

EXHIBIT 3.2: Pricing Issues at Different Levels of the Value Chain [Source: Analysys]

Area of Value Chain	*Pricing Issue*
Terminal equipment	Cross-subsidisation for market stimulation
Infrastructure provision	Interconnection to infrastructure and service provider networks, unbundling, accounting separation
Service provision	Access to networks, unbundling, accounting separation

[30] Namely, sell different forms of the same product at different prices related to how much different types of customer are willing to pay.

The following sections consider each of the pricing issues identified in Exhibit 3.2 and the implications of each one for the development of the mature multimedia market. User pricing issues are discussed separately in Section *0*.

3.6.1 Cross-subsidisation

Our definition of cross-subsidisation is pricing one service or product below its long-run incremental cost by subsidising its price from the revenues earned from another source. In competitive markets it is not in itself a problem unless market power is used to support subsidies over a long duration *e.g.*, a company may cross-subsidise to prevent what would otherwise be efficient entry into the market by a company which cannot match the cross-subsidised price of the incumbent.

Two circumstances might lead to cross-subsidisation in the multimedia market:

- one player may span a number of areas in the value chain
- there may be a strong linkage between the products of two different parts of the value chain. For example digital television broadcasting and set-top boxes.

The primary objective of cross-subsidisation in such circumstances would be to stimulate the market. In order to accelerate the transition from analogue to digital TV, or to make TV receivers WWW-capable, service providers in broadcasting and other areas have already set up arrangements partially to finance the costs of set-top boxes. There is also a risk that the player is attempting to lock subscribers into long term contracts which will make it more difficult for other players to gain market share. If the aim is market stimulation then this clearly benefits the consumer and does not appear to damage other players.

Initially, however, it may be difficult to distinguish this type of activity from attempts to create artificial barriers to entry. Actions such as giving away application software for free, *e.g.*, *Netscape's* of *Microsoft's* web browser (to certain types of user), offering free installation of second telephone lines, or offering discounted content in conjunction with using a particular service provider's product would fall into this grey area. If the cross-subsidy persists in the long term there is a case for investigating whether an abuse of dominant position has occurred. In addition, without a system of transparent cost monitoring it may be difficult to discover whether a vertically integrated player is cross-subsidising some of its products or services. This may require some form of accounting separation as discussed in the Section 3.6.3.

When the market is mature, the cost of set-top box manufacture may have fallen sufficiently that cross-subsidy is no longer necessary and it will be withdrawn assuming that either unit costs have fallen as demand has risen or that customers' willingness to pay has increased as they have become more familiar with the product. However, a substantial proportion of the installed base of terminal equipment may still have been subsidised. Pricing problems may arise if service providers other than the cross-subsidising provider gain access to the customer through the same subsidised equipment. The question will be whether the costs incurred by a provider in subsidising the cost to the consumer of a set-top box should be recovered in part from any charges made to other service providers.

3.6.2 Interconnection

The convergence of digital networks with completely different histories will create a new set of technical and institutional problems. Satellite and terrestrial broadcasters such as *BSkyB* in the *United Kingdom*, may be the first to seek to connect their networks to with telecoms network, as a means of establishing two-way and interactive services. This is different to the current concept of interconnect in telecoms because separate communications are flowing over each company's network. In telecoms network the same communication flows over both networks. However, in order to provide the multimedia service the broadcast network needs to be connected to the telecoms network therefore we consider that there are significant parallels to interconnection for telecoms services.

Although they can provide a high bandwidth channel in one direction (to the user), they will depend on telecoms facilities for a channel in the opposite direction. Telecoms operators will, therefore, play a key role in enabling a broadcaster to provide interactive services by delivering traffic to its network. Pricing interconnect services in this sort of situation becomes very complex. The TO is offering pure telecoms provision, the broadcaster is delivering a value added service, however both services are necessary to deliver the end-user service. An interconnection pricing approach which imposes obligations for prices to be oriented towards the cost the TO incurs in delivering traffic would not seem to be equitable in this case because the TO should be able to share in the high value attributed to the service. Without the imposition of a cost orientation approach, the parties would have to negotiate, and the interconnection price agreed would probably be much higher than the cost oriented price, recognising the contribution of both parties in providing the end-user service. If the broadcaster or service provider does not have significant market power, there is a risk that the TO could extract monopoly rents for the use of its access infrastructure if local loop competition is limited.

Pricing of service provider to service provider interconnection is also an area that may create new problems. For example, the growing dominance of large firms in the Internet service provision market is creating a tension between the openness of the market and the objectives of the major players. Quality is becoming a key differentiator and this is creating incentives for the major players to replace the current flat rate interconnect pricing system with a traffic-sensitive one. Larger ISPs are being treated more favourably than small ISPs, because the latter do not have sufficient backbone network capacity to match the quality of service provided by the larger ISPs. If large ISPs, continue to price discriminate in favour of other large ISPs, the small players may find it difficult to continue trading unless they can find a niche in the market.

3.6.3 Unbundling, Accounting Separation and Access to Networks

These three issues will be very important in the multimedia market because of the growing importance of service provision as distinct area of the value chain, *e.g.*, providing platforms for home banking services. Some independent service providers will be leasing infrastructure from operators who are also competing in service provision. These integrated infrastructure suppliers will have incentives to inflate their margins in infrastructure provision, while squeezing profitability in service provision, attempting thereby to kill off the independent competition.

In the medium term, we believe that there is likely to be enough competition in core network infrastructure to prevent problems arising in the interconnection of service providers to network operators. Interconnection to the access network may, however, be more problematic because levels of competition are likely to be lower than in the core network. In this case it may be necessary to intervene in the market, *e.g.*, by requiring accounting separation, in order to make pricing more transparent and help to create open access to bottleneck local access facilities.

Unbundling may also be necessary as a complement to accounting separation, given that many of the large infrastructure providers are also likely to have integrated service provision for multimedia into their operations. The necessity of unbundling also depends partly on the level of effective infrastructure competition. Smaller service providers with little market power may find it difficult to get network providers to unbundle particular components of their infrastructure, *e.g.*, use of intelligent network overlays to enable independent ISPS to use virtual Points of Presence to offer local call rate access to the Internet. This may severely limit service providers' ability to experiment and innovate in service provision, and may, as a result, constrain the development of the market.

3.7 END-USER PRICING STRATEGIES

The key to understanding end-user pricing in the multimedia market is the way in which the changing market structure will fundamentally disrupt infrastructure providers relationship to and control of the customer in the telecoms and broadcasting industries. As discussed in Section *0*, there will be a variety of different channels to the consumer. This has already been demonstrated by the Internet in which content and service providers have been able to interact directly with the user in ways which would not have been possible previously in the telecoms sector - for example, share dealing over the Internet, pioneered in the *United Kingdom* by *Electronic ShareLink International*. Service and content providers may also seek to make deals with terminal equipment providers as part of their service marketing strategy. Players will seek to exploit their newly opened channels to the customer by developing pricing strategies which extend their control of the customer and build up their market share. The following sections discuss these potential pricing strategies and how they vary across the value chain.

3.7.1 Infrastructure Providers

Infrastructure pricing will play an important role in the development of the entire multimedia market because service providers and content packagers will pass on some or all of their infrastructure costs to end-users. Infrastructure providers may offer discounts to users who jointly purchase basic delivery services (such as a telecoms subscriber line), and higher level services (such as Internet service provision[31]). This would allow them to exploit their current consumer relationships to the detriment of independent service providers. Providers such as Global One, CompuServe also intend to offer one-stop shopping facilities - *e.g.*, a managed intranet service for business could cover basic service provision, connectivity to the provider's dedicated[32] Internet backbone, security software implementation, and integration of business applications into the network.

Infrastructure providers will also have to consider how they charge users for services delivered over networks that are capable of supporting several different types of service at the same time and, hence extremely variable use of capacity. Charging users for services delivered over ATM network is a prime example of this problem. The different types of traffic which ATM networks can carry place different demands on the network, and this makes it difficult to derive a common basis for valuing and

[31] AT&T's special offer gave AT&T long distance users a year's discount if they used AT&T's Internet access service when it was launched in 1996.

[32] The provider will have its own global Internet backbone network, enabling it to dedicate capacity to managed intranet services and maintain a high quality of service for its intranet customers.

charging for use of infrastructure by different types of service. Similar concerns will arise with high bandwidth local access networks

3.7.2 Service Providers

Service providers (who may purchase infrastructure at wholesale prices) will be able to offer their connectivity services independently of the infrastructure providers and may also link higher value services for specific applications such as electronic commerce systems, videogame servers etc. Some service providers may also combine content packaging or service integration with their basic service provision package in order to gain a share of the higher value parts of the multimedia market.

Given the rate of development of terminal equipment technology, and the fact that limitations in terminal equipment functionality may also place constraints on service provision, service providers may also offer to cross-subsidise terminal equipment prices from service provision revenues, as has happened with the successful roll-out of digital satellite television decoders in *France*. These agreements may range from network computers to upgrade cards for a PC or TV. Service providers will benefit by stimulating the terminal equipment and service provision markets simultaneously when the installed base of the required terminal equipment is low. However, if such arrangements persist beyond the early stages of market development they may create distortions by artificially discouraging efficient entry into the market, particularly if one supplier of terminal equipment controls the markets and has an exclusive link with one particular service provider.

3.7.3 Packagers

Packagers will face a number of different issues in multimedia pricing. Many existing content packagers such as *MSN* and *CompuServe* already bundle service delivery with packaging. As the multimedia market develops, however, these players will have to reassess their pricing strategies in the light of competition from different players. For example, *America Online*, is finding its profit margins squeezed by competition from both service providers and content originators. Service provider competition, particularly in the ISP market, may lead packagers to unbundle the pricing of content packages from service delivery. It is likely that content packagers like *America Online* will always be at a pure cost disadvantage to TOs in terms of service provision because they do no enjoy the same degree of economies of scale. Only if a packager's traffic were to approach the volume of a TOs would it have the scale to compete. If a packager were given access to a TO's connectivity at the same price as the TO charged itself then, of course the cost disadvantage would disappear.

In other areas of the content packaging market, the broadcasting sector pricing approach may need to be re-evaluated in view of the potential of different types of multimedia networks to deliver similar services through technological advances such as digitalisation. Platform independence, as discussed in Section *1/ Market Structure* should mean that broadcasters will no longer have a unique delivery mechanism for their content and may have to allow other packagers and content originators direct access to their multimedia service delivery platforms. In a limited fashion this is happening with *BIB*, where the broadcaster (*BSkyB*) doesn't have the necessary skills to provide every type of interactive service and the need to spread the market risk (which arises from the uncertain demand for new services over) several partners.

Pricing packages linking content to the purchase of terminal equipment may also be more common in the multimedia market than they are today. Pre-installing subscription mechanisms for a particular packager *e.g.*, the bundling of *MSN* with the Windows 95 operating system, onto access control devices will be one possibility. Some packagers will therefore offer special pricing packages to purchasers of particular brands of set-top box.

3.7.4 Content Originators

Content originators who choose to offer their work directly to the public will be faced with many of the same options for pricing as electronic publishers are today.

Content could be distributed:

- free to user with revenue generated by advertising
- on the basis of periodic subscription charges
- through charging per item or transaction

Issues similar were discussed in Section 3.5 on electronic publishing and are relevant here. The first two alternatives are relatively straightforward, the latter presents many challenges in deciding in what form services and digital goods should be sold. Electronic commerce may allow services to be sold in much smaller quantities, because transaction costs are lower, thus giving customers the ability to consume only part of an information good or service where before they had to buy an entire product.

3.8 CONCLUSIONS

Bundles of Services Based on Alliances or Vertical Integration

The pricing issues which have most relevance to market development are those related to the bundling together of end-user services from different areas of the value chain. Players will offer bundles of products and services either through establishing alliances or through vertical integration across several areas of the value chain.

Portfolios of Pricing Packages

Players will also will develop portfolios of pricing packages in order to customise products more closely to different types of customers, aiming thereby to improve targeting and market share. They may, for example, offer discounts to subscribers who purchase multiple services.

Challenge to Regulatory Framework of Current Telecoms Sector

These pricing strategies (which may involve cross-subsidy and price discrimination) would be problematic within the terms of the current regulatory framework of the telecoms sector, and a central issue for regulators will be to assess the probable impact of such strategies on market growth

In general, where competition is limited, pricing packages may be used to lock customers in to a particular combination of services, thereby creating artificial barriers to entry for competing companies, or gaining market share through predatory pricing. Where there is effective competition, the impact of bundling services together into pricing packages will not necessarily limit the growth of the market. The availability of alternative digital channels to the customer should, in principle, provide protection from the formation of bottlenecks which limit competition.

4/ Standardisation and Multimedia Services

4.1 Objectives and Structure

This section explores the medium-term issues of standardisation in multimedia communications. There is no attempt to analyse specific standards or standards-making bodies; rather, the objective is to explore the interaction between standardisation issues and the development of a mature market in multimedia services. It is structured as follows:

- background of standards creation
- the key issues behind current multimedia standards thinking
- examination of four general 'layers' of standardisation issues
- summary and conclusions.

4.2 Background

Standardisation is currently a very large, pervasive and expensive activity which looks set to continue to expand without obvious limits. It is driven not only by electronic inter-operability requirements (the original and most fundamental of pressures for standardisation), but also by the need to satisfy the conditions for open markets in products and services for the ultimate benefit of the user. However, in some cases standardisation can have the opposite effect, instead limiting innovation or creating barriers to competition.

4.2.1 Legacy of National Standards

The process of standardisation started in radio communications in the early 1920s when public service broadcasting began and the need to reach agreement on international radio frequency allocations resulted in the formation of the CCIR (Comite Consultatif Internationale des Radiocommunications). Thus the concept of

international standardisation was born. A common factor in all forms of electronic communication, not just radio, is that by definition they have an international scope and cannot be confined within the borders of a country.

Apart from the case of radio frequency allocation, in telecoms generally national standards appeared first, primarily to accommodate the products of indigenous suppliers within the network of the dominant operator. Indeed the dominant operator frequently combined the roles of standards originator and adjudicator of conformance, applying its market dominance to drive the process to its logical conclusion. More recently, however, these indigenous standards have come into conflict with international standards, a topical example being the differences between national and European ISDN standards. There are commercial pressures to retain national, and in some cases supplier-owned, standards in a number of areas such as packetised mobile data services.

4.2.2 Proprietary Standards

Proprietary ownership of key technologies is one source of difficulties in standardisation work. There have sometimes been difficulties in adopting certain ETSI-developed telecoms standards due to late claims of proprietariness. As the market place for suppliers becomes more competitive, and as scope for product differentiation declines (partly as a direct result of standardisation), this kind of problem may increase in frequency and severity.

Information technology has progressed along a different path. With few exceptions, its 'standards' are proprietary and commercially closed but widely disseminated by dominant vendors. A few major operating systems have dominated the desktop computer (DOS, Unix, Windows), all of which have been developed with private finance and generally without the constraints of 'openness' and 'transparency' that are imposed by the international standards bodies on telecoms equipment. Consequently, use is conditional on completing a contractual process, often through licensing encouraged at low or no cost. Market forces, however, have ensured that many applications have been successfully developed on the back of these de-facto standards, and these applications are now the life-blood of desktop computing.

4.2.3 The Role of Fora

An important factor in the standards world has been the 'rise and rise' of fora and associations. Virtually all major service and standards-related topics are now handled by fora; sometimes in addition to and some times instead of statutory standards bodies. Some fora have been exceptionally successful in accelerating the release of mature standards where product development, and hence the development

of markets, has been hampered by the absence of standards. A particularly good example is the ATM Forum, which has produced standards for user-network interfaces, physical layer interfaces, network management, and much more. A more recent and perhaps even more startling example is the progress made by DAVIC (Digital Audio-Visual Council) towards integrating the requirements of multimedia in a coherent multi-layer structure of standards. An interesting angle on multimedia forum activity is BIMA (British Interactive Multimedia Association) which makes annual prestige awards for outstanding multimedia applications.

4.2.4 Non-statutory Standardisation Work

The Internet is perhaps the prime example of 'populist' standards creation through sheer weight of demand. While the TCP/IP protocol has its origins in the DARPA-net standards (also the forerunner of the X.25 standard) in the USA, it has broken its 'shackles' and has developed along far less specifically defence-oriented and academic lines. It is administered by the non-statutory Internet Society, in conjunction with the Internet Engineering Task Force (IETF), and the Internet Engineering Steering Group (IESG). Internet standardisation aims to ensure interoperability not purely among 'expert' user groups such as might be found in the academic community, but also for non-expert users such as those now being addressed by service providers in the mass market. The Internet is therefore equipping itself to handle mass-market peer-level communications using its present loosely-knit self-regulatory organisation, which has served it quite well up to now.

4.3 Standardisation Requirements of Multimedia Services

The key issues for standardisation in the multimedia market may be summarised as:

- the impact of standardisation on product differentiation
- the balance between mandatory standards and recommendations
- the goal of international interoperability
- standardisation as a condition of open markets
- vertical and horizontal harmonisation
- solution-independent and transparent standards.

The following sections provide broad overviews of each of these issues.

4.3.1 The Impact of Standardisation on Product Differentiation

Almost inevitably, standardisation tends to create uniformity. While uniformity is essential at interface points between systems and products to achieve interoperability

and competition, it also tends to cause an erosion of the 'unique selling points' which vendors are keen to derive from subtle differentiations built into their products.

Multimedia products, particularly terminals, are potentially extremely varied and diverse, providing room for differentiation while maintaining essential standards conformance. This fine balance will in some cases be difficult to maintain, particularly given the terminal approval procedures currently in force, even when allowance is made for mutual recognition requirements imposed on Member States.

4.3.2 The Balance Between Mandatory Standards and Recommendations

Full realisation of the economic potential of the multimedia market will depend both on technical interoperability and on product diversity. These goals can best be achieved in a competitive market in which users and operators are aware of, and demand access to, standards-conforming products. The formation of such an environment will require efforts to increase awareness amongst telecoms operators, users, and vendors of the benefits of standardisation.

4.3.3 The Goal of International Interoperability

The central goal of standardisation in this area is to achieve seamless end-to-end services delivering advanced multimedia applications. The technical targets include product interchangeability, interworking between network platforms, and international interoperability.

A key feature of multimedia services is their international scope. The content on which such services draw (film, TV, drama, literature, music, education, etc.) is intrinsically without frontiers, and the technology needs to support fully international sourcing, packaging and dissemination of this content.

Multimedia services are supported by a complex substrate of telecoms and IT services. It may prove difficult to meet the goal of international end-to-end interoperability within the time-scales imposed by the explosive growth of demand for Internet and other multimedia services. A general source of difficulty is the uneven status of deregulation in the Member States, and the variable levels of implementation of EC Directives in telecoms. It is hoped that many of these variations can be smoothed out with the implementation of the measures setting up the creation of the framework for full telecoms liberalisation in 1998 and with agreement on the proposed amendments to the Community terminal equipment legislation.

4.3.4 Standardisation as a Condition of Open Markets

There have recently been a number of high-profile cases in which dominance in the market-place was claimed to have been used to achieve dominance of key technologies and hence undue restriction of competition. One such case involves *News International's* implementation of conditional access to direct-to-home (DTH) broadcast services. The allegation was of improper use of their dominant position in determining set-top box ("STB") standards. A factor in this case is the lack of stable public-domain standards that would allow low-cost manufacture of STBs for the mass market. *News International's* position, in the absence of public standards, represented a commitment to the de-facto standard and to creation of an access market based on that standard.

To prevent abuse of dominant positions, promotion of open networking (*i.e.* procurement and interconnection in multi-operator and service provider environments) is sought within the industry. The balance between diversity and uniformity in the management of multimedia services may also become an issue.

4.3.5 Vertical and Horizontal Harmonisation

It is important to remember that the new multimedia market will be produced by the convergence of various existing markets. This will create a new set of relationships and dynamics between the various players.

The proliferation of different types of content providers, content packagers, and disseminators is creating the need for *horizontal* harmonisation of multimedia services. Content needs to be able to be assembled from more than one source, delivered to one or many destinations. The standardisation required is in the domains of information creation and dissemination, rather than in telecoms or IT services.

Inevitably, there will also be strong commercial imperatives for vertical integration, although the large vertical structures of today (*e.g.* the BBC and other national broadcasters) are considered unwieldy to manage and not as cost-effective as smaller, decentralised broadcasters. However, there is evidence that the trend is towards integrated content creation, packaging and marketing, while delivery and distribution form other vertical structures. Nevertheless, there is a danger with vertical structures that they lead to the abandonment of 'openness' in favour of 'proprietariness'.

4.3.6 Solution-independent and Transparent Standards

Over the previous ten years or so, we have seen an increasing trend in standards going far beyond interoperability and interfacing requirements and tending to specify entire *technologies and solutions*. One of the best examples is the difference in concept between Q-sig (for private networking) and the GSM suite of standards for cellular mobile networks. The former is a self-contained (but complete) specification for network access signalling which is largely independent of the solution employed. In contrast, the latter specifies not just the processes but also the solutions in considerable detail – the processes will not work with other solutions.

When the standards creators couple the processes with the realisations, they curtail the freedom of the manufacturer to innovate and value-engineer his product, a role not originally foreseen for the standards bodies.

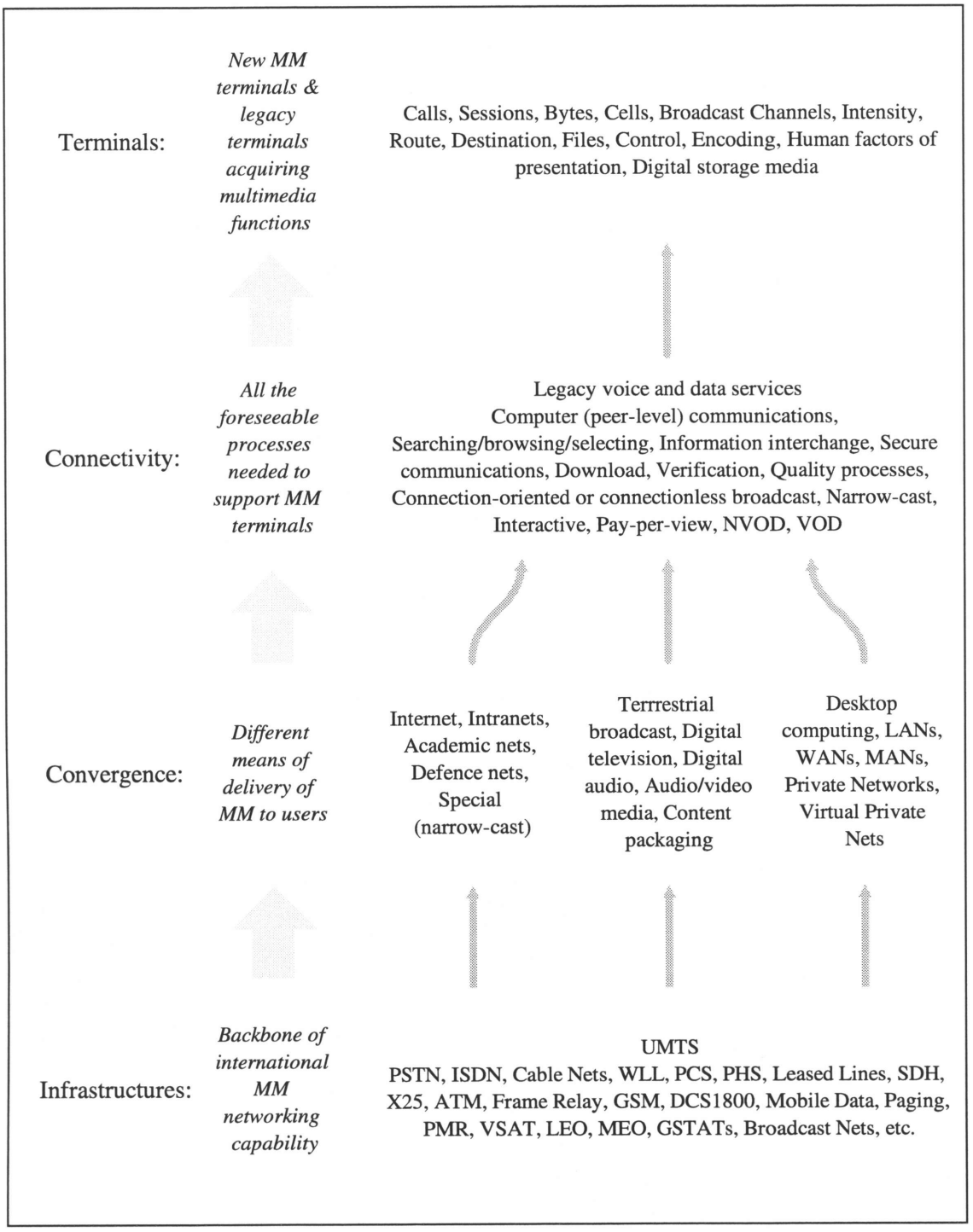
4.4 Four Layers of Interoperability Requirements

In Exhibit 4.1 (overleaf), we present a schematic framework which we have developed for the analysis of multimedia technologies and applications. Its purpose is to assess whether multimedia standards are effective in addressing the issues we have described in Section 4.3 above, and to suggest new approaches.

A number of layered schemas have already been proposed. The prototype may be thought of as the OSI seven-layer model, which is predominantly used (wholly or in part) for technically-oriented analyses. More recently, DAVIC has developed a schema addressing multimedia technology and networking. The Global Multimedia Mobility framework uses a four-layer approach: Applications, Service Integration, Networks, Civil Infrastructure.

The issues of standardisation which arise during a convergence of different markets may, however, require a slightly different approach. Existing commercial and technical structures will alter; demarcations will vanish and new ones will emerge; some interfaces (for example, those required to monitor competition) will need to be formalised, while others (needed, for example, for technical and international interconnection) will need to be recognised. The present schema is offered specifically to support clarity in standardisation work during the emerging convergence processes. However, no schema is perfect for more than one purpose, and this schema is by no means offered as a panacea for all structural problems.

EXHIBIT 4.1: From Transmission Infrastructures to Terminals - Four Broad Layers of Interoperability Requirements for Multimedia (MM) [Source: Analysys]



The schema proposed groups standardisation issues into four layers, ranging from multimedia terminals down to communications infrastructure; with a view to analysis of the kind of issues discussed in Section 4.3. The layered approach facilitates identification of two types of issue:

- **vertical issues** where inter-working and standardisation *between* layers may have created a problem (for example, in the evolution of networks between the Infrastructure Layer and the Convergence Layer)
- **horizontal or peer-level issues** such as those arising from different technology platforms supporting the same applications.

At the top of the schema we have placed the *multimedia terminal*, but in accordance with the generality of the approach we have not assumed any specific realisation (*i.e.* it could be a standard PC, a network PC, a TV). Multimedia terminals will support a set of user facilities which can be content-specific, such as session control or browsing. Many of the standardisation issues in this layer present new problems as legacy terminals acquire multimedia functions.

The *terminal* layer interfaces with the *multimedia connectivity* layer, which contains all the foreseeable processes needed to support multimedia terminals, such as communications routeing/addressing and security. These processes are transparent to the information content but may have elements that affect content quality.

The *convergence* layer has a different significance in our schema, as the realisation of the different means of delivery of multimedia and other types of services. While these layers are largely content-transparent, they are more or less service specific. In this way, they can support certain types of multimedia services: for example, ISDN (fixed network) can support multimedia but no browsing, while the Internet can support both but may have a latency problem affecting high-quality sound. This is the area where we will see some of the next developments as the market evolves. The means of supporting a diversity of content, content packaging, means of delivery, narrow- versus broadcasting, will impinge on this layer. The major impact of the integration of IT and telecoms, with digital terrestrial broadcasting for specific multimedia applications having the greatest impact on this layer.

The bottom layer in our schema comprises the core *telecoms technologies* which form the backbone of any international multimedia networking capability. This is a substantially stable layer incorporating networks and services which could interoperate (and in many important areas already do), but may not have achieved their full potential because of local interests outweighing the benefits of wider interworking.

In the rest of this section, each of the layers in the diagram is reviewed in turn highlighting the impact of any applicable issues discussed in Section 4.3.

4.4.1 Multimedia User Premises Terminals

For the purposes of this analysis, we have identified the multimedia terminal as the point at which elements of a multimedia file, message, document, etc. are created, assembled and viewed. The creative process may have taken place elsewhere (for example, in a studio, concert hall or film set), but the multimedia terminal is the 'interface' point between the creative process and the electronically communicable version of the created entity.

The corporate terminal and the domestic terminal should be considered as historically two quite distinct markets, but a process of convergence between the two has been evident in recent years.

Corporate and Domestic Terminals

The corporate telecoms network (CTN), to which a corporate terminal would typically be attached, imposes its own requirements on the terminal in terms of the in-house systems and software (associated with the internal management information systems) in use. These allow access to the company 's facilities on a selective basis (possibly on a 'need to know' basis), some facilities for access to online external sources, and access to the WWW. Access to multimedia information is therefore already fairly routine. Multimedia presentation software is also fairly widely used, particularly multimedia creation and display facilities and central file servers which enable dissemination of information within the company, the site or the unit served by the file server.

In the domestic environment, one can make a distinction between terminals running semi-commercial applications (for example, PCs being used for home banking and for teleworking), and the purely domestic terminals (running applications such as entertainment and education) However, the boundaries are blurring, as to some extent are the boundaries between the domestic professional and workplace professional applications.

Core Applications

To an increasing extent, both domestic and commercial environments are characterised by a core set of fairly uniform applications:

- word-processing applications
- spreadsheets
- Internet browsers
- graphics packages
- read-only mass storage, providing still and motion picture displays
- sound replay facilities.

This huge range of functionality is covered by few, if any, mandatory standards. Most of the products concerned conform to de-facto standards, and these are mostly private intellectual property.

Impact of Digital Technology on Multimedia Terminals

Digital techniques provide the means for seamless concatenation of production, distribution, transmission and display facilities with little or no degradation in content quality, despite long chains from production to consumption. Several production elements could for instance be concatenated: films - animation overlays - interactive overlays - language overlays - network transmission. For example, *Toshiba*, *Sony*, *Matsushita*, and *NTT*, the powerful *Intertext Consortium*, plan to expand current Japanese teletext systems into a form of graphical interactive TV. *Wink Communications* (Ca, USA) is providing the software, and the hardware will include a modem. The consortium members are *NHK Enterprises*, *Samsung*, *Sanyo*, *Sharp*, *Dentsu*, *NEC*, *JVC*, *Pioneer*, *Hitachi*, *Mitsubishi*. Wink is compatible with the Intercast system planned by Intel for broadcast of Internet material.

The sheer range and volume of information which digital technology brings to the terminal will challenge the user's capacity to learn how to use new products and absorb new pieces of information. However, virtual reality and virtual realisation techniques may offer improvements to human interfaces which could otherwise become unwieldy and act as a serious deterrent to the user.

Charging for Multimedia Content

The traditional distribution of content on physical media has offered limited scope for pay-per-use charging. One attempt to overcome this problem has been adopted by the *United Kingdom* company *Gamester*, which allows for the rental of encrypted videos, and CD disks that are automatically erased after a specific rental period. The relevant consumer equipment is said to cost £20. Such approaches are, however, doomed to a short life by the strong pressures for online dissemination of recorded media.

Proprietary Systems

Corporate communications terminals have been custom designed within a supplier 's product structure, incorporating, for example, custom signalling systems. This approach to product differentiation renders such terminals obsolete as soon as the core system (ISPBX, router, etc.) is replaced. A proprietary signals system may have helped a supplier to sell the product, but only at the expense of the life expectancy of the product. Some improvements in this legacy situation are, however, apparent, and the effect of such improvements on the cost, availability, interchangeability, and transparency of terminals and other user-premises equipment will no doubt be extremely beneficial.

Digital Video Standards

Consumers and businesses are already using a range of differing techniques for compressing digital video. Examples include the *Intel/IBM DVI* technology and the H261 standard (for videoconferencing). The future may well see the use of fractal and wavelet technology to achieve even greater sophistication than we currently have; but the key current compression standard is the ISO/MPEG (Motion Picture Expert Group) standard. MPEG-1 is well established - it is possible to buy videos on CD which you can play back on your PC using an MPEG decompression adapter. MPEG-1 uses about 1.5Mbits/s to achieve slightly better than VHS type quality - 352 pixels × 240 lines. The speed is limited by the throughput capacity of a standard CD-ROM drive, and also by the transmission speeds achievable over ordinary copper telephone lines using ADSL access technology.

The ISO/MPEG-2 standard is now complete and awaiting International Draft Sign-off. Many implementations of this higher quality standard exist. The standard offers data rates up to 60Mbit/s; suitable for HDTV. MPEG-2 also defines the protocols for the transport stream, which are important when the data is to be transmitted rather than just stored on a CD. To achieve full MPEG quality requires powerful specialised processors, currently using multiple passes to achieve the optimum compression and quality. In contrast, decompression is less demanding and there are adapters available for ordinary PCs. MPEG-4 (draft due in 1997) provides a very low bit rate encoding, designed for applications such as low resolution video telephony.

Set-top Boxes

There remains a legacy of problems with the set-top boxes which provide control for conditional access to broadcast services, and provide the user interaction interface to the TV set. The key issue is that of who controls the unique encoding technology to

which the user will first subscribe in order to obtain digital multi-channel services. It is unrealistic to assume that more than one such technology could be deployed by a user at any one time. The de-facto standards are *Mediabox*, *d-box* and the *BSkyB* technology.

Broadly, the choice of digital terminal strategy is bound up with future DTV concepts, and the following questions still have to be addressed:

- Will DTV rapidly replace analogue services, or will there be a long transition period, for example to allow receivers to be replaced?
- What degree of user-interactivity will future TV services include?
- Will terminals be computers or TV sets?
- How will TV interact with information technology, the Internet and telecoms?

The answers to these questions are bound up with the development of key technologies (such as set-top boxes for conditional access), and with the shape of the industry and relative positions of its players (for example, *BSkyB* versus the *BBC*). In support of such developments, ETSI has published ETS 300 744, obligatory use of DVB Common Conditional Access Interface, and the DVB Common Scrambling system.

The Digital Television Standard is based on the ISO/IEC MPEG-2 Video Standard, the Digital Audio Compression (AC-3) Standard, and the ISO/IEC MPEG-2 Systems Standard.

The technology of multimedia terminals is a matter of considerable commercial interest to manufacturers. Screen technology in particular is receiving attention, with the focus being on flat panels of high resolution, wide viewing angle, low power consumption, etc. There is some danger that whichever component supplier (probably Japanese[33]) seizes the initiative in this area, it will come to dominate this vital area of multimedia terminals through proprietary intellectual property. Initiatives via the EC's Eureka programme would appear to be a more equitable way of dealing with the essential commercialisation of publicly funded technology development in this area.

In summary multimedia user-premises equipment is:

- mostly not standardised

[33] The next generation of TV sets will be different: "Wall hanging plasma TV shipments start Sept. 1996 from NEC, panels cost $7772, the total market forecast to reach $2360m by 2000, with a projection of 3m units. NEC are building a new plasma display plant in Kagoshima Prefecture, Japan, output 10k per month", Screen Digest August 1996.

- not always open to competitive procurement on its own, *i.e.* without proprietary networking hardware
- often technically differentiated by vendors, allowing abuse of dominant positions.

However, some improvement is detectable, with some of the latest technology terminals conforming to fora interface standards which are receiving 'popular' if not statutory support from manufacturers.

4.4.2 The Multimedia Connectivity Layer

'Connectivity' is the term used in this study to describe the essential support processes available for the inter-communication of different elements of multimedia. These processes handle the delivery, security, quality and billing of multimedia traffic. The 'connectivity' of these processes can be achieved with a number of alternative technologies (TCP/IP, ATM, DQDB, frame switching) or a combination of technologies (*e.g.* TCP/IP over ATM). Each technology or combination thereof brings a unique set of benefits (or disadvantages) as perceived by the user, network operator, or service provider. Considerable work by vendors is in progress to assess and measure these complex effects and to relate them to the quality of multimedia services.

A discussion of the technologies is more appropriate at the convergence layer (see Section 4.3), but it is not straightforward to subdivide the standards structures and organisations supporting them. For example, DAVIC's work covers all aspects of multimedia from physical layer (Infrastructure layer in this study) to Terminals. In contrast, the ATM Forum does not, as yet, get involved at the Terminal layer except in its market awareness role.

The role of DAVIC in multimedia standardisation is important at the Connectivity layer. An important aspect of DAVIC's work is the development of appropriate reference configurations for multimedia transmission, networking, compression and display. These have the potential of establishing an enduring structure for multimedia technology with selected open and transparent interfaces between major communication layers.

In contrast to the Internet Society, which adopts RFCs (Requests for Change), giving them the weight of mandatory standards for the Internet, DAVIC provides only recommendations and imposes no mandatory adoption regime. The Internet Society is the guardian of the Internet Protocol (IP), of the numbering and addressing schemes, and other features of the Internet. It monitors performance, but exercises no day-to-day policing action. Instead, it re-enforces the longer term qualitative aspects by bringing in enhancements to appropriate functions of the Internet.

A useful role is being performed by the Interactive Multimedia Association (IMA), a not-for-profit trade association of more than 350 companies focusing on interpretability and compatibility issues surrounding multimedia for CD-ROMs, PCs, Macintoshes, the Internet, online services, and broadband interactive television.

In summary:

- the multimedia connectivity layer is one of the most complex areas of the multimedia world
- several organisations are laying down technical standards to open the door to ubiquitous content dissemination and networking
- the success of the approach adopted depends on a mixture of commitment and goodwill by the participants rather than on edict. The experience to date has, however, been favourable, with the exception of some intellectual property rights procedures which may not bear up under the strain of future commercial pressures.

4.4.3 The Convergence Process

The sense in which the word 'convergence' is used in this study reflects the progressively higher-value use now being made of integrated telecoms, broadcasting, cable and satellite networks. The higher value arises from networking a wider range of content (multimedia and other) to a broader market than was possible prior to 'convergence', as well as from qualitative and feature improvements. The key enabler of convergence is digitalisation, as described earlier in the study in Chapter I, Section 1 and Chapter II, Section 2.

The Internet

The informal approach adopted to the creation of standards for the Internet has the potential to strike an appropriate balance between interoperability and uniformity of Internet products, and can do so on an international scale. The mode of operation of the Internet Society is interesting, as it obviously relies on voluntary expert long-term involvement by individuals whose external affiliations are not regarded as particularly important. The role of the Society in maintaining control over all IP developed under its auspices is beneficial so long as the terms under which it offers 'use' by non-members of the Society are fair and reasonable (use by members is subject to a 'free licence').

The Internet has demonstrated that a major international facility can develop without dominant suppliers and service providers, although in some areas (such as WWW browsers) dominant players have emerged. *Netscape* and *Microsoft* have for the most part been willing to comply with standards once they have been produced, but have also pushed ahead with their own developments ahead of the standardisation process. Java provides an object-oriented, cross-platform and Internet-focused extension to HTML that allows the distribution of applications over the Internet. Java allows the same executable file to be run on a Mackintosh, a PC and a Unix machine. It has built-in encryption technologies for security. A Java-based browser (HotJava or Netscape) allows animation, dynamic and inter-activity applications to run within the browser. Although the language is still in its infancy, it has been adopted by *Netscape* and is included in the next version of the Netscape browser.

Intellectual Property Rights (IPR)

The issue of IPR has presented the standardisation process with some challenges. The voluntary or involuntary actions of holders of patents have, in the process of standards making, created situations which could make standards at best impractical, and at worst un-enforceable.

The Commission has acted by stating the basic rules to be observed by patent holders, in a policy paper 'Communication from the Commission: Intellectual Property Rights and Standardisation'. ETSI has responded by formulating policy on the issue of IPR and releasing its document 'ETSI IPR Policy', document D930056D. Both these documents are described in Annex A.

Digital Broadcasting

Digital broadcasting is, as already stated, subject to existing ISO standards, which should guarantee that international interoperability is realised. Nevertheless, there remain the problems of ensuring that horizontal convergence is not hindered by lack of interfaces between, for example, broadcast digital sources and the Internet. Suitable interfaces not only ensure that interoperability is content independent, but also reduce the risk of abuse of dominant position by a player gaining exclusive access to a content source.

LAN/WAN

The position in the LAN/WAN standards area could not be more different. With the exception of the IEEE 800-series endorsements of proprietary standards such as Ethernet, Token Ring, FDDI, DQDB, 100Base-T, there have been few

internationally supported standards. Most of these de-facto standards had their origins in private commercial ventures. This sector has thrived under such anarchic conditions, with one dominant player (*IBM*) giving way to another (*Microsoft*) and others (such as *Sun*) on the ascendancy. Each dominant player has (or will) deliver to the market a set of de-facto standards, together with some private commercial interest package.

In summary:

- the convergence layer has a mixture of tightly-defined standards, and some de-facto standards
- on balance, some additional regulation and standardisation may be necessary to isolate solutions and dominant players, for example between digital broadcasting and terrestrial networking. This will need to be done with care, in order to facilitate horizontal convergence in a free market environment
- further analytical work is clearly required in this layer.

4.4.4 Telecoms and Broadcast Infrastructures

The bottom layer of requirements for multimedia, which might also be labelled the *Physical* layer, is extremely well defined and, with some notable exceptions, implemented in accordance with international standards. All multimedia services, the Internet and other virtual networks, are supported on public physical layer networks. Even special networks such as Dante (for the inter-networking of academic networks) use leased public network capacity.

Since virtually all European infrastructure is now digital, the existing swathe of ITU-T and ETSI standards cover all aspects of transmission, switching (both circuit switched and packet switched), signalling, line encoding, intelligent networking, mobile networking, management and leased lines.

One notable exception is EuroISDN. Despite the adoption of fully developed standards for access to EuroISDN (the Qsig standard), Member States have still not uniformly implemented the EuroISDN MoU within their networks. This is stifling the availability of international end-to-end services for, for example, multimedia teleconferencing over telephone lines.

Asynchronous transfer mode (ATM) is the only currently available technology that is firmly targeted at broadband multimedia applications. It is a multi-tiered protocol (from layer 2 to 6) with enormous potential in switched networking applications. It was originally defined by the ITU-T as the basis for the future B-ISDN. The standards process has, however, been driven by the ATM Forum, which has a well-

developed awareness of the complex markets for which ATM is intended. The ATM Forum maintains very strong safeguards against unfair exploitation of its work by members or non-members. These are predominantly legal safeguards within which the members vest the intellectual property not in the standards themselves but in the realisation of those standards at the commercialisation stage. This approach has something in common with the approach adopted by the EC in the two RACE programmes.

The wireless local loop (WLL) market is apparently benefiting from a wave of innovation stemming from cellular technologies and from other, more specifically appropriate technologies such as short-range CDMA, but having no international standards.

In summary:

- the physical infrastructure layer has benefited from 20 years of ITU and other standards activity
- innovation is somewhat stifled by over-standardisation, but there are exceptions such as WLL technology. International leased line and switched networking are now routinely supplied to private clients as well as to licensed operators
- future deregulation will put additional pressure on interface standards for interconnection and operator-diversity.

4.5 Conclusions

Standardisation in the multimedia environment needs to support:

- the interoperability of products serving specific service markets, in order to allow diversity and innovation without confusion in the delivery of multimedia services
- the interchangeability of products from suppliers serving the same applications, in order to promote price competition
- interoperability within national environments between different networks comprising the multimedia platforms
- interoperability between national networks as multimedia services develop without national boundaries
- seamless end-to-end services provided on a national and international scale, on multiple network platforms, with fully interchangeable product elements.

Analysis shows that there has been considerable progress towards achieving these requirements in Europe, partly as a result of the background developments in technology, markets and deregulation, and partly through targeted multimedia

activities in the standards bodies and fora. We would make the following recommendations with regard to how standardisation should develop.

The preponderance of proprietary standards in user terminals could prove detrimental to the long-term development of the mass market, and some potential abuse of dominant market position may already be evident. There may be a role, therefore, for standards institutions to investigate interoperability between the proliferation of terminals from a range of technological bases.

Multimedia connectivity is a complex and fast moving area involving several different technologies in the Internet, telecoms and broadcasting areas. Vendors, connectivity providers and industry fora are best placed to evaluate the commercial risks and develop standards in this area, particularly given the relative immaturity of the market.

Players within the industry appear to be motivated by the opportunities arising from convergence at the network and service level into creating interoperable platforms which will give content providers a variety of options for delivering their content. We would not recommend any regulatory interference in these processes because players in the telecoms, broadcasting and Internet markets already seem to be making good progress in the area of interoperability.

Stable standards already exist for infrastructure, for delivering multimedia communications and little further activity is needed in these for technologies such as ATM in its current phase of development. There is scope, however, for standardisation activity in newer technologies such as wireless access, if end users are to be offered the widest possible choice of access methods to multimedia services. The work of bodies such as the UMTS Forum should include this goal within its set of objectives.

Chapter III
Emerging Policy Issues and Regulatory Challenges in a Multimedia Environment

On the basis of the technological market and regulatory research discussed in Chapters I and II, and the analysis of national regulatory approaches outlined in Annexes I and II, the Study Team has identified a number of key policy issues which need to be addressed under any future multimedia regulatory environment.

These issues are the key regulatory drivers which will shape future liberalisation, harmonisation and enforcement measures. Of course, there will always be debate among market players as to which particular policy from a range of options should be chosen in any given case. Nevertheless, we have sought to put forward a number of working principles which should assist regulators in the creation of a forward-looking regulatory framework that will give the right signals to the market for investment in multimedia services and networks, while at the same time providing consumers and smaller market actors with an appropriate degree of protection against potential abusive practices.

Chapter III is directed primarily towards identifying:

- ⇒ the extent of appropriate regulatory intervention
- ⇒ the underlying assumptions behind the adoption of certain forms of regulation
- ⇒ the future market structure best suited to sustainable, workable competition
- ⇒ those aspects of market behaviour which generate the greatest potential for abusive practices
- ⇒ the types of emerging business practices which reflect the dynamics of convergence

⇒ the regulatory structures best suited to a dynamic multimedia environment

⇒ the future role in a competitive marketplace of market players which have to date benefited from a privileged regulatory status.

These issues are canvassed on the basis of the following broader grouping of issues, namely:

(1) the structure of regulation; and
(2) the conditions of operating in a multimedia-based environment.

1/ The Structure of Regulation

1.1 THE MULTIMEDIA VALUE CHAIN / VERTICAL INTEGRATION

A critical component of a future multimedia regulatory environment should be the ability to redress market failure or bottlenecks which adversely affect the key elements of the emerging multimedia value chain or links between separate elements of that chain.

1.1.1 The Emerging Value Chain

The dynamics of the marketplace indicate that certain economic functions are considered high margin activities, whereas other elements of the value chain are being progressively commoditised. In light of this shift in value, priority should be given at the Community level to regulatory actions which target these high value activities (*e.g.*, service and content packaging), because they are to be the areas in which market power will be the most significant and capable of being leveraged into other levels of the value chain. These high margin activities are also the parts of the value chain in which the existence of proprietary rights or "gateway" technologies such as Conditional Access Systems or Electronic Programme Guides ("EPGs") will have the potential to exacerbate any potential restrictions on competition occurring at other levels of the multimedia value chain.

As explained in our economic analysis, convergence will create an incentive to vertical integration,[34] as a result of which firms will be able to gain access to higher margin

[34] In vertical integration, a single company controls several or all phases of the production and distribution process. This type of integration is particularly prevalent in the media industry, whose products are "information" and "entertainment". These products (whether made up of news, records and CDs, films or audiovisual programmes), once created, can be reproduced at very low marginal costs. Consequently, the originator who maintains control over both production and distribution processes will generate greater revenues than the creator of content who cedes the control to another company. Vertical integration ensures that the investment necessary to create information and entertainment products can be recouped.

areas in the developing value chain. This may result in economies of scale and scope for the vertically integrated firm, and may also produce consumer benefits. Although vertical integration should therefore not be forbidden *per se*, there should be serious consideration given to its potential harmful effects on the structure of the emerging multimedia marketplace if it involves the aggregation of significant market power at the level of content creation and packaging and the delivery platforms over which that content is distributed. Where a firm enjoys dominance at one level of the market (*i.e.*, access to content, transmission or service provision), its vertical integration may have a foreclosing effect on new market entrants contrary to the terms of Article 86 of the EC Treaty; however, will usually involve some form of non-profit maximising behaviour in one market or market segment, such as cross-subsidisation, tying or price discrimination.

1.1.2 The Role of Content Providers and Packagers

In the developing multimedia value chain, the key role played by **content providers** and **content packagers** has the potential to lead to resource bottlenecks in certain circumstances. Where market power in these areas is complemented by vertical integration, exclusive rights of access to certain types of content or to certain types of delivery platforms, and/or the existence of proprietary rights in conditional access systems, the structure of competition may be adversely affected. In these situations, there is a vital role to be played by competition rules in overcoming such potential bottlenecks.

Recourse to regulatory action needs to be balanced in light of the fact that most discernible "markets" for content are, and will continue to be, highly competitive. By the same token, the continued existence of a significant difference in media cross-ownership between Member States will skew market developments and retard cross-media concentration on a truly pan-European basis. On the demand side, content "markets" may become highly fragmented, in view of cultural and language traditions, with the potential for market power easily inferred as a result of the ownership of certain specific types of content unless a realistic appraisal of market dynamics is adopted.

The packaging of content, unlike the mere creation of content, presents significantly greater foreclosure concerns in a developing multimedia market. Straddling the cross-roads of content production and content transmission, content packagers have the potential to become monopsonists[35] in the acquisition of certain types of content (either

[35] A monopsonist is an entity which has market power in the *purchase* of certain types of goods or services (rather than in their sale). Power in purchasing can be evidenced in a number of sectors, particularly where a limited number of processors extract either low prices or exclusive sale commitments from raw material producers. In the food industry, supermarket chains are

through the commissioning of works or through their acquisition on an exclusive basis), while at the same time being de-facto dominant in the distribution of such content to broadcasters or others. This dual role can result in even greater bargaining power in the acquisition and distribution of content packagers (thereby squeezing margins for content providers, and especially for the transmission of content).

Where a content packager integrates upstream or downstream in the value chain, there will be a temptation to favour its own content or access to its own infrastructure at the expense of third parties. In these situations, it may be critical to extend the regulatory norms of the telecoms sector, which require that operators with significant market power deal with their affiliates or joint venturers on terms which are non-discriminatory, proportionate and transparent when compared to the conditions offered to independent third parties. As had been explained in Chapter I, it is unlikely that any single entity will be dominant in all sections of the multimedia value chain; insofar as this does occur, however, the level of competition from other media "systems" will no doubt influence the types of remedies which might be available under competition law (*e.g.*, annulment of exclusive relationships, divestiture of certain subsidiaries, infringement actions for "structural" abuse pursuant to the terms of Article 86 of the EC Treaty).

1.1.3 Exclusive Acquisition of Content

As regards those parties which occupy a position at the higher end of the multimedia value chain and which have access to major media events such as live sports and new film releases (acknowledged to be some of the key drivers in the future success of Pay-TV), the acquisition of exclusive rights is likely to be met with three types of legal measures at the Member State level, which can apply in various combinations, namely in measures:

(i) which ensure the full, live, in-the-clear transmission of specific events;
(ii) which ensure that deferred highlights are available; and
(iii) which grant priority or pre-emption rights to certain broadcasters.

At present, over half of the Member States have enacted measures restricting the acquisition or exercise of exclusive rights to the broadcasting of major events (with a number of other Member States considering appropriate action). [36] Consistent with principles of Community law, most Member State laws have taken the position that it is

developing comparable degrees of market power in their purchases of agricultural products from small producers.

[36] Refer to national country reports in Annex II to the Study.

not the acquisition of exclusive rights to content which is problematic, but rather the nature of their exercise.

In addition to the measures set forth above, Member States have the ability under the *Television Without Frontiers Directive* to designate a certain event as being of "major importance to society" and thus not capable of being broadcast on an exclusive basis. Community competition rules can be invoked to challenge exclusive rights to content that are excessive in duration or scope, have a foreclosing effect or form part of a series of exclusive contracts in the industry. Although exclusivity *per se* is not problematic under Community competition rules (*i.e.*, Article 85(1) of the EC Treaty),[37] and may in fact be necessary to launch new digital services or enter new geographic markets,[38] the question of whether exclusivity can be justified will usually involve a very fact-specific inquiry by the Commission under Article 85(3) of the EC Treaty.[39] Exclusivity for live sporting events, if not unduly long or overly broad in scope, will usually be more justifiable than exclusivity for a movie which is not a new release; this is because live sporting events are "perishable" by their very nature, and generally have little or diminishing economic value after they have been performed.

1.1.4 The Role of "Gateways"

To the extent that content packagers with market power (especially if vertically integrated) place themselves in key "gateway" positions because of their ownership of proprietary rights, for example, in conditional access systems, there may be a need for the application of competition rules on a case-by-case basis to unravel the bottlenecks which may arise. However, the application of competition rules in an *ad hoc* manner may be an unsatisfactory regulatory solution if a handful of significant market actors position themselves successfully as gateway operators over a limited number of digital delivery platforms across the European Union. In such situations, strong vertically integrated firms with control over Conditional Access Systems, Electronic Programme Guides and critical content might entrench their market power in the critical transition phase from limited to full competition.

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[37] See *Coditel v. Ciné-Vog Films (Coditel II")*, [1982] ECR 3381 (esp. at paras. 15-20) cf. *Nungesser v. Commission*, [1982] ECR 2015 (esp. at paras. 57-58). *Contra* approach of the Commission in the *London Weekend Television Case*, Ninth Competition Policy Report (1979), at p. 73.

[38] At least for an initial "start-up" period in a new market (*e.g.*, digital broadcasting).

[39] For example, as has been pointed out by John Temple Lang, whether or not an exclusive right to televise a sports event is contrary to Article 85 depends on *inter alia*: the duration of the agreement; the number and importance of the events in relative and absolute terms; the number of viewers; the degree of substitutability; the importance of the event to advertisers; whether editing rights are available to others, and so on (see "Media, Multimedia and European Community Antitrust Law", Fordham Corporate Law Institute, October 1997).

Diluting such market power may be very difficult to achieve unless a more institutional response is taken to the anti-competitive problems created by market structure (rather than simply behaviour). Consequently, it may be necessary to establish a legal framework which promotes transparency of commercial relations between entities with significant market power and other economic actors.

1.2 MARKET DEFINITIONS

Market definitions will play an increasingly important role in a multimedia environment. Traditional means of defining "relevant markets" for competition law purposes, however, will be hard pushed to cope with the dynamics of multimedia.

1.2.1 The Effects of Digitalisation

The logic of classifying all forms of information/communication/entertainment in terms of digitalised "bits" has the potential to revolutionise current thinking as to what constitutes a "relevant product market" for competition law purposes. Assuming the existence of sufficient bandwidth, providers of multimedia services should at least in theory be able to provide the full range of services hitherto provided along sector-specific grounds. As a general observation, this should have an expansive effect on product market definitions.

At the very least, digitalisation will increase the number of market actors perceived to be "potential" competitors of traditional broadcasters, telecoms operators, on-line information service providers and so on. This should result in the dilution of at least some of the more harmful effects on the structure of competition which flow from certain types of market foreclosing strategies. Digitalisation may also affect the intrinsic value of certain types of messages (*e.g.*, voice, video, data and so on). For example, the onset of digitalisation, coupled with the availability of voice over the Internet, means that the value of voice services will be measured increasingly less in terms of the distance covered by a communication; this "death of distance" will exert a natural downward pressure on the economic value of voice services, both from the demand and the supply side.

Similarly, on-line services in general and the Internet in particular will render the narrow geographic markets of the telecoms and broadcasting worlds obsolete. Particularly as a result of the Internet and the availability of sophisticated search engines, geographic markets for the provision of many types of multimedia services are becoming more internationalised. Although technological barriers to the provision of services on an international basis are being quickly dismantled, traditional media markets continue to be primarily national in character because of cultural and language barriers.

An expansive view of market definition, perhaps applied for certain regulatory purposes,[40] will not prevent the European Commission's Competition Directorate from configuring markets narrowly around individual service offerings if an abuse of dominant position is alleged to have occurred. It is important that market definitions not become unrealistically narrow in such cases, because a key issue which will often arise is whether a firm is leveraging its dominance in a particular market into an adjacent, neighbouring, upstream or downstream market. For example, the question of whether or not the natural migration of analogue broadcasters with market power into a digital environment is "abusive" may well depend on the initial product market definition adopted.

One can expect to see the adoption of very narrow market definitions in the media sector when abusive practices are targeted towards niche service providers. [41] Product markets defined in terms of content may be narrow at times; the spread of thematic television channels made possible by digitalisation and transmitted via DTH satellite and cable TV has made this a distinct possibility. [42]

In determining the degree of demand-side substitutability, the preferences of both viewers and advertisers will be highly relevant. For example, different markets are being identified for individual sporting events such as live football and Formula-One racing. By the same token, the market definition for an international footballing event may differ in scope during the preliminary rounds (more likely to be country-specific *e.g.*, *Belgium* vs. *Italy*) as opposed to the finals of such an event (*e.g.*, *Brazil* vs. *Germany* - more likely to have universal appeal). Separate markets are also being identified for live and recorded shows, full coverage and extracts, Pay-Per-View and Pay TV.

Finally, the proliferation of niche service providers alongside vertically integrated entities will mean that the functional level of competition in certain markets may differ. For example, the competitive concerns about abuses in the "wholesale" services market (*e.g.*, DTH broadcasters providing programmes to a cable TV company or "carrier's carrier" services provided to smaller telecoms operators) will be distinctly different in character for those directed at the "retail" level of the market (*e.g.*, consumers).

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[40] For example, the classification of services for licensing purposes, or the concept of a "market for interconnection" found in the *Interconnection Directive* and so forth.

[41] For example, refer to *Tetra Park International v. Commission*, judgment of 14 November 1996, [1996] I ECR p.5951at paras. 10-20; see also *MSG Media Case*, OJ 1994 L 364/1; *cf* the Commission Notice on the definition of the relevant market for the purposes of Community Competition Law, OJ 1997 C 372/5.

[42] For example, sports channels, news channels, children's programmes, documentary programmes, cartoon channels, music channels, home-shopping and so on.

1.2.2 "Essential Facilities"

The emergence of multiple network infrastructures capable of carrying "bits" to the end user may require the legal concept of an "essential facility" to be reassessed. Jurisprudence and administrative practice at the Community level have tended to treat the concept of an essential facility as providing a particular type of platform for the delivery of sector-specific services (*e.g.*, ferry ports and airports). That paradigm may not hold true if the infrastructure to which access is sought provides multiple streams of data which are differentiated at the terminal of a user. Under such circumstances, equating the ownership of network infrastructure with an "essential facility" in all cases would appear to be artificial from a regulatory perspective. The widespread use of ATM transmission standards, ADSL technology, the Internet Protocol ("IP"), cable modems and fibre-optic cables means that the goal of platform independence is a technological reality. In such an environment, rerouting and hubbing options abound, thereby challenging the notion that any single given network infrastructure constitutes an essential facility or bottleneck in all circumstances.

Moreover, investment throughout the European Union in local access networks belies any notion of the continuing existence (at least in the medium term) of a natural monopoly in the local loop.

A "monopoly" of sorts which continues to exist, however, is the provision of call or "bottleneck" termination services in the switched world of telecoms. [43] There is growing recognition among operators and regulators in the European Union and the *United States* that a balanced regulatory framework needs to consider call termination issues separately from call origination issues. This is because the latter is a contestable market (assuming the correct regulatory incentives are in place), and should therefore be ruled by market principles. Call termination, on the other hand, is a practical bottleneck because any given communication can only be terminated on a single number or address over a given network (*i.e.*, it is an "externality" or "non-market element" in which there can be no "make-buy" decision in economic terms). Competition may certainly exist at different functional levels of the market (re-routing, hubbing, etc.), but cannot occur beyond the connection to the terminating facility. Consequently, there are strong incentives to regulate the interconnection prices charged to an operator for call termination and to allow market forces to determine the appropriate level of tariffs for all other forms of access to a network (*i.e.*, in the market for call origination), subject to measures designed to prevent the abuse of dominance or significant market power. A challenge for a future multimedia regulatory framework will be to determine the extent to which the termination/origination dichotomy can be extended to services

[43] Refer to discussion in Section 3 of Annex I; the termination/origination argument is more appropriate to fixed line networks rather than to mobile networks.

which have a similar policy goal of maintaining any-to-any communications in a multimedia context (*e.g.*, e-mail).

Similarly, the assessment of the "relevant market" for competition law purposes with regard to a Conditional Access System should go beyond the scope of the actual system itself in the vast majority of cases, taking into account upstream and downstream relationships relative to the Conditional Access Systems themselves. It would be wrong, in the view of the Study Team, to treat each Conditional Access System provider as being a provider of an "essential facility" *per se*. Such an approach would unwittingly encourage over-regulation and unnecessarily interfere with market forces. Accordingly, regulatory intervention should be targeted selectively at those conditional access providers whose position at the crossroads of content provision, transmission and service provision renders them most likely to engage in anti-competitive behaviour.

1.2.3 "Innovation" Markets

Finally, the European Commission may wish to consider adopting, especially in its review of strategic alliances and mergers which have an impact on multimedia, the concept of "innovation" markets (developed in the *United States*) to assess the effects on competition of alliances in the IT sector. The concept of an innovation market allows regulators to balance losses in the current generation product market (static competition) with the gains in a future developing market (dynamic competition). The recognition by the European Commission of the existence of "technology" markets in its merger review of the *Shell/Montecatini case*[44] suggests that such an approach is feasible and consistent with the Community legal order.

The European Commission's ongoing review of market definition, as evidenced in its *Draft Commission Notice on the Definition of the Relevant Market for the Purposes of Community Competition Law* and its *Draft Commission Notice on the Application of the Competition Rules to Access Agreements*[45] suggests, however, that the potential scope of the doctrine in the multimedia context has not been fully realised.

[44] Commission Decision of 24 April 1996 amending Decision 94/811/EC declaring the compatibility of a concentration with the common market (Case No IV/M. 269 - *Shell/Montecatini*) OJ 1996 L294/10.

[45] OJ 1997 C76/9.

1.3 HORIZONTAL REGULATION/FUTURE REGULATORY STRUCTURE

The phenomena of technological and market convergence raise fundamental questions regarding the viability of traditional notions of "vertical" jurisdictional competence for sector-specific regulation in a multimedia environment.

The existing static model of "vertical" regulation for the respective telecoms, broadcasting and publishing sectors requires radical regulatory re-evaluation. A forward-looking approach to regulation would be more horizontal in nature, and would seek to regulate key common issues which cut across traditional vertical lines of sectoral regulation.

1.3.1 The Need for Horizontal Regulation

Given that market players in a multimedia environment will be vying for access to a common set of operating rights (*e.g.*, licences) and limited resources (*e.g.*, frequencies), there should be common approaches to such issues across existing "vertical" industrial sectors. It is arguable that, in the absence of a "horizontal" approach to regulation, technological and market convergence may be unnecessarily delayed. Moreover, the onset of technological convergence has meant that regulatory policy can no longer be realistically confined to narrow vertical industrial sectors. Policies such as conditional access, for example, should not be restricted solely to "television broadcasting" (as occurs currently under the *Television Standards Directive*), but should be developed consistently across the full range of multimedia services. A recent example of such forward-looking "horizontal" legislation can be found in the *Proposed Conditional Access Directive*,[46] which, unlike the *Television Standards Directive*, addresses certain aspects of conditional access systems across the full range of transmission media. By not adopting policies along horizontal lines, regulators risk the uneven growth of particular niche services in an environment in which many market actors will be seeking to enjoy the benefits of economies of scope by providing a full range of multimedia services.

Horizontal regulation should be complemented by a degree of convergence in the nature and functions of regulatory authorities in the telecoms and broadcasting sectors. The application of policies along horizontal lines can only be complete if the regulatory authorities applying such policies reflect an equivalent degree of concentration of their regulatory functions. The possibilities of such a convergence of regulatory functions increases where the regulatory issues in question are essentially

[46] Draft Proposal for the European Parliament and Council Directive on the Legal Protection of Services based on or consisting of Conditional Access, OJ 1997 C 314/7.

economic in nature, and decreases to the extent that regulatory oversight is required for matters which are essentially non-economic (*i.e.*, public policy) in nature.

1.3.2 Future Layers of Regulation

The essential lines of a horizontal regulatory demarcation should reflect the commercial and technological developments brought about by multimedia and should be consistent with the new industry configurations which are emerging in the marketplace. In the absence of a mature multimedia market, the extent of horizontal overlap should be restricted to those issues which share common characteristics to all potential new market entrants. These issues will principally be of an "economic" nature and will involve such key issues as market entry (*e.g.*, licensing conditions) and market operation (*e.g.*, interconnection and access rules).

Beyond those types of issues, regulation along horizontal lines should ensure that access to scarce resources (of both a public and a private nature) is developed in a relatively harmonised manner. At a minimum, Member States should be encouraged to adopt similar policies for the valuation of such resources.

1.4 Scarcity in a Digital Environment

The regulatory tradition of the broadcasting sector is based on the fact that scarce public resources – frequency spectrum – were being used. That regulatory rationale for broadcasting regulation is no longer valid.

Broadcasting has traditionally been the subject of a regulatory tradition which is totally different from the relative freedom enjoyed by the directly comparable publishing industry. The regulation of broadcasting was premised on the following range of factors:

- the airwaves over which transmission took pla ce were a public resource;
- the scarce spectrum which was enjoyed by broadcasters should be accompanied by the obligation to fulfil certain public service obligations; and
- the character of the broadcasting media was more influential on the public than other media such as the press, especially because the audio and visual elements of the communication were transmitted simultaneously and were subject to passive patterns of consumption.

None of these factors conclusively justify the continuance of the onerous regulatory tradition for broadcasting services. The increases in network capacity brought about by digitalisation and the ability to deliver content a number of delivery platforms means that scarcity is becoming less significant as the basis of regulatory intervention in a

multimedia environment. These changes should be reflected in any reassessment of the current telecoms regulatory framework. In the short term, however, capacity bottlenecks are likely to continue until a full migration occurs from analogue to digital broadcasting.

In a world where the benefits of digitalisation and compression will facilitate the use of hundreds rather than a handful of TV channels, the logical regulatory response should be a lighter regulatory touch in those areas (*e.g.*, licensing) which no longer require strict regulatory governance. By the same token, content regulation and other public policy objectives continue to be unaffected by the fact that scarcity may be overcome, except insofar as a competitive marketplace may be able to deliver "public goods" or "public services" which would otherwise not be available (see discussion at 2.5 on "Public Mission Operators").

An end of scarcity in network capacity does not necessarily mean that there will be a corresponding increase in the number of services which can take advantage of that capacity. Limited access to premium content, particularly that which is perishable (*i.e.*, a short shelf life, such as live football coverage), may contribute to enduring capacity bottlenecks.

1.5 INFRASTRUCTURE-BASED VERSUS SERVICES-BASED COMPETITION MODELS

There is a fundamental theoretical debate taking place in the telecoms sector which is likely to carry over to the multimedia sector. The issue is whether the appropriate regulatory model should be one of infrastructure-based competition or a model based on the existence of numerous service providers with few network operators.

One school of thought sees the future of competition in the telecoms sector based on the existence of a **number of local access infrastructure providers**; *e.g.*, the incumbent telecoms operator, a local cable TV company, mobile operators, satellite operators, alternative infrastructure providers, Wireless Local Loop operators and an increasing number of fixed networks run by public authorities.

A second school of thought sees the market developing primarily on the basis of a **regulated monopoly model**, in which there will be many service providers which have cost-based non-discriminatory access to a very limited number of networks. The proponents of this model assert that service providers will invest in (limited) infrastructure once they have had the opportunity to grow in the marketplace. Indeed, some market actors have commented that the rapid build-out of infrastructure may result in such excess capacity in the medium term that there may be little commercial difference between owning or leasing one's own infrastructure in the future.

Many Member States, however, have not yet adopted a clear policy position in either direction. By way of contrast, *The Netherlands* and the *United Kingdom* have adopted policies which have a clear orientation towards the promotion of infrastructure-based competition, as have *France* and *Belgium*. Countries such as *Finland* and *Germany*, however, which display a high degree of dual ownership of both telecoms and cable TV infrastructure, are characterised by regulatory regimes which mandate unbundling of the network down to the level of the local loop. This level of unbundling, which is not mandated under Community law, clearly inures to the benefit of service providers.

Although the Study Team clearly supports policies adopting an infrastructure-based regulatory model in the long run (*e.g.*, assuring platform independence, greater and cheaper bandwidth and so on), we do not believe that the regulatory options in a transitional phase permit a clear "all-or-nothing" approach. What is more appropriate, in our view, in making the transition from limited competition to open competition, is a regulatory model for multimedia which is competitively neutral in terms of picking either of the two suggested regulatory models. Accordingly, we have sought to balance the interests of infrastructure operators and service providers through the use of a new model for interconnection and access which we consider to be consistent with these underlying policy goals in a multi-operator multimedia environment.

1.6 Regulation of the Content of Communications Services

The provision of on-line services challenges the traditional civil and criminal law notions of legal liability for the provision of illegal or harmful content. That legal threat relates both to the issue of which parties involved in the multimedia value chain should be held liable for harmful or injurious content and to the issue of which Member States shall have the legal right of intervention should such illegal or harmful content be widely disseminated.

These regulatory challenges are particularly acute in the case of the Internet, both because of its global reach (rendering the exercise of national sovereignty highly problematic) and becomes the ease until which, and the extent to which, information can be disseminated (making the implementation of censorship measures and the maintenance of diversity and plurality are maintained more difficult).

1.6.1 The Existing Regulatory Framework

Rules relating to content are a key feature of the regulatory landscape for broadcasting and print media in all Member States, because of the key role played by these media in disseminating information and ensuring the preservation of standards of taste, decency, diversity and choice, and as a means of furthering freedom of expression .

Aside from the accession of all of the Member States of the European Union to the *European Convention on Human Rights ("the Convention")*,[47] which pre-dates the establishment of the European Community, there is nothing in the Community legal order regarding the right to freedom of expression and the right to privacy (Articles 10 and 8 respectively). The right to the freedom of expression is nevertheless considered to be a fundamental right at the Member State level, which is found in the Constitutions of most Member States.[48] Case-law developed under the *Convention* by the Court of Human Rights suggests that, at least insofar as the right to freedom of expression is concerned, protection extends in principle to all forms of multimedia communications.[49] The jurisprudence developed under the *Convention* by the Court of Human Rights forms part of the fabric of the legal order of the Member States and constitute general principles of Community law.[50]

The right to the freedom of expression for broadcasters and publishers, however, is not an absolute right. Consequently, Member State laws impose several regulatory restrictions on the provision of content, *inter alia*, for breach of criminal, national security, or defamation laws, on the grounds of public morality and decency, the protection of minors, the veracity and impartiality of information, and the nature and scope of advertising (especially in broadcasting).[51] Most of the restrictions imposed at the Member State level on advertising (in terms of volume and content) by broadcasters and their obligations to protect minors in the manner and timing of their programming reflect the general minimum standards prescribed under the 1989 *Television Without Frontiers Directive* (as amended in 1997).[52]

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47 *European Convention on Human Rights and Fundamental Freedoms*, signed in Rome on 4 November 1950.

48 In the *United Kingdom*, in the absence of a written Constitution, reliance is placed on case-law to uphold fundamental liberties.

49 This is because Article 10 does not differentiate as to the types of persons, information, the nature of the content, nor the means of transmission or reception of that information. See *Groppera Case*, 14/1988/158/214, Judgment of 28 March 1990; *Autronic Case*, Case 15/1989/175/231, Judgment of 22 May 1990; *Case of market intern Verlag GmbH and Klaus Beermann*, Case 3/1988/147/201, Judgment of 20 November 1989.

50 Refer to Article F(2) of the Treaty on European Union. See also *TV 10 SA v. Commissariaat Voor de Media*, Case C-23/93, [1994] ECR I-4795; *cf. Nold v. EC Commission*, Case 4/73, [1973] ECR 491. Refer also to Recital 15 of the revised *Television Without Frontiers Directive*.

51 For example, veracity and objectivity is expressly required under the legislation of *Spain*, *Italy* and the *United Kingdom*. The manipulation of information for electoral purposes is also specifically prohibited in *France*.

52 Council Directive 89/552 of 3 October 1989 on the coordination of certain provisions laid down by law, regulation or administrative action in Member States concerning the pursuit of television broadcasting activities, EC O.J. (1989) L 298/23 (due to be implemented by 3 October 1991), as amended by European Parliament and Council Directive of 30 June 1997, EC O.J. (1997) L 202/60 (to be implemented by 31 December 1998). In particular, refer to Articles 1, 10-19a and 22-22b. Member States can exceed also the minimum standards prescribed by the Directive (Article 3(1)).

Attempts to extend the scope of the content restrictions contained in the *Television Without Frontiers Directive* to all on-line services were ultimately discarded. Nevertheless, the revised *Directive* exhorts Member States, in taking any regulatory measures with regard to services which are "comparable to television broadcasting", to do so consistently with the terms of the *Directive* (Recitals 7 and 8).

1.6.2 Content Issues for OnLine Services

By and large, the Member States of the European Union have refrained thus far from adopting *sui generis* legal sanctions against the transmission of illegal or harmful content on the Internet, preferring to rely on civil or criminal liability concepts developed over many years in an off-line environment. Much of that reluctance to interfere stems from the fact that many Member States consider the threat of harmful or illegal content over the Internet to be exaggerated; others take the view that imposing regulatory obligations may stifle market entry and innovation in on-line applications, while there are also those which believe that existing legal obligations need only be applied by analogy to the on-line environment. Of the European Union Member States, only *Germany* has put forward legislation which addresses such issues specifically.

Recognising the inevitable threat to national sovereignty posed by the advent of on-line services in general and the Internet in particular, there has recently begun to develop a broad consensus at the level of the European Union that the current regulatory environment should be adapted in a way which fosters the common approaches of Member States to the resolution of content-related issues. The futility of purely national policies in this domain was illustrated in 1995 in the *CompuServe case*, which resulted in the forced closure by CompuServe of over 200 Internet newsgroups in *Germany* in order to prevent racist messages (from a Website in *Canada*) from being accessed by German customers. The Bavarian government's demanded closure of CompuServe sites in *Germany* proved fruitless, as the information could easily be accessed in *Germany* from a variety of other on-line sources, including *The Netherlands*.

Ultimately, the primacy of **freedom of expression** should be maintained. The experience in the *United States* shows that a blanket ban on the transmission of "obscene or indecent communications by means of telecoms device to persons under age 18, or sending patently offensive communications through use of interactive computer service to persons under age 18 " is *prima facie* too broad a restriction on the freedom of speech.[53]

[53] *Reno v. American Civil Liberties Union*, 117 S.Ct.2329 (1997), interpreting the constitutionality of provisions of the *US Communications Decency Act*.

The need for some degree of coordination of national content regulation policies at the European Union level has been reflected in a number of recent initiatives, which establish the political foundations for further cooperation:

- ***Green Paper on the Protection of Minors and Human Dignity in New Audiovisual and Information Services (16 October 1996).***[54]
- ***Communication on Illegal and Harmful Content on the Internet (16 October 1996).***[55]
- ***Resolution of the European Parliament on the Commission Communication on Illegal and Harmful Content on the Internet (24 April 1997).***[56]
- ***Press Communiqués subsequent to the Bonn Summit (6-8 July 1997).***
- ***Draft Council Recommendation on the Protection of Minors (November 1997).***
- ***Internet Action Plan (July 1997).***[57]

These various initiatives distinguish clearly between content which, on the one hand, is **illegal**, and which, on the other, is **harmful**.

Any perceived need to regulate content over the Internet must take due account of the fundamental principle of freedom of expression contained in Article 10 of the *European Convention on Human Rights*. However, according to Article 10(2) of the *Convention on Human Rights* ("the *Convention*"), this right can be limited in order to protect health or morals, and to prevent crime.[58] To date, the Internet has largely been self-regulated. Internet Societies and individual members themselves have established Codes of Conduct for appropriate on-line behaviour. The general consensus is that this type of **self-regulation** ought to be promoted, but that national and international bodies must also play a crucial role in the evolution of this new medium. Consequently, the enforcement of appropriate standards for content will also be the responsibility of national regulatory and police agencies, Europol, and Interpol.

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54 COM(96)483 Final.

55 OJ 1996 C330/3.

56 OJ 1997 C150/38.

57 COM 96/607 (as updated).

58 The *Convention* permits signatory States to impose "formalities, conditions, restrictions and penalties as are prescribed by law and are necessary in a democratic society, in the interest of national security, territorial integrity or public safety, for the prevention of disorder or crime, for the protection of health or morals, for the protection of the reputation or rights of others, for preventing the disclosure of information received in confidence, or for maintaining the authority and impartiality of the judiciary."

It is further recognised that, while there ought to be uniform minimum standards for appropriate content, there should be sufficient flexibility in regulatory mechanisms to maintain cultural differences. International institutions must take into account **different ethical standards** and ensure freedom of expression when they adopt regulations.

The policy proposals developed at the Community level contemplate that a number of parties are likely to become involved in content regulation in an on-line environment. Reliance will be placed both on self-regulation and the use of technical solutions (*e.g.*, filtering software), the principle of limited service provider responsibility (where they are aware of the existence of questionable content) will also apply.

Due to the lack of geographical frontiers for the Internet, regulation at the national and the European Union level must also be complemented by widespread international cooperation. This cooperation and the establishment of international standards will be crucial in preventing certain types of illegal and harmful content securing "safe-havens" on the Internet.

The establishment of a European Quality Rating System for providers of Internet Services, which would over time become integrated into an international system of ratings, has been suggested as a regulatory option for future cooperation. This would be facilitated if the equipment used to provide such a system utilised open, rather than proprietary, standards. Such a rating system would be bolstered by reporting mechanisms, modelled upon *United States* voluntary watchgroups, which allow the general public to police the Internet.

At the Conference on Global Information Networks ("GINs"), which took place in Bonn in July 1997, the Ministers of 29 European countries adopted a Ministerial Declaration to develop action plans and strengthen cooperation in the use of GINs, [59] taking into account the types of issues raised above.

Implications for Multimedia

In the view of the Study Team, the Community has already put forward the fundamental elements of a future regulatory environment which would govern the regulation of content in a multimedia environment.

[59] The Conference was attended by Ministers from the European Union, Members of European Commission, Ministers of the European Free Trade Association and of countries of Central and Eastern Europe. Guests at the ministerial level included representatives from the United States, Canada, Japan and Russia and representatives from industry, with users and European and international organisations.

⇒ *Beyond the extension of existing restrictions under civil, commercial and criminal law concepts to the Internet, the Study Team takes the view that content regulation should be kept to a minimum in the short term because:*

(i) Regulators run the risk of overemphasising public policy concerns regarding content. Illegal or harmful content transmitted over the Internet differs from similar content transmitted over other media only in terms of the speed and scope of its dissemination, but not with respect to the other elements of its legality. Consequently, the key regulatory issues which need to be addressed are those which relate to the detection of the source of illegal or harmful content.

(ii) Content regulation brings with it the real danger of over-regulating the multimedia industry at a time when it is still in its formative stages in Europe, particularly with regard to matters on which individual Member States may take widely divergent views (sexual, health, fair political comment and so on). Consequently, there exists a risk that pan-European services may be threatened if the Internet is subject to burdensome regulation.

⇒ *In the transition to a multimedia environment, self-regulating industry bodies should assume paramount importance. In the medium term, the use of encryption technology to filter inappropriate content should become widespread and the subject of international agreement and standardisation. In light of the fact that the detection of illegal or harmful content is the most pressing concern for on-line services, mandatory labelling of all communications (possibly by way of pseudonym) via technical standards is arguably the best strategy to achieve such detection.*

⇒ *Any decision on the part of the Community to extend liability for the provision of illegal or harmful content to Internet Service or Access Providers should be the subject of a broad and detailed debate among all affected members of the Internet community. The Study Team takes the view that any such extension of liability should only take place on narrow, precisely defined terms, where knowledge of the illegal or harmful nature of the content can be presumed to be known. Indeed, the provision of mere* **access** *to the Internet appears to be similar in effect to the simple transport of communications which, under the telecoms regulatory regime, attracts little or no liability for the telecoms provider/operator because of the confidentiality of the communication. Indeed, a more appropriate regulatory analogy might be to the postal service regulatory model, where the simple carriage of the message should not bring liability in the absence of notice or a special duty of care brought about by unique circumstances.*

2/ The Conditions of Operating in a Multimedia Environment

2.1 Defining the Appropriate Conditions for Market Entry

Market entry for the provision of multimedia services throughout the European Community should be based on the principle of the mutual recognition of licences.

2.1.1 The Goal of Mutual Recognition

There appear to be no public policy reasons why the freedom to provide services [60], which characterises other industrial sectors, should not apply to multimedia services which are subject to declaration, notification or authorisation procedures. Given the fact that licence fees should only reflect the administrative costs of issuing licences (unless scarce resources are required), there are not even any compelling revenue-based reasons for opposing the mutual recognition of licences.

Of course, such mutual recognition could not extend to those situations where scarce national resources are the subject of the licence grant (*e.g.*, rights-of-way, frequencies). In such situations, however, the adoption of a common approach to the valuation of such resources would assist in overcoming significant national regulatory differences in the treatment of such individually licensed services.

2.1.2 The Licensing of Infrastructure and Services

The development of a flexible and transparent licensing regime for infrastructure and services will be a key regulatory driver for the future provision of multimedia

[60] For example, refer to *Gebhard*, [1995] I ECR 4165; *Bond van Advereerders*, [1988] ECR 2085; Commission v. *The Netherlands*, [1991] I ECR 4069; *Commission v. VTM*, [1992] I ECR 6757.

services. The formulation of such a forward-looking licensing regime will need to take place at a time when the traditional licensing frameworks in the telecoms and broadcasting sectors are in a state of flux.

For example, the **telecoms sector** is witnessing a radical shift from monopoly in the provision of voice services to open competition across a full range of telecoms services. Moreover, telecoms services and user needs are becoming increasingly global in scope. Satellite technology in particular is making national borders irrelevant in the design and delivery of services, yet licensing remains highly fragmented along national lines. The radical change from monopoly to open competition is being driven by regulatory developments at the level of the European Union. The adoption of a harmonised Community licensing regime and the market entry it will facilitate are key elements in that process of liberalisation. The increasing harmonisation of licensing principles in the telecoms sector should facilitate the development of global services and should act as a counterweight to alliances among dominant operators.

By way of contrast, licensing in the broadcasting sector is regulated primarily at the Member State level, except insofar as Community competition rules may apply or the content-related issues harmonised under the *Television Without Frontiers Directive*[61] are at issue. In broadcasting, the momentum for the introduction of greater competition has grown because of the opportunities made possible by digitalisation, rather than by harmonised regulatory intervention (*e.g.*, digitalisation is undermining the validity of "scarcity", the traditional rationale for limiting the number of broadcasting licences).

By way of further contrast, the publishing sector has never been restricted in terms of market entry through formal licensing conditions, and has opted instead for a system of self-regulation which is largely administered through national Press Councils and similar self-regulating bodies.

In order to develop a cohesive licensing policy which cuts across all of the industrial sectors affected by convergence, the following working principles have to be taken into account:

- Regulatory and economic elements which are common to the licensing of infrastructure and services across industry sectors need to be identified with a

[61] Directive 97/36/EC of the European Parliament and of the Council of 30 June 1997 amending Directive 89/552/EEC on the coordination of certain provisions laid down by law, regulation or administrative action in Member States concerning the pursuit of television broadcasting activities, OJ 1997 L202/60.

view to determining the extent, if any, to which similar regulatory principles should be applied to the licensing of "multimedia" services and networks.

- Burdensome and fragmented licensing conditions can deter market entry and limit effective competition, particularly competition in international and high value services. The Study Team believes that market entry restrictions can only be justified for such fundamental policy reasons as ensuring that certain public interest goals are attained, that public services are provided, that scarce resources are fairly allocated and that market power is controlled. The Community's goal should be to reach a consensus regarding the fundamental licensing conditions which cut across traditional vertical sectoral lines.

- The separate licensing of technology-based services and services identified with a single delivery platform should in principle be avoided. Such licensing is inconsistent with technological convergence and would undermine the important regulatory goal of platform independence. It would also undermine the important progress being made towards the integration of fixed and mobile services and networks.

There will exist a number of "public interest" and content-related issues with respect to which there is no broad consensus among Member States. In such cases, and consistent with the principle of subsidiarity, it will be important for any future regulatory model to identify clearly those aspects of regulation which fall primarily within the competence of the Member States.

2.1.3 Particular Examples of Market Entry

A key policy goal in adapting the current telecoms regulatory framework to tomorrow's multimedia market should be the establishment of clear, transparent and non-discriminatory rules governing market entry. The procedures for granting licences, the criteria used to select prospective licensees and the timeframes within which licences are granted are all important elements of a coherent licensing policy. Although much of the groundwork for such licensing framework will be achieved in the telecoms sector through the effective implementation of the *Licensing Directive*, the licensing traditions of the broadcasting sector do not display a comparable degree of transparency and objectivity.

Outlined below are some of the key aspects of licensing policy which will have an impact on the range of new market entrants likely to be active in future multimedia markets and the types of entry barriers which they are likely to encounter.

Voice Services

Market interviews indicate that the ability to provide voice telephony services, particularly during the important transitional phase from monopoly to competition, is a critical consideration in the strategic investment decisions of potential new multimedia market entrants. Voice services are seen by many investors as the short-term driver for the future development of a portfolio of multimedia services, most of which are relatively untested in the marketplace. As a consequence, it is important that the licensing requirements imposed on providers of voice services should not be so cumbersome as to deter market entry.

Conversely, in a future multimedia market, the possible (and some say likely) commoditisation of voice services (see Chapters I and II of the Study) may diminish the relative importance of such services relative to the remainder of a multimedia service package (or at least be of relatively low economic value). The Study Team sees this possible market development as exerting pressure on regulators to adopt the least burdensome licensing regime for voice services (*i.e.*, because the relative cost of market entry in the short-term may not be proportional to the economic value of voice services in the longer term). In the transition from monopoly to free competition, it may therefore be important to subject licensing regimes to regular review so as to ensure that they reflect the economic and social values attached to various services in a multimedia world.

Insofar as the intrinsic economic "value" of voice services might diminish over time, the manner in which such services are licensed ought to reflect the manner in which value-added services are regulated. Indeed, Member States such as *Denmark*, *Finland* and *The Netherlands* no longer require an individual licence for the provision of voice telephony services. The growth of voice communications over the Internet will also have the effect of blurring the distinction between "voice" services and other digitalised communications (at least from a technological viewpoint).

The present tendency to define the regulatory status of voice on the Internet solely in terms of the existing regulatory definition of "voice telephony" highlights the inherent weakness of licensing new digital services along traditional sectoral lines. Even if voice on the Internet were being made through a PSTN connection at either end, the reality of digitalisation means that any communication, whether voice, data, images or sound, is simply a stream of "bits" to the provider of the Internet service. Consequently, an Internet Service Provider ("ISP") is not in a position to know the particular nature of any given communication, nor is the ISP able to differentiate voice communications from other streams of traffic in multimedia applications such as videoconferencing or telemedicine.

In any event, it is the use of enabling software which allows an end user to transmit voice messages over the Internet, and such software may be supplied by a variety of vendors independent of the ISP. In these circumstances, it would be a disproportionate burden to subject the ISP to an individual licence for voice telephony, both because of the high entry costs (licence fees) and because of the inherent difficulties of separating voice from other traffic streams for purposes of determining the ISP's universal service obligation contribution.

The growth in Internet communications may require, therefore, a radical overhaul of existing regulatory definitions (see Section 2 of Annex I) to reflect the realities of digitalisation. In this regard, the increasing use of voice over the Internet may require a re-evaluation of the need to distinguish voice telephony from other communications services.

Value-Added Network Services ("VANS")

The provision of VANS has been liberalised throughout the European Union since the adoption of the *Services Directive* in 1990. The regulatory treatment of the basket of services which are considered to be VANS should in principle cover most, if not all, forms of new digital services. Consequently, the manner in which such services are regulated in many Member States should serve as an appropriate model for the licensing of "multimedia" services in the immediate future (while the absence of licensing, which currently characterises the publishing industry, possibly being even more appropriate in the context of a competitive multimedia market).

Because there has not been full harmonisation of national "telecoms" licensing frameworks, the approach of the Member States to the licensing of VANS has been anything but consistent. Indeed, some Member States appear to have interpreted the *Licensing Directive* as providing a legal basis for imposing licensing obligations on VANS that were previously provided free from regulation. Insofar as this tendency reflects a minimal level of regulatory involvement (*e.g.*, class licences or simple notifications), this should not create unnecessary market entry barriers for new competitors. Such barriers, however, have arisen in certain Member States whose fee structures bear no reasonable relation to the costs of administering VANS licences. The absence of a harmonised approach to the duration of VANS licences may also have a material effect on the ability of certain new market entrants to provide pan-European services.

Most important, the effects of digitalisation and compression have brought VANS to the forefront of the debate regarding the traditional regulatory lines of demarcation between the telecoms sector and the broadcasting sector. The discussion below explores the ways in which current Member State rules apply to certain new "digital services" whose characteristics contain elements of both regulatory frameworks.

Mobile Communications Services

The outstanding commercial success of mobile communications systems which use the GSM standard (including both GSM and DCS-1800 networks), and the political commitment of the Community to a "wireless information society" raise a number of broad public policy issues with ramifications for a future multimedia regulatory environment:

- *First*, the limitation on the number of mobile licences in each Member State has historically been attributable to the scarcity of valuable public resources (*i.e.*, radio frequency spectrum). This raises the issue whether the current management and valuation of those resources should act as the basis for a general regulatory framework in a multimedia environment.

- *Second*, the licensing of mobile systems in the 1990s has largely taken place in the context of a particular technology (*e.g.*, GSM). In a multimedia environment, licensing may more appropriately be undertaken in the context of particular services rather than particular technologies. Such a service-based approach, however, may not be suitable in a competitive environment in which product and service differentiation will become increasingly important.

- *Third*, mobile communications today support high quality voice service and data transmission, including Internet access, E-mail and so forth, but at transmission speeds of only around 9.6kbit/s. However, third generation mobile systems should support a full range of multimedia services. The evolution of mobile operators which currently enjoy special rights (for existing systems) into third generation broadband operators raises the issue whether regulatory safeguards should be imposed to prevent the abuse of a dominant position.

- *Fourth*, the licensing of new mobile operators has taken place in an environment in which fixed line telecoms operators have been allowed to have a competitive interest in the mobile sector. If competition in the local loop is to be a key regulatory driver for the spread of broadband networks to the home, the question arises whether regulators should permit and, if so, on what conditions, the same entities to operate competing delivery platforms. An ancillary but related issue is whether operators providing a fixed or mobile service today should be given access to additional spectrum in the future.

- *Fifth*, the separation of the provision of mobile services from the ownership and operation of the mobile network has been considered necessary in certain Member States to promote competition. The question arises whether this type

of separation, which can be found in the regulatory regimes of certain Member States, is necessary to promote competition in the provision of multimedia services and to ensure the goal of platform independence.

- *Sixth*, the European Commission has either prohibited the imposition of licence fees on new mobile licensees where an incumbent operator in fixed telephony has been permitted to enter the mobile sector without being subjected to the same costs or sought compensating benefits for the new entrant. In a competitive multimedia market, this precedent may be applied by analogy to equalise competitive conditions in the broadcasting sector (especially as digital television licensing commences throughout Europe). This might be achieved by eliminating licence fees for new entrants, imposing them on incumbents, or equalising key competitive conditions by other means (*e.g.*, spectrum re-allocation). In doing so, it is important that the universal service obligations and public service goals of the telecoms and broadcasting sectors are not compromised.

- *Seventh*, the growth of third generation multimedia mobile systems may require additional spectrum which is currently being used inefficiently for State purposes and, to a lesser degree, for broadcasting. In the case of broadcasting, increased technological efficiency may mean that individual channels may require less spectrum in the future. Regulations in a multimedia environment will no doubt need to resolve competing claims to the same spectrum bands in a manner which promotes efficiency and market entry.

- *Eighth*, the future licensing of networks using wireless technologies may require a degree of frequency coordination which goes well beyond the present regulatory framework. The issue arises whether frequency coordination in a future multimedia environment will require the greater convergence of frequency management agencies in the telecoms and broadcasting sectors, and whether such institutional convergence best takes place at a Community or Member State level.

Satellite Communications Services

Satellite, broadband cable and terrestrial fibre networks will soon be widely used to offer multimedia services. These different delivery platforms will often compete with one another for the business of individual end users. In other situations, they will complement one another and address separate market segments. For example, broadcast satellites cannot currently support interactive applications. Satellite-based services must use terrestrial lines for a return path. By the same token, only satellite systems appear capable of providing truly global (*i.e.*, beyond the European Union)

broadband services. Satellites are therefore likely to form a part of many global systems, especially where mobility, cost effectiveness, timeliness and interactivity are considered to be important elements in satisfying end user communications needs.

The licensing by the *United States* of companies such as Teledesic has fundamentally changed the traditional world of one-way broadcast satellite. Teledesic will provide interactive "Internet to the home" via satellite. A new generation of regulatory issues may flow from this phenomenon, all of which have global implications. For example, the fixed line voice telephony bypass possibilities created by a broadband satellite system will create irresistible commercial pressure for the dismantling of the existing international settlements framework currently used in telecoms (possibly to be replaced by interconnection charges - see Section 3 of Annex I).

In addition, the unilateral authorisation by the *United States* of a number of global broadband satellite systems using the so-called Ka band raises important strategic concerns for European regulators, including: (i) whether the granting of authorisations by the FCC effectively precludes potential European operators from using the Ka band; and (ii) whether effective action can be taken by European regulators to correct any foreclosure of European satellite operators. The truly international nature of satellite communications highlights the need for regulatory cooperation beyond the Community level to other international *fora*.

The growth of UMTS, of which satellite communications will form an integral part, will undoubtedly increase the extent to which satellite, mobile and terrestrial networks are used to provide seamless international broadband services. This double-edged phenomenon of network/service integration and competition raises a number of regulatory issues for the future of satellite communications in a multimedia environment:

- *First*, the licensing of satellite services should take place under a sufficiently harmonised set of procedures throughout the European Union. Those procedures should be analogous, even if not identical, to those used for other forms of communications services in order to facilitate fixed-mobile integration. Ideally, because the needs of satellite operators transcend national boundaries, this should involve the mutual recognition of national satellite licensing schemes, or even European level action (either to create pan-European licences or to provide an international coordination body for "one-stop-shopping"). The Community has already taken concrete measures to further such policy goals.

- *Second*, the grant of operating licences under a harmonised system should be complemented by harmonised spectrum allocation procedures. In a multimedia world, this may require the forced migration of existing services

from currently used frequency bands so as to open the airwaves for the next generation of mobile communications.

GMPCS systems do have the potential to create an international multimedia infrastructure, going well beyond the narrow uses of today for international travellers, businesses, and governmental organisations. In terms of creating a truly global infrastructure, satellite communications may become very important because of their ability to supply services to those parts of the world otherwise unable to obtain (or to afford) fixed-line access. Although they could constitute the one broadband network with truly global reach, satellite communications systems in Europe are currently exhibiting technological weaknesses and tend to be characterised by a low take-up in urban areas, which throws into question their relative importance in delivering multimedia to the mass market in the European Union (at least in the short term).

More important, however, the current licensing regime for international satellite communications systems in the European Union poses significant hurdles for the take-off of multimedia applications via satellite. Under international law, government regulation and control of satellite systems is considered to be a national matter, with the use of frequencies for uplinking or downlinking clearly deemed to be matters falling within national jurisdiction. A recent study concluded that the factor most likely to slow the growth of GMPCS is current regulatory policy, because of the requirement that operators obtain licensing in every Member State in which they wish to operate.[62] The adoption of the *Licensing Directive* into Member State laws will succeed partly in ameliorating the effects of fragmented regulation. However, the fact that ground segment licensing requirements can be divided into three separate categories under Member State laws creates the potential for multiple (and different) licensing requirements on a Member State level. Repeating this experience for every country in the world in which an operator wishes to provide global services raises immense market entry barriers.[63]

In the absence of an international satellite regulatory body to facilitate the effective regulation of end-to-end global satellite communications systems, efforts should be made for the harmonisation of national approaches towards licensing requirements. As recognised by the European Commission in its *Action Plan*, the Community has a potentially important role to play in this process. Beyond that degree of international

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62 The independent consultancy Ovum, cited in *Mobile Satellite News* of 6 February 1997, at p.5.

63 At the ITU's TELECOM 95 event, a representative from Iridium claimed that 16,000 individual agreements would have to be entered by his company if licensing agreements were necessary for each ITU Member Nation. Globalstar also observed that the establishment of operational licences was the single most burdensome task faced by it.

harmonisation, there are a number of less ambitious regulatory goals which should be sought, namely:

- The consolidation of ground segment licensing requirements across the European Union, which would greatly expedite the licensing process. The logical way in which such licensing could be consolidated would be along the lines used with respect to other aspects of telecoms, namely, the licensing of networks or infrastructure (in this case, "satellite systems"), on the one hand, and the services provided over or through the use of those systems, on the other.

- The "one-stop-shopping" mechanism proposed in the Decision of the European Parliament and Council, once fully implemented, will also be an important step in the erosion of existing regulatory barriers. The extension of the mandate of the ETO[64] to administer licences seems to be a logical extension of its current role in providing one-stop-services for other forms of telecoms services.

- The logical next regulatory step after one-stop-shopping is a system of mutual recognition of satellite licences throughout the European Union, as was proposed originally at the Community level in 1994, and as already occurs to a limited degree in the VSAT sector between *Switzerland* and the Member States of *Germany*, *France*, *The Netherlands*, the *United Kingdom* and *Belgium*. The implementation of a successful system of mutual recognition may be as effective as the granting of a European satellite licence by a centralised pan-European body.[65] An essential element of the harmonisation necessary for such a system of mutual recognition to succeed is a relatively high degree of harmonisation of national laws and coordination among Member States of their management of radio frequency spectrum (achieved in large part through the ITU).

- The related issue of type approvals should be addressed on an international basis. To this end, a series of mutually recognised standards for GMPCS operations and equipment could be agreed upon between the European Union and other nations on the basis of bilateral arrangements.

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64 The European Telecommunications Office.

65 Analysys canvassed these regulatory possibilities in its report of February 1994 to the European Commission.

Because of its truly international nature and because of the relatively small number of satellite operators throughout the world, there exists the possibility that some form of industry self-regulation may be feasible in the satellite communications sector

The Licensing of "Telecoms" Infrastructure

The development of a competitive multimedia marketplace will depend on the number, diversity and availability of infrastructure and service providers. The number of infrastructure providers will have a direct and obvious impact on the amount of bandwidth available for multimedia applications. In the absence of readily available bandwidth, the price of transmission capacity will remain high and the development of a mass market for multimedia services may be delayed.

Until recently, many Member States did not differentiate for regulatory purposes between the operation of telecoms infrastructure and the provision of services. Such differentiation was unnecessary as long as Community law focused on the liberalisation of services as the principal means of encouraging competition to the fixed line telecoms incumbent (which continued to hold a monopoly over voice telephony).

It became clear during the mid-1990s, however, that the fixed line telecoms incumbent would continue to have market power even after liberalisation of all telecoms services if service providers were unable to use alternative infrastructure or build their own networks. Consequently, infrastructure was incrementally liberalised at the Community level in a relatively short timeframe, in the following order: (1) cable television networks providing liberalised telecoms services in 1995; (2) infrastructure supporting mobile networks in 1996; and (3) alternative infrastructure for liberalised services in 1996, and for the provision of any type of telecoms service after January 1998.

This liberalisation programme is reflected in Member State law, and the regulatory distinction between services and infrastructure is now widely drawn, even in countries where neither telecoms services nor infrastructure require licensing. An equivalent distinction in the broadcasting sector is made in only a handful of Member States and, even then, terrestrial television broadcasting networks are operated on a monopoly basis to support the provision of broadcast services.

Having drawn a regulatory distinction between infrastructure and services for licensing purposes, regulators must now decide how an adapted regulatory framework for multimedia should regulate the market behaviour of these different licensees.

The manner in which the operators of infrastructure are licensed and regulated will have a major impact on whether potential investors are willing to make the huge expenditures necessary to construct the proverbial "Information Superhighway" to support the provision of multimedia services to the home. Those expenditures are being put at risk by commercial factors (see Chapter II of the Study) which are progressively "commoditising" the provision of infrastructure. According to market interviews, the investment in networks is also being put at risk by regulatory policies which prevent investors from deriving the proper value from their investments (especially interconnection and "equal access" policies).

Whether such investments can or should be promoted by a future multimedia regulatory framework is the subject of lively debate, both among the Member States and between regulators within the European Union and the *United States*. The debate has been couched in terms of whether society's multimedia needs are best served by a regulatory model concerned primarily with infrastructure-based competition or services-based competition.

The licensing regime that is ultimately adopted for infrastructure will have a profound impact on the shape of the future multimedia market:

- The licensing of infrastructure separate from services will facilitate market entry by a broad array of alternative infrastructure providers (especially utilities) which, although possibly not wishing to provide multimedia services themselves, may see a business case in providing the underlying bandwidth needed to deliver multimedia applications to a mass market. Indeed, a "carrier's carrier" market, led by companies such as Hermes Railtel and Unisource Carrier Services, is already developing on a pan-European basis.

- The provision of infrastructure as a separate "business" in a multimedia environment can provide regulators with a clear indication of the costs involved in operating a "network" separate and apart from the services provided over it. This transparency will facilitate "best practices" comparisons when issues relating to interconnection and access arise, and can serve as a yardstick for identifying abusive practices.

- In order to adapt existing regulatory structures to take into account the effects of the Internet on interconnection, access and end-user pricing, the regulatory policies governing the operation of the infrastructure upon which the Internet is based should be market-driven.

- The spread of multimedia services will depend in large part on the relative availability of bandwidth, which will increase exponentially relative to the amount of infrastructure deployed.

- In the view of the Study Team, a balanced reconciliation of the Infrastructure Competition Model and the Services Competition Model can best be achieved, in a multimedia environment which will require greater broadband capacity, through the implementation of balanced interconnection and access policies which can sustain both service providers and network operators in a competitively neutral manner.

- Infrastructure competition will determine to a significant extent the degree to which Community level policies are needed to address such ancillary issues as interconnection, equal access and unbundling. The greater the degree of infrastructure competition, the less need there will be to engage in regulatory micro-management and ongoing *ex ante* regulatory governance.

- Although a long term regulatory goal should be the promotion of infrastructure-based competition, there should be a regulatory "safety net" for service providers in the event of market failure or an abuse of market power. In the transition from monopoly to full competition, concerns about market failure are not without foundation. The most appropriate means of ensuring the viability of service providers, while at the same time protecting the investments of network operators, is to adopt a new model regarding "interconnection" and "access". That model should be based on a distinction between call termination ("interconnection"), on the one hand, and call origination ("access"), on the other (refer to discussion in Section 3 of Annex I).

- The influx of infrastructure-based competition in the local loop, coupled with the platform independence of the Internet, should dilute the market power resulting from control of a monopoly network. It is therefore not likely that a multimedia regulatory framework will require measures as extreme as the structural separation of the network and service levels of an operator 's multimedia business. Indeed, this type of regulatory intervention runs counter to the technological convergence currently taking place between delivery platforms and service levels, and would complicate the regulatory status of parties with modest infrastructure goals ("hybrid" network/service providers). It also would threaten to turn network operators into de facto utilities, by presupposing that they are natural monopolies which must be regulated in this way.

On the other hand, separation between the wholesale (network) and retail (services) levels, in the form of accounting separation requirements, may be necessary to deter (or at least to identify) abusive pricing practices. Accounting separation requirements would appear to be a more proportionate regulatory response to concerns about cross-subsidisation, price discrimination and bundling by network operators with market power. Where market power is enduring and abusive behaviour flows therefrom, it may be necessary to adopt more extreme measures such as structural separation. Such an approach, however, should be accomplished only on a case-by-case basis where necessary to enforce competition rules.

The Licensing of "Broadcasting" Networks and Services

Cable and over-the-air television broadcasting have traditionally been subject to a significantly greater degree of regulation than the publishing sector and other forms of mass media. This regulation includes a very burdensome set of subjective licensing procedures which vary dramatically from Member State to Member State and which confer a great deal of discretion on the regulator.

Much of the subjectivity inherent in licensing lies in the fact that issues relating to content are regulated *ex ante* as part of the market entry process. By way of contrast, the publishing sector operates throughout the European Union on the basis of virtually no *ex ante* regulation. *Ex post* regulation in the publishing sector becomes relevant when and if certain standards of good taste, decency, harmful content, libel and so forth have been exceeded or violated. The publishing sector is also characterised by self-regulation in the form of Press Councils and other national equivalents, which bring together a broad cross-section of societal and market interests.

A number of technical rationales have historically been advanced to justify the extensive involvement of the State in the regulation of broadcasting and, in particular, the privileged treatment accorded to public broadcasters:

- *First*, because the airwaves are a public resource, governments are entitled to license their use on the terms which they see fit.

- *Second*, because frequencies and, hence, available channels are limited, society has an interest in requiring licensees to share their privileges with other representative members of the public, and in compelling them to present a balanced range of programmes in the interests of listeners and viewers.

- *Third*, because the broadcasting media (both television and radio) are more influential than other media, they need to be regulated more stringently than

other media such as the press. The presence of both sound and picture in the home is considered to be a key distinguishing feature which makes broadcasting an exceptionally potent opinion-forming medium.

In the view of the Study Team, none of the reasons cited above provides a compelling justification for intrusive regulation of broadcasting in a future multimedia environment. The airwaves used by the telecoms sector are no less "public" property than those used by broadcasters. The public good, however, is served by using those frequencies to support further competition and the spectral efficiency which such competition promotes (see Section 4 of Annex I). Similarly, digital technology permits the more efficient use of spectrum such that hundreds of TV channels now exist where previously only a few were possible. Hence, as and when digital broadcasting is widely deployed, the scarcity rationale for regulation will no longer be justified.

Finally, the view that broadcasting creates public policy concerns which are absent in other sectors underestimates the influence of other instantaneous transmission media such as the Internet. These new media are changing public perceptions regarding the sources of available information. They are also increasingly blurring the traditional association of "the public" and "passive" entertainment with traditional broadcasting services. Digitalisation, and the possibility of increased interactivity, mean that the borders between "public" and "private" entertainment and communications are becoming increasingly difficult to draw. Digitalisation, by making available a wealth of new programming choices, may further weaken the claims of public broadcasters – the focal points of the current broadcasting regulatory structure – to be the unique channel for "public" broadcasting and undermine their ability to operate partly outside the sphere of market economics.

The continuing degree of regulatory involvement in broadcasting can best be explained from a historical perspective by public interest considerations, given that broadcasting is still a relatively new means of mass communication that society has felt compelled to regulate, just as the cinema was initially treated with more caution than the theatre. Moreover, the regulation of broadcasting involves critical issues such as social, cultural and democratic ideals (pluralism), which prompt a uniquely "national" regulatory response in any given case. These elements raise distinctly non-economic issues which are not readily susceptible to a simple market-based regulatory model. Consequently, the history and tradition of the respective Member States, rather than technical reasons, are more relevant today in explaining the divergent treatment of the broadcasting and publishing sectors.

In light of the above, key regulatory issues will be: identifying the elements of the prevailing national regulatory models for broadcasting that can be sustained in a

multimedia environment; and identifying the elements of existing broadcasting regulation that should be adapted so as to enable the broadcasting sector to benefit from the opportunities and positive economic effects of the spread of multimedia applications.

A number of aspects of existing broadcasting regulation will need to be re-appraised in the context of the emerging multimedia environment.

- *First*, the legal character of the broadcasting licence fee will have to be clarified (namely, whether it is a tax, a special fee or duty, or a charge for services rendered by the broadcasting national regulatory authority or NRA). This legal characterisation is relevant to the question whether the fee should be assessed and periodically reviewed by the government or by the broadcasting national regulatory authority. Opinion is split among the Member States as to the particular legal character of such licence fees. A key issue is whether the dependence of the broadcasting national regulatory authority on government review of the level of a licence fee compromises its autonomy. By way of contrast, licences in the telecoms sector are directly related to the level of administrative effort required to process the licence application and the extent to which scarce resources are used. In a multimedia environment, it is arguable that the taxation aspect of broadcast licensing should be progressively lessened in order to reflect the harmonised approach currently taken in the telecoms sector.

- *Second*, market and historical developments have led to an environment in which the functions performed by private broadcasters are becoming increasingly indistinguishable from those performed by public broadcasters. In a multimedia environment with the capacity for multiple sources of content, the usual requirements of diversity, pluralism and minority representation may be capable of being satisfied by non-public broadcasting sources. Were this to occur, the privileged position which public broadcasters hold vis-à-vis private broadcasters may need to be re-examined. For example, to the extent that pluralism and other public service goals may be able to be satisfied by the full range of market participants, rather than a single public broadcasting entity, it may be more efficient for the State to sponsor the appropriate public service programming by reference to an open and transparent bidding procedure. This would allow the provision of public services in a form which is not only comparable to the manner in which universal service is provided in a number of Member States, but also compatible with a competitive marketplace. This would be without prejudice, however, to the ability of Member States to define "public services" in a manner which may be unique to each Member State (contra universal service

in the telecoms field, which must satisfy certain minimum criteria laid down at the Community level).

Similarly, to the extent that public broadcasters expand their service portfolios to provide multimedia services and take advantage of their strong market presence in broadcasting, the competition rules should apply to them with the same force they apply to other market actors, to the extent that Article 90(2) of the EC Treaty does not apply.

- *Third*, there is an increasing tendency on the part of governments to expand the scope of activities in which a public broadcaster can engage consistent with the terms of its concession or charter. This means that many broadcasters will be able to participate in the provision of multimedia services. It is therefore important that the licensing system which applies to their services clearly differentiate between the provision of multimedia services – which should in principle be subject to a licensing regime similar to that used for VANS in the telecoms sector – and broadcasting services which are subject to more onerous licensing requirements.

- *Fourth*, the concept of "broadcasting" in a multimedia environment should more accurately reflect the changing environment in which such services are provided. The presumption of scarcity traditionally has led to the conclusion that one broadcaster could most effectively satisfy the public good. The introduction of competition suggests that the public good may be capable of being served by others, often as effectively as a public broadcaster. Moreover, changing public perceptions of "information" and "entertainment" sources suggest that the public may be able to obtain a high level of quality services from alternative sources to traditional broadcasters. The relative importance of such alternative sources means that the concept of "broadcasting" should not be interpreted unnecessarily broadly (see discussion in Section 2 of Annex I).

- *Fifth*, in pursuing the overarching policy goal of platform independence, public broadcasters which continue to maintain special or exclusive rights with respect to satellite networks and services should be treated in the same manner as would an incumbent telecoms operator with such interests in an alternative delivery platform such as cable TV.

- *Sixth*, consistent with the principles employed by the Commission in the telecoms sector, the technological benefits of broadcaster migration from analogue to digital services should be treated favourably (*i.e.*, as the equivalent of telecoms fixed operators migrating from analogue to ISDN or

mobile operators migrating from GSM to UMTS services). That migration, however, should reflect efficiencies, not the leveraging of market power. Accordingly, this process should be complemented by a regulatory policy which encourages the full transition from analogue to digital over time (rather than a presence in both markets for an indefinite period), coupled with a policy of releasing analogue spectrum for use by other operators as that transition is completed. To this end, the management of spectrum for both telecoms and broadcasting applications should be monitored closely.

- *Seventh*, careful consideration should be given to streamlining licensing procedures for broadcasting in order to make them more reflective of an open marketplace characterised by competition, rather than by scarcity.

  In particular, in the interests of market certainty, licensing procedures and conditions should be made more transparent and less subjective in their application. Perhaps the only way of achieving this goal in the context of multimedia, while at the same time doing justice to all of the public policy goals of broadcasting, is to separate from the licensing process all matters relating to content and other public policy issues. In so doing, the licensing framework for broadcast networks and services could over time be governed by the same regulatory principles which apply to the licensing of other networks and services in the provision of multimedia services. There are already concrete examples of such licensing procedures being effectively deployed in the context of the licensing of satellite broadcast services.

Under such a scenario, all content-related issues would be subject to a separate layer of regulation. This would not diminish the relative importance of content-related and other public policy issues. On the contrary, it would simply allow them to be dealt with at the Member State level in a manner which is not interwoven with other issues which have the character of purely economic regulation.

Ownership and Operational Restrictions

In a true "converged" or "multimedia" environment, many operators seeking to benefit from economies of scope and scale will wish to provide a full range of multimedia services, ranging from simple voice-based applications, to interactive applications, to traditional broadcasting services. Three types of regulatory restrictions threaten such full-line operations, namely:

- "**Line-of-business**" restrictions, which limit the ability of an operator providing a particular type of service to provide another type (or range) of services, because of its ability to affect adversely competition in the provision

of the additional services (*e.g.*, prohibiting a telecoms incumbent from providing cable TV services). Although clearly designed to protect "vertical" competition, these types of restrictions are inconsistent with the convergence of service offerings and delivery platforms. The challenge is to encourage convergence throughout the European Union while, at the same time preventing an operator from leveraging its market power to stifle competition.

- **Cross-media ownership** restrictions, which reflect the particular traditions of plurality and cultural diversity in individual Member States. These restrictions run completely counter to the commercial drive towards convergence. Although designed to promote democratic ideals and diversity of choice, they were formulated at a time when industrial sectors were defined along clear vertical lines. Convergence, and the proliferation of new distribution channels brought about by digitalisation, should increase consumer choice. Accordingly, the need to limit cross-ownership of media-related services should no longer assume the same level of significance as it has in the past. The regulatory challenge lies in preserving plurality, while achieving sufficient harmonisation to facilitate the provision of pan-European multimedia services.

- Non-uniform **foreign ownership** restrictions across sectors, which have existed both within and between Member States. Although such restrictions are being dismantled in the telecoms sector because of WTO commitments, they are still pervasive in the broadcasting sector.

Line-of-business restrictions

The line-of-business restrictions found throughout the European Union are a potentially serious impediment to the growth of pan-European multimedia services:

- Line-of-business restrictions in a converged environment, *prima facie* distort competition. They should, therefore, only be imposed where they are needed to promote independent investment in new services (*e.g.*, greenfield cable TV investments or new DCS-1800 mobile licences) which would otherwise be threatened by an operator capable of leveraging its market power into an immature adjacent or neighbouring market.

- Restrictions on the ability of market players to engage in the production of content, unless prompted by serious competition law concerns resulting from vertical integration, do not appear to be justifiable in a multimedia world dependent on content for its continued growth. Moreover, depriving telecoms and cable TV operators of the right to engage in the production of content

may jeopardise their commercial future by excluding them from the most lucrative part of the multimedia value chain. In the case of telecoms companies, the downward pressure on telephony prices will need to be offset by revenue generated from high value content-rich transmissions. In the case of cable TV companies, consigning them to the role of carriers would deny them the right to develop strong multimedia product packages compete with broadcasters and the enhanced information services of telecoms companies.

- Competition between delivery platforms may require the adoption of a range of regulatory options, namely:

  - In extreme cases, an incumbent telecoms operator might be required to divest its interest in an alternative delivery platform such as a cable TV network. Such a course is best taken, on a case-by-case basis, at the national level, whether at the behest of the National Regulatory Authority or the National Competition Authority. At the Community level, *ex ante* legislation to this effect would be difficult to reconcile with Article 222 of the EC Treaty,[66] especially where vested rights are likely to be affected.

  - The European Commission, using to its powers to review strategic alliances under Article 85(3) of the EC Treaty or its powers under the *Merger Control Regulation*, may require divestiture as a condition precedent to clearance of "multimedia" mergers, joint ventures or other looser forms of cooperation. Given that few firms in the industry will have the full range of skills necessary to provide all multimedia services and platforms, it is inevitable that network operators will pursue ventures which have the potential to provide them with access to a full set of multimedia skills. Accordingly, the European Commission will have ample opportunity to review the potential anti-competitive consequences flowing from common ownership of multiple delivery platforms.

  - Another regulatory option to promote platform independence and to prevent cross-subsidisation is to require the structural and accounting separation of different businesses run using different platforms, whether those services are full substitutes for one another (*e.g.*, telephony provided over telecoms or cable TV networks) or partial substitutes (fixed telecoms and wireless communications). This

[66] Article 222 prescribes that *"This Treaty shall in no way prejudice the rules in Member States governing the system of property ownership."*

regulatory option is best implemented on a case-by-case basis, rather than through *ex ante* regulation. The goal of structural separation is to prevent the leveraging of market power between sectors. However, in a converged environment, characterised by mixed service offerings, integration and the combined use of different technologies, the use of structural separation as a general policy without reference to the level of platform and service competition in a given situation, may retard convergence and deny full-line operators economies of scale. Consequently, structural separation would be a viable policy option in those cases where markets are not fully competitive and where cross-subsidisation or discrimination has occurred (or is likely to occur).

- Some of the anti-competitive concerns relating to multiple delivery platforms might be addressed by policies promoting greater network access. For example, unbundling down to the level of the local loop is mandated in *Finland*, where each regional cable TV company also operates a separate telecoms network to each household. Although the same unbundling requirement is mandated in *Germany*, it is questionable whether it is as effective, since the national telecoms incumbent also operates the national cable TV network.

Existing geographic restrictions on the operations of cable TV operators should be counterbalanced by allowing them to forge alliances with other cable TV operators, allowing them to use the economies of scale from providing national broadband services.

Cross-media ownership rules

The current patchwork quilt of national cross-media ownership rules requires reform in a multimedia environment:

- These restrictions were based on the premise that each media sector constituted a discrete product market, with little or no overlap. That premise is no longer true. The capacity to download newspapers from computers, the capacity to receive scheduled programming on the Internet, and the capacity of telecoms networks to deliver a variety of multimedia services, mean that notions of distinct media are becoming redundant. Moreover, interactive uses are fundamentally altering the character of such media.

- Technical, complex and widely differing media concentration rules act impede to the growth of truly pan-European media operations which can compete on a global scale. The absence of a truly European media industry is due in part to

the significant cultural and linguistic differences in the European Union. Nevertheless, the relatively successful involvement of Canal Plus in American cinema suggests that a greater degree of cross-cultural involvement within the European Union itself is feasible, if regulatory barriers are lowered.

- The traditional goal of promoting pluralism should be re-appraised in light of the shifting notions of "markets" in a multimedia environment and the need to encourage investment. Minimal thresholds should be used to protect against distortions of competition, whilst encouraging convergence. Because the notion of "relevant markets" is in a state of flux, harmonisation should not proceed on the basis of simple numerical limits on the numbers of channels, stations or newspapers.

  It will also be important to develop a common understanding of how "market power" is to be measured. The *United Kingdom*, for example, introduced the criterion of "audience share" in its *1996 Broadcasting Act*, which certain other Member States may also be willing to adopt (*e.g., Germany*). The concept, however, presupposes the existence of well established markets, which will be difficult to define with precision in a multimedia world. A common understanding of the elements which enable an undertaking to "influence" the management (whether through ownership or some other form of control) of other media undertakings would facilitate greater consistency in the approach to such concepts.

- There is a need for increased cooperation among the regulatory authorities responsible for the various sectors. Such coordination would be facilitated by a greater degree of convergence of the regulatory functions currently performed by different authorities.

The Study Team has not identified any compelling policy reasons to treat cross-media ownership restrictions differently when applied to public broadcasters, except insofar as they would affect a broadcaster's ability to perform public service functions efficiently.

2.2 "INTERCONNECTION" AND "ACCESS" RULES

In the short term, the concepts of "interconnection" and "access" should be clearly distinguished because their roles in a multimedia environment are likely to serve different policy goals. The policy behind "interconnection" is to ensure any-to-any communications among citizens. "Access", on the other hand, potentially refers to a very broad range of purely commercial relationships between market players.

The regulatory issues arising from interconnection and access in a fully competitive environment gradually alter as the number of operators increases. As more entities become involved in the provision of the same network or service, the development of niches by new entrants will create a "network of networks" on which multimedia services should thrive. The pricing of interconnection, however, becomes increasingly complex as one moves to a packet-switched environment.

The development of an appropriate regulatory framework for **interconnection** and **access** in a multimedia environment will largely be based on the experiences of two-way, real time **telecoms** services, where there is a strong public interest in maintaining any-to-any connectivity. The most effective interconnection framework exists where there is a high level of facilities-based competition, which exerts downward pressure on interconnection rates (which should reflect call-termination costs) and deters operators from choosing economically inefficient routing options (see Section 3 of Annex I).

The same observations do not apply in the case of **broadcasting** and **cable television**. They are one-way, store-and-forward services without any-to-any characteristics. In these circumstances, there is no rationale for requiring cost-based interconnection between broadcasters or satellite operators and cable TV networks. Parallels are sometimes drawn between interconnection requirements in telephony and "must carry" rules in television (*e.g.*, in *The Netherlands*), but the analogy appears to be strained. "Must carry" rules should be limited to the performance by broadcasters of a public service role related to content regulation, rather than economic regulation.

Rules regarding 'access' should similarly be derived from the telecoms context, and should deal with everything which falls short of interconnection, for the purpose of ensuring any-to-any connectivity. The basis for national rules regarding interconnection and access is found in the *Interconnection Directive*, which most Member States have either adapted into national law already or are in the process of implementing.

Under the *Interconnection Directive,*[67] by 1 January 1998, organisations which have significant market power must provide interconnection on non-discriminatory terms, and interconnection charges must comply with certain basic principles (*e.g.*, they must be set on the basis of objective criteria, follow the principles of transparency and cost orientation and be sufficiently unbundled in terms of network and service elements offered). Although charges for interconnection based on a price level closely linked to long-run average incremental cost (LRAIC) are appropriate, the *Directive* leaves a large degree of flexibility in relation to the level of interconnection

[67] Directive 97/33/EC of the European Parliament and of the Council of 30 June 1997 on interconnection in telecommunications with regard to ensuring universal service and interoperability through application of the principles of Open Network Provision (ONP), OJ 1996 L74/13.

charges, subject to the supervision of National Regulatory Authorities. The development of appropriate standards for interconnection has gained added importance with the imminent demise of the International Accounts Settlement Scheme. A new settlement procedure, arguably based on interconnection charges, will need to be established.

Aside from key differences in the degree of specificity provided at the national level for matters such as co-location, unbundling and so forth, there is confusion about the boundary between the concepts of "interconnection" and "access". As in the telecoms world, the dividing line may lie in the conceptual difference between call termination ("interconnection") and call origination ("access"). There is a public policy goal in having the former concept valued by reference to an appropriate costing model such as LRAIC, whereas a competitive marketplace should in theory set a fair price for the latter (this distinction has been recently recognised explicitly in *The Netherlands*). In the case of market failure, competition rules can be relied upon to prevent the abuse of a position of significant market power.

There is a question whether the significance of the concept of "access" in a multimedia world can go beyond the development of direct contacts with a customer or obtaining access to physical network infrastructure or resources of a network operator. Indeed, based on the fact that there is an underlying economic need to obtain interconnection or access,[68] we envisage that an economic rationale could be developed which would include requests for particular types of content within the scope of a legitimate request for "access". Given the relative economic importance of content in a multimedia society, there appears to be nothing to prevent it from being treated, in appropriate circumstances, as a necessary operating resource to which access must be obtained on fair and non-discriminatory terms (at least when provided by a vertically integrated entity – see Section 4 of Annex I).

2.3 PRICING PRACTICES

The regulatory traditions underlying pricing practices in the telecoms, broadcasting and publishing sectors are ill-suited to the development of regulatory norms for pricing in a multimedia environment. The flexible pricing practices which characterise the mobile communications and the electronic publishing sectors provide more realistic models for the pricing of multimedia services.

[68] We have sought to avoid discussion of the broader notion of "access" in the broadcasting context, as we consider that it is used in a way to signify the importance of various public policy (*i.e.*, non-economic) goals which have more to do with issues of pluralism than with commercial market behaviour.

2.3.1 Telecoms

Current Regulatory Requirements

According to Community law, once a given telecoms service is open to competition, prices are to be set by market forces, rather than by regulatory instruments. The exception to this principle has been basic voice telephony, where significant competition is not likely to exist until 1 January 1998 in most Member States.

However, Community law requires tariffs for basic voice telephony services (where provided by operators with special or exclusive rights) to be oriented towards cost except to the extent that it is part of a universal service obligation, where the criteria of "affordability" is more significant. To this end, Member States are required by the *Full Competition Directive* to lift restrictions on the rebalancing of tariffs (an essential ingredient in most Member States for cost-based tariffing by their incumbent telecoms operators). Tariff rebalancing should, in principle, be completed by all Member States before 1 January 1998. After this date, the onus will be on Member States to justify price constraints and to report to the Commission on the phasing out of tariff imbalances, and to produce a detailed timetable for such phasing out.

With the abolition of "special and exclusive" rights, the revised *ONP Voice Telephony Directive* subjects organisations which enjoy "significant market power" to the obligation that tariffs be cost-oriented. This obligation may be relaxed, at the discretion of the competent National Regulatory Authority ("NRA"), when a sufficient degree of competition exists in the relevant market (as yet undefined).[69] Formal adoption of the agreed revised text is expected in early 1998.

It is widely acknowledged that tariff rebalancing is, in all likelihood, resulting in an increase in what is currently an artificially low tariff structure for local calls, including fixed charge elements such as line rental. In all Member States, rebalancing has the potential to impact the affordability of basic voice telephony services, which are considered to be the core of universal service obligations.[70] To guarantee the affordability of these services, price regulation may still be needed even after competition is introduced. Price regulation of telecoms services may, in any event,

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[69] Note that a significant degree of discretion would be granted to NRAs in conducting the significant market power test, and in considering whether conditions of competition in the relevant market justify the relaxation of tariff principles. Significant market power is presumed to exist when a market share of over 25% of the relevant telecoms product market is held in a Member State (*i.e.*, the national market), unless the competent NRA declares otherwise.

[70] Universal service is currently defined by the Commission as being restricted to voice telephony services, and essentially to the connection to the fixed public telephone network and publicly available telephone services at a fixed location, allowing users to make and receive national and international calls, and capable of supporting speech, facsimile and/or data communications.

only be implemented to ensure the affordability of universal service. The revised *ONP Voice Telephony Directive* grants Member States greater flexibility for maintaining existing price regulation for the provision of basic voice telephony services. [71]

Effects of Multimedia

ONP rules were designed to allow operators and service providers to compete with incumbent telecoms operators. However, in the long term, such rules might not be suited to an emerging multimedia environment. As competition develops, market forces should exert pressure to bring tariffs in line with costs, thereby relaxing the need for regulation.

Moreover, ever-increasing telecoms network intelligence, increasing bandwidth and the imminent demise of the distinction between national and international telephony, will render the concept of "costs" a more elusive and arbitrary concept. Also, as discussed in our economic and commercial analysis in Chapter I, the pricing process which characterises the world of packet-switching is based on wholly different criteria than those applying to traditional voice traffic. The introduction of new services provided over the PSTN may, almost certainly, also require a restructuring of telecoms tariffs.

Finally, in an advanced multimedia environment, voice telephony may tend to become so much of a "commodity" that it may eventually even be offered free of charge by some operators, thereby rendering the "universal service dilemma" an issue of the past. This practice is already being pursued in *Sweden* by a new market entrant and, although it may be no more than a marketing gimmick at this stage, may nevertheless provide an insight into the variety of future pricing models available for multimedia. In contrast, higher prices for local calls may have a negative impact on Internet access and the development of on-line services in the residential sector.

Depending on the evolution of the market, it may be necessary to introduce measures to increase pricing flexibility which would support an emerging multimedia environment. Useful examples of flexible tariff practices can be found in the mobile communications and the electronic publishing sectors:

(a) In the field of **mobile communications** (a sector in which many ONP rules are not currently applicable), competition has driven suppliers to diversify their

[71] In this context, special or targeted tariff schemes would be allowed to be implemented, "where necessary", for an appropriate period of time and "in accordance with Community law". This type of targeted scheme would be mainly intended for users in rural or high-cost areas and/or for "vulnerable groups of users" such as, for example, the disabled, the elderly, and so forth.

tariffs to include low-user schemes, including a relatively low rental charge and higher call charges, especially during peak periods. This has enabled an increasing number of consumers other than "premium" clients, to take advantage of mobile communications. Nevertheless, overall price levels remain considerably above PSTN prices in most Member States. Similarly, some suppliers of mobile communications offer discounts on mobile subscriptions to customers that remain with them for a certain period of time. The subsidisation of handsets also arguably triggers market demand, although the evidence on this issue is by no means conclusive (refer to discussion in Section 1 of Annex I).

(b) In the field of **electronic publishing**, the range of pricing mechanisms used by publishers allows them a degree of flexibility which reflects customer needs, facilitates the distribution of a portfolio of service, and takes advantage of cost savings brought about by micro-processing techniques (see discussion in Chapter II of the Study).

Effects of the Internet

The current pricing of Internet services provides insights into the potential range of pricing practices for the future. The most common way for residential or small business users to access the Internet is by using a personal computer to dial an Internet Access Provider (IAP) *via* the PSTN. To access Internet by this method, the user generally pays a fee to the IAP and local PSTN charges.

The price of Internet access *via* "dial-up" monthly services has radically changed over the past few years. While in 1995 it was common for IAPs to impose complicated pricing schemes based on time or volume-sensitive charging, today a critical mass of IAPs apply a flat monthly rate pricing mechanism (although time-sensitive charging is available to low volume users). This change in pricing practices has been reflected in a strong reduction in the price for IAP services. In 1996, the average IAP charge for 20 hours of Internet access per month in the OECD area was ECU17, while a year earlier the price had been ECU60.[72] The most important factor behind this reduction is almost certainly the increasing competition in the market.

The reduction in IAP charges means that, today, the main expenses for a customer accessing the Internet are the local PSTN charges. It is therefore the inherited pricing structure for local PSTN charges which will continue to be the primary determinant of the pricing of access to the Internet for most residential or small business users.

[72] OECD Report, Table 14 of the OECD Report "Information Infrastructure Convergence and Pricing: The Internet", OECD/GD(96)73.

Business users often obtain access to the Internet *via* leased lines from incumbent telecoms operators over which they connect their facilities to Internet backbone networks. The pricing of access to the Internet *via* leased lines is therefore an essential factor in the development of the Internet. Business customers also need leased lines from telecoms operators to connect their premises to the facilities of the IAP. In addition, the influence of pricing by a telcoms incumbent of leased lines extends to customers obtaining access to the Internet *via* "dial-up" services. The underlying charges by a telecoms incumbent to the IAP are reflected in their rate for "dial-up" customers. The cost of access to the Internet *via* leased lines varies enormously across the European Union. For instance, in 1995, the pricing for 56/64 kbits/s leased lines access to the Internet varied from approximately ECU5 in *Finland* to ECU27 in *Portugal*. The average price for leased lines is much lower in Member States with telecoms infrastructure competition than in Member States without it. [73]

The potential for growth of the Internet will mean that the pricing structure for access to services provided over the Internet will raise key regulatory issues. In view of the importance of the low access costs for the development of the Internet, it is essential that pricing structures be developed for local PSTN charges and for leased lines which are sufficiently flexible to allow innovative pricing. Moreover, the fact that many telecoms incumbents are beginning to offer Internet access services and that some cable TV operators allow their users to access on-line services, suggests that new flexible pricing models will need to be developed to reflect such tendencies.

2.3.2 Broadcasting

Generally speaking, there are few regulatory constraints on pricing in the broadcasting sector. The five main current sources of funding for broadcasters are: (1) direct funding from governments; (2) licence fees; (3) advertising revenue; (4) subscriptions for theme channels or special programming; and (5) the sale of programming.

As regards **terrestrial television**, direct budgetary contributions from governments and licence fees account for a large percentage of the revenues of public broadcasters. In *Spain* and *Portugal*, however, advertising is the main source of revenue for public broadcasters. While advertising is still the main source of revenue for private television companies, subscriptions are becoming increasingly important. For both public and private terrestrial broadcasters, the percentage of programme sales is relatively small. In this context, if licence fees are subject to significant government regulation, other sources of funding for television companies are not specifically regulated and are left solely to market forces.

[73] See also in this regard, OECD Report, Table 9 of the OECD Report "Information Infrastructure Convergence and Pricing: The Internet", OECD/GD(96)73.

In the **cable television** sector, specific regulations on prices are also very rare. Only *Belgium* and *Germany* (where the cable TV industry presents specific features)[74] have specific regulations, while most other Member States have left cable TV operators, which are often private companies, to set their own prices. This has led to wide variations in the pricing of cable TV services across the European Union. For instance, while connection for basic services will cost approximately ECU255 in *Austria*, the same connection will cost only ECU48 in *Belgium* and be free of charge in the *United Kingdom*, where only monthly charges are applicable. Monthly charges vary from approximately ECU7 in *Belgium*, to ECU11 in *Austria* and ECU16 in the *United Kingdom*. Other factors that explain the wide variations in the pricing of cable TV services include: government regulations which either permit commercial advertising or impose "must carry" obligations; or the quasi-public nature of many cable TV operators (*e.g.*, in *Finland*, the local residents own the local cable TV operator, while in *Belgium* many of the communal authorities own their own cable TV operations).

Finally, with regard to **satellite television**, the essential revenue sources are customer subscription fees and commercial advertising. Special programmes can often be subject to additional Pay-per-View charges (*e.g.*, special sporting events).

The development of new broadcasting services is likely to introduce some changes in the pricing practices in this sector. For instance, the introduction of individual programmes on a Pay-per-View basis will require charging on a programme by programme basis. Pricing models for new broadcasting services are currently not sufficiently developed. It appears, however, that the broad pricing flexibility which exists in this sector would allow customers to pay in accordance with a variety of criteria, (*e.g.*, the relative importance of the event, the fact that it is recent, the amount of advertising included in the overall programme).

The convergence of different platforms for the delivery of content also raises the issue of the applicability of telecoms pricing practices (in particular, the ONP rules) to the broadcasting sector for networks and services. While there may be some arguments supporting the applicability of such rules at the network level in certain cases, it seems that they should have little or no role to play at the service level.

[74] In *Belgium*, the majority of cable TV operators are public municipal entities. In *Germany*, the telecoms incumbent, *Deutsche Telekom*, owns and operates the vast majority of cable TV networks.

2.3.3 Publishing

As has been explained in Chapter II of our economic analysis, the tariff options used for on-line publishing are arguably one of the most innovate means of promoting the take-off of multimedia services. In contrast, traditional pricing practices in the publishing industry do not exhibit the same degree of commercial flexibility.

The publishing industry has been traditionally characterised by widespread resale price maintenance (RPM), which is highly problematic under competition rules. Indeed, price-fixing is usually regarded as a *per se* infringement of competition rules which, by its very nature, is unlikely to be able to benefit from the grant of an individual exemption decision under Article 85(3) of the EC Treaty. Many Member States continue to maintain RPM systems in the publishing sector under national legislation (*e.g.*, *France*, *The Netherlands*, *Germany*, *Austria*, *Denmark*, *Spain*, *Portugal* and *Denmark*).

In *France*, national RPM legislation was discarded. It was re-introduced in 1981 to protect books as cultural items; the object behind such a policy was to overcome the negative effects on the diversity of publications which would otherwise arise from fierce competition at the retail level. Under the *French Book Price Act* of 1981, [75] every publisher or importer of books is required to set the public selling price of the books he publishes or imports between 95% and 100% of that price. The *Act* provides derogations from this obligation for certain public and private entities such as libraries and teaching establishments, and authorises clearance sales under certain conditions. RPM for German language books in *Germany* and *Austria* has been in operation since 1885, having been characterised as a "normal business practice" under *German* law.[76]

In other Member States, it is market actors themselves which have concluded agreements for the maintenance of resale prices. For instance, in *Belgium* and the *United Kingdom*, agreements have been concluded which provide for the sale of books, newspapers and magazines at fixed prices.

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[75] Loi No. 81-766 du 10 août 1981 relative au prix du livre, [1981] *Journal Officiel de la République Française* 2198.

[76] Organised between the Börenverein des deutschen Buchhandels, on the one hand (in *Germany)*, and the Hauptverband des österreichischen Buchhandels and the Bundesgremium des Handels mit Büchern on the other (in *Austria*).

Community Jurisdiction

When dealing with national RPM schemes in the publishing sector, the European Commission has reviewed them under Article 85 of the EC Treaty (which prohibits anti-competitive agreements) in the face of official Member State encouragement of such systems. Moreover, Article 128(4) of the EC Treaty provides that the Community is obliged to take into account *cultural considerations* in determining the measures which it should take under other provisions of the Treaty. The Commission's review is further complicated by the fact that intra-Community trade in books, newspapers and magazines is limited and is largely confined to countries with a common language, namely, *France*, *Belgium* and *Luxembourg* (French speaking), *The Netherlands* and *Belgium* (Dutch speaking), the *United Kingdom* and *Ireland* (English speaking) and *Germany* and *Austria* (German speaking). For these reasons, the Commission has not attempted to take actions against purely national systems of RPM in the publishing sector. It has, however, intervened in cases of RPM for books where it extends to intra-Community trade. In this respect, the Commission has taken the view that an agreement concluded in 1947 (and amended in 1958) between the Dutch and the Flemish book trade associations to maintain the retail prices of Dutch-language books fixed by the publisher, and covering sales in the country of publication and exports, infringed Article 85(1) of EC Treaty and did not qualify for exemption under Article 85(3). Similarly, the Commission took action against a series of agreements concluded in 1957 by British publishers under the "Net Book Agreements" scheme, which lays down standard conditions for the sale of books at net prices. Under these standard conditions of sale, a "net book" could not be sold to the public in the *United Kingdom* or *Ireland* at less than the net published price, subject to certain exceptions.[77]

The European Court of Justice has generally supported the actions of the European Commission, even against national RPM systems, in the publishing sector. With respect to the system established by legislation in *France*, the Court has ruled that, although this system cannot be held contrary to Article 85(1) of the EC Treaty, which only refers to conduct by undertakings and not to State measures, it is nevertheless contrary to the rules on the free movement of goods (Articles 30-36 of the EC Treaty).[78] It should be noted, however, that a more recent line of jurisprudence developed by the Court may run counter to the outright prohibition of RPM systems established under national legislation insofar as such RPM systems do

[77] Decision 89/44/EEC of 12 December 1988 relating to a proceeding under Article 85 of the EC Treaty (IV/27.393 and IV/27.394 (Publisher Association-Net Book Agreements) OJ 1989 L22/12; [1989] 4 C.M.L.R. 825.

[78] *Association des centres distributeurs Edouard Leclerc and Others v. "Au Blé Vert" Sàrl and Others* [1985] 2 C.M.L.R. 286.

not de-facto discriminate between domestic products and those imported from other Member States.[79]

With respect to RPM systems established in furtherance of private agreements, the Court has confirmed the Commission Decisions against the Agreement between the Dutch and Flemish book trade Associations[80] and the British "Net Book Agreements".[81] The Court has also recently taken the view that national RPM schemes may be contrary to Article 85(1) of the EC Treaty when they are associated with broader anti-competitive restrictions (for example, a selective distribution system).[82] For instance, the Court ruled that a Belgian selective distribution system for newspapers and periodicals was contrary to Article 85(1). However, in its judgment, the Court suggested that:

> *"if (...) the fixing of retail prices by publishers is the only means of bearing the economic burden arising from the return of unsold copies, and if the return of unsold copies is the only method which makes it possible to provide consumers with a wide range of newspapers and periodicals, it is for the Commission to take this into account (within the framework of an application for exemption under Article 85(3))".*[83]

The recent case-law of the Court demonstrates that the legal status of national RPM systems under the Community rules on the free movement of goods and Community competition laws is still unclear. In particular, certain national systems which do not discriminate between domestic and imported products, or which are not associated with other anti-competitive restrictions, might be able to withstand a legal challenge under Articles 30 and 85 of the EC Treaty. In the absence of strong Court of Justice authority on the issue, it will be difficult to determine the extent to which Article 128(4) of the EC Treaty can override the express requirements of Articles 30 and 85 of the EC Treaty. However, it is instructive to note that, even at Member State level, doubts are being expressed as to the legitimacy of using a "cultural" exception to justify price-fixing in the publishing sector. In *Spain*, the National Competition Authority (Tribunal de Defense de la Competençia) recently recommended that RPM arrangements be phased out by the year 2001. In its view, the lowering of prices

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79 Refer to *Keck (Bernard) and Daniel Mithouard* [1993] 1 C.M.L.R. 101.

80 *VBVB v. VBBB* [1987] 1 C.M.L.R. 27.

81 Re *The Net Book Agreements: Publishers Association v. E.C. Commission* [1992] 5 C.M.L.R. 120.

82 Refer to *S.A. Binon & Cie v. S.A. Agence et Messagerie de la Presse* [1985] 3 C.M.L.R. 800.

83 *Supra* at para 46.

brought about by abandonment of the RPM scheme would promote culture by making books more affordable to a broader range of consumers.

A pending review of RPM practices in the publishing sector in the European Union is likely to reveal the extent to which distortions to competition created by such schemes justify more extensive regulatory challenge.

Implications for Multimedia

⇒ *What is likely to be required in multimedia environment is a radical new approach to pricing, which allows customers to choose, on the basis of a broad range of factors (e.g., the value of the service, the portfolio of services being offered, the time spent in receipt of the services, a flat charge for usage, subsidised terminal equipment and set-top boxes).*

⇒ *In a competitive environment and, in the absence of market power, requirements of cost orientation may be wholly unnecessary. More appropriately, the lessons learned from the flexible tariff packages which characterise mobile communications and on-line publishing are likely to reflect commercial efficiency and flexibility for consumers.*

⇒ *A radical new approach to pricing may need to be adopted in the longer term, in light of the effects of the Internet. For example, one may foresee end-user prices reflecting a flat rate or a tiered rate, depending on factors such as:*

- *the quality of access obtained to a particular service (e.g., measured in Kbits);*
- *the use of particular protocols; user designations (e.g., normal or urgent delivery); and*
- *whether or not the communication is sensitive to "congestion" concerns (according to the timing of the communication and the availability of the network).*

⇒ *By the same token, it is possible that the commercial dynamics of the Internet may change fundamentally over time, thereby aligning its pricing more or less with prevailing telecoms pricing practices. This result may follow from increased performance and quality expectations, the demand for dedicated real-time communications capabilities and the resulting pressure to implement sophisticated billing practices.*

⇒ *The maintenance of resale price practices (RPM) in the publishing industry appears to be ill suited to an on-line environment, which is characterised by flexible tariff schemes. Moreover, it is doubtful whether RPM practices, which are generally considered to be per se anti-competitive, should be able to benefit from any form of "cultural exception" to the competition rules.*

⇒ *In any future pricing model for multimedia services, because of the great scope for tariff flexibility, traditional anti-competitive practices such as price predation, cross-subsidisation and price discrimination are likely to prove significantly more difficult to detect.*

2.4 MULTIPLE REVENUE STREAMS

The logic of convergence requires that market players be encouraged to take advantage of economies of scope, by allowing them to provide "bundled" service offerings, thereby taking advantage of the multiple revenue streams generated in the provision of multimedia services.

Market players which are most keen to develop a full range of multimedia services for the emerging marketplace have expressed a desire for the adoption of a flexible approach towards tariffing policies. The corollary of this flexibility is that there is also a perceived need to be able to bundle service offerings to actual and potential clients. The bundling of services is not only attractive from a consumer 's point of view (the "one-stop shop" principle), but also allows operators to achieve economies of scope in the production and distribution of various services.

The provision of a full line of services allows a telecoms incumbent to more readily satisfy its universal service obligations. It also allows broadcasters (especially public broadcasters) to increase their resource base to satisfy their "public service" commitments.

In a truly competitive environment, the potential anti-competitive dangers of bundling are less likely to arise. Firstly, bundling does not pose any serious anti-competitive concerns if the party responsible for the "bundling" does not have significant market power. Aside from telecoms incumbents and, a small number of large broadcasters in each Member State, there will be few market actors with significant market power in the short term whose bundling practices can adversely affect the market.

Secondly, the usual concern with bundling in the telecoms world, (the cross-subsidisation of competitive services from monopoly profits) should no longer represent the same danger as it did prior to the liberalisation of voice telephony after 1 January 1998. The liberalisation of voice telephony services means that this type of cross-subsidisation is not likely to occur, except in those countries which maintain a derogation for voice telephony services. Moreover, the profits for voice services will become increasingly subject to severe price competition; consequently, over time they should be less capable of subsidising more lucrative (yet highly risky) multimedia services.

Thirdly, there is a concern that the bundling of services will result in "full-line forcing" compelling niche service providers to enter the market only at particular levels or preventing them from providing specialist services (because consumers will prefer to purchase a service "package". However, there is nothing to suggest that all consumers will prefer a full range of multimedia services, or that they would always

prefer a single bill for the provision of all services. The multimedia environment is just as likely to be characterised by divergence as it is by convergence (at least at the service level). In a fledgling multimedia environment, therefore, concerns about full-line forcing may be somewhat exaggerated; as that market matures, however, there is a risk that undertakings with a "first mover" advantage in the marketplace will reinforce their position of market strength, using bundled offerings to do so.

Fourthly, there may be a temptation to provide a full range of bundled services throughout the European Union to large commercial customers (*e.g.*, multinationals). Insofar as this results in an inevitable "take it or leave it" approach for the whole territory of the European Union (rather than services provided on a country by country basis), geographic bundling of this type may cause competition law concerns where it is practised by an undertaking with market power; in such situations, service bundling coupled with geographic bundling may result in the entrenchment of 'first mover' advantages.

On balance, the Study Team is of the view that operators should be permitted to take advantage of multiple revenue streams in a multimedia environment. Care should be taken, however, to ensure that competition rules are used to prevent the creation of a limited number of full-line service providers, to the exclusion of smaller specialist service providers. In this respect, regulatory measures designed to ensure the transparency of commercial actions of operators will act as an important structural safeguard in the preservation of a competitive market structure.

2.5 "PUBLIC MISSION" OPERATORS

2.5.1 Regulatory and Commercial Pressures

The role of public broadcasters will inevitably change in a multimedia environment, since the traditional basis upon which they have been regulated is no longer wholly valid. The changing nature of public broadcasters may need to be reflected over time in the changing nature of the State's influence in broadcasting matters. In particular, the role of the former in providing public services and the role of the latter in commissioning such services, will need to be re-evaluated.

The original economic and technical bases upon which the national regulatory regimes for broadcasting were founded are being eroded by the changes brought about by convergence. This is placing strain on the existing regulatory structures at Member State level for broadcasting, and particularly on the role of public broadcasters in a competitive environment for the provision of multimedia services.

As a result of the relative abundance of broadcasting spectrum for digital services and the potential for the dissemination of traditional audiovisual images over other delivery platforms, the hitherto privileged role of public broadcasters *vis à vis* private broadcasters is problematic. Although the Study Team considers that the cultural role of public broadcasting continues to be of paramount importance, the taking of one of two likely commercial paths in response to the pressures of convergence by public broadcasters will, in our view, have a direct bearing on their future regulation.

Under one scenario, public broadcasters will become full-line providers of multimedia services by taking advantage *inter alia* of their significant libraries of content (developed over many years of public funding). In these circumstances, public broadcasters should run the same regulatory risks, regarding the conditions of market operation, as other market actors, particularly as regards the need to distinguish between their public service mission (Article 90(2) of the EC Treaty) and their other duties. The Protocol to the *1997 Amsterdam Treaty* concluded at the Inter-Governmental Conference does not have a negative impact upon our conclusion.

Under a second scenario, public broadcasters would not seek to extend their market penetration beyond their current spheres of activity. In doing so, however, they run the significantly greater commercial risk of being confronted with an ever-diminishing market share, which will affect the means by which they funded and will also challenge their raison-d'être (*i.e.*, serving the "public" at large).

Finally, in the absence of proof in the medium term that the proliferation of TV channels does not deliver (in aggregate form) the quality of content expected by government authorities of public broadcasters, it may even be premature to take the position that public broadcasters provide the only guarantee of plurality, cultural diversity, objectivity in political reporting and so forth. Judgement on these issues will need to be reserved until the multimedia environment matures.

2.5.2 The Changing Role of the State

The role of the State will be critical in the process of transformation of public broadcasters in a multimedia world, because it will inevitably be called upon to determine, in light of commercial and technological realities, what role public broadcasters should play in the creation and dissemination of "public" information in a multi-platform environment.

The State will be in the position of a potential commissioner of content, rather than a mere regulator of content. The role adopted by the State in this respect (in the sense of opening up the provision of the public service mission to a range of providers) may determine the role to be played in the longer term by public broadcasters in a

multimedia environment. For example, if the ultimate goal of the State is to ensure that "public goods" or "public services" are supplied to the consumer, it may decide that the best means of satisfying these goals is to allow the market (rather than any given broadcaster) to provide such goods or services. This might be achieved by a process of tender or application, where market actors have the opportunity to bid for the right to provide particular ranges or types of programmes.

Such an approach is consistent with the "market failure" approach adopted in Member States such as *Germany, Austria* and *Luxembourg* with respect to the provision of universal service in the telecoms sector, and reflects the optimal means of resource allocation in a competitive market situation. Most importantly, it is consistent with the tradition that broadcasting has particular national democratic and cultural traditions which are not susceptible to a set of minimum harmonised standards (as occurs on a pan-European basis with the concept of universal service). The role of the State in the broadcasting sector would become even more important than it is today, because it is currently public broadcasters (rather than the government) which are currently associated in the public mind with the provision of public service.

Implications for Multimedia

⇒ *Public broadcasters should not be exempt from the application of competition rules insofar as their activities in the multimedia market place go beyond their core mandate of providing broadcasting services to the public of a particular nature and quality. To do otherwise, given the potential importance of broadcasting in a digital world, would be to run the risk of severely upsetting the regulatory balance of any future regulatory framework for multimedia. Consistent with the European Court of Justice precedents, the "public mission" exception to competition law liability which is contained in Article 90(2) should be interpreted narrowly by Member State authorities.*[84]

⇒ *Member States should re-examine their current role in the promotion of content by considering whether, in a multimedia environment characterised by many delivery platforms, the State's goals of disseminating particular standards of content to as broad an audience as possible requires that it consider itself as a commissioner of content, not just the regulator. Over time, the regulatory function of the State as a regulator of content may, where appropriate, be passed on to more industry-based bodies (similar to those governing industries such as publishing).*

2.6. BOTTLENECKS AND ESSENTIAL FACILITIES

Regulatory intervention should be restricted in the short term to those situations where the market cannot correct the abuse of market power.

[84] Refer to *Corbeau* [1993] I ECR 2533.

To the extent that new regulation may be required at a Community level as part of the process of adaptation of the telecoms regulatory environment, it should be directed towards resolving enduring market failure brought about by the control of bottleneck facilities and assets (whether tangible or intangible).

In pursuing the goal of a light regulatory approach, the Study Team envisages that the adoption of new legislation at Community level should only be required where the introduction of competition has failed to overcome enduring bottlenecks. These bottlenecks are most likely to occur at the higher end of the emerging multimedia value chain (especially when gateway technologies such as Conditional Access Systems and Electronic Programme Guides are the subject of proprietary standards), or they may occur where infrastructure providers entering into new service markets attempt to deny access to their facilities to service providers. In such situations, it may be advisable to opt for prescriptive legislation which ensures that undertakings with significant market power are subject to structural obligations designed to ensure that their dealings with third parties are transparent, objective and non-discriminatory. This type of approach should only be employed, however, where there is clear evidence of market failure (refer to discussion in Section 4 of Annex I).

2.7 TRANSPARENCY RULES AND ACCOUNTS SEPARATION REQUIREMENTS

The natural by-product of convergence at the service level is the regulatory acceptance of greater tariff flexibility and the bundling of services. The regulatory quid pro quo for such regulatory leniency, however, should be a greater emphasis on transparency rules in all of their different forms.

Integrated firms can cross-subsidise competitive services from profits made in relatively non-competitive areas. In addition, they are likely to be able to discriminate in the types of tariffs and interconnection which they offer to their affiliated companies or preferred customers, as opposed to other independent market players. Differentiation as to prices and terms and conditions of operation are, of course, acceptable as long as they are justified by objective cost savings or other objective business factors. However, where that differentiation cannot be explained by reference to such objective justifications, "discrimination" occurs which, if effected by a dominant undertaking, is actionable under Article 86 of the EC Treaty.

In a fully converged environment, it will be exceedingly difficult to detect anti-competitive pricing practices by dominant undertakings. Fixed-mobile integration, coupled with convergence of the service layer, does not lend itself to the transparency of commercial relations (either internally within a corporate group or externally in dealings of that corporate group with third parties). In these situations, it may be necessary to introduce specific regulatory measures designed to introduce transparency

in the relations between independent market actors. The existing telecoms regulatory framework has already implemented a number of such transparency-related measures which should prove to be of great importance in a multimedia environment. These requirements take a variety of forms, namely:

- cost accounting;
- unbundling;
- publication; and
- arms-length dealing.

Each of these requirements is discussed briefly below.

Cost Accounting Requirements

The implementation of flexible tariff and pricing principles is difficult to monitor, unless adequate cost-accounting systems are in place. The *ONP Voice Telephony Directive* vests telecoms NRAs with the powers and imposes the obligation to verify the accounting systems used by those companies which are subject to pricing obligations. In addition, the *Directive* has established a classification of the costs associated with the provision of public telecoms networks and voice telephony services which should be used in accounting systems. However, a large degree of flexibility is allowed for the use of other accounting systems insofar as they are suitable for implementing Community tariff obligations, have been approved by the National Regulatory Authorities, and the Commission has been informed of their application.

In addition, Article 8 of the *Interconnection Directive* requires that operators with significant market power keep separate accounts for activities related to interconnection (both for interconnection services provided internally and to others) and other activities. The purpose of accounting separation is to ensure that the information derived from the accounting records reflects as closely as possible, the performance of parts of the businesses.[85]

The NRA is responsible for ensuring that the cost accounting systems used are suitable for the implementation of the interconnection obligations, especially with regard to the principles of transparency and cost orientation.

[85] ONP COM(97)40, Brussels, 6 November 1997, entitled: "Interconnection in a Liberalised Telecoms Market", Working Document on Cost Accounting and Accounts Separation.

Unbundling Requirements

To prevent potential abuses of market power, the *ONP Voice Telephony* Directive mandates that tariffs for facilities additional to the provision of a connection to the PSTN and the fixed telephone service be "sufficiently unbundled", to ensure that customers are not paying for facilities which are not necessary for the service requested. This unbundling requirement may not be used, according to the *Directive*, to preclude the offer of tariff packages. Any discounts offered to users and special tariff offers must be fully transparent and non-discriminatory.

Publication Requirements

Under both *ONP Voice Telephony Directives*, all organisations providing fixed public telephone networks and/or publicly available telephone services are obliged to publish information concerning their tariffs, in a clear and accurate manner. Tariff changes may not be implemented before the public notice period, set by the competent NRA, has elapsed. In addition, published tariffs for voice telephony services may not be varied, unless the NRA consents.

Finally, the *Full Competition Directive* and the *Interconnection Directive* require operators with significant market power to publish a "standard" interconnection offer (which includes reference to relevant tariffs). Moreover, interested third parties may be allowed by telecoms NRAs to review interconnection agreements of market players with significant market power (subject to the principle of respect for confidentiality).

Arms-Length Dealing Requirements

The *Interconnection Directive* specifies that undertakings granting interconnection to independent third parties will do so on terms which do not discriminate between third parties and affiliated organisations or service subsidiaries. A similar obligation is imposed by the *ONP Voice Telephony Directive* in relation to the provision of Special Network Access.

Implications for Multimedia

The transparency requirements under the existing telecoms regulatory framework are likely to play an increasingly important role in a multimedia environment where traditional service and network boundaries are breaking down. Their efficiency in the medium term will also be likely to determine the extent to which other more extreme forms of regulatory intervention may be required to redress market failure (e.g., structural separation coupled with separate accounts, and, in extreme cases, divestiture).

There appear to be no strong policy reasons why these transparency obligations, created specifically for the telecoms sector, should not apply with equal force to the broadcasting sector. Such requirements are clear instances of 'economic regulation' whose logic cuts across traditional sectoral lines of regulation and which will facilitate a more competitive environment for the provision of multimedia services and infrastructure.

2.8 ROLE OF COMPETITION RULES

The importance and enforcement of competition rules will inevitably increase as markets move from monopoly or limited competition to full liberalisation. Competition rules however, will, be faced with a number of new emerging issues which will challenge existing procedural structures and substantive tests of legal compatibility.

Although it is beyond the scope of the Study to review the applicability of competition rules in the multimedia sector with any degree of specificity, there are nevertheless a number of issues which the Study Team considers to be of critical importance in the adaptation of the existing telecoms regulatory environment. For example:

- the tension between primarily national geographic markets existing in the media sector in co-existence with an increasingly international geographic market definition for many types of telecoms-related services;

- the development of relevant service markets at the wholesale and retail levels in both the broadcasting and (more recently) the telecoms sectors;

- the increasing importance of "partial substitutes" in competition law analysis, especially for media-related services without direct substitutes, and their role in the further development of the concept of "potential competition" and "supply side substitutability";

- the role of exclusivity in the licensing of programming content, especially as regards particular types of content with a relatively short shelf-life (*i.e.*, "perishable" content such as unique sporting events) or new releases of films;

- the implementation of the "essential facilities" doctrine, as applied to technical gateways such as Conditional Access Systems or Electronic Programme Guides, or to intangibles such as intellectual property rights held with respect to content;

- the inherent tension in any form of true multimedia joint venture or merger which is the subject of competition law review, prompted primarily by the fact that the European Commission has refused clearance to a number of high-profile concentrative joint ventures in the media sector, while at the same time being willing to grant clearance to a series of high-profile telecoms strategic alliances under Article 85(3) of the EC Treaty (subject to behavioural undertakings being given by the parties);

- the alignment of current procedures and remedies under Article 85 of the EC Treaty and the *Merger Control Regulation* in order to review strategic joint ventures which cut across multimedia sectors and which display both important structural (usually associated with review under the *Merger Control Regulation*) and behavioural (usually associated with review under Article 85) characteristics;

- the desirability of promoting the principles of transparency, proportionality and non-discrimination by adopting *Block Exemption Regulations* designed to overcome bottlenecks;

- the inevitable foreclosure concerns created by telecoms incumbents seeking to preserve their market power by means of entering into strategic alliances with strong media groups, whose market power is much more resilient than its telecoms counterparts; and

- the development of regional monopolies or duopolies by large media groups, potentially restricting the number of digital delivery platforms to the home to a handful of market operators.

2.9 FLANKING POLICIES

The adaptation of the telecoms regulatory framework to a multimedia environment also requires that there be sufficient confidence in both consumers and producers of multimedia services that their fundamental rights will be protected. Rules relating to the provision of universal service, the protection of intellectual property rights and maintenance of data protection principles are particularly important in this regard.

2.9.1 Universal Service and Public Service Goals

Universal service schemes in the telecoms sector have been formulated in the context of an incumbent operator being obliged to provide such services. Over time, however, contribution by other market players to the costs of such universal service obligations

has raised the possibility that such schemes, if not properly administered, might constitute significant entry barriers. In a multimedia world, the primary regulatory challenge will be to adapt the existing regime to one which fully reflects a competitive marketplace where numerous market players may be willing to satisfy part of the universal service goal. In turn, a longer term issue might be how, if at all, public service goals usually associated with the broadcasting sector, might be assimilated into a broader concept of "universal service" or "public service".

Universal Service

The concept of universal service has been acknowledged in the Community legal order as playing an important role in the Information Society. Universal service responds to the idea of a minimum set of services of specified quality which are available to all users, regardless of their location, and at an affordable cost. If and when Member States decide to impose universal service obligations, they must be compatible with Community law and policy.

Indeed, the *Full Competition Directive*[86] requires that National Schemes imposing universal service requirements of any kind be notified to the Commission for the assessment of their compatibility with Community law. The Commission has subsequently issued a *Communication*[87] which contains the principles and criteria against which such National Schemes will be assessed.

This "minimum level" approach for universal service should, in principle, be limited across the European Union to a core group of services regarded as being essential (and which are, in any event, already provided across the European Union by the incumbent telecoms operators). This minimum level of service is described as: " *the provision of voice telephony via a fixed connection which also allow a fax and a modem to operate, as well as the provision of operator assistance, emergency services and directory inquiry services (including the provision of subscriber directories, and the provision of public pay phones)*".[88] The *ONP Voice Telephony Directive* clearly recognises that the connection may be established using either a fixed line or a wireless connection, where this proves to be the most cost-effective method.

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86 Commission Directive 96/19/EC of 13 March 1996 amending Commission Directive 90/388/EEC regarding the implementation of full competition in telecommunications markets, OJ 1996 L74/13.

87 Commission Communication on assessment criteria for national schemes for the costing and financing of Universal Service in telecommunications and guidelines for the Member States on operation of such schemes, COM(96)608 of 27 November 1996.

88 See the Commission's *Communication on Universal Service* and the proposed new *ONP Voice* Telephony *Directive*.

Member States are, however, left free to impose any additional universal service requirements if they so desire. In these instances, the Commission has taken the view that such additional requirements may not be financed from mandatory contributions by market players and may not have an impact on the costing of universal service provisions laid down at Community level.

The Community legal order recognises universal service to be a dynamic and evolving concept, which may need to be expanded in the multimedia era. However, for the time being, it is recognised as being both realistic and practical to limit universal service to the basic voice telephony service unless and until market demand proves otherwise. Broadening the scope of universal service too early in the life of multimedia threatens to impose disproportionate burdens on new market entrants.

To be included within the concept of universal service, any new service would need to establish that it is both essential and also "universal" in character (*e.g.*, it should have over 75 per cent penetration rate). To the extent that a number of governments of Member States are actively seeking to introduce a concept of "universal access" in their legal systems, thereby extending the availability of ISDN and Internet access to a greater spread of the population (via schools, hospitals and other public institutions), that political commitment has to date not been marked by an equivalent transformation in the meaning of universal service. Finally, the spread of alternative means of voice communication such as voice over the Internet could mean that universal service might be satisfied in the future by being provided through alternative means.

Public Service Missions

Public service missions in the broadcasting sector are both varied and not susceptible to any "universal formula" at Community level, being an area where Member States have the right to identify particular national objectives. However, their varied nature does not exclude the possibility of market forces playing a greater role in their delivery, including the possibility of organisations (other than public broadcasters) being able to provide such services.

To this end, the model adopted for universal service in the telecoms sector in *Germany*, *Austria* and *Luxembourg*, may be instructive. Under that regulatory model, there exists a general presumption that universal service is being provided. Insofar as market failure suggests that universal service is not being provided, market players may tender to be able to provide such service. In the event that the provision of such service proves to be uneconomic, a mechanism has been established which foresees contributions being made by all relevant market players.

The above approach is geared towards a competitive marketplace, and would appear to be consistent with the fulfillment of key policy goals in the multimedia sector. Moreover, such an approach would appear to be highly consistent with the increased importance likely to be played by the State in the commissioning of content. The new role of the State, taken in conjunction with the use of a tendering process for the provision of "public goods" or "public services", may be the system best suited in the medium term to preserving pluralism and cultural diversity in a competitive environment.

2.9.2 Intellectual Property

The protection of intellectual property rights in an on-line environment is a key policy goal in the encouragement of creators of content to disseminate their creations as widely as possible in an on-line environment. However, the exercise of those rights should not be abusive.

The field of intellectual property is a broad one, and many aspects of it are affected by the adaptation of the existing regulatory telecoms framework in the context of multimedia. A relatively harmonised approach to intellectual property protection at Community level ensures that rightholders are given balanced protection in the light of the rights of consumers to have "fair" use of copyrighted materials. A number of additional areas of intellectual property law which interface with current regulatory changes include:

- the role of collection societies in the multimedia environment;
- the use of copyright to prevent access to key types of content, and the possibility of compulsory licensing in relation to same;
- the hoarding of Internet Domain names by dominant operators, and the implications on both trademark law and competition rules of such action;
- the abuse of intellectual property rights in the context of proprietary standards; and
- liability in an on-line environment.

2.9.3 Data Protection/Privacy

The creation of a thriving commercial on-line environment requires that information on customers be made readily available and transferable. By the same token, the goal of commercial efficiency should not compromise the traditional rights of data subjects to grant clearance for the use of data which relates to them. The regulatory challenge in a multimedia environment will be to strike an appropriate balance between these two competing policy goals and arrive at an appropriate clearance procedure for the wider dissemination of personal data.

Regulatory Framework

Most Member States have enacted legislation designed to balance the individual 's right to privacy with the need of public authorities, employers and others to process personal data. National laws are similar in many respects, since they are based on a *Council of Europe Convention* on the matter.[89]

Additionally, the European Parliament and Council of Ministers adopted a Directive in October 1995 on the protection of individuals with regard to the processing of personal data.[90] The *1995 Framework Directive* imposes a harmonised framework for the types of obligations which can be imposed on those who process personal data and provides individuals with certain rights to ensure that data is not misused. The *1995 Framework Directive* applies where any information relating to an identified or identifiable natural person (the "data subject") is processed wholly or partly by automatic means and non-automatic means where the data forms part of a filing system.

According to the *Directive*, the data subject must unambiguously give his/her consent to the processing of personal data. There are a number of exceptions to this rule, *inter alia*, where the processing is necessary for: (i) the performance of a contract to which the data subject is party; and (ii) the legitimate interests pursued by a third party to whom the data is disclosed, where these factors outweigh the interests or fundamental rights of the data subject.

When collecting personal data, the controller must inform the data subject of his identity, the purposes of the processing and the identity of the recipients of the data. In addition to the right to information, the data subject is entitled to have access to the data and to have the data rectified or erased if incomplete or inaccurate, or if the processing otherwise infringes the *Directive*.

A further proposed *Directive* seeks to supplement the *1995 Framework Directive* on data protection by catering for the specific requirements relevant to telecoms networks.[91] The *Telecoms Data Protection Directive* will apply to the processing of

89 Council of Europe Convention No. 108 of January 28, 1981 for the protection of individuals with regard to automatic processing of personal data. *Greece* and *Italy* have signed the Convention but have not formally ratified it.

90 Directive 95/46 on the protection of individuals with regard to the processing of personal data and on the free movement of such data, OJ 1995 L281/31.

91 Common Position 57/96 adopted by the Council on 12 September 1996 with a view to adopting Directive 96/.../EC of the European Parliament and of the Council, of ... concerning the processing of personal data and the protection of privacy in the telecommunications sector, in particular, in the integrated services digital network (ISDN) and in the public digital mobile networks, OJ 1996 C315/30.

personal data in connection with the provision of publicly available telecoms services in public telecoms networks, in particular via the ISDN and public digital mobile networks. This *Telecoms Data Protection Directive* covers data relating to legal persons, as well as to natural persons. It would cover large and small businesses in electronic publishing, Internet-based and other on line services, interactive television and audiotext services.

Currently, the *Telecoms Data Protection Directive* guarantees the confidentiality of calls by making it unlawful to listen in to calls, to intercept them or to record them. Three types of exceptions are provided for : (i) when the activities are legally authorised; (ii) when these procedures are used with the user 's consent; and (iii) when what is involved is a recording legally authorised to provide proof of a business transaction or any other professional calls. The *Telecoms Data Protection Directive* also prohibits the use of automatic call systems or faxes for direct marketing purposes, unless they are directed at subscribers who have given their consent beforehand.

At present the subject of a conciliation procedure between the European Parliament and Council, the *Telecoms Data Protection Directive* is expected to be adopted in the near future. If it is, Member States will be obliged to amend their domestic legislation to give effect to both data protection Directives by 24 October 1998.

Implications for Multimedia

Market players in general are uncertain as to the level of protection which is to be offered with respect to "third country" transfers, especially as regards transfers to the United States, under the Framework Directive. With respect to the Telecoms Data Protection Directive, a number of market actors take the view that data protection in the on-line environment should be treated no differently to elsewhere, and that the current proposal constitutes potential over-regulation.

Chapter IV
Conclusions and Recommendations

In preparing this Study, "*Adapting the EU Telecommunications Regulatory Framework to the Developing Multimedia Environment*", the Study Team has reviewed the commercial, technological, legal and regulatory dynamics underlying the convergence of the telecoms, broadcasting, publishing and IT sectors. Our research indicates that this convergence is being driven by the technical phenomenon of digitalisation and the geometrically declining unit costs of switching, processing, transporting and storing of information, on the one hand, and by the commercial realignment of market actors across sectors (horizontal) and along the multimedia value chain (vertical), on the other.

An inevitable side-effect of these technical and commercial phenomena is that all forms of information/communication/entertainment, whether they be voice, data or images, will soon be platform-independent. There is substantial marketplace evidence that a critical mass of platform providers is eager to transmit content in ways far different than today's traditional content-specific approach.

Given these trends, there is increasing pressure to reform the regulatory frameworks which have historically governed hitherto separate "vertical" market sectors. The momentum for change has been given greater urgency by the "disruptive" effect of the Internet. Indeed, the Internet model, a "virtual network" that straddles all forms of delivery platforms, provides a vision of the regulatory future.

What follows are the principal commercial, economic and regulatory conclusions of the Study Team and a series of options for regulatory reform at the Community and Member State levels which flow therefrom. For the purposes of presentation, this Chapter separately addresses:

- our commercial and economic conclusions; and

- the regulatory options which could facilitate market entry and the development of a future multimedia market.

The regulatory options proposed by the Study Team are intended to be technology-neutral, to promote efficiency and, most important, to reflect commercial realities.

Although the scope of this Study is confined to the adaptation of the **telecoms** regulatory framework, a truly integrated "horizontal" approach which adapts other non-telecoms regulatory environments is needed to address the phenomenon of convergence. To do otherwise would be to produce a static regulatory model which ignores the realities of convergence.

1/ Commercial and Economic Conclusions

1.1 COMMERCIAL CONTEXT

Conclusion 1: It has only been since the appearance of the Internet in general, and the World Wide Web in particular, that the commercial basis for a multimedia environment in the European Union has been formed. Digital broadcasting has now been introduced, but at present few commercial multimedia services have been released into the marketplace.

Until the early 1990s, the development of a multimedia market in the European Union had been progressing very slowly in response to digitalisation and the creeping convergence of the IT, telecoms, broadcasting and publishing sectors. The advent of the Internet fundamentally changed the market structure in each of the converging IT, telecoms and broadcasting industries.

By and large, the fundamental elements of the technology required to provide multimedia services to the general public over all manner of delivery platforms are already available or in very advanced stages of development. The fact that those services have not as yet achieved widespread marketplace penetration has been the result of many commercial and regulatory factors, including but not limited to:

- the availability of low bandwidth throughout most parts of the European Union (still only on average 28.8kbit/s for the majority of residential users);
- the trialling of technology-push rather than demand-pull applications by the key actual and potential market actors in the multimedia marketplace;
- a preoccupation of telecoms operators with "big" digital solutions such as ATM, which take a long time to develop and to deploy, rather than with more

incremental technologies such as XDSL which can provide increased bandwidth more rapidly;

- the high costs of providing multimedia services by satellite or mobile radio;
- the relatively low penetration of PCs in the European Union as compared to other industrialised regions such as the *United States*;
- the efforts of intellectual property rights holders to earn monopoly rents for their original works in a digitalised environment;
- the widespread concern that the conduct of commerc ial transactions in a digitalised environment is not conducive to confidentiality and data protection concerns;
- the existence of explicit or implicit regulatory barriers which restrict the ability of certain market actors in the telecoms or broadcasting fields to operate in one another's traditional markets;
- the foreclosure concerns of the European Commission's competition authorities about mergers or joint ventures that span different levels of the multimedia value chain; and
- the usage-sensitive pricing of public networks, which suppresses the demand for connectivity.

The rapid growth of the Internet is attributable, *inter alia*, to the perception by consumers of the quasi-multimedia potential of the Internet, its low cost, the ability of service providers to offer simple access, and the availability of relatively easy-to-use service offerings. This growth has been so rapid since 1995 that the Internet has emerged as an alternative communications "network" in the European Union (although not a network *stricto sensu*). This usage has in turn imparted new momentum to the drive for the development of a true "multimedia" market by existing and future actors in the IT, telecoms, broadcasting and publishing sectors.

1.2 FUTURE MULTIMEDIA MARKET

Conclusion 2: From a commercial viewpoint, it is difficult to identify a definitive evolutionary path for the development of multimedia, because the market is still at an early stage of growth. As the market develops, however, some market actors will try to leverage their existing market dominance into adjacent sectors, while others will seek to build market power by creating bottlenecks or maximising "first mover" advantages.

It is a widely held belief that those market actors with control over, or preferred access to, content will have the most advantageous market position in a multimedia environment. Beyond this, there is little agreement as to how the multimedia market will develop. As a consequence, it is more useful to focus on the constituent elements of the overall multimedia sector rather than on the development of the market as an integrated whole.

Each part of the multimedia market is closely intertwined with other parts of the market through a series of complex relationships. Those relationships have been complicated by the advent of the Internet, which has brought into question a number of fundamental regulatory principles underpinning the treatment of the telecoms and broadcasting sectors. For example, digitalisation and the Internet are changing the cost structure of the converging sectors and allowing new market players to enter the industry with considerable market strength.

The changes in the relationships between market players are leading to the development of a new market structure different from that of the old IT, telecoms and broadcasting sectors. Functions that were previously performed by one type of provider in each market sector are forming separate levels of the multimedia value chain. That value chain comprises:

- content origination;
- content and service packaging;
- service provision;
- infrastructure provision; and
- terminal equipment supply.

Although each element in the value chain will be significant, the content origination and packaging levels will enjoy the highest margins. Terminal equipment supply and infrastructure provision are likely to have the lowest margins because of the tendency towards commoditisation of their respective products and the intensity of competition in these sectors.

1.1 INDUSTRY RELATIONSHIPS AND ROLES

1.1.1 Access to Networks

Conclusion 3: The extent to which networks are considered to be "open" can determine the relative influence which service providers and network operators have in service design and creation. The extent to which networks are open may also have an impact on the rate of innovation because it affects the number of firms which can provide services.

The critical difference between the Internet and traditional communications networks is the fact that the Internet is much more open to service providers. The openness of the Internet, coupled with the fact that it is comparatively cheaper than traditional networks, means that there are relatively low entry and exit barriers. This openness has encouraged firms to provide experimental services.

By way of contrast, service providers that are dependent on the intelligence embedded within the core network of incumbent telecoms operators find it more difficult to gain access to customers and to develop innovative services. The clear desire of telecoms operators to enter the Internet market is providing a counterweight to such dependency.

With respect to broadcasting, the increase in channel capacity brought about by digitalisation could tempt broadcasters to resell excess capacity on fair and non-discriminatory terms to companies wishing to provide alternative services over digital broadcasting networks. There will be greater potential for such "openness" in the short term if network operators are encouraged to adopt an open framework for the use of set-top boxes. The necessary investment in network delivery systems, however, may be discouraged if network operators lose all "control" over a customer.

1.1.2 Market Positioning of Content Providers

Conclusion 4: Control of, or access to, content is a vital asset in the multimedia market.

Content providers and packagers (including broadcasters, publishers, individual artists and authors) now have a range of choices in how they position themselves in the multimedia market, the format in which their material reaches consumers and the share of customer revenue they decide to keep.

The most important issues relating to the market positioning of content providers are:

- their opportunities to expand into other parts of the multimedia value chain ;
- the degree to which content providers deal with network providers on an exclusive basis;
- the level of copyright protection which content providers enjoy and the effectiveness with which such copyright protection is exercised; and
- the extent to which content providers seek to control customers.

1.1.3 Multimedia Terminal Equipment

Conclusion 5: The ongoing attempts to dominate the multimedia terminal market (both business and consumer) by the producers of television receivers, set-top boxes, and personal and network computers will inevitably affect the balance of power in other parts of the multimedia value chain.

The personal computer and the television are the two principal alternatives for accessing multimedia services, although neither is as yet widely established as a multimedia terminal. The relative success of the PC and TV formats is important to manufacturers, software developers and network operators because, if one format prevails, those supporting the other will not recoup their investments.

Ultimately, the growth of services which are platform independent may leave manufacturers with little choice other than to produce terminals combining both PC and TV capabilities (although there is little evidence thus far of widespread market acceptance of such multi-purpose terminals, and they continue to be prohibitively expensive).

Separate market developments are affecting whether intelligence is located in customer-premises terminals or in the network. In digital broadcasting, for example, the emergence of the set-top box is adding intelligence to basic television sets (with the level of intelligence embedded in set-top boxes destined to increase significantly). Cable modems, in turn, will increase set-top box intelligence and add communications capabilities. The point at which intelligence is located has implications for the relative control which different players in the value chain exert over customers. The location of intelligence is also related to storage capacity. If the intelligence resides in a terminal (as in the PC), storage capacity is also needed there. If the intelligence is in the network (*e.g.*, a server), greater storage capacity is needed there.

Conclusion 6: The retailing of terminal equipment may change from a market in which consumers buy terminals separate from a service, to one in which the purchase or lease of terminal equipment is linked to subscription to a service. The market may follow the precedents set in the television and mobile communications sectors. This would mean that an equipment manufacturer's business plan for a new product would be linked closely to its business plan for an associated service. This may lead to the cross-subsidisation of equipment, which may raise competition law concerns.

1.1.4 Control of the Customer

Conclusion 7: A new multimedia value chain is emerging which will afford market actors direct access to customers through routes other than traditional telecoms and broadcast networks. Services and content are becoming independent of the platforms used to deliver them. This will have a major impact on the balance of economic power between content providers and network providers, to the detriment of the latter.

The existence of a wider range of ways in which content providers or packagers can deliver content will enable them to take greater control of their relationships with customers. The Internet has already demonstrated that network operators can no longer assume that they "own" the customer.

Attempts by network owners to overcome these trends are reflected in various attempts to develop proprietary platforms for the delivery of multimedia services. Two factors, however, suggest that network operators are unlikely to be wholly successful in doing so, namely:

- the open model represented by the Internet is becoming a viable mechanism for delivering multimedia services, and most network operators recognise that they cannot avoid providing access to, or providing services on, the Internet;

- the spread of the Internet Protocol, related protocols and software (*e.g.*, Java) from the Internet to other communications networks, including broadcast networks, has given content providers the ability to create services which are platform independent.

It is clear that industry relationships are changing as a result of convergence and multimedia developments. A key element of the change is the shift in the balance of power from network owners to packagers, integrators and content creators.

The key influences in this trend are:

- access to networks;
- the enhanced role of content;
- the degree to which multimedia terminals are bottlenecks; and
- the control of customers.

1.2 MULTIMEDIA ALLIANCES

Conclusion 8: The sharp rise since 1996 in merger and acquisition activity across the IT, broadcasting and telecoms sectors has been driven by two major objectives:

- ***consolidation (horizontal mergers and alliances) – firms merging or allying with other players in similar markets to cut costs and increase market presence;***
- ***diversification (vertical mergers and alliances) – firms seeking to position themselves by merging or allying with other firms whose activities complement their existing revenue streams.***

Vertical mergers and alliances are more significant indicators of the industry's belief in the multimedia market; they are founded on the long-term opportunities arising from convergence and multimedia. Horizontal mergers have, until recently, usually taken place to exploit short-term opportunities arising from changes within one particular sector.

Horizontal mergers within the multimedia sector are generally prompted by one or more of the following rationales:

- gaining efficient scale (especially in the cable TV and Internet sectors);
- the high cost of new (digital) technologies (especially in the media and network distribution sectors);
- uncertain demand for new services (especially in the digital broadcasting industry);
- internationalisation (especially in the communications industry); and
- opportunities arising from regulatory change (especially in the cable TV sector).

Vertical alliances and mergers reflect the way in which the multimedia value chain may be expected to develop (*i.e.*, along vertical rather than horizontal lines), thereby affecting market structures in the IT, telecoms and broadcasting industries. Vertical mergers and alliances in these sectors have typically been motivated by one or more of the following reasons:

- uncertainty as to market demand;
- market positioning and access to new skills;
- control of channels to the customer;
- movement into higher value areas of the multimedia value chain; and
- staving off competition from companies in other parts of the value chain or related sectors.

Conclusion 9: Alliance and merger activity is an indicator of how the multimedia sector will evolve in the future, as recent mergers and alliances have been motivated by new opportunities in the IT, telecoms and broadcasting markets at the technological and service levels.

By the same token, the volatility of the evolving multimedia marketplace is evidenced in the numerous shifting alliances which are currently taking place and the pressures brought to bear on the maintenance of loose strategic alliances. Notable examples of this volatility can be witnessed in the telecoms sector in the recent bid made by WorldCom for MCI (pending regulatory approval), which led to the dismantling of the "Concert joint venture" between BT and MCI, and in the departure of Telefonica from the "Unisource" joint venture with Telia, KPN and the Swiss PTT. By way of contrast, US West announced in late 1997 that it plans to unravel its cable TV operations from its telephony business.

The broadcasting sector has witnessed a similar degree of volatility, especially with respect to the planned relationships entered into by national telecoms incumbents such as BT and Deutsche Telekom, respectively, with satellite broadcasting entities/content providers such as BSkyB, Bertelsmann and the Kirch Group. These particular strategic alliances and a number of other proposed alliances in the broadcasting sector, have encountered particular difficulties in obtaining regulatory clearance because of the perceived foreclosing effect which these relationships would have on the market.

1.3 NETWORK TECHNOLOGIES

Conclusion 10: In order to support multimedia services, networks need to:

- ***support two-way packet switched data traffic in the core network, as well as circuit switched voice telephony and one-way broadband data traffic (as in broadcasting); and***
- ***support high bandwidth in the access network.***

The technology exists to support these requirements. The only questions are when and at what rate network operators will want and be able to implement this technology.

The access network is a particular barrier to the further development of multimedia services, especially in the residential market. Although subscription to networks capable of delivering multimedia services (*e.g.*, the Internet) is growing at a rapid rate, multimedia services would develop faster if the cost of high bandwidth access were lower.

1.4 THE EVOLUTION OF MULTIMEDIA SERVICES

Conclusion 11: The demand for multimedia services is currently stronger in the business sector than in the residential sector, primarily because of the stronger purchasing power of the business sector and its ability to obtain higher speed telecoms access. We expect this difference to persist for three to four years. Demand for multimedia services often very closely follows supply, i.e., as new services are invented or existing services become more affordable, demand rises.

The key demand drivers for multimedia services are:

⇒ In the business sector:

- Business to business electronic commerce --- this has developed partly from electronic data interchange and partly through the use of intranets and extended intranets. The largest exponents, *e.g.*, General Electric in the *United States*, claim to have carried out US$1 billion worth of business in electronic commerce (business-to-business) in the last recorded financial year, 1996.

- Globalisation and global presence – the nature of business is changing for large firms and Small and Medium Sized Enterprises ("SMEs"). Since the 1980s, multinational or global firms have attained major importance in the business community, and global firms need global communications. More recently, SMEs have realised that, with the increasing capabilities of communications technology, they need not be limited to national markets. This, in turn, is creating demand for new multimedia services that give companies greater control over their business processes and their relationships with global partners.

⇒ In the residential sector:

- Electronic commerce – this is emerging as one of the key drivers for multimedia in the residential sector. Estimates of its current size vary, but it is probably about a tenth of the size of the business market measured by

turnover. It is one of the few applications on the Internet, however, which has been able to generate substantial amounts of revenue, *e.g.*, the much-copied model of the very successful US Internet bookshop Amazon.com.

- Changing work patterns and reduced social time – one of the key trends in the Western world, particularly amongst service sector and white collar workers, is an increase in working hours and a reduction in the personal time available to individuals. This is fuelling the incipient demand for multimedia services that enable individuals to carry out routine tasks more easily and efficiently, *e.g.*, home banking, homeworking.

1.5 Multimedia Compatible Technologies in the Home

Conclusion 12: Trends in the purchase of multimedia-capable terminal equipment (based, respectively, on PC, terrestrial TV, satellite TV, and cable TV technologies) will be much more important in the consumer market than in the business market, which is generally less constrained by cost concerns.

Across the European Union, the penetration of PCs is increasing faster than most other household technology products, though from a much lower base. However, there is a large price differential between middle-of-the-range PCs and other consumer products in this category. Once the costs of modems are added, the equipment for Internet access appears very costly compared to that needed for television-based multimedia.

Recent IT developments such as the network computer have been identified as means by which this concern can be addressed. If the pricing differential is not resolved, PC penetration may reach a plateau, limiting PC-based multimedia services to only a part of the population (terrestrial television penetration is far more ubiquitous).

Many of the entertainment and computing products which consumers are currently using will have to be upgraded, if not replaced, in order to take full advantage of new developments in multimedia-related technologies and to access true multimedia services.

1.6 Market Structure

Conclusion 13: The creation of new digital routes to the customer (and the prospect of new high-value services) point strongly to an imminent transformation of the existing market structure, with significant changes in the current relationships between market players. It is this transformed market structure which will shape the development of a mature multimedia sector.

Convergence in service and distribution technologies is likely to mean convergence and transformation of whole value chains. The economics of certain sections of the value chain are changing. In particular, technological change has drastically reduced the cost of becoming a market player in certain sectors of the value chain, thereby demolishing some of the former barriers to entry. Size is no longer critical in the provision of infrastructure and terminal equipment, and the institutional barriers to entry in service provision and packaging, created by network owners, have broken down. Market players now active at particular points in the traditionally separate value chains of IT, telecoms, broadcasting and publishing will need to adapt their roles, develop new strategies, and form new relationships with other market players.

Technology is also creating new functions within the value chain, such as information management, information packaging and the provision of information navigation systems. These new functions will further upset the previous balance of the industry because these new and potentially lucrative activities require skills which network operators do not possess.

1.6.1 The Evolving Multimedia Value Chain

Conclusion 14: Existing value chains will not retain their current separation or structure in the new multimedia sector because of the:

- ***platform independence of digital material, which enables traditional telecoms and broadcasting infrastructures to carry the same services;***
- ***unbundling of services from infrastructure through the development of open network architectures, as exemplified by the Internet;***
- ***direct routes available from the content provider to the customer; and***
- ***re-grouping of market players (including increased vertical integration) for access to new skills.***

Market players will often occupy more than one level of the value chain and may also establish contractual links with players in other parts of the value chain. The value chain in a mature multimedia market should have the following characteristics:

Terminal equipment vending, the area of the value chain closest to the consumer, will remain a commodity market. Depending on the level of intelligence embedded in terminal equipment, there may be some important links with other layers of the value chain (greater intelligence should result in easier access to content *via* different platforms).

Infrastructure is tending towards a commodity market, characterised by high levels of concentration and low margins. This tendency towards commoditisation is the result of the introduction of competition, the associated breakdown of cross-subsidies between long distance and local services, and the collapse of the international accounting rate system. It should remain a viable market for those companies large enough to achieve the necessary economies of scale.

Service provision, previously provided in conjunction with infrastructure, is becoming a distinct category in itself. Telecoms liberalisation policy at the Community level has sought to "unbundle" service provision from infrastructure provision. The demand for multimedia services is not limited to those delivered over fixed networks or to a fixed terminal. Mobile communications users also have raised expectations regarding the services that they should be able to access, and efforts are underway to provide services such as mobile Internet access.

Content and service packaging is the next level in the value chain, which in turn is divided into the two high-margin activities of **service integrators** (principally IT companies) and **content packagers** (broadcasters and electronic publishers). Business customers are the main targets for service integrators, which package together infrastructure, connectivity, and software applications to create platforms which allow consumers to use specific applications. Entry barriers in this part of the market will be low for those firms with the right specialist skills. Content packagers targeting the general residential market will typically be larger organisations, but should not pose a challenge to smaller specialist packagers. Content packagers may move into programme production in order to manage some of the risk associated with trying to satisfy a broad range of customer preferences. Residential customers are the main focus of content packagers, which arrange content and information either for the mass market or for more individualised tastes.

Content creation is the final level in the value chain. This level will be typically high margin, with several large content providers operating both nationally and internationally. The greater the copyright protection enjoyed by the content originator, and the more popular its material, the greater will be its bargaining power with content packagers. The ability of content providers to establish direct links with customers, however, should also allow smaller content creators to flourish.

1.6.2 Market Relationships

Conclusion 15: It is unlikely that incumbent telephone operators and broadcasters will be able to wield the market power they enjoy today in the new value chain, because relationships between market actors are changing. The positions of today's leading market actors may therefore become very different in a future mature multimedia market.

The extent to which incumbent telecoms operators will be able to constrain competition in a multimedia market by bundling infrastructure and services will depend on the degree to which competing alternative infrastructures are available. Fair and non-discriminatory access should be a policy priority if such alternative platforms do not emerge.

As regards broadcast infrastructure, the issue of fair access to packagers and service providers is more appropriately linked to the downstream relationships between broadcasters and terminal equipment manufacturers. In this regard, set-top boxes are a potential bottleneck because their designers have the potential to control access to customers owning ordinary TV sets who wish to obtain access to digital TV and other services. Similar bottleneck issues will arise with regard to navigation systems, which will become increasingly important in an environment characterised by a proliferation of content. The use of standard technology and the application of competition rules will be necessary to ensure that such systems are open and non-discriminatory.

Conclusion 16: It is likely that no single firm will try to span the entire multimedia value chain from infrastructure provision to content creation because the skills required to compete in each segment are too dissimilar. Instead, market actors are likely to seek alliances which allow them to expand outside of their core areas in a growing multimedia market.

Empirical evidence suggests that broadcasters will follow a collaborative route in producing and marketing interactive services.

The ability to extract exclusive contracts, either through the control of bottlenecks or the leveraging of market power from one particular part of the value chain to another (*e.g.*, through the use of intellectual property rights), may constrain the dynamics of the multimedia market.

Competition will also suffer in the absence of equitable access to exclusive facilities or scarce resources such as radio spectrum.

Conclusion 17: Competition is likely to be particularly intense in that part of the value chain which involves the packaging of content. Both content and infrastructure providers are likely to compete vigorously in packaging, along with many specialist companies.

Telecoms companies will be particularly attracted to the service integration market because of its high margins, as compared to their core infrastructure business. Telecoms operators will also be attracted to the packaging of content because it allows them to maintain contact with, and control of, their customers.

It will be of major strategic importance for investors in new infrastructure either to acquire or ally themselves with firms in content-related industries, especially for the packaging of content. Otherwise, they run the risk of seeing their investment in infrastructure transformed into "dumb pipes", particularly if they are regularly required to provide programmers with access to their networks, thereby diminishing the value of their investments.

1.6.3 Platform Independence

The phenomenon of platform independence, as seen in the context of the emerging value chain for multimedia, will be a key factor in evaluating potential structural constraints upon the development of a truly competitive multimedia market.

1.7 Impact of Digital Technologies

Conclusion 18: Platform independence will have a major impact on the structure of the multimedia market. No single combination of delivery mechanisms, networks and packaging is likely to dominate the industry, because alternative means of gaining access to the consumer should always be feasible.

Conclusion 19: Digital technology has greatly expanded the network capacity of traditional telecoms and broadcasting infrastructures. This expanded capacity significantly exceeds the requirements of traditional telecoms applications such as voice telephony and national terrestrial TV channels. Telecoms and broadcasting operators are looking for new opportunities such as interactive multimedia services to exploit spare capacity and to enhance the market positions of their respective organisations. This could create a "pull" effect for new services.

Conclusion 20: The computer processing of digital signals essentially makes all networks multi-functional, thereby ending the need for their traditional specialisation in particular types of content. With an increased range of transmissible content comes the distinctive characteristic of multimedia services, i.e., combinations of different types of content in a single service. This potential for combining different types of content, when coupled with increased network capacity, will lead to the growth of a broad range of multimedia services over the next few years.

Only in the unlikely event that one single company establishes dominance in the provision of telecoms infrastructure, digital broadcast infrastructure and Internet access will these conclusions change.

The phenomenon of platform independence is leading major market actors to consider all potential means of delivering multimedia services, rather than relying exclusively on one particular technology.

Platform independence is being driven by the Internet's IP and related protocols, which are rapidly becoming the tools for carrying all multimedia applications over all delivery platforms. They are attractive to content providers because they can be used to deliver information to consumers in a relatively standardised format, with little adaptation, to an installed base of users, regardless of whether the user has a TV, PC or other type of terminal.

1.8 PRICING AND SERVICES AND PAYMENTS

Conclusion 21: The traditional pricing of services in the telecoms and broadcasting sectors is ill-suited to the flexible pricing which will likely be required in a multimedia environment. Today's pricing is in general a combination of flat rate and usage-sensitive charges, usually assessed on a per minute basis. Today's billing systems are not well suited to pricing according to the number of packets of data transmitted, the priority attached to a communication, or the information content of a message.

Flat-rate charging has been very important in the development of the Internet. Indeed, it is largely responsible for the phenomenal growth in users and usage. Flat-rate pricing, however, may not be the most efficient way to allocate resources, particularly when bandwidth is in some way constrained. Usage-sensitive pricing, priority-based pricing, and capacity-based pricing are all ways of encouraging the efficient use of resources. Flexible pricing is needed to take into account the different demands which multimedia services are likely to make on networks.

Conclusion 22: More appropriate indicators for pricing policy can be found in the electronic publishing sector, where prices to end users and businesses vary in terms of the distribution of CD ROMs, online access by subscription, advertising revenues or payment per transaction.

Combinations of these payment mechanisms can be used for multimedia services in the future. The mechanism chosen could be determined by factors such as the volume of information required, the value of that information, the frequency of access, and the customer's willingness to pay.

Conclusion 23: Some Open Network Provision ("ONP") principles do have applicability to the infrastructure level of the future multimedia market (e.g., interconnection at the network and service level). The application of ONP principles beyond this level would, however, be counter-productive.

Conclusion 24: The pricing issues which have most relevance to market development are those related to the bundling of end-user services from different areas of the value chain. This may occur through the synergies created by alliances or through vertical integration across several levels of the multimedia value chain. Market actors will develop portfolios of pricing packages in order to customise products for different types of customers.

Conclusion 25: The spanning by various market actors of different levels of the multimedia value chain will inevitably trigger a tendency to cross-subsidise certain products or services with the profits derived from others or to discriminate in pricing relative to the types of consumers of the products or services in question. Insofar as the motivation behind such cross-subsidisation or discrimination is the stimulation of the market, this will clearly be of benefit to consumers. There should be no objection to cross-subsidisation in a competitive market, provided that the cross-subsidy is not financed from a monopoly market.

Conclusion 26: In the medium term, there is likely to be enough competition in core network infrastructure to provide service providers with sufficient access to networks at prices oriented towards cost. The access network may present more problems in the short term because competition is likely to be less intense than in the core network. The contestability of the access network will depend on the influence of new technologies such as Wireless Local Loops.

The general principle which should apply in the future multimedia market is that the market should set prices, except where market prices are distorted by the abuse of a

dominant position or market power. In a competitive market, such abuses would be unlikely to occur, which means that price regulation should be light.

1.9 STANDARDISATION AND MULTIMEDIA SERVICES

Conclusion 27: Standardisation in the multimedia sector is driven not simply by the electronic interoperability requirement, but also by the need to satisfy the conditions for open markets in products and services for the ultimate benefit of users. The full realisation of the economic potential of the multimedia market will depend both on technical interoperability and on product diversity. These goals can best be achieved in a competitive market in which users and operators are aware of, and demand access to, standards-conforming products.

Standardisation in the multimedia environment needs to support:

- the interoperability of products serving specific service markets, in order to avoid confusion in the delivery of multimedia services;
- the interchangeability of products from suppliers serving the same applications, in order to promote price competition;
- interoperability within national environments between different networks comprising multimedia platforms;
- interoperability between national networks as multimedia services develop without regard to national boundaries; and
- seamless end-to-end services provided on a national and international scale, on multiple network platforms, with fully interchangeable product elements.

There has been considerable progress towards achieving these requirements in the European Union, partly as a result of the background developments in technology, markets and deregulation, and partly through targeted multimedia activities in various standards bodies such as ETSI.

Conclusion 28: The preponderance of proprietary standards in user terminals, however, could prove detrimental to the long-term development of the mass market. Some potential abuse of dominant market position may already be evident.

The technological and market convergence which is taking place will prove broadly beneficial to users, and will encourage the development of multimedia services. The role that will be played by information technology in future multimedia applications points to a significant continuing role for de-facto standards. Some additional regulation and standardisation may be necessary to isolate key solutions from dominant players, for instance between digital broadcasting and terrestrial networking.

The physical networks of the future will need to be responsive to changing demand for more capacity, wider bandwidth, greater mobility, and more flexible routing and addressing. The platforms provided by conventional digital networks, as well as new technologies such as ATM and broadband Wireless Local Loops, are well specified and interoperability standards are already being prepared. There is some danger of over-specification leading to stagnation, for instance in ISDN-type digital networking.

2/ Legal and Regulatory Conclusions

2.1 REGULATORY CONTEXT

Conclusion 29: Telecoms liberalisation is the key regulatory driver for multimedia. The process of telecoms liberalisation is bringing new investment into multimedia networks and services. This is leading to increased capacity and lower prices for consumers.

A competitive telecoms market that ensures platform independence is the key condition precedent to the emergence of a sound multimedia environment.

The liberalisation of the telecoms sector began with the *Services Directive* in 1990. The process continued with the adoption of a series of Article 90 directives between 1994 and 1996 that liberalised satellite services, mobile services and infrastructure, cable TV infrastructure and alternative infrastructure used for the transmission of liberalised services. The liberalisation process has culminated with the prescription of **1 January 1998** as the date upon which the sole remaining telecoms monopoly -- public switched voice telephony -- will be fully liberalised upon the satisfaction of harmonised licensing and interconnection conditions (with the exception of those few Member States which have received derogations from this obligation).

No other industrial sector in the European Union has witnessed the transition from monopoly to full competition in such a short timeframe. It is this process of liberalisation which has provided the regulatory impetus for the rapid growth of multimedia applications in the European Union. The telecoms regulatory agenda will continue to be important in the multimedia environment because consumers will still expect access to on-demand, real-time voice communications services; the Internet and other multimedia services, which employ packet-switching technology, cannot as yet guarantee the same level and quality of voice communications.

Recommendation: The adaptation of the existing telecoms regulatory framework for multimedia should track the key regulatory milestone for the review of existing Community legislative instruments governing the telecoms sector (*i.e.*, the Commission is to report by 31 December 1999).

Conclusion 30: The adoption of new rules and regulations should be avoided. Instead, emphasis should be placed on adapting the existing regulatory framework to tomorrow's multimedia environment.

Multimedia services will require the lightest possible regulation if the correct signals are to be sent to the marketplace and investment in new multimedia services and their underlying infrastructure is to be encouraged. Such a minimalist regulatory regime would be consistent with the policy underlying the *Licensing Directive of 1997* and the proposals put forward by the European Commission in its *Communication on Electronic Commerce* of April 1997. Competition rules should also play an important role in such an environment.

In the great majority of cases, it will be more appropriate to adapt existing policy than to adopt new laws and regulations. Where new laws and regulations are deemed necessary, they should be narrowly targeted to address particular market failures which cannot be remedied through the application of competition rules (*e.g.*, bottleneck-related or interconnection issues). In the *United States*, the phenomenal success of the Internet and the proliferation of services that it supports are in large measure attributable to the de-facto policy of "benign regulatory neglect".

There exists a serious risk that regulatory intervention, if taken before the market is allowed to develop, will stifle investment in new multimedia services. Consequently, it will be extremely important for regulators to curb their natural instincts to regulate and, instead, adopt a "wait and see" approach.

Conclusion 31: The role of competition rules will be of crucial importance in a multimedia environment.

In common with all competitive markets, a key public policy goal should be to preserve competition, not the viability of individual competitors, in a multimedia environment. The flexibility of competition rules is best suited to achieve this goal. Recent decisions affecting the telecoms sector by the respective antitrust authorities and the courts of countries such as *Germany*, *France*, *Sweden, The Netherlands*, *Italy* and *Spain* suggest that there will be increasing importance attached to the enforcement of competition rules at a national level. In the transition from monopoly to competition, however, the

value of prescriptive *ex ante* rules for key aspects of market behaviour should not be underestimated. Addressing market failure solely by reference to competition rules may be inadequate in such a transitional phase, as is evidenced by the experience of new entrants in a country such as *New Zealand*.

Conclusion 32: The widely held view that the Internet is "unregulated" is incorrect. Although the current system of Internet governance is relatively anarchic, it is wrong to assume that the Internet is not subject to any regulation.

The infrastructure which comprises the "network of networks" that supports the Internet is plainly regulated. The infrastructure networks are subject to licensing requirements and, in the case of traditional telecoms, operate according to prescribed principles of interconnection and access.

Moreover, most Member States impose licensing requirements on Internet Service Providers ("ISPs"), even though the licensing often takes the form of a simple authorisation or notification procedure. Indeed, under the terms of the *Licensing Directive*, there is likely to be greater licensing activity at the Member State level in the context of ISPs, even if it is a relatively light licensing regime.

In addition, an Internet-specific addressing system has been established which, although not administered by an independent regulatory authority, has operated relatively successfully to date on the basis of industry self-regulation.

Finally, the transmission of harmful content on the Internet is a matter regulated by civil and commercial sanctions, much like harmful content that is disseminated via other more traditional media (*e.g.*, publications).

Consequently, there is little need for new laws or regulations to be adopted with respect to the Internet. What is required, however, is that the existing body of laws and regulations throughout the multimedia spectrum be adapted so as to reflect common principles across all sectors. This would facilitate the development of a "network of networks" that embraces the existing worlds of telecoms and broadcasting.

2.2 DYNAMICS OF REGULATION

Conclusion 33: Uncertainty may continue in the absence of a determination whether competition in a multimedia market should be based on multiple means of access to the user or through one or two channels.

The resolution of this issue has its counterpart in the ongoing debate in the telecoms sector whether competition should be infrastructure-based or services-based, or both (see Section 1 of Annex I). Clearly, the greater the number of alternative routes or networks to the consumer, the less the degree of market power which the operators of any particular network can exert. This in turn affects the extent to which *ex ante* regulation should be adopted; in the absence of residual market power, contestable markets should in principle mean that regulation is less necessary. On the other hand, the increased levels of vertical integration (either internally or through strategic alliances) that are likely in a multimedia environment may mean that the number of alternative routes to the customer will be limited.

Conclusion 34: Genuine user choice for multimedia services can only be ensured if consumers have a genuine choice of multimedia providers.

Consumers should have a genuine choice as to the platform from which they obtain access to multimedia services. Such "platform independence" will be realised when customers can switch allegiance between network and service providers without incurring high transaction costs.

This consumer choice can be secured through a variety of means in the telecoms sector, some of which can be mandated by structural change, but many of which can be accomplished through the use of competition rules on a case-by-case basis. For example, the mandating of number portability for all fixed local access providers by 1 January 2000 will ensure that a customer, rather than a network operator, "owns" a telephone number. This will enable a customer to change its service provider without incurring any obvious costs in the changeover. The assignment of domain names on the Internet has created a similar effect. (*France* has even proposed that an Internet address be made available to each citizen.) Similarly, the ability of consumers to select the carrier of their choice for non-local calls (whether on a call-by-call basis or on a pre-selected basis) will increase their ability to achieve some degree of independence from any single network or service provider.

A similar result could be achieved in the broadcasting sector, for example, by requiring conditional access systems to be completely "open" in nature, either through common interfaces which can be used by a "smart card" or through a set-top-box rack which can accommodate numerous set-top boxes. The adoption of an "open systems" policy, however, should be tempered by the need to ensure that market entrants obtained a fair return on investments in a risky business environment (which may require reliance on proprietary standards).

In addition to promoting a more competitive services market, platform independence is likely to lead to a more competitive marketplace for terminals, which should lead to lower terminal equipment prices.

Conclusion 35: The future regulatory framework should address the risks of market failure and/or the creation of bottlenecks. To this end, targeted regulation should focus on high value activities in the multimedia value chain.

The dynamics of the multimedia marketplace indicate that certain economic functions will be high margin activities, whereas other elements of the value chain will be progressively commoditised. Priority should be given at the Community level to regulatory action which targets high value activities (*e.g.*, content packaging) because they are the ones in which market power is likely to be the most significant and which can be leveraged into other levels of the value chain. These high margin activities are also the parts of the value chain in which the existence of proprietary rights or "gateway" technologies will exacerbate any potential restrictions on competition. It is in these areas where market failure is most likely to occur.

Conclusion 36: The dynamics of convergence require that a shift occur from traditional lines of vertical regulation to horizontal regulation, at least in areas related to network operation and the economic aspects of service and content provision.

The fact that existing market actors from the traditional fields of telecoms, broadcasting, IT and publishing are entering into one another 's respective sectors (whether by product line extension or as a result of horizontal or vertical relationships) means that they are being progressively subject to the same underlying norms of competitive behaviour. In addition, the same market actors are vying for the same competitive resources, some of which may be scarce.

This convergence of technology and markets means that common regulatory themes need to be addressed across existing sectors in a consistent manner. Horizontal regulation should extend in principle to such key policies as market entry (Section 1 of Annex I), interconnection and access (Section 3 of Annex I), the allocation of scarce resources (Section 4 of Annex I), and the convergence of regulatory functions and powers (Section 5 of Annex I). The development of common policies across sectors with respect to the above issues will be an important element in preventing market distortions and in providing greater impetus to the process of convergence. A key element of such a horizontal approach will be a re-examination of existing regulatory definitions.

2.3 CONDITIONS OF MARKET ENTRY

Conclusion 37: Liberalisation and open licensing regimes are important preconditions for the development of multimedia.

The development of a competitive multimedia marketplace is predicated upon the effective implementation of Community liberalisation measures at the Member State level. The effectiveness of liberalisation is in turn dependent on the effectiveness of licensing conditions which can attract new market entrants and establish a stable environment in which new market entrants will operate. The *Licensing Directive* has set forth a series of licensing standards which, at least in the telecoms sector, establish a minimum set of harmonised licensing requirements across Member States as from 1 January 1998. By contrast, licensing in the broadcasting sector remains fragmented, onerous and, by and large, non-transparent. At the other extreme, the publishing and IT sectors are characterised by no formal market entry requirements whatsoever; self-regulation is preferred in these sectors. The regulatory challenge lies in how best to harmonise the fundamentally different licensing disciplines which characterise the telecoms, broadcasting, publishing and IT sectors.

Conclusion 38: Existing entry barriers presented by the licensing regimes of the Member States threaten to impede the take-off of multimedia services on a pan-European basis.

As discussed in Section 1 of Annex I, licensing conditions both between Member States and between discrete sectors within individual Member States differ widely, especially with regard to such essential issues as the duration of licences and the scale of licence fees. These differences, unless subject to some degree of harmonisation, threaten to perpetuate the fragmented delivery of digital services along Member State or regional lines. Some degree of harmonisation of these conditions is therefore necessary. One aspect of such harmonisation will be to adopt a very light licensing regime, in acknowledgement of the fact that voice services will be increasingly indistinguishable from other digitalised services (from a technical viewpoint) and that content-rich alternatives to traditional broadcasting will also be available. Another approach will be to value scarce resources at their appropriate market worth.

Conclusion 39: It should be a regulatory priority to ensure that a light approach to licensing is adopted.

The successful development of multimedia services in the European Union will require that regulatory entry barriers be lowered as far as possible. Initially high barriers may discourage entry by small market entrants such as niche service providers and small

content producers. An onerous licensing regime would be a significant entry barrier. There are no overriding public policy reasons why onerous licensing conditions for the provision of networks and/or services would be necessary in a multimedia environment. Indeed, the underlying policy should be that, to the extent that services in an off-line environment are not subject to regulation (*e.g.*, the sale of books), the delivery of those same services on-line (*e.g.*, the downloading of a book from a computer) should be treated no differently from a regulatory perspective. This result should only be modified when market actors require access to scarce public resources to provide their services. Even voice telephony services, which are unlikely to remain high value services in the near future, may benefit from a relaxed licensing regime. (This, of course, would be without prejudice to the licensing of underlying infrastructure, which will inevitably require access to scarce resources such as rights-of-way.)

Marketplace experience, however, suggests that the complete absence of licensing requirements is not without its drawbacks in the transition from monopoly to full competition; complete deregulation significantly lowers the bargaining power of multimedia service providers in negotiating with the telecoms incumbent for access to networks and related matters. This potential problem has been largely remedied by the *Interconnection Directive*, which acknowledges that parties satisfying a simple notification or authorisation procedure are entitled to negotiate an interconnection or access agreement with a telecoms operator with significant market power.

2.3.1 Infrastructure Licensing

Conclusion 40: Infrastructure liberalisation means that there will be a variety of networks over which multimedia services can be offered.

The progressive liberalisation of mobile, cable TV, and other forms of alternative infrastructure for the provision of liberalised telecoms services and (as of 1 January 1998) voice telephony services means that there will no longer be any regulatory restrictions on the number of networks which can be used in the provision of multimedia services. The decision of a number of Member States to subject terrestrial broadcasting infrastructure to separate licensing requirements from broadcasting services should further enhance the availability of alternative infrastructure.

The greater the degree of infrastructure-based competition, the greater the possibility that the goal of platform independence will be realised. Regulation should in principle be "light" if competition is strong at the network level. The introduction of new local access competitors may necessitate asymmetric regulation in certain circumstances in order to stimulate competition in the short term.

Conclusion 41: The licensing of infrastructure separately from services promotes transparency in the dealings of network operators with service providers.

It will be important in a multimedia environment for competition rules to be effective in preventing abuses of market power.

The licensing of independent infrastructure providers should assist regulators in achieving a degree of regulatory transparency as regards cost structures and interconnection charges. This in turn should obviate the need to implement more severe structural responses which could run counter to the phenomenon of convergence (*e.g.*, structural separation of the network business from the services business).

Conclusion 42: Except where considered necessary in the case-by-case application of competition rules, there should be no absolute line-of-business restrictions which prevent the owner of one type of network (e.g., telecoms) from owning another type of network (e.g., cable TV).

Although the ideal regulatory situation would be one in which no single entity owned or controlled more than one multimedia delivery platform with direct access to consumers (unless, of course, there were numerous delivery platforms available), there are no absolute *a priori* regulatory prohibitions at the Member State level against the ownership or control of different networks by the same entity. Indeed, for historical reasons, the telecoms incumbent enjoys a dominant position in cable TV infrastructure in countries such as *Germany* and *Portugal*, and also operates its own wholly separate cable TV infrastructure in *Ireland* (as was also the case in *The Netherlands*, until the national authorities required the Dutch telecoms incumbent to divest itself of its majority stake in local cable TV operations). In *Germany*, the telecoms incumbent announced in December 1997 that it intended to operate its respective cable TV and telephony businesses through structurally separate entities.

The European Commission also has few jurisdictional bases upon which to challenge the dual ownership of infrastructure in terms of *ex ante* prescriptive legislation, but may no doubt do so on a case-by-case basis under the general competition rules and the *Merger Regulation* where an incumbent telecoms operator leverages its market dominance in telecoms into an adjacent upstream/downstream market in the multimedia value chain (whether unilaterally or by merger or joint venture). The judicial precedent of *Hoffman-La Roche* and related case-law might be relied upon by the European Commission to establish an action under Article 86 of the EC treaty based on an allegation of "structural abuse". In appropriate circumstances, separate accounts can be required; in more serious situations, structural separation may be necessary (*e.g.*, as will be prescribed under a proposed Article 90 directive which is scheduled to be

adopted in early 1998). A merger or joint venture may, in extreme circumstances, require the divestiture of an interest in a particular delivery platform as a condition precedent to the grant of regulatory clearance.

In the alternative, regulation may be used to overcome the potential anti-competitive effects of ownership of dual infrastructures through such measures as requiring unbundling down to the level of the local loop (as is prescribed in *Germany* and in *Finland*) or subjecting cable TV networks owned by incumbent telecoms operators to an "open access" regime (as has been proposed by the incumbent telecoms operator in *Ireland*).

Conclusion 43: Regulatory policies regarding the ownership of multiple networks need not apply with equal force across all potential multimedia delivery platforms.

Although a wide variety of platforms may support the delivery of multimedia services in the near future (*e.g.*, telecoms, cable TV, satellites, mobile, broadcast, wireless local loop and alternative infrastructure), special considerations apply where an alternative platform competes with the local loop (*e.g.*, telecoms and cable TV) and where the services delivered over mobile networks are direct substitutes (*e.g.*, DCS-1800 and GSM). With the exception of those instances where platforms are direct substitutes for one another, regulatory responses to the ownership and/or operation of different platforms need not be uniform.

Recommendation: The application of competition rules should be sufficient to safeguard against abuse in the provision of access to infrastructure. Depending on the seriousness of the threat to competition, two alternatives are available: first, an operator of two networks can be required to operate them as structurally separate businesses subject to separate accounting requirements; second, in more extreme cases, the operator may be required to divest its controlling interest in one of the two networks (through individual decisions). Where such measures are not considered to be necessary, accounting separation should at least be applied to ensure transparency in commercial dealings regarding different delivery platforms. Individual National Regulatory Authorities may supplement such measures with additional regulatory obligations (*e.g.*, greater degrees of unbundling).

2.3.2 Services Licensing

Conclusion 44: Liberalisation has created an environment conducive to the rapid growth of services, provided that a light regulatory licensing regime is implemented.

Harmonised licensing conditions throughout the European Union should facilitate the offering of pan-European digital services over multiple networks. There are positive signs that the onset of liberalisation creates its own dynamics for the diminishing role of individual licensing requirements. For example, the great majority of new digitalised services are likely to be treated as "Value Added Services" in the telecoms world. For the most part, such services are subject to simple notification, declaration or authorisation procedures, rather than onerous individual licences. In many Member States, Value Added Services are provided without the need for any form of licensing whatsoever.

Recommendation: Internet Access Providers and other Value Added Service Providers should be subject to the least onerous form of licensing (*i.e.*, either no licensing, a simple notification procedure or "Class Licence" regime).

Conclusion 45: The most appropriate regulatory response to the growth of pan-European multimedia services is to create a pan-European licensing area.

A pan-European licensing area can be achieved most efficiently where national licensing conditions are sufficiently harmonised so as to allow the mutual recognition of licences. Such a system of mutual recognition would also be consistent with the principle of freedom to provide services, which applies in a number of other sectors (including the broadcasting sector). Clearly, there will be limits to a system of mutual recognition; individual licences, granted on the basis of access to (local) scarce resources, do not lend themselves to such an approach. As many national laws currently illustrate, however, the great majority of multimedia services will not be likely to require individual licensing.

Recommendation: In the medium term, a system of mutual recognition of licences for similar categories of services should be adopted by Member States. Such a system could be supplemented by a greater degree of industry self-regulation.

Conclusion 46: Efforts should be made to harmonise essential market entry criteria for licences across the full range of multimedia services.

Insofar as mutual recognition cannot extend beyond a certain range of services, every effort should be made to harmonise the underlying essential market entry conditions for other services and infrastructure provision in a multimedia marketplace. This can be achieved, in part, by valuing scarce resources on the basis of market-driven criteria. Such an approach would introduce a degree of transparency into licensing procedures and provide coherent market entry signals throughout the European Union.

2.3.3 Line-of-Business Restrictions

Conclusion 47: Line-of-business restrictions which prevent operators from offering certain services over their existing networks impede convergence at the service level. These restrictions are only justifiable in a limited range of circumstances.

Line-of-business restrictions run counter to the phenomenon of convergence. The only apparent justification for them in a multimedia world would be the goal of fostering new network investments (*e.g.*, greenfield cable TV networks) or the need to prevent the leveraging of market power into developing new markets (*e.g.*, preventing GSM operators from bidding for DCS-1800 licences). Preventing network operators from engaging in content production raises particular concerns, because it would deny them the right to enter the most valuable part of the multimedia value chain.

Conclusion 48: Existing cross-media ownership restrictions need to be re-appraised in light of the dynamics of multimedia.

Throughout the European Member States, cross-media ownership restrictions have been framed with a view to maintaining the principles of pluralism and competition along distinctly national lines, which do not take into account the blurring of boundaries between traditional vertical sectors. Although these public policy goals are as relevant today as when these restrictions were first adopted, there is a fundamental need to address these public policies in terms which acknowledge the phenomenon of convergence. Convergence has brought about the greater availability of content not only in terms of quantity, but also in terms of the number of outlets of distribution.

Conclusion 49: There is a very real risk that the multimedia marketplace will be fragmented because of divergent rules on media ownership.

It will be important for European Union undertakings in the various media sectors to achieve economies of scale and scope if they are to be fully competitive in an international multimedia marketplace. Fragmented cross-media ownership restrictions will jeopardise consolidation across sectors and across Member States, at least as regards the broadcasting and publishing sectors.

Recommendation: A minimum degree of harmonisation of cross-media ownership rules is necessary in order to create a common framework which takes into account the implications of convergence. Within that forward-looking framework, Member States may adopt their own standards regarding acceptable levels of concentration across media sectors.

2.4 REGULATORY DEFINITIONS

Conclusion 50: Existing regulatory definitions are fundamentally ill-suited to deal with the phenomenon of convergence.

As has been argued in Section 2 of Annex I, the traditional distinction between "telecoms" and "broadcasting" services that has governed the regulatory treatment of individual multimedia services is obsolete. Particularly as a result of the Internet and other on-line services, traditional regulatory distinctions have lost their relevance because, *inter alia*:

- Simplistic distinctions based on the difference between "point to point" (telecoms) and "point to multipoint" (broadcasting) services are no longer valid.

- The distinction between services whose nature is essentially "private" (telecoms) or "public" (broadcasting) is questionable.

- Distinctions based on the delivery platform used to transmit messages or signals (*e.g.*, a "public telecoms network") ignore the fact that convergence is predicated on platform independence.

- Definitions which rely on the essential nature of messages (*e.g.* "audiovisual") ignore the fact that digitalised "bits" cannot be readily differentiated.

- The equipment that is used to record, transmit and receive messages no longer determines the regulatory character of the message (*e.g.*, multi-purpose terminal equipment).

Conclusion 51: The current definition of "broadcasting" should not be expanded. Rather, it should be interpreted narrowly because it will constitute a major exception to the principle of lightly regulated competitive services.

The process of digitalisation and compression has all but removed the primary rationale for the distinctive regulatory regime which governs broadcasting, namely, the scarcity of spectrum (a single digital broadcaster will now be able to supply hundreds of channels of content).

Moreover, the historically critical role of broadcasting in the formulation of public opinion and in the preservation of pluralism may change over time with the growth of content-rich alternative sources of on-line information and entertainment. These on-line sources in general, and the Internet in particular, could provide many of the "public service" elements previously provided by terrestrial public broadcasters. This suggests that the onerous licensing conditions usually associated with broadcasting should be limited, rather than expanded, in a multimedia world. Such an approach would parallel the approach already taken in the telecoms sector under the *Services Directive*, namely: that exceptions to fully liberalised services should be interpreted narrowly (with the onus of proof lying with the National Regulatory Authority that a service is "broadcasting" where there is doubt regarding its regulatory status).

Recommendation: In order to foster the growth of lightly regulated liberalised services, the concept of "broadcasting" should be interpreted narrowly.

Conclusion 52: Convergence requires that key regulatory concepts falling within traditional areas of regulation be redefined in ways which can accommodate the development of new multimedia services.

The failings of traditional regulatory definitions suggest that a more functional approach is needed to frame the legal boundaries of multimedia services. Such a functional approach should define multimedia services in terms of whether they are obtained by contract (*i.e.*, "on demand") and/or whether they are interactive. Under such a classification scheme, a broad category of "communications" would be distinguishable from a narrower category of "broadcasting". Within each of these two regulatory categories, targeted regulatory policies dealing with specific types of services would be able to evolve over time (*e.g.*, universal service obligations for voice services). The dividing line between the two concepts would be drawn on the basis of the **on demand** nature of the former and the **scheduled** nature of the latter.

Residual regulatory uncertainty between the two concepts resulting from particular applications such as Web TV might be resolved by a variety of means (*e.g.*, a *de*

minimis test and/or the proportionality test). Ultimately, the characterisation of any given service as a "communications" service should be driven by the overriding public policy goal of whether that service, if not provided in an on-line environment, would otherwise be subject to licensing requirements.

The need to develop new regulatory definitions goes beyond the resolution of existing jurisdictional disputes over new digital services such as Video-On-Demand. New regulatory definitions will be required to address next-generation multimedia issues which do not lend themselves to an "either/or" approach under current regulatory definitions. For example, in the absence of a new regulatory model, conditional access systems may be subject to regulation under both telecoms and broadcasting regulatory regimes.

Recommendation: A new definitional model should be adopted for the future multimedia environment which distinguishes between "communications" and "broadcasting" services. Under that model, "communications" services would be defined on the basis of their contractual, on-demand nature. By way of contrast, "broadcasting" services would be defined primarily by reference to their scheduled nature, and would exclude the provision of ancillary services and other non content-related matters (*e.g.*, Conditional Access Systems).

To this end, the *Services Directive* should be amended to replace the existing definition of "telecoms" services with a definition of "communications" services. Such action could be taken when the various derogations to telecoms liberalisation lapse.

It is important that the broadest possible consultation procedure be pursued to review future regulatory definitions.

2.5 Conditions of Market Behaviour

Conclusion 53: Regulatory issues associated with requests for "access" will evolve in response to the level of competition. Requests for "interconnection", which should be treated differently than requests for "access", involve the termination of calls on a designated number or e-mail address (which is in most cases a de facto "bottleneck").

The regulatory issues arising from requests for "interconnection" and "access" in a fully competitive environment will gradually change their character as market entrants multiply. As an increasing number of entities become involved in the transmission of a single communication, the niches they occupy and the roles they perform will create a

"network of networks" over which Internet and other future multimedia services should thrive.

The development of an appropriate regulatory framework for **interconnection** in a multimedia environment will largely be based on the experience gleaned in the telecoms world of two-way, real time communications service, where there is a strong public interest in maintaining any-to-any calling. Interconnection should, in our view, be restricted to the termination of a communication on the network of another operator. That communication may take the form of a telephone call or even an e-mail message. The most effective interconnection exists where there is a high level of facilities-based competition, which exerts downward pressure on interconnection rates (which should in turn reflect costs) and deters operators from choosing economically inefficient routing options.

The same observations do not apply in the case of broadcasting and cable television. They have historically been one-way, store-and-forward services without any-to-any characteristics. In these circumstances, there is no rationale for requiring cost-based interconnection between broadcasters or satellite operators and cable TV networks. Analogies are made in certain quarters between interconnection requirements in telephony and "must carry" rules in television (*e.g.*, in *The Netherlands*), but the analogy appears to have little merit because "must carry" rules should be limited to the performance by broadcasters of a public service role related to content regulation (rather than being an issue of fundamental economic regulation).

Rules regarding **access** will similarly be derived from the telecoms context, and essentially reflect all manner of commercial requests for access to the assets of an operator or to its customers. Requests for "access" fall short of "interconnection" because there exists no policy priority of ensuring any-to-any calling. The difference between interconnection and access may lie in the conceptual difference between call termination ("interconnection" *per se*) and "access" (embracing the call origination function). There is a public policy goal in having the former concept valued by reference to an appropriate costing model such as LRAIC (Long Run Average Incremental Cost), whereas a competitive marketplace should in theory set a fair price for requests for commercial access. This theoretical distinction has been recently recognised explicitly in *The Netherlands*. Article 86 of the EC Treaty and its national equivalents should be used on a case-by-case basis to curb abusive behaviour in the context of requests for access.

The development of an appropriate regulatory framework for interconnection has gained added importance because of the imminent demise of the international accounting rate system, which will require the creation of new settlements procedures, arguably based on interconnection charges. A new costing model is likely to be needed

in the long term for interconnection, which will possibly be aligned more closely to the tariff structure employed for end users.

Recommendations:

1. **The essential difference between "interconnection" and "access" under current regulatory regimes should be clarified. The respective roles of these two concepts are likely to be more clearly differentiated in a multimedia environment.**
2. **It is arguable that the concept of ONP should not be extended beyond traditional telecoms-related areas to requests for access to multimedia networks and services.**

2.6 SCARCE RESOURCES

Conclusion 54: Although digitalisation is providing much of the transmission capacity that new services require, bottlenecks will continue to exist with respect to public and private resources. The regulatory framework governing access to and distribution of these resources will therefore be of great importance.

2.6.1 Public Resources

Conclusion 55: There is a pressing need to manage physical resources in a manner which supports competition.

The relative abundance of information and the channels of delivery for such information have been brought about by digitalisation, and the more effective use of bandwidth. Resources such as frequencies, rights-of-way and numbers, however, are not infinitely elastic. These resources must be effectively managed to accommodate new competitors taking advantage of telecoms liberalisation measures. Access to, and the valuation of, these public resources should be market-driven.

Frequency Allocation

Conclusion 56: The growth of multimedia services and digital television is leading to an increased demand for spectrum. New mechanisms may be needed to accommodate these demands. The use of auctioning and "administrative pricing" methods may be an important component of such an approach.

With full liberalisation of most Member State telecoms markets by 1 January 1998, an increasing number of new telecoms technologies will be vying for spectrum. This broadening of demand will coincide with other significant developments such as television broadcast aggregation, which will also strain the spectrum capacity of some fixed link bands. To accommodate these demands for spectrum, new and improved approaches to frequency management will be necessary in a multimedia environment.

At the present time, most Member States allocate spectrum to individual licensees on a "first-come-first-served" basis. Those Member States which are at an advanced stage in the liberalisation of their telecoms sectors have begun to explore market mechanisms as a means of fostering efficiency and promoting competition in their spectrum allocation decisions. Although few countries in the world have yet to treat spectrum like real estate, spectrum has substantial economic value, particularly when demand far exceeds the amount of available bandwidth. For example, the *United Kingdom*, *France* and *Germany* and *The Netherlands* are conducting comprehensive reviews of their spectrum allocation policies with a view to having spectrum fees reflect the economic value of that public asset. This is in line with existing Community policies, which foresee the possibility of auctions and other valuation techniques for determining the economic value of spectrum.

The commercial pricing of spectrum is most viable where:

- demand exceeds supply;
- users or potential users have genuine technological alternatives;
- licences are readily transferable;
- new bandwidth is made available for new applications; and
- incumbents can be encouraged to release existing spectrum to others to use more efficiently (*e.g.*, the release of analogue spectrum by broadcasters that migrate to digital spectrum; *cf.* the release of spectrum currently used for government purposes for telecoms use).

The commercial pricing of spectrum should take into account:

- that efficient pricing alone may not address certain public service/universal service obligations;
- the dangers of market failure, especially as a result of auctions;
- the existence of significant non-price barriers which restrict the ability of users to transfer spectrum;
- the formidable difficulties associated with the transfer of spectrum between certain types of telecoms providers, whose principal assets may be impossible to replicate (*i.e.*, where the loss of spectrum would mean the winding up of a business);

- that some parts of the spectrum will prove more difficult to price and allocate than others;
- that different users may utilise the same frequencies in different ways and be subject to different cost structures; and
- the security of tenure for incumbents, many of which are governed by licensing obligations for long periods of time (*e.g.*, 25 years in the case of certain GSM operators and cable TV operators).

What will be required in a future multimedia environment is a greater balance between such factors as:

- the extent of spectrum available for telecoms, television, and State-related usages;
- the relative costs borne by broadcasters and telecoms operators in the acquisition of spectrum;
- the treatment of public and private entities as regards the prices paid for frequency in each sector; and
- the competitive implications of differential pricing for particular spectrum bands in a converged environment.

Recommendations:

1. **The commercial pricing of radio spectrum can be used to promote the more efficient use of spectrum in a multimedia environment. It can also reduce competitive distortions between public and private entities, and between actors in the broadcasting and telecoms sectors. The Study Team, however, is of the view that the commercial pricing of spectrum may not be appropriate in all cases.**
2. **Decisions to allocate spectrum by Member States on the basis of certain market criteria will need to be coordinated across the European Union, in order to prevent the occurrence of market distortions (which are not apparent under the current regime).**
3. **The commercial pricing of spectrum should be preceded by: (i) a review of existing spectrum allocation techniques; (ii) an assessment of how newly released spectrum would be allocated to new users; and (iii) a linking and an alignment of spectrum allocation policy with the structure of emerging licensing techniques (and, indeed, the evolving structure of regulation).**

4. **Any policy of commercial pricing should be introduced over a reasonable period of time, so as to allow the market to adjust. This period may be staggered, depending on frequency bands, but a "refarming" schedule may need to be put in place as soon as 1999 by the Member States.**
5. **A commercial pricing policy for frequencies should not be used as an indirect form of taxation.**
6. **Particular care should be taken to avoid making excessive frequency available to incumbent telecoms or broadcasting entities, especially where this would have a foreclosing effect on new entrants and/or encourage cross-subsidisation.**
7. **In a competitive environment, the valuation of spectrum should not depend on whether the entities using the spectrum have a "public" character.**

Rights-of-way

Conclusion 57: The costs of rights-of-way over both public and private land for new entrants will have a significant impact on the cost of new networks.

Notwithstanding general principles of Community law regarding the non-discriminatory availability of rights-of-way and the ability of telecoms regulators to require facilities-sharing and collocation, the administration of rights-of-way differs markedly throughout the European Union. This degree of regulatory diversity is not conducive to the development of a harmonised approach at the Community level. In a number of Member States (*e.g.*, *Germany*), a liberal policy at the federal level has been met with constitutional challenges by local authorities, which see local charges for rights-of-way as key components of their revenue-generating efforts. Only *France* has enacted a comprehensive legal framework which governs the charges which can be imposed by local authorities for the different elements of rights-of-way.

The environmental concerns of local authorities also limit the number of sites available for radio masts and the extent and frequency with which roads can be excavated.

The Community's ability to harmonise the regulation of rights-of-way is limited, principally because such matters relate to real property (*cf.* Article 222 of the EC Treaty) and because, as such, they may be subject to the jurisdiction of local or regional authorities.

Recommendation: The European Commission should explore with the Member States the development of a common approach to assessing the market value of rights-of-way. In the absence of a harmonised approach to the administration of rights-of-way at Community level, it will be imperative that rights-of-way are at least valued consistently in a liberalised market environment.

Numbering and Addressing

Conclusion 58: A clear Community legal framework is being developed which establishes a timetable for resolving a variety of numbering issues (including number portability, the creation of a European Telephony Numbering Space, and the establishment of "equal access" systems for carrier selection and pre-selection). In addition, the transfer of powers concerning numbering issues from the telecoms incumbent to an independent regulator has been an essential element of ensuring platform independence and guarding against abusive behaviour.

There is widespread cross-industry support for most of the numbering principles being developed by the European Commission in its *1997 Communication on Numbering* (as subsequently included in the form of a draft Directive in October 1997) . The goal of number portability, for example, has received widespread support from all market players because of its importance in ensuring platform independence by lowering transaction costs for consumers wishing to shift their allegiance to other network operators and/or service providers. The "equal access" principle, however, has been met with scepticism from potential investors in infrastructure, who argue that it will create disincentives to invest in infrastructure and raise costs for new infrastructure owners.

Recommendation: The specific policy goal of promoting platform independence should be addressed in light of the broader policy goal of promoting investment in new networks, which will ensure that there are numerous routes to the consumer. A thorough cost-benefit analysis may be required in order to strike an appropriate balance between such policies, which may at times be in conflict with one another (*e.g.*, the issue of "equal access").

Conclusion 59: The existing system of Internet Domain Name registration is under strain, but industry is attempting to develop a solution in order to avoid more formal regulation.

Today, numbering is a particularly telecoms-oriented issue. The popularity of the Internet, however, is bringing into focus a number of addressing issues which will be peculiar to a converged marketplace. Moreover, the ability and interest of all market players in providing traditional voice telephony, Internet access and other services are transforming numbering issues from a telecoms-specific debate to one affecting the whole multimedia industry. One such industry-wide issue is whether regulators should prescribe "addressing" for conditional access systems, or whether an informal self-regulated system of addressing similar to that used for the Internet should be adopted.

The assignment and use of Internet domain names, which has thus far been administered under a system of self-regulation, is coming under increasing strain as a result of the significant growth in Internet usage, particularly as a medium of commercial communication. Recommendations are currently being considered which would allow addressing on the Internet to assume a variety of new forms which are amenable to commercial use, are protective of domain names which also serve as trademarks, and which make a greater share of numbers available for European users .

In addition, analogous to the situation which exist with respect to numbering policy, the administration of Internet Domain Names (and possibly new forms of addressing in a multimedia world) will need to identify a mechanism to avoid the involvement of incumbent telecoms operators and broadcasters with market power from being involved in the allocation of addresses.

2.6.2 Private Resources

Conclusion 60: The ownership and operation of proprietary systems in a multimedia environment will be as important as the ownership of public resources.

In a multimedia environment, certain types of tangible and intangible assets may be tantamount to a "resource" whose relative importance is no less significant than scarce public resources. A future regulatory environment should balance the need to create incentives for creators, while at the same time ensuring that proprietary rights do not erect insurmountable barriers to entry for new market actors.

Conditional Access Systems

Conclusion 61: The establishment of clear but flexible rules for the operation of Conditional Access Systems in a multimedia world is a regulatory priority. In order to promote the dual goals of platform independence and consumer choice, competition rules must ensure that the "gatekeeping" function of a Conditional Access Provider is not abused.

The technological and market capabilities currently exist for the introduction of digital television services in over half of the Member States of the European Union. To facilitate the introduction of such services, the 1995 *Television Standards Directive* establishes a general regulatory framework pursuant to which Member States must ensure that proprietary Conditional Access Systems for "digital television services" are offered on "fair, reasonable and non-discriminatory terms" to all broadcasters. Insofar as market players voluntarily adopt "open" standards for Conditional Access Systems, concerns that they are susceptible to abuse are unlikely to materialise in practice.

There continues to exist some degree of confusion as to which of the relevant regulatory authorities are responsible for conditional access issues. On balance, it appears that telecoms regulators have principal responsibility in most Member States that have made a decision in this regard (*e.g.*, the *United Kingdom*, *The Netherlands* and *Spain,* under recently enacted legislation, have vested jurisdiction in the hands of their respective telecoms regulatory authorities, with a single regulatory authority being responsible for such matters in *Italy*).

It is clearly important in the long term that Conditional Access Systems not be abused so as to prevent consumers from freely choosing among competing multimedia services. Certain aspects of a Conditional Access System make it tantamount to an "essential facility" or "gateway". National Regulatory Authorities, however, must be sensitive to the fact, that in many cases, exclusive control over a Conditional Access System (at least during the pay-back period) will provide operators with the confidence to invest in new services which might otherwise be highly risky. Any attempt to require competing service providers to use the same Conditional Access System, or to permit their subscribers to access each others' services *via* different Conditional Access Systems on other than freely-negotiated terms, may encourage some or all service providers to leave the market because they can obtain better returns elsewhere.

Recommendations:

1. **Within the framework of convergence, it would be highly desirable to extend the principles of conditional access contained in the recently revised *Television Standards Directive* beyond "television broadcasting" activities to multimedia services.**

2. **Measures will be needed to ensure that, in the long term, Conditional Access Systems cannot be used to inhibit market entry or to justify the continued pricing of set-top boxes on the basis of a supposed cross-subsidy derived from other profitable services. These measures should be as flexible as possible, and capable of addressing second and third generation foreclosure concerns as the multimedia market matures. In the view of the Study Team, such an approach can be best achieved through the enforcement of competition rules and/or through the enforcement of more detailed regulatory provisions by a single regulatory authority.**

8. **The Study Team suggests that, in the context of assessing the potential for abuse of Conditional Access Systems, the issue of market definition be approached in a manner which takes into account the overall structure of the multimedia market affected by any alleged abusive practices (*e.g.*, barriers to entry, the possession of programming and programme distribution rights, competition from other delivery platforms, the degree of vertical integration, the existence of competing channels of content). An automatic presumption of dominance in a derivative market, namely, the Conditional Access System itself, should be avoided.**

Directory Information

Conclusion 62: Although the European Commission's 1995 Guidelines on Directory Services identified the legal standards which had to be implemented by 1 January 1998 to promote a competitive market for directory services, many Member States have been relatively slow in clarifying the relationship of market actors with, and their access to, information compiled in directories and underlying databases.

Competition in the provision of directory services does not appear to have been effectively liberalised throughout all Member States since the European Commission determined that existing monopolies over voice services do not extend to directory information and services. In certain Member States, the designation of the incumbent telecoms operator as the only official provider of universal service has in practice dissuaded new market entrants from providing directories. There is evidence, however, of market demand for specialised directories.

More problematic are the terms and conditions pursuant to which new entrants can obtain access to the databases upon which directory services are based and the restrictions on the use to which customer information can be put. Although the *1995 Guidelines on Directory Services* specify that ONP principles should govern the terms

and conditions of access to directories, it is as yet unclear how such rules apply in practice. In *France* (and to a lesser degree *Denmark*), directory information has been characterised as an "essential facility" to which all market actors must be given access on transparent, proportionate and non-discriminatory terms; an independent third party has been appointed to administer such a regime.

The eventual implementation into Member State law of the proposed *Telecoms Data Protection Directive* should assist in the prevention of predatory practices by telecoms incumbents, whose privileged access to customer data puts them at a significant competitive advantage *vis-à-vis* new market entrants (by allowing them to track traffic flows, customer preferences and market segments in which they should compete against new entrants).

Recommendation: In a multimedia environment, access to directory and customer information is likely to increase in relative importance as there is a gradual shift from voice communication to combined forms of communications traffic. In such an environment, regulatory policy should ensure that access to customer information does not perpetuate "control" over the customer which would deter market entry. Regulatory policy should be consistent with, and adapted to, the policy pursued with respect to advanced technological applications of directories such as Electronic Programme Guides (see below).

Navigation Systems /Electronic Programme Guides ("EPGs")

Conclusion 63: Because of their ability to act as "gateways" or "gatekeepers" to information in an advanced multimedia environment, so-called "navigation systems", "navigation providers" and Electronic Programme Guides ("EPGs") raise serious competition law concerns, particularly when they are operated by vertically integrated companies.

Navigation system providers already play key roles in the multimedia world, either as search engines and/or as directories to content, programming and specialist services. Their relative importance is likely to grow with the availability of increasing volumes of information made possible by digitalisation. The potential for EPGs to add a high degree of value in a content-rich environment means that they are also likely to become some of the most powerful brand names in a converged environment. Seen in this light, the relationships between navigation providers and other actors in the multimedia market, and the terms and conditions pursuant to which they deal with platform and content providers, will inevitably be the subject of competition law scrutiny.

Navigation systems and EPGs raise the same, albeit more complex, types of competition law concerns that exist with respect to directory services (see above); they also raise issues which have already been considered in the context of other "network" industries such as airlines. Parallels can be found in the treatment of airline Computerised Reservation Systems ("CRSs") under *Block Exemption Regulation No. 83/91* and, to a lesser degree, under *Block Exemption Regulation No. 82/91* for ground handling services. The *CRS Block Exemption* for joint ventures engaged in the development and operation of CRSs is subject to several regulatory conditions, the most important of which, from a multimedia navigation system perspective, is the requirement that the system be operated in a **neutral and non-discriminatory way** (namely, the display of information may not be biased in favour of one or more particular content providers and/or delivery platforms).

Recommendation: The important role played by "gateways" such as navigation systems and EPGs in a multimedia environment warrants an appropriate regulatory response, especially in terms of the application of competition rules. It is arguable that guidance should be given under the competition rules in the short term (*cf.* the *Communication on Directory Services*) which would supplement the application of competition rules on a case-by-case basis. It is important, however, that any regulatory response is proportional to the potential anti-competitive concerns addressed, and that excessive regulation not be imposed on a market which has yet to develop.

In the longer term, if residual concerns exist with respect to the foreclosure of non-integrated service providers, a more *ex ante* response in the form of a Block Exemption Regulation may be more appropriate, which might also be supplemented by a Code of Practice.

Ownership or Control of "Inside Wire"

Conclusion 64: The prescription or presumption of ownership of inside wire by the incumbent telecoms operator is premised on the existence of a monopoly, which can no longer be justified in a multi-operator environment.

In a majority of Member States, either by express legislative decree, trade practice or by virtue of a legal presumption, the incumbent telecoms operator owns the inside wire which runs from the point of entry into the home throughout the premises of a customer (*contra* the *United Kingdom* and the Scandinavian countries). The transfer of inside wire from the telecoms incumbent to the individual property owner would facilitate the entry into the home of alternative local access providers *via* the same point

of entry (because it would not be necessary to obtain permission from the incumbent telecoms operator to use the wiring).

Recommendation: With the liberalisation of voice services, it should be a policy priority to require incumbent telecoms operators to relinquish property rights over inside wire.

Standards

Conclusion 65: Standardisation based on open standards should be encouraged as an important means of ensuring platform independence.

The potential for proprietary standards to be abused in a multimedia environment has been acknowledged by a number of government and industry initiatives, which are seeking to promote the adoption of open technical standards for a variety of multimedia platforms and applications.

In the traditional telecoms environment, the essential requirement for interoperability between equipment supplied by different vendors has meant that standardisation has become relatively centralised in the hands of governmental entities such as CEN and "mixed" institutions such as ETSI. The IT industry, by contrast, is characterised by a tradition of single firm de-facto standards or multi-firm commercial standards.

In the convergence of these two traditions in a multimedia environment, the role of competition rules will become increasingly important to ensure that, whichever regulatory tradition ultimately prevails: (a) access to both the standardisation process and the standards themselves are not denied arbitrarily, disproportionately or unfairly to certain market players; (b) standardisation does not unnecessarily reduce product differentiation and competition in product design and research and development; (c) widespread access to proprietary standards does not act as a disincentive to innovation, while at the same time preventing the entrenchment of a dominant market position based on proprietary standards developed in the early stages of multimedia; and (d) the standardisation process does not extend the habit of cooperation among competitors to other aspects of their commercial behaviour.

Digital broadcast standards pioneered by the so-called Digital Video Broadcasting Consortium, which resulted in a September 1997 agreement to support open standards for set-top boxes throughout Europe, is the most recent example of the attempted development of open standards at the Community level which cut across traditional vertical industry sectors and which facilitate convergence at an operational level.

Recommendations:

1. **The European Commission should encourage the promulgation of broadcast standards that are compatible with multiple hardware platforms, through ETSI and other standards-setting fora.**
2. **A fully convergent environment should be characterised by broadcasting signals which are interoperable with other distribution media, especially switched (*i.e.*, telephony) and routed (*i.e.*, Internet) networks.**
3. **Proprietary platforms which are linked to new digital systems (whether terrestrial, satellite or cable) should not be developed in ways which operate as barriers to integration and the interoperability of different information systems.**
4. **Despite the very real competition issues raised by de-facto standards set by a single firm or a small number of firms, regulators must be sensitive to the commercial need to recoup the massive investment required to launch new multimedia services (which are usually based on proprietary standards).**

Access to Content

Conclusion 66: In the absence of overriding public policy reasons justifying regulatory intervention, it would be premature to mandate access to content except on the basis of competition rules applied in particular cases.

The demand for ever-increasing amounts of content in a multimedia world means that there exist tremendous opportunities both for growth in content production in absolute terms and also in the number of content producers, especially for niche markets. Nevertheless, certain types of content are likely to be more attractive than others. For example, exclusive rights for certain types of sporting events and new release films are widely perceived to be key drivers of Pay-Per-View television and thematic channels. Exclusivity will be important in establishing a market brand name and penetrating new product and geographic markets.

In the view of the Study Team, the application of competition rules on a case-by-case basis should be adequate in most cases to ensure that certain types of exclusive rights to content do not adversely affect the structure of competition in certain multimedia markets.

The interest of Member States in ensuring the possible availability of sporting and cultural events is addressed specifically by the *Television Without Frontiers Directive*, which empowers Member States to designate events of "major importance to society"

which cannot be broadcast in such a way as would deprive a substantial part of the public of the ability to watch such events via live or deferred coverage on free-to-air television. Under the regime established by the *Directive*, the broadcasting authorities of one Member State must allow viewers of another Member State to see an event of designated importance on free-to-air television in that latter Member State (*e.g.*, Wimbledon in the *United Kingdom*). In addition, national competition rules in a number of Member States such as the *United Kingdom*, *The Netherlands*, *Germany* and *Spain* have been or are being revised in ways which are designed to prevent the abuse of market power achieved as a result of exclusive access to certain types of "perishable" content (*i.e.*, high value/low shelf life).

Conclusion 67: Mandated access to certain types of content may be necessary in exceptional cases where the content provider has significant market power and displays a high degree of vertical integration.

The vertical integration of market actors across various levels of the multimedia value chain (content production or acquisition, transmission and service provision) may mean that access to content of high market value will result in market power which is capable of being abused both in terms of the acquisition (monopoly power) and distribution (whether on a wholesale level such as cable TV operators and/or a retail level of end users) of content. In these situations, exclusive access to content may constitute as much a "bottleneck" to competitors as conditional access technology. Moreover, such exclusive access at the outset of the telecoms liberalisation process or the commercial launch of digital television, may translate "first mover" advantages into enduring market power. In these situations, exclusive access to content may be tantamount to an "essential facility".

The *Interconnection Directive* requires a vertically integrated telecoms operator to provide interconnection to its service arm or affiliated entities on terms which are no more advantageous than those provided to independent third parties. If such an approach were extended to the broadcast sector, access to valuable content could arguably be mandated on the basis of the principles of non-discrimination, objectivity and transparency.

Recommendation:

1. **The ability of Member States, under the terms of the *Television Without Frontiers Directive*, to prevent broadcasters from obtaining exclusive access to events of "major importance to society" appears to provide adequate protection against the abuse of market power in the provision of content of high economic value whose economic shelf-life is limited (*i.e.*, "perishable content").**

2. **In those instances where an economic actor has exclusive access to key types of content (*e.g.*, new releases, sporting events and so forth) and is vertically integrated into other layers of the multimedia value chain such as transmission and service provision, regulatory intervention may be necessary to ensure access to such content on fair, objective and non-discriminatory terms. Regulatory intervention may also be necessary where the content in question, when assessed in the context of the market power exerted by vertically integrated entities, amounts to an "essential facility" for competitors.**

2.7 FRAGMENTED REGULATION

Conclusion 68: There is a highly fragmented and inconsistent pattern of regulation of the telecoms, broadcasting, publishing and IT sectors in the European Union. This pattern of regulation is ill-suited to a multimedia environment.

As is discussed in Section 5 of Annex I, the regulation of the telecoms, broadcasting, publishing and IT sectors has developed along markedly different historical lines.

In the **telecoms** sector, regulatory responsibility is shared by the Ministries of Communication or Transport with independent regulatory authorities. A number of these independent regulatory authorities will not be in operation until 1 January 1998 (notable exceptions are OFTEL in the *United Kingdom*, the A.R.T. in *France*, O.P.T.A. in *The Netherlands*, and the T.A.C. in *Finland*).

In the **broadcasting** sector, the pattern of regulation varies widely from Member State to Member State, although by and large (with the exception of a body such as the quasi-independent CSA in *France*) there are strong links between the regulatory body and the relevant responsible Ministry. In federal structures such as *Germany* and *Belgium*, the jurisdiction for broadcasting rests in regional authorities, while telecoms matters are regulated at the federal level. Because of the relatively greater importance attached to such issues as content regulation, pluralism, public morality, advertising standards and so forth, there are often numerous regulatory bodies involved in the broadcasting sector (with well over twenty bodies being involved in some capacity in broadcasting regulation in the *United Kingdom*).

The **publishing** and **IT** sectors are characterised by little or no *ex ante* regulation throughout the European Union. An overlapping layer of quasi-private regulation is often found in self-regulating bodies such as Press Councils and industry standards bodies respectively, many of which coordinate their activities with the government.

The phenomenon of convergence is exerting significant pressure on existing regulatory structures to accommodate new market actors wishing to provide multimedia services. These new market actors may be driven by digitalisation, which has resulted in a proliferation of new TV channels, or by the process of liberalisation, which has spawned multiple new providers of voice and value added services. These new market actors are giving rise to a common set of regulatory issues which cut across traditional vertical lines of regulation (*e.g.*, the allocation of frequencies, access to scarce resources, conditional access systems). Realistically, these issues cannot be resolved solely by coordination and cooperation among regulatory authorities because the manner in which these issues are resolved will affect the regulatory competence of each of these regulatory authorities.

Conclusion 69: Member States are beginning to recognise the need for converged services to be regulated in a consistent fashion by different regulators or by the same regulator.

A critical mass of Member States has responded to the growing need to regulate certain matters in the telecoms and broadcasting sectors in a similar manner pursuant to similar criteria by different (or even the same) regulatory authority(ies). Thus, the allocation of **spectrum** is the responsibility of the same regulatory body across the telecoms and broadcasting sectors in a number of European Union Member States (*e.g.*, *Italy*, *Finland*, *The Netherlands*, *Denmark*, *Spain*, *Greece*, *Luxembourg*, *United Kingdom*, *Portugal* and *Ireland*). With the exception of the final three Member States listed, these countries also regulate the **licensing** of infrastructure through the same regulatory institution. The licensing of multimedia services, however, follows the jurisdictional divide between the traditional telecoms and broadcasting sectors. *Italy* has been the Member State most willing to concentrate all regulatory functions in one entity, and adopted a regulatory regime to this effect in the summer of 1997 under the auspices of its Communications Authority. Official announcements in the *United Kingdom* suggest that such convergence is being considered as a likely policy option by 1999 for a range of "economic" regulatory functions, including licensing and resource management (with the future establishment of OFCOM).

Conclusion 70: Common, or at least consistent, regulation across industry sectors will assist convergence.

Although multimedia services in general, and Internet services in particular, have grown in an environment that is relatively free of regulation, the continued growth of these services will be facilitated by resolution of the increasing number of jurisdictional conflicts between regulatory agencies (*e.g.*, conditional access issues). This can be best

achieved through regulatory convergence, at least in those areas which are governed by the same principles of economic regulation. Such regulatory convergence should facilitate the emergence of a genuine multimedia market.

The most likely and immediate candidates for regulatory convergence are:

(i) **Conditions of market entry**, including licensing requirements for infrastructure and service provision. Because market entry conditions can act as barriers to entry for new multimedia service providers, a common licensing approach should be adopted across all sectors.

(ii) The allocation of, or access to, **essential and scarce public resources** such as frequencies and rights-of-way. If public resources are truly "scarce", they need to be valued using commonly held principles which cut across vertical industrial sectors. Otherwise, there is a likelihood that market distortions will occur and that the process of convergence will be adversely affected.

(iii) Certain types of **"gateway" issues** such as the control of Conditional Access Systems affecting broadband networks. These types of issues clearly cut across both the telecoms and broadcasting sectors and require a balanced application of competition principles.

Conclusion 71: Regulatory convergence should be restricted to issues of "economic" regulation. Convergence of regulatory functions is not required, nor may it be desirable, in the area of "public interest" regulation (e.g., rules relating to the "content" of services).

The opportunities for regulatory convergence are not without limits. There will always be issues of a non-economic nature which are not susceptible to evaluation under a common regulatory framework. Most of these are of a public policy nature, spanning such issues as content control, pluralism, public morals, advertising standards, cultural diversity and so on. The specific ways in which these issues are addressed on a sectoral basis reflect particular national cultural choices, which are unlikely to be capable of harmonisation significantly beyond that which has already been achieved at the Community level (*e.g.*, common harmonised standards in the *Television Without Frontiers Directive*).

There will, of course, be instances where the distinction between "economic" and "public interest" regulation is not always self-evident. For example, issues such as universal service obligations in the telecoms sector contain elements of the "public interest" in the broadest sense. At another level, however, universal service might be seen as being little more than a regulatory mechanism to protect the consumer in the

event of market failure. As such, it is imbued with many of the qualities of economic regulation; the fact that it is clearly defined at Community level, without the scope for differential treatment as between Member States, indicates that it may also be less subject to subjective interpretation (to which much public interest legislation is prone).

Moreover, empirical research suggests that the majority of Member States will not be introducing universal service contribution funds (or other financing mechanisms for universal service) in their respective jurisdictions; this policy choice is based on the presumption that a competitive market is likely to provide the various elements of universal service and the conclusion that the provision of universal services brings attendant benefits to telecoms operators (*e.g.*, goodwill, brand image) which counterbalance its potential costs.

As multimedia markets develop and as new services gain marketplace acceptance, it might become apparent that certain "public service" goals are susceptible to a more transparent form of market-based evaluation and provision (refer to Section 2.9, "The Role of Public Broadcasting").

Conclusion 72: Competition rules should continue to be enforced by general competition authorities, rather than by respective telecoms or broadcasting regulators.

Regulatory policy and competition policy, although complementary, should nevertheless continue to be administered by different authorities. The reasons for this are several:

- Regulatory policy applies *ex ante*, and is focused on rules and regulations deemed necessary to foster a sustainable competitive environment (*i.e.*, one that essentially mimics competition). Competition policy, on the other hand, applies primarily *ex post*, and is designed to address market failures reflected in abusive behaviour or collusive practices. To the extent that competition policy can be applied *ex ante*, Article 90 limits the Commission to the prescription of general rights and obligations which affect the fundamental structure of the market (rather than individual instances of behaviour). Similarly, the Commission's Merger Task Force, in its review of notified mergers and concentrative joint ventures in the multimedia sector, has to date only had a limited ability to take action with respect to the fundamental structural elements of competition.

- Sector-specific competition policy runs the danger of becoming *sui generis* over time and departing from the general legal standards which should govern competitive behaviour in all economic sectors.

- The essence of convergence is the bringing together of historically separate industrial sectors. Relying on a "sector-specific" regulator would be inconsistent with convergence (unless, of course, the sector were to be defined as a "multimedia" market).

- Care should be taken to avoid the concentration of all regulatory and competition powers in a single regulatory authority. A system of regulatory checks and balances is more appropriate in a dynamic market environment.

The recent announcement by the government of the *United Kingdom* that the "Fair Trading" condition in BT's licence would be replaced by the application of general competition rules is consistent with the views expressed by the Study Team.

Recommendation: There needs to be a consistent approach to economic regulation across sectors. To the extent possible, this consistency should be achieved by a single regulatory authority or by regulatory authorities pursuing essentially similar policies. Competition authorities should play a key complementary, yet independent, role in preserving competition in multimedia markets.

Conclusion 73: A liberalised multimedia marketplace requires the oversight of independent regulators.

The spread of competition across the full range of multimedia services will undoubtedly be accompanied by multimedia-specific market corrective mechanisms. The emergence of a competitive marketplace, however, will also be accompanied by an even greater need for a truly independent regulator, as the focus of regulation shifts from the monopolist to the market as a whole. There will be an increasing need for regulators in the broadcasting sector to be as independent of market actors and government as their counterparts in the telecoms sector. This will require, for example, that public broadcasters not be involved in the regulation of the national broadcasting industry, as is now commonplace in certain Member States.

Recommendation: Regulators in the broadcasting sector should be as independent as their telecoms counterparts. The convergence of regulatory functions should support such a development.

2.8 PRICING OF MULTIMEDIA SERVICES

Conclusion 74: New and innovative ways of end-users paying for multimedia services should be allowed to replace the traditional means of paying for TV, telephony and so on.

The pricing mechanisms used by electronic publishers gives them the flexibility to address customer needs, facilitate the distribution of portfolios of services, and take advantage of cost savings brought about by micro-processing techniques. In contrast, the publishing industry has been characterised by significant Resale Price Maintenance ("RPM") practices, which plainly are not compatible with Community competition rules.

The traditional broadcasting model is even more inappropriate for multimedia services, as broadcast services have traditionally been offered on terms which reflect neither the true value of the service provided, nor the cost of its production.

The pricing practices of operators which have previously been holders of "special or exclusive rights" in the telecoms sector have been governed by the principle of cost orientation, with pricing controls to ensure that universal service could be provided at an "affordable price". Cost orientation has been skewed by the short-term goal of tariff rebalancing (until the end of 1998). In addition, ever-increasing network intelligence, higher bandwidth and falling costs have rendered the concept of "cost" a somewhat more complex concept in the provision of telecoms-based services.

In addition, as discussed in our economic and commercial analysis, the pricing process which characterises the world of packet switching is based on wholly different criteria than traditional voice traffic. Moreover, charging on the basis of actual usage, which is common within the European regulatory tradition for voice telephony, is not conducive to the growth of the Internet and other on-line services. A new approach to Internet pricing may also need to be adopted in the longer term. Among the end-user pricing mechanisms that may be adopted are flat or tiered-rates, that depend on such factors as:

- the quality of access to a particular service (*e.g.*, measured in Kbits);
- the capacity dedicated to a user;
- the use of particular protocols;
- user designations (*e.g.*, normal or urgent delivery); and
- whether the user's communications are sensitive to "congestion" concerns (in terms of the timing of the communication and the availability of the network).

By the same token, it is possible that the commercial dynamics of the Internet may change fundamentally over time, thereby aligning its pricing more or less with prevailing telecoms pricing practices. This trend may be the result of increased

performance and quality expectations, the demand for dedicated real-time communications capabilities and the resulting pressure to implement sophisticated billing practices.

In an advanced multimedia environment, voice telephony may become so much of a "commodity" that it may actually be offered free of charge by some operators, thereby rendering the traditional telecoms pricing model wholly obsolete. This practice is already being pursued by a new market entrant in *Sweden*, and may nevertheless provide an insight into the possible variety of future pricing models for multimedia.

Recommendations:

1. **A radical new approach to pricing issues, which allows customers to choose on the basis of a very broad range of factors (*e.g.*, the value of the service, the portfolio of services being offered, the time spent in receipt of the services, a flat charge for usage, subsidised terminal equipment and set-top boxes, and so forth) is likely to be required in a multimedia environment.**
2. **In a competitive environment and in the absence of market power, regulatory requirements with respect to cost orientation for end-users tariffs may be wholly unnecessary.**
3. **Because of the necessary flexibility inherent in any future market pricing model for multimedia services, traditional competitive concerns such as price predation, cross-subsidisation and price discrimination are likely to be significantly more difficult to detect.**

2.9 THE ROLE OF PUBLIC BROADCASTING

Conclusion 75: The economic and technical bases for broadcasting regulation are being eroded by the impact of convergence. This phenomenon will call into question certain aspects of public broadcasting.

The privileged role of public broadcasters is being challenged by the relative abundance of broadcasting spectrum for digital services and the dissemination of traditional audiovisual images over other delivery platforms. The realities of convergence will give public broadcasters little choice other than to alter their existing marketplace behaviour. Absent a sound justification for their privileged regulatory status, and in the face of constantly eroding market share, public broadcasters may be ill-advised to refrain from providing commercial multimedia services. By the same token, their entry into the multimedia market will expose them to the vagaries of the marketplace.

The proliferation of multimedia services over multiple delivery platforms should mean that the idea of a "public broadcaster" is no longer synonymous with the idea of "public service". As has occurred in the telecoms sector in a number of countries such as *Germany*, universal service provision, insofar as it is characterised as a net financial burden, should be seen to be a reflection of market failure. As such, the Member States may wish to initiate a procedure by which all market actors can participate by bidding for the right to provide a specified range of "public service" programmes. In a truly liberalised environment, a Member State might conclude that satisfaction of the public good is best achieved by opening certain types of programming services to competitive tender in this manner. In adopting such a "universal service" approach to the satisfaction of "public service" goals, the State would increasingly assume the role of a commissioner of content rather than its regulator. Decreased content regulation by the Member States would over time be counterbalanced by an increased level of self-regulation by industry bodies.

Conclusion 76: As regards the universal service and public service obligations usually associated, respectively, with the telecoms and broadcast sectors, the key issue in a multimedia environment should be their method of financing, rather than their breadth.

In the telecoms sector, universal service obligations need to satisfy a Community-defined minimum level of services at an affordable price. Efforts by some Member States to expand the concept of universal service to include Information Society services such as Internet access and ISDN lines should be resisted until those services are sufficiently widespread to justify their characterisation as "universal" in nature. To the extent that Member States conclude that such additional services should be provided as part of a broader political commitment on the part of the State, market participants should be afforded the opportunity to provide such services, or "universal access" to such services, either on an individual basis or in response to an open tender procedure for the provision of such services.

The satisfaction of public service goals in the broadcasting sector should follow a similar pattern. The sole difference between the satisfaction of universal service and public service goals is that the scope of public service should be defined solely at the Member State level because of the unique democratic and social traditions of each Member State.

Recommendations:

1. **Public broadcasters should not be exempt from the application of competition rules to the extent that their provision of multimedia services goes beyond their core mandate of providing broadcasting services to the public of a particular nature and quality under their national "public service" commitments. To do otherwise, given the importance of broadcasting in a digital world, would run the risk of severely upsetting the regulatory balance in the multimedia marketplace. The Study Team takes the view that the protocol on public service broadcasting contained in the *Amsterdam Treaty* does not in any way diminish the scope of this proposition.**
2. **Member States should re-examine their current role in the promotion of content. In a multimedia environment characterised by multiple delivery platforms, the State's goal of disseminating particular standards of content to as broad an audience as possible may be better achieved if the State acted more as a commissioner, than a regulator of content. This may require the eventual adoption of a regulatory model for the satisfaction of public service goals, defined at the Member State level, through a general tender procedure. Over time, the regulatory involvement of the State in content-related issues could be assumed to an increasing extent by industry-based bodies, such as those which currently govern other "content" industries.**

2.10 FUTURE REGULATORY MODEL

Conclusion 77: The existing static model of "vertical" regulation of the respective telecoms, broadcasting and publishing sectors requires re-evaluation. A new "horizontal" regulatory model is needed that reflects the commercial and technological realities of multimedia and addresses the new industry configurations which are emerging in the marketplace.

Recommendations:

1. **A future regulatory model should be defined in terms of three horizontal tiers, the first two of which are intertwined and involve economic regulation (and may be overseen by the same regulator), with a third and final tier involving non-economic regulation, namely:**
   - **Tier 1 →the regulation of essential operating conditions in a multi-platform environment, especially as regards interconnection and access.**

- **Tier 2 →the regulation of market entry for both infrastructure and service provision.**
- **Tier 3 →the regulation of content and a broad range of public policy issues (many of which have an impact on the nature of content).**

Competition rules should be overlaid upon all three tiers (as represented in the diagram overleaf).

2. **The implementation of the proposed regulatory structure should involve a minimal amount of new regulation. The new structure can be implemented successfully through:**

   → **amendments to existing legislation;**

   → **the release of interpretative Notices ("soft" law) in the early stages of the multimedia sector;**

   → **the application of competition rules on a case-by-case basis; and**

   → **the formulation of structural regulatory solutions such as *Block Exemption Regulations* or equivalent legal instruments where the market dominance of certain economic actors is enduring and their control over certain types of bottlenecks requires an *ex ante* regulatory approach.**

3. **The *Transparency Directive 83/189* should be revised so as to apply to information services provided "at a distance, by electronic means, on the individual request of the service receiver".**

   This mechanism would provide the European Commission and those Member States committed to liberalisation with an opportunity to review new Member State laws which may constitute an unjustified barrier to trade in the internal market, and to address harmonisation in those areas of interest to the Member States. Such an approach would be consistent with the goal of minimising fragmentation of the internal market and avoiding over-regulation, by highlighting those areas where harmonisation may be truly necessary.

4. **In light of the European Commission's review of the state of telecoms liberalisation in 1999, it may be appropriate to consider the eventual consolidation of all existing Community legislation (as amended) into a single, comprehensive legal text (*e.g.*, a *European Telecoms Law*).**

Study on Adapting the EU Regulatory Framework to the Developing Multimedia Environment

Appendix A

EXCERPTS FROM THE TERMS OF REFERENCE FOR THE STUDY ON ADAPTING THE EU TELECOMMUNICATIONS REGULATORY FRAMEWORK TO THE DEVELOPING MULTIMEDIA ENVIRONMENT

Squire, Sanders & Dempsey L.L.P.

Analysys

The opinions expressed in this Study are those of the authors and do not necessarily reflect the views of the European Commission.

 January 1998

I. CONTEXT

The Commission has published a series of measures that will form the basis of the regulatory framework for telecommunications in the post-1998 environment. These include proposals for European Parliament and Council Directives dealing with Interconnection and Licensing, amendments to the 1990 Telecommunications Services Directive (based on Article 90), and modifications of existing Open Network Provision legislation.

It is important to ensure that the future regulatory framework for telecommunications is flexible and forward-looking with respect to commercial and technological developments in the marketplace and that it operates in a manner which can promote the take-off of the Information Society.

Traditionally, most Member States have drawn clear regulatory and legal boundaries between the telecommunications, audiovisual and information technology sectors, and between different segments of each market (equipment supply / network operation / service provision / content provision, etc.).

These traditional boundaries are now blurring as digital broadcasting leads to the potential for highly individualised services and as services, such as video-on-demand, are provided over telecommunications networks. It is now important to examine the effects of such distinctions on the development of new multimedia services and the extent to which distinctions can and should continue to be drawn in a converged environment.

Part II of the Infrastructure Green Paper, published at the beginning of 1995, as well as dealing with regulatory safeguards in the liberalised environment, noted that new kinds of integrated and multimedia services are developing on telecommunications networks and that, more generally, the different networks are converging. The Commission has subsequently adopted a Directive allowing from 1996 the use of cable television networks for the provision of liberalised telecommunications services. In the context of that proposal, the European Parliament raised the question of "symmetrical treatment" between telecommunications networks and cable TV

networks and the role of all communications networks in delivering the new multimedia services.

Part II of the Infrastructure Green Paper further noted that infrastructure liberalisation in addition to services liberalisation will lower the cost of transport and will underpin the development of the information society, characterised by more and new types of communications and information services flowing over networks. Yet at the same time such developments must occur within national frameworks, which draw distinctions between traditional telecommunications and broadcasting services, as well as between different segments of the market, such as network operation, service provision and content. The Study will therefore allow an assessment to be made of what changes are required to ensure that the regulatory framework will promote, rather than hold back, development and at the same time continue to fulfil the role of pursuing public interest objectives.

II. SCOPE AND REQUIREMENTS OF THE STUDY AND TERMS OF REFERENCE

The Study team

The Commission believes that the ideal team for the Study is a small, focused one, whose members have market analysis and legal/regulatory expertise in relation to :

- the EU telecoms regulatory framework
- an understanding of the economic principles of regulation
- general commercial and technical issues which are driving market developments
- general aspects of EU policy in related sectors, in particular as concerns media and broadcasting.
- the legal and competition implications of any proposed regulatory framework for developing a multimedia environment.

The Study

The purpose of this study is to look beyond the current situation and assess the ways in which the telecommunications regulatory framework will need to be adapted in the medium term (*i.e.* after 1998) for the evolving multimedia environment, whilst avoiding regulation that could inhibit efficient commercial developments. It will be able to draw substantially, in particular with regard to the assessment of market and commercial developments of audiovisual and multimedia services, on the results of a separate study being carried out for the Commission by KPMG which examines

market and regulatory aspects of convergence from an audiovisual industry perspective, "the KPMG Study").

Regulation in this area should go no further than what is required to secure the public interest and maintain competitive safeguards.

The study, building where appropriate on the results of the KPMG Study, should examine commercial and regulatory issues, and make recommendations based on that examination.

1. Commercial Issues

Commercial developments in this sector are extremely rapid. A number of large players in the neighbouring sectors of computing/software and publishing/media/television are beginning to be involved in the supply of services over (switched) networks. The provision of paid entertainment services and access to on-line information services over existing telecommunications networks are seen as major growth area.

These patterns of market entry may either challenge or reinforce the traditional supply structures, which characterise the information society, namely: (a) manufacturers of equipment and terminals connected to the network, (b) network operators, (c) service providers in their various forms, and (d) content providers (e.g. authors / film producers) and content packagers (*e.g.* software houses). Future approaches to the vertical or horizontal integration of these different market players will be a key determinant of how markets in Europe will develop.

Already, service provision is becoming much more complex as services and company alliances develop to provide systems integration, navigation and software systems and on-line services. In addition, vertical integration involving content providers potentially has an important impact on services and network competition, as shown by recent cases under the competition rules (see *Media Services Group and Nordic Satellite Distribution cases).*

Moreover, the involvement of cable TV networks in offering telecommunications services together with the development of digital broadcasting via satellite, cable and terrestrial networks raises questions relating respectively to asymmetric regulation and the regulation of access.

Additionally, two studies undertaken for the 1995 Infrastructure Green Paper (by KPMG and Devotech respectively), showed the potential imbalances at least in the short term between the large size or cost of network investments and the value of the new multimedia markets. This indicates that services will develop in a fragmentary

and incremental way with the focus on business applications or profitable consumer areas rather than by means of mass deployment except to the extent that current networks can be used to provide the services.

In the light of the above and in order to assist in formulating proposals for any adaptation of the future regulatory environment, the Study should assess:

Current market trends

- the current commercial situation and how it might evolve (for example: types of companies involved, *e.g.* levels of integration, types of services offered and general market structures).

  The study should provide a general summary of network or delivery mechanisms (fixed and wireless) building on existing studies. An in-depth and detailed analysis of the commercial situation will be provided by the above-mentioned KPMG study on which this Study may draw. The coverage should include hybrid (for both switched voice and television) networks (both wired and wireless) and also television networks where return path capability is added.

- the role of, and relationships between, equipment and terminal suppliers, network operators, service providers, and content providers.

- the current multimedia strategies of telecoms operators, of both traditional fixed telecoms operators and new fixed/mobile operators.

  This analysis should be limited to what is necessary to draw conclusions for the adaptation of the regulatory framework for telecommunications, as a more detailed examination of market and service development from a broadcasting/media perspective is the subject of a related and parallel study.

  The Study should focus on expected European developments, whilst drawing on relevant experience elsewhere. Account should also be taken of the degree to which significant variations in the speed of development can be expected in different parts of the Union, given the potentially different starting points in terms of the level of economic and commercial development of their telecoms / broadcasting / IT sectors.

Particular technological factors which the Study should take into account in the context of this section are :

- the decreasing cost of broadband communications

- the success of Internet in providing a platform for the development of some data services, given the increasing levels of business and household computer penetration

- the multiplication of channels (in particular in satellite and cable TV transmission but also in terrestrial transmission) which digitisation makes possible, and the consequent erosion of the traditional scarcity or limitations on broadcast channel capacity.

Market Structure issues

- in the context of market evolution, the impact of alliances between, and the vertical integration of, network operators, service providers and/or content providers should be addressed from the perspective of open access to networks and services.

The impact of digital technologies on telecommunications networks

- the development of digital broadcasting and digital compression (growth of capacity and channels / trend towards pay per view / interactive services) on the telecommunications framework with regard to the impact on network competition and access to networks. The Study should also examine the development of networks capable of delivering television and other services.

Pricing issues

- issues related to pricing and migration strategies in the context of the development of multimedia services. Issues related to interconnection pricing should also be examined. The focus of regulation in the telecoms area is on the pricing of interconnection and access, and level and structure of prices paid by consumers is also important. Pricing in the multimedia area will reflect pricing for transport as well as content even if the two are bundled together and low transport costs are crucial for the take-off of multimedia services (presenting potential conflicts of interest for operators supplying low priced telephone service and transport for Internet access).

Standards

- Standards issues with respect to interfaces (particularly between terminal equipment and the public networks) and in relation to the promotion of pan-European services.

- Issues concerns standards for software and hardware and related interfaces, given the influence / control potentially resulting from proprietary ownership of customer terminal equipment, gateways, navigation systems standards etc.

2. Regulatory issues

The Study should examine and analyse the regulatory issues that arise from the development of multimedia services in order to identify proposals for the adaptation of the current regulatory approach in telecommunications for multimedia services.

This examination should include a survey of the current distinctions drawn in the Member States between telecommunications / broadcasting and other services, in terms of (i) legal and regulatory definitions of services / systems, (ii) the existence of special and exclusive rights in these different sectors, (iii) applicable obligations (licensing obligations, including the level of fees if any / interconnection obligations / universal service – public service obligations) and (iv) how and by whom regulation is applied. In responding to these questions, account should also be taken of existing studies in this area,[92] as well as the ongoing parallel study on audiovisual market aspects of convergence.

The regulatory emphasis should be on creating a structure which can facilitate positive market developments, in particular, by analysing whether current approaches at a national and European level are consistent with such developments. The examination should also focus on particular public interest issues via public access or related initiatives.

The Study should therefore examine:

Impact of changes to current definitional boundaries between telecommunications/ broadcasting and other services

- *Whether current definitions found within national and/or Community regulatory frameworks should be maintained and are appropriate for the development of multimedia services?*

- *What would be the impact of changes to existing definitional boundaries within the regulatory framework?* This should be considered, in particular, in relation to key elements of the current regulatory framework at a national level, namely the requirement for the abolition of special and exclusive rights over telecommunications infrastructure and services; the application of open network provision rules; interconnection and licensing of telecommunications networks

[92] See principally Coudert: Overview and Analysis of the legal and regulatory barriers to the take off of multimedia applications, January 1995.

and services. This also raises issues linked to achieving fair access to necessary resources, such as spectrum or numbering (or its equivalent for data services *i.e.* addressing and navigation).

A key consideration must be whether current regulatory approaches, based on vertical market segmentation (telecommunications/audiovisual), should give way to a horizontal regulatory approach (transport and transmission / content).

- Additionally, broadcasting is a service of public interest in the sense of Article 90 and therefore special or exclusive rights can be accorded, proportional to the aim sought. One clear area of public interest is the provision of public broadcasting. Another is the issue of media pluralism an issue which is being examined by the Commission, in the fight of earlier proposals in relation to media pluralism, COM(94) 353.

- *Whether, even within current definitional boundaries, the development of the multimedia services requires elements of the current telecommunications regulatory framework (separation of regulator and operator / open access principles, etc.) to be extended to other non-telecoms services?*

The role of regulatory authorities and principles for control of multimedia services

- *The relationship between the authority or authorities responsible for network regulation and those responsible for content regulation, as well as the appropriate level for such regulation.*

  One of the main features of the telecoms regulatory environment is that a framework exists at European level for application at a national level, with various recourse procedures either at a national or an EU level. In general it is important to avoid double regulation. In addition, there is a complementarity between framework regulation and competition rules even if the former does not prejudice the application of the latter.

- *The impact of the globalisation of multimedia services.* New services may be made available globally without it being possible to limit access in a particular Member State, obliging service providers in situations where, for example, the service contravenes national rules on advertising in one Member State, from removing that service from its global offering.

  The Study should focus on the regulatory issues connected with networks and distribution systems. It should only touch on content regulation, where that may directly impact the regulation of network operation / transmission of a service. Equally, issues related to IPR and copyright rules, data protection and privacy,

security over networks, and public interest aspects of media ownership and pluralism are covered in a parallel study.

Pricing and resource allocation issues

- *Regulatory aspects of the pricing of multimedia services (e.g. cost-orientation principles / affordability) and of the allocation of underlying physical resources.* This should also address current variations in the approach to allocating/charging for scarce resources, in particular, radio-frequency in the broadcasting and telecommunications sectors, as well as possible implications for numbering and addressing.

Competition issues

- *Regulatory supervision of market dominance in the market for multimedia services.* Such dominance is likely given the very large companies which are combining to offer new services, or which are entering the market on their own.
- *Issue of cross-subsidies within vertically integrated organisations.*

Asymmetric regulation of telecommunications and broadcasting

- *Asymmetric regulation between telecommunications and broadcasting.* At least one Union Member State expressly forbids TOs from conveying or supplying broadcasting services, whilst implicit or de facto restrictions exist in several countries. A summary table on this can be found in the second part of the Infrastructure Green Paper, drawn from one of the background studies (Coudert).

  Countries which do have express restrictions will or are likely to review them in the coming years, as they allow cable and other networks to provide telecommunications services. This raises a number of questions concerning respectively asymmetric regulation and the regulation of access.

In the light of the two aspects (market / regulatory), the consultants should present options for the adaptation of the current or proposed regulatory framework for telecommunications in order to foster the development of multimedia services, analysing the strong and the weak points of each option."

Study on Adapting the EU Regulatory Framework to the Developing Multimedia Environment

Appendix B

GLOSSARY OF TERMS

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Analysys

The opinions expressed in this Study are those of the authors and do not necessarily reflect the views of the European Commission.

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GLOSSARY OF TERMS

ADSL	Asymmetric Digital Subscriber Loop, a technique for transmitting data at high speed (2Mbit/s or higher) over copper exchange lines
ARPA	Advanced Research Projects Agency, the sponsors of the research that led to the creation of the Internet
ATM	Asynchronous Transfer Mode, a standard for high-speed packet switching, providing quality of service and bandwidth management features
B-Channel	Unit of capacity equal to 64kbit/s used to denote the capacity of an ISDN connection, *e.g.* a PR-ISDN connection has 32 B-channels
Backbone Network	High-speed series of lines which form a major pathway across the Internet
Back Channel	The return path from the consumer to the network or service provider, which one-way communications media, such as digital terrestrial broadcast, need in order to offer interactive services
BR-ISDN	Basic Rate ISDN (64kbit/s to 128kbit/s)
Browser	Programme used to search and retrieve information from the WWW
Cable modem	Modem used for sending data at broadband speeds over cable TV networks. The system requires installation of modems at the customer premises and at the routing point in the network
CD-ROM	Mass storage medium for data on a CD
Client	User-operated software which requests data from a server running compatible software and therefore provides the user interface to Internet applications, e.g. a browser is a WWW client which draws information from a WWW server
Client-server streaming	Method of sending a continuous flow of data from a server to a client, allowing real-time playback of audio and/or video
CPE	Customer Premises Equipment
Extranet	An extended intranet, *i.e.* a corporate or single organisation network, to which associated organisations, suppliers or clients are given secure access
FAQ	Frequently Asked Question
Firewall	Security device used to control access to a company's networks and information
FTP	File Transfer Protocol, a means of transferring documents and programmes from one Internet host to another under user control

Gbit/s	Gigabits per second
Gopher	System of information resources on the Internet allowing documents to be linked by hypertext
Host	Computer or server connected to the Internet with a unique address, which provides information or services to Internet users
HTML	HyperText Markup Language, the language for writing hypertext documents viewed by a WWW browser
HTTP	HyperText Transfer Protocol, the protocol for transmitting multimedia information over the WWW
Hypertext	Means of linking documents by highlighted text
Intranet	Corporate or enterprise network using IP, not necessarily connected to the public Internet
Intelligent Agent	Software designed to make using the Internet easier. *e.g.* by automatically performing a sequence of routine tasks or customising information delivered to a user
Internet Exchange	Neutral point for interconnection between ISPs, where traffic is routed onto Internet backbone between ISPs
IP	Internet Protocol, defining the addressing scheme, packet information and routing information for transmission of data over the Internet
IPv6	The latest version of the Internet Protocol, providing both a much larger range of addresses than its predecessor and support for transmitting traffic according to priority
ISDN	Integrated Services Digital Network
ISP	Internet Service Provider
IT	Information Technology
ITU	International Telecommunications Union
Java	Object-oriented programming language for creating software applications which are independent of operating systems and can be uploaded from servers to clients allowing, for example, the functionality of WWW browsers to be increased
kbit/s	Kilobits per second
Mbit/s	Megabits per second
MIME	Multipurpose Internet Mail Extensions, allowing multimedia information to be sent in a similar way to email
MIS	Management Information System

Multicasting	Communication from one to many sites over a network, but only routing the information to specified sites involved in the communication instead of all sites on the network
NAP	Network Access Point, major Internet exchanges in the USA set up to take over from the NSFNet when it was disbanded
Network Computer	A less powerful version of a personal computer, which downloads software applications from the Internet instead of storing them on the hard disc
NSF	National Science Foundation
NSFNET	Main Internet backbone serving the US academic community, sponsored up by the NSF, decommissioned in 1995
OSI	Open Systems Interconnection, a set of standards for data networking drawn up under the auspices of the International Standards Organisation
OSP	Online Service Provider, a company providing restricted access to content and information, in addition to basic Internet access
PC	Personal Computer
POP	Point of Presence, a node providing local access (dial-up and fixed link) to an ISP's network and routing Internet traffic over the ISP's network and onto the global Internet
PPTP	Point-to-Point Tunnelling Protocol, a proposed standard for enabling secure transmission of data between two hosts on the Internet for corporate data transmission
PR ISDN	Primary Rate ISDN (2Mbit/s)
PSTN	Public Switched Telephone Network
RBOC	Regional Bell Operating Company, US local telecoms operator
Router	Specialised computer dedicated to the reception and queuing of TCP/IP packets and responsible for sending them on towards their final destination
RSVP	Resource Reservation Protocol, a protocol allowing the establishment of virtual routes over the Internet providing more efficient transmission for real-time communication over the Internet
Search engine	Searchable databases continually updated by software which categorises and classifies information stored on the WWW
Server	Computer, not necessarily on the Internet, connected to other computers via a network

Set-top-box	A device connected to a television receiver which incorporates a digital broadcast decoder, guides to programmes and other services available, a usage monitor for billing purposes and a modem which can be connected to a telecommunications line
S-HTTP	Secure HyperText Transfer Protocol, a proprietary system for secure transmission over the WWW
SME	Small or Medium-sized Enterprise
SMTP	Simple Mail Transfer Protocol, the basic Internet protocol for transporting email messages
SSL	Secure Sockets Layer: a proprietary security protocol
TCP	Transmission Control Protocol, governs transport of data between networks, including the sequencing of IP packets, error correction
TCP/IP	The common term for the set of protocols which underlies the basic transmission of data on the Internet
URL	Uniform Resource Locator, the address given to a document of information stored on a server connected to the Internet
USENET	A decentralised system giving access to discussion groups (or newsgroups) over the Internet
VDSL	Very High-Speed Digital Subscriber Loop, a technique for transmitting data over copper local loops, for short distances, currently able to attain speeds up to 40Mbit/s
VPOP	Virtual Point of Presence
VRML	Virtual Reality Modelling Language, a language for simulating three-dimensional environments that can be accessed over the Internet
WAIS	Wide Area Information Servers, allow keyword searching capability of information resources on the Internet
WWW	World Wide Web, a system linking information (text, audio and video) by hypertext stored on servers connected to the Internet running HTTP
X.25	ITU-defined standard for packet switching
xDSL	The family of digital subscriber loop technologies including, ADSL and VSDL