

Chapter 1

FROM ANALOGUE TO DIGITAL

Christopher Marsden

Independent consultant on broadband communications, London

and

Monica Ariño

European University Institute, Florence, Italy

'The multimedia revolution was just hype.' (John Malone, 1997)

DIGITISATION AND CONVERGENCE OF INTERACTIVE PLATFORMS

In the last decade, communications markets have undergone fundamental changes. Analogue technologies are being progressively replaced by digital communications services. Digitisation involves turning data into binary digits (bits) for storing, processing and transmission purposes. A fundamental feature of digital information is its independence from a specific transportation medium; consequently, it can be conveyed over all available networks, including satellite, coax and fibre-optic cable, high frequency wireless, digital terrestrial television (DTTV), analogue and digital telecommunications networks including digital subscriber lines (DSL), and even power lines. This not only leads to a more efficient use of the existing infrastructure but, because digitisation enables compression and packaging of data, it also reduces the amount of transport capacity needed per data unit. In the future, the digital conversion of all signals, transmitters, networks and equipment is envisaged.

It is easily forgotten, given the enormous losses incurred by pension funds and other investors in the technology-media-telecoms meltdown of 2000-03, that enormous changes in the manner in which communications are undertaken have indeed taken place. It was not all just hype, although Malone's statement may indicate the extent to which business executives used and were used by the

irrational optimism of the 1990s. Writing in early March 2003, we can state that in the European Union (EU)¹ today:

- 80 per cent of citizens have a mobile telephone, though none a third generation video phone;
- 50 per cent of British households have bought digital television (DTV) services;
- 50 per cent of citizens use a personal computer (PC) linked to the Internet;
- approximately 5 per cent of all households have a cable or DSL broadband connection (normally 512 kilobits per second); and
- about 33 per cent have a DVD (digital video disc) player, the same number a video camera and/or a still digital camera.

Europe, North America and developed East Asia are becoming digital (Negroponte, 1995).

A convergence phenomenon has taken place between previously separated communications networks and services. The rates of growth of adoption of broadband, in-home PCs and image recording/playback devices (DVD players, digital still and video cameras) means that the majority of EU homes will soon be digital. Using home media servers or 'WiFi' technologies² will enable wireless connectivity to spread from its predominant current use in offices to residential uses in and between homes.

Convergence is indeed blurring the market and regulatory boundaries between broadcasting, telecommunications and information technology (IT). The idea of having all services available in all platforms is hard to achieve in practice, because each platform and network has limits, and consumers do not always embrace what is technologically possible. The benefits will be considerably reinforced with universal digital reception allowing consumers to access services from multiple digital platforms (principally Internet-connected PCs, DTV sets and mobile terminals). Convergence will not be absolute and the

¹ By 'EU', we refer to the 15 Member States of the European Union, and by extension the advanced Western European nations which are members of the European Economic Area (EEA) but not full political members of the EU (notably, Norway and Switzerland). When the term 'European' is used, this encompasses the ten Eastern 'accession states' expected to join the EU in 2004, creating a market of 25 full political EU members and the EEA states, and those other Council of Europe states which are signatories to the European Convention of Human Rights (including, for instance, Russia, Ukraine, several southern Balkan new states and Belarus). There were 40 Council of Europe member states in 2003.

² WiFi is the commercial name for wireless local area network technologies, which provide multi-megabit portable Internet access from laptop computers.

precise capabilities of each platform mean it is more likely that they act as complements rather than substitutes (Liikanen, 2002).

Information Society and DTV

In Europe, public policy discourse has focussed on the metaphor of networks reinforcing ‘Information Society’, not technological development of ‘Information Superhighways’. The social, economic and regulatory implications are enormous, affecting the population at large: “The information revolution prompts profound changes in the way we view our societies and also in their organisation and structure” (Bangemann, 1994: 1). Digital technology is a “potential vehicle for achieving a broad distribution of access to, and participation in, the social processes of knowledge production” (Benkler, 1998a: 184). Transition to digital raises entertainment and information costs for consumers, which potentially widens gaps between ‘information rich’ and ‘information poor’ (the ‘digital divide’). Indeed, digitisation increases public dependence on screen-based media for information, entertainment, education and other public services. The principal threat is the creation of a two-tier society in which, ultimately, only a part of the population has access to the new technology, is comfortable using it, and can fully enjoy its benefits. Preventing a similar outcome is a major challenge for public authorities.

Public authorities therefore are taking an important role in the development of DTV for overall societal benefit. Recently, an EU initiative has reiterated the importance of DTV and new digital interactive services, and the consequent need for public policy to remove obstacles to its development, promoting openness, interoperability and freedom of choice (CEC, 2002h). The reason is that, due to higher penetration of analogue television sets, as compared to PCs or even mobile phones, television platforms have the potential of becoming a central and ‘consumer friendly’ point of access to a wide range of Information Society services. Indeed, Nobuyuki Idei of Sony has stated that the television set will be at the centre of the future broadband experience (*The Economist*, 2003).

The process by which households will progressively migrate from analogue to DTV reception is called digital switch-over. In DTV the benefits to producers and network owners of the use of digitisation have been significant. Digitisation allows:

- improved efficiency in spectrum usage;
- substantially increased capacity in the number of channels that can be transmitted;
- superior quality of image resolution and audio;
- consistent reception over varying distances;

- reduced costs in transmission and energy consumption;
- interactivity with a return path, either dial-up Internet (DTTV, analogue cable and satellite) or broadband (cable and DSL broadband);
- data transmission;
- better applications for the disabled; and
- greater flexibility of operations in general.

Many of those benefits have already been realised to some degree and will be further enhanced when production and storage are fully digitized. However, consumer adoption of DTV has been slower than for other digital equipment and services. There are numerous long term benefits of an all-digital environment (quality, choice, competition, development); yet there are also considerable obstacles (analogue legacy, uncertainties, potential distortions of competition, market failures and externalities). Television's relatively poor current interactivity will be augmented by more powerful future PCs connected to the television screen, including upgraded set-top boxes (STBs), personal video recorders which will integrate video cassette recorders (VCRs) and DVD players, computer games consoles and home media servers. With half of Western European households expected to have broadband fixed connections to the Internet by 2008, policy for the medium term (around five years) needs to consider both households that will be fully wired to interactive broadband, and the remainder that show little propensity to join the digital age beyond a second generation GSM (global system for mobiles) narrowband mobile telephone. That will be a true digital divide.

The remainder of the introductory chapter is structured as follows:

1. We consider the early development of DTV markets to the end of 2002, focussing on the three dominant platforms – satellite, cable and DTTV – and the market development of a STB subsidy model to encourage consumers to switch from analogue.
2. We address the public interest in DTV, as part of Information Society policy.
3. We assess the path dependency in national television market structure and previous technological switch-overs, discussing particularly the central role of public service broadcasting (PSB) in the European television ecology.³

³ Public service broadcasting is financed by taxation in most EU Member States, and provided by a public service broadcaster – normally a statutory corporation. The organisation and funding of PSBs are discussed in Chapter 3, and we here use the term PSB to refer to both the concept and the corporation responsible for such programming. Where we refer to terrestrial FTA broadcasters who

4. We follow with discussion of the analogue switch-off, the release of spectrum that will be enabled by the ending of all terrestrial analogue television signals, and the necessary steps and motives in achieving that goal.
5. Finally, we assess the overall role of government in the switch-over process, and conclude by considering the reasons why convergence between DTV, PCs and mobile is proceeding at a slower pace than predicted by the ‘hype’ of the 1990s.

This final factor includes the most important policy issue: to what extent should government interfere in the processes of a market that is achieving rapid if uneven growth? Should government concentrate on the wider aim of ensuring a rapid migration of households from 25-28 hours per week of passive television viewing to broadband interactivity via computer-like devices? Is government’s role in DTV a maximalist sponsorship as in the 1950s introduction of analogue television, or the minimalist role that it played in the introduction of VCRs in the 1980s? In this introductory chapter, we do not seek definitive answers, but rather raise the pertinent questions. As lawyers researching the interaction of economics with law and policy, we begin by assessing the empirical evidence of market development, before analysing the law and policy which interacts with these dynamic market developments.

OVERVIEW OF THE EUROPEAN DTV MARKET

The EU DTV market has experienced substantially greater growth than that in the United States (US). European digital satellite television was first introduced in March 1996 in France; cable services followed shortly and DTTV was introduced in the United Kingdom (UK) in late 1998. There are other potential delivery mechanisms such as DSL, which so far are relatively little utilised. Currently DTV services, whether pay-TV or free-to-air (FTA), are available in all EU countries.⁴ DTV markets have developed in different ways depending on migration paths from analogue television. Consequently, important divergences between EU markets can be observed. DTV take-up proved to be more successful in those countries where the majority of consumers previously only accessed analogue FTA (mainly France, UK, Italy and Spain), as compared to

receive no public financing, but whose licenses nevertheless contain public service obligations, we do not refer to ‘PSB’. The European Commission has conducted extensive investigations into the legal definition of a PSB under the competition rules of the Treaty of Rome.

⁴ In 2002 the number of digital households rose to 32.2 million, as compared to 26.6 million in 2001, and overall penetration increased to 20.8 per cent (CEC, 2002a).

Germany, Austria and the Benelux,⁵ where multi-channel existed in analogue either by basic cable or by satellite. (Multi-channel has no exact definition, but our working definition is 12 or more channels.)

Consumers' primary motive appears to be access to premium content on pay-TV whether analogue or digital, so analogue pay-TV subscribers are predictive of DTV subscribers. Even where cable or satellite is used for reception by the main television set in the house, secondary and portable sets still depend on FTA terrestrial reception. EU DTV penetration at the end of 2002 was:

- satellite 21.5 million (13.9 per cent of all television households);
- cable 8.1 million (5.2 per cent); and
- DTTV 2.6 million (1.7 per cent).

Satellite Television

Satellite distribution offers the possibility of up to 500 extra channels (ten times more than analogue satellite). For operators, it has the technical advantage that, unlike cable for instance, services are immediately available anywhere in the satellite's 'footprint', including even foreign audiences. Sunk costs are thus relatively small. The principal disadvantage is that satellite does not permit two way communications, relying on a telecoms line with a modem to provide interactivity. This is also the case for DTTV. Neither is a truly interactive platform. The distribution processes of digital satellite television is shown in Figure 1.1.

Cable Television

Cable networks do have bi-directional transmission – hence a return path for sophisticated interactive services – but require long-term investments and substantial sunk costs for digital conversion. Even analogue cable can be unprofitable in areas with low density of population. Cable has rolled out DTV incrementally, with easier DTV upgrade in the newest analogue networks. However, in early 2003 digital cable operators were in or near bankruptcy, as will be examined in the conclusion to the chapter.

In addition to its 500 channel DTV capabilities (like satellite, about ten times more than analogue), cable also allows for the provision of telephone

⁵ The collective term for the 'Low Countries', namely, Belgium, Netherlands and Luxembourg.

services and Internet broadband (the so-called ‘triple play’). The distribution processes of digital cable television are illustrated in Figure 1.2.

Figure 1.1: Digital Satellite Television

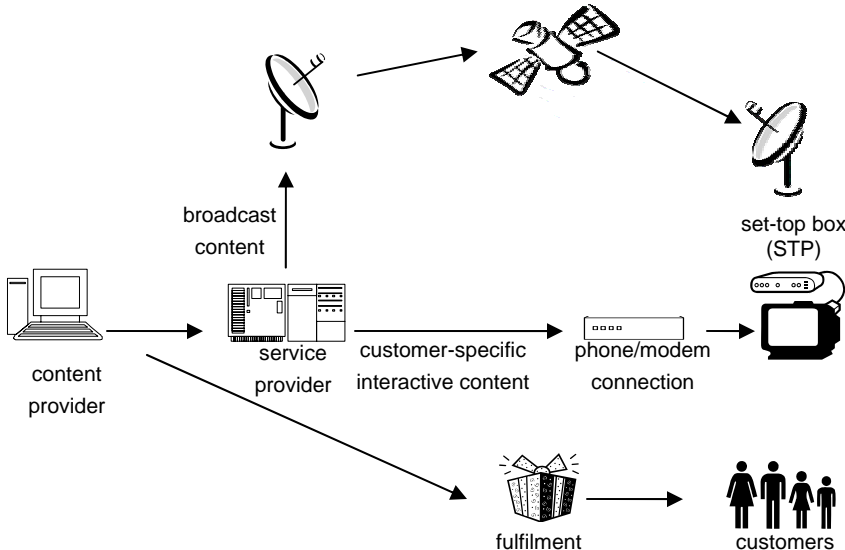
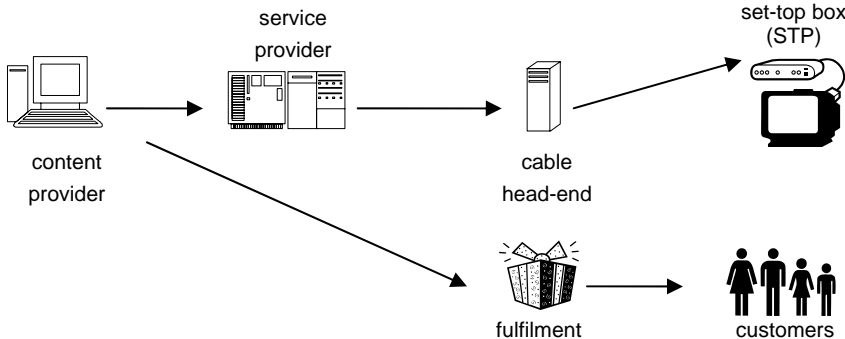


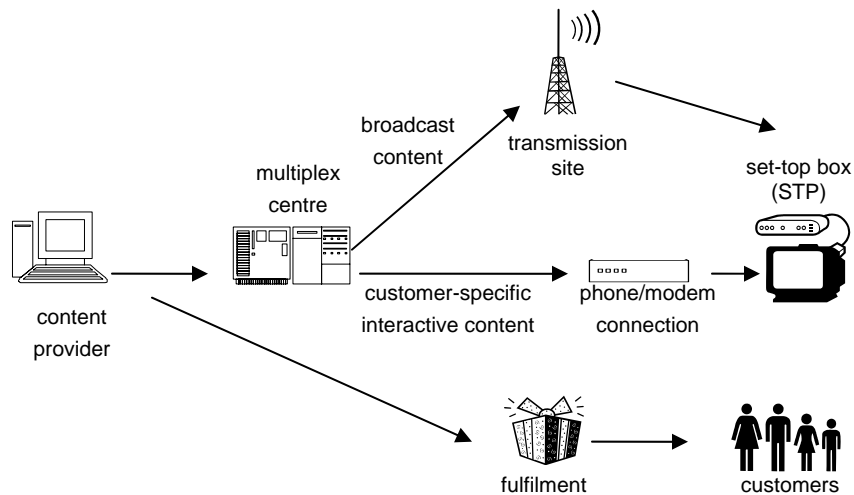
Figure 1.2: Digital Cable Television



Digital Terrestrial Television

Using a normal television aerial, consumers can receive digital signals in markets where signals are broadcast. They do require a STB to convert the signals back into analogue unless they have an integrated DTV receiver. (By March 2003 there were only a few thousand digital display televisions in Europe.) DTTV offers up to 40 channels, about five to eight times greater than analogue terrestrial. However, this is less than analogue cable or satellite, and far less than digital versions of these platforms. It is therefore an upgrade path for previous viewers of FTA and other terrestrial channels. Its great advantage is portability: there is no requirement for expensive reception dishes or cables, simply a normal aerial and a STB. The distribution processes for DTTV are shown in Figure 1.3.

Figure 1.3: Digital Terrestrial Television



In 1999 most EU States had set rather optimistic deadlines (usually 2000-01) for the launch of DTTV. However, delays and bankruptcies of pioneer DTTV platforms in Spain and the UK mean that in most countries DTTV services have very few or no viewers. To the end of 2002, DTTV had been launched in the UK, Sweden, Finland, Spain and Portugal, and its launch was imminent in France and Italy. In Germany the introduction of DTTV has occurred at different speeds in different regions. In other countries (Ireland, Denmark, Norway and Austria) the launch of DTTV has been postponed or was

still subject to ongoing discussions. The specific characteristics of various national markets will be analysed in Part 2 of this book.

Although terrestrial television was historically the main network delivering analogue television reception, DTV markets have so far been driven by satellite and cable (primarily pay-TV) operators, generally using proprietary STB technologies, while DTTV roll-out faces serious problems in most EU Member States, including newly acceding States in 2004, whose DTV markets are typically less developed. This situation makes a uniform migration process throughout the EU highly improbable and subsequently switch-over policies are likely to remain national in scope. There might be an argument for Community action in order to co-ordinate the digital transition, avoiding fragmentation of the internal market in Europe as well as delays in the release of spectrum currently used for analogue FTA services.

Challenges for DTV Broadcasters

Broadcasters encounter three major challenges in the DTV world. First, they must upgrade their infrastructures to support DTV services. As mentioned above, it is DTTV delivery that faces more difficulties in this respect. Nearly all satellite pay-TV platforms now operate exclusively on a digital basis, which is not the case for FTA DTTV channels that must be transmitted ('simulcast') in analogue format until consumers switch over to digital reception for *all* television sets, in the household, tent and mobile home. More than 80 per cent of EU cable networks have been rapidly upgraded to carry digital, allowing cable operators to offer telephony, Internet access and video services. However, in practice only a relatively small share of connected households have actually been equipped with the STBs that are needed for DTV reception. Because DTV signals must be converted by the consumer's equipment into analogue signals for television display, all DTV reception – whether cable, satellite or DTTV – requires a STB. This box, which also decrypts premium programming for pay-TV households, is the gateway into all DTV households. In consequence, it is regulated as a bottleneck facility. Because it is classified as a telecommunications system, it is regulated by Member States under EU Directive 95/47 (as amended in 2003). Chapter 2, on regulation, deals with this issue (see also Cave & Cowie, 1996), but some general comments may indicate the increased complexity of television reception for the consumer in the DTV era.

The second challenge is the entrance of new players (principally platform operators) which has precipitated a change in organisation and strategies. The DTV industry has been shaped around complex vertically integrated structures, where proprietary systems prevail. Broadcasters are being forced to rethink their

roles and business models; in a multi-channel environment this is particularly imperative for PSBs wishing to get access to the increasing number of viewers/voters/taxpayers using non-terrestrial platforms.

Third, a multiplication in the number of channels has boosted demand for television programmes and attractive content has become a highly valued asset. As Cowie and Marsden (1999) remark, the location of constraints in the supply chain of production is reversed. Delivery costs decrease and are no longer an issue; instead, what we now have is a greater number of retail outlets competing for relatively scarce content. Demand for national language audiovisual products remains extremely limited in other linguistic markets, and there is a risk that the already negative trade balance with the US will further increase (Noam, 2000). A stronger demand for 'quality'⁶ (and if possible exclusive) programmes implies higher fixed costs for broadcasters (Sutton, 1991). This is because the costs of delivering a programme are the same regardless of the quality of such programme so that fixed costs are not given by exogenous technical considerations but instead by the need to acquire sufficiently attractive content. As Motta and Polo (1997) show, this results in persistent levels of concentration in the media industry and suggests that it is the most likely scenario in the near future. This accentuates pluralism concerns, where concentrated ownership restricts the diversity of media control, and therefore potentially content.

Market Structure and Subsidies for the STB

The analogue installed base of television sets and STBs is an enduring policy issue. Consider Benelux, where almost the entire population receives multi-channel television via analogue cable, using analogue television sets and STBs. A complete transition to DTV will require the replacement of all analogue receivers (including second and third television sets as well as other complementary products such as VCRs) and even some of the current first generation DTV equipment. As with other consumer electronics equipment, initially integrated DTV sets were priced as novelty luxury goods and, therefore, take-up has occurred at a very slow pace. The benefits of digital screens are generally seen in the household only on PCs, leading the consumer to perceive that DTV is essentially more of the same: pay-TV.

STB manufacturers and other consumer electronics producers need to roll out equipment rapidly as mass market volume drives prices in consumer electronics (which is why PCs, DVD players and VCRs are so inexpensive compared to a decade ago). Platform and networks operators also need a fast

⁶ Here the term 'quality' is understood in an economic sense as referring to 'attractive' or 'popular' programmes that drive demand, but without any moral valuation of the content itself.

roll-out to achieve a critical mass and the network effects of ‘bandwaggoning’ – consumers copying early adopter behaviour and creating a virtuous circle of emulation and service development, where supply and demand are mutually reinforced. With the purpose to foster the market for DTV services, platform operators decided to subsidise DTV receivers (effectively giving them away free). In most cases proprietary and non-interoperable standards were adopted in order to ‘lock in’ the consumer and recoup investments. Boxes for different platforms carry different and incompatible software, which cannot ‘talk’ to that in other boxes; for example, your DTTV box cannot be used for cable television.

All of this was done in a context of vertical integration, which has proved more effective than retail models in achieving roll-out in initial stages of market development, but where competition is usually restrained. Any rents created by monopoly are justified by cross-subsidies to more competitive segments of the value chain, for instance STB subsidies and new programming and interactive services. Currently, the desire exists, particularly among equipment manufacturers, to migrate towards open standards. A prerequisite, though, is an appropriate regulatory policy with respect to standardisation and interoperability issues. This is discussed further in later chapters, but we identify briefly some concerns here.

Interoperability between proprietary standards is possibly the most critical, controversial and complicated issue in the DTV environment: “Standardization, compatibility, interoperability and application portability are essential pillars in the erection of a successful and competitive European digital television system” (Nolan, 1997: 610). Mandating standards might not necessarily solve the problem. As the following section illustrates, European television has a strong tradition of *ex ante* standardisation and interoperability that guaranteed certainty in the analogue era, but that differs in the telecommunications sector and is practically absent in the IT industry.

How to reconcile all the different traditions in a digital world is not an easy task. Presently, standardisation difficulties are exacerbated by rapidly changing technologies and by a progressive transition from network based models (hardware), which are relatively easy to standardise, to service based models (software), with more flexible and sophisticated systems. In today’s markets there are too many variants, options and interests: a single monolithic concept is almost impossible. Systems present different layers so that standardisation of one of the layers could result in the interoperability problem simply moving up to the next one, if there is an economic incentive to lock in the consumer. Perhaps a more sensible approach might be to concentrate on building bridges between different platforms and layers, to achieve a satisfactory degree of interoperability, understanding it as an evolutionary process more than as a feature.

IDENTIFYING THE PUBLIC INTEREST IN DTV

The regulatory implications of digitisation are many and complex. Before addressing them, some brief considerations about television regulation in general are important. In the analogue tradition there were two major rationales for television broadcasting regulation. The first one was technical: spectrum scarcity. This justified public intervention designed to achieve an efficient distribution of a public resource. The second or ‘public interest’ rationale referred to the social impact of the media and its centrality in democratic processes (Feintuck, 1999). In practice, greater weight has normally been put on the protection of pluralism, cultural traditions and moral values (democratic rationale), while the technical rationale operated sometimes as an excuse for politically motivated regulation (Humphreys, 1996). In spite of the weakening of the spectrum scarcity rationale (because the introduction of cable and satellite television networks reduced dependence for these networks’ viewers on terrestrial television spectrum), the democratic argument remains powerful as an argument for regulatory intervention in the DTV era.

Viewers’ commercial and electoral power makes them central to the migration process. First, the digital world empowers the educated consumer, who can personalise his/her media consumption. There is greater freedom to select not only the type of content one wants to watch, but also the time, the conditions (language, with or without advertising, various programmes simultaneously) and the device(s) used. However, greater diversity of content and multiple outlets also implies fragmented and not necessarily better informed audiences. On the contrary “the prospect of individuals knowing of the existence of much of the material more widely available, let alone surveying it, is highly unlikely” (Gibbons, 2000: 311). In addition, a boost in the number of television channels entails an increased difficulty in locating desirable content. For this reason navigation devices (electronic programme guides) become essential tools for viewers and thus have the potential to influence viewing patterns (as Microsoft Windows default settings affect our choice of media player on PCs).

In essence, two fundamental problems can be identified: effectively safeguarding pluralism including access to programming; and avoiding citizen’s exclusion from information flows, which includes copyright policy.

Pluralism and Access to DTV Programming

The effect of digitisation on pluralism in television broadcasting markets is twofold. First, it multiplies the number of channels and, hence, the number of

potential voices. DTV services are increasingly customised and personalised so that the ability to reach mass audiences is reduced. At the extreme, it could be argued that the need for regulation derived from impact on public opinion disappears. However, the crucial factor is not the hypothetical, but the actual impact of the media on citizens (McGonagle, 2001). This is measured by audience reach, rather than by number of channels. Viewing patterns have certainly not changed enough to suggest that viewers are now emancipated from media manipulation. Television broadcasting remains (and the Internet is emerging) as a means of mass communication of a particularly intrusive nature. Furthermore, there seems to be an inexorable tendency towards globalisation and restrictions on media concentration (structural ownership control) continue to be loosened. This is to accommodate regulation to convergence-oriented conglomerates seeking advantages of complementarities between media and technologies, but has an impact on *ex ante* media specific pluralism and seriously threatens the diversity of opinions required in a democratic state (Marsden, 2000).

Second, digitisation has created new bottlenecks or gateways at the various stages of the value chain; these are facilities without access to which it would be practically impossible for a third party to provide competing services to consumers. This is primarily a competition concern, but clearly it has implications from the point of view of pluralism and the 'digital divide' since access to viewers is a fundamental premise for the development of a diversity of views and access to information. Traditional controls are necessary but not sufficient to maintain pluralism in digital services (Marsden, 1999); they need to be combined with greater scrutiny of bottlenecks both under generic competition law and also, when competition rules do not adequately protect pluralism, under specific rules.

Digital Copyright and Peer-to-Peer Networks

Another significant risk of social exclusion is exclusion from copyrighted material, including broadcast material. Convergence, as seen by the extraordinary success of broadband peer-to-peer (P2P) file sharing of media, is increasingly a home-made process. It has overtaken the legal, regulatory and market process. The policy process' major incumbent players increasingly look like their finger-in-the-dyke approach is being overtaken by a broadband digital P2P tidal wave. Content providers are reluctant to produce non-encrypted content in digital forms for various reasons, of which two overriding factors are institutional inertia and disintegration of the vertical value chain, which creates coordination problems (Noam, 2003). The lack of digital programming on the Internet is directly related to the lack of copyright protection, whereas 'closed'

television systems protect digital rights holders absolutely from copyright infringement, but could also curtail end-users' legitimate access to the programming for which they have paid.

Copyright was designed as a legal monopoly for a limited period to reward innovators by enabling profitable licensing of their innovation. In a digital network environment there are new challenges in the application of copyright laws (Samuelson, 2000). The numerous advantages of digital technologies (superior quality, lower reproduction and distribution costs) also facilitate copyright infringement (Fallenböck, 2003). Fallenböck proposes a model of regulation through technology as the most effective way to enforce copyright protection, stressing the role of anti-circumvention provisions. Copyright systems are being adapted in order to keep pace with technological change and ensure enough protection for content creators. When doing so, it is crucial to balance copyright protection against the protection of traditional rights like access for public use (US 'doctrine of fair use') or against the protection of the right of freedom of expression.

These tensions between intellectual property rights and their limits have always existed, but are exacerbated in the digital era. As Hugenholtz (1996: 5) states: "In the analogue world, acts of information consumption, for example reading a book or watching TV, are not copyright protected. Arguably, the same should be true for the digital environment". In fact, a potential danger exists of granting copyright owners more protection than they actually had in the analogue world. Such an expansion could hurt the public interest by making digital works less available or less usable (Benkler, 1999) and could eventually be contrary to Articles 8 and 10 of the European Convention of Human Rights, on privacy and freedom of expression. In this context an adequate legal treatment of digital rights management is key. It is widely accepted that functions for managing and protecting digital rights are crucial for a successful distribution of content.

A Multiplatform Approach: DTV and Broadband Policy

It is important to highlight that the achievement of general interest objectives should not be linked to one particular technology only. Overestimating the role of DTV in the convergence process could put at risk developments in other areas. This is why DTV policy should be coordinated with other complementary policies, particularly broadband, which also have the potential to deliver similar social and economic benefits. Forcing DTV as a platform of universal access to a wide range of Information Society services might jeopardise investments in broadband or other platforms in the long term. For this reason it is fundamental to find the appropriate balance between the provision of basic DTV services,

affordable and widely available, and the development of other more advanced solutions, so that market players are not faced with excessively heavy obligations that could discourage alternative private initiatives. Recently, the European Commission recognised the necessity of a multi-platform approach and proposed several actions in order to promote widespread availability of broadband networks throughout the EU. Encouraging DTV switch-over is one of them, but by no means the only one; others might include ensuring a wider availability of digital programming on broadband interactive networks.

POLICY SOLUTIONS IN PREVIOUS TELEVISION MARKET DEVELOPMENT

We analyse in this section the specific impact of digital switch-over for the different players and consider the public policy challenges. Special attention is paid to the DTTV market, which is central to the issue of the ‘digital divide’.

The vertical value chain between networks and content raises a ‘chicken and egg’ co-ordination dilemma. It does not make economic sense to invest in digital applications if there are not enough consumers equipped to receive the service. Manufacturers do not want to produce equipment on a large scale (which would increase affordability) if there are no attractive digital services readily available. In the analogue terrestrial environment, this co-ordination problem was solved by integrating manufacture, transmission and production in a licensed oligopoly or monopoly of ‘broadcasters’. The British Broadcasting Corporation (BBC), founded in 1924 by equipment manufacturers, produced radio programming initially to incentivise consumers to buy radio receivers. Government periodically regranted the BBC a legal radio monopoly until 1968. This monolithic industrial planning was also the means of introducing monochrome and then colour television in the 1950s and 1960s. Those manufacturers who had gradually withdrawn from the BBC consortium as saturation coverage of radio sets was achieved in the early 1930s, re-invested in the new commercial terrestrial monopolies. The BBC received public funding for colour transmission of its new second channel in 1964, in order to encourage public interest in colour television sets (see Coase, 1950; Briggs & Spicer 1985).

However clumsily monolithic this ‘old’ approach appears, the continued evolution of an entire broadcasting system in which hardware and programming must make a revolutionary technological and consumer behavioural change in a synchronised manner, does tend towards vertical integration. This is made more difficult in DTV by the increasing number of players in all markets: transmission; production; channel management; multiplex bundling; interactive application development; equipment manufacturing; encryption technology

development, and so on. The DTV market more closely resembles the PC market of the 1980s than the analogue television market of the 1970s, when colour television was introduced. The following factors help to identify the coordination problems involved:

- globalisation of manufacturing;
- internationalisation of software production;
- fragmentary evolution paths towards the intended consumer switch-over; and
- government policy favouring the local domestic champion strategy while consumer preference emerges for vertically integrated international system designs.

Consider the 1984 consumer computer buyer: do they buy a PC using the DOS operating system, a legacy of IBM architecture which would develop into the Wintel (Microsoft-Intel) monopoly in associated markets? Or do they plump for a Siemens/Bull/Olivetti/BBC Acorn design running locally designed software? Or for the user-oriented and technologically advanced Apple, incompatible with the other systems and creating a ghetto of converts? Those who bought an Apple were fortunate that the software designers created new content and programmes that kept users supplied, and that there was the ability to convert Apple files to DOS. Those who bought the Phillips V2000 or the Sony Betamax VCRs were less fortunate. While programmers could supply computer programming from source code, Hollywood studios and distributors simply stopped supplying Betamax and V2000 format 'software' (cassettes), killing all consumer interest. For the consumer, it is vital to judge which of the rival platforms to purchase.

How to pick a winner? Government has consistently (in VCRs and PCs, but also in multi-channel television) failed to pick the winner. It is impossible to discuss DTV policy without reference to the foreign pirate history of all broadcast innovation. Commercial radio in the UK was the legitimisation of a *fait accompli*, as it emerged due to offshore commercial operators acting entirely outside of national law. The same process resulted from foreign terrestrial television and then satellite television operators achieving commercial success. In DTV, it is again satellite operators who have led technological innovation, with local cable and DTTV operators responding to the 'foreign threat'. It is no accident that the foreign threat is often associated with business interests that are close to government, and which connive to produce the 'foreign invasion', for instance Luxembourg-based foreigner RTL in countries bordering the Rhine River (notably Benelux, France and Germany) and Luxembourg-based SkyTV in the UK and Ireland (see CEC, 1989).

The Future of Public Service Broadcasters

EU governments have long favoured their domestic television champions to the exclusion of foreign competition. The particular cultural and economic characteristics of television and radio broadcasting demand that the market be supported by publicly directed subsidy to providers of merit goods and public goods: PSBs (Davies & Graham, 1997). Merit goods are those that command no monetary value but which are perceived to contribute to the public welfare, which includes such cultural products as FTA educational programming. Public goods are those that can be consumed by the marginal consumer without degrading the product for the existing consumers, and of course FTA signals do not depend on limiting the number of consumers. In fact, FTA television, because it creates ‘water cooler’ discussions, is perceived to actually have positive externalities, in that the more viewers, the more non-viewers want to join the ‘club’ of existing viewers (if only to join the water cooler discussion at work next morning).

The extent to which PSB is marginalised or supported by governments in the interactive multichannel environment determines the degree of non-commercial merit programming that will be broadcast as a public good, and the size of externalities. That also distorts the digital environment, so that the BBC has a position of pre-eminence in British multimedia that AOL-Time Warner cannot imagine in the US. While BBC Worldwide is entrepreneurial in exploiting its properties, US commercial broadcasters such as Walt Disney Corporation have made much bigger profits, unfettered by non-commercial merit good (cultural) considerations.

The marginalisation of PSB in the US has acted as a cautionary tale for EU policy-makers in the DTV process. The contrast between the BBC and CNN reporting of the Iraqi disarmament process of 2002-03 is often cited as an example of the ‘dumbing down’ of US news reporting in the multi-channel era. The bi-media integration of PSB in radio and television in most EU countries has contributed to the strength and independence of PSB, and radio news is a very strong competitor to television as the ‘medium of record’, most reliable news source. Extremely vigorous lobbying by the BBC has ensured massive increases in resources over the period since the 1996 Broadcasting Act introduced the framework for DTTV, as its commercial competitors were asset stripping through mergers and then suffering the advertising recession of 2001 to date. The Treaty of Amsterdam 1997 addition to the EU ‘constitution’ included a Protocol on Public Service Broadcasting designed to insulate the sector from normal competition rules. Though individual countries have very culturally

specific relations between PSBs and governments, there has been continued support for the non-commercial broadcast sector.

The pact between PSBs and governments revolves around universal availability of programming, within national borders, to all citizens. Politicians receive free political advertising on this medium. The means of providing universal coverage has been terrestrial transmission. In return for providing universal coverage, the French, German and UK governments have imposed a flat rate universal tax on all viewers, backed by criminal sanction for non-payment. The vast majority of this tax is passed on as a public subsidy to the PSBs. The tax is not trivial, and in the UK in 2003 was over 160 Euros. This tax is levied per household, providing reception for all receivers in each household. It is of course quite possible that households have only one television receiver which is connected to a cable or satellite system on which they choose not to view public service channels. Nevertheless, they must pay the license fee, as this tax is called, or go to prison. It is not an idle threat: in the UK there are hundreds of convicted criminals at any one time due to non-payment of the license fee.

The formula for funding PSB is therefore:

$$\begin{array}{ccccccc} \text{universal} & & & & \text{unbiased and} & & \\ \text{terrestrial} & & & & \text{copious} & & \\ \text{availability} & + & \text{meritorious} & + & \text{free political} & = & \text{universal} \\ & & \text{programming} & & \text{coverage} & & \text{tax} \end{array}$$

Given this grand political settlement of the medium which occupies 70 per cent of leisure hours, reform or abolition of the taxation has been studiously avoided throughout the postwar period. The breaking of the PSB monopoly actually reinforced its values, as the new commercial broadcasters were given access to the medium and concessions to broadcast advertising in return for further political access to the viewing public and further, if slightly less meritorious, programming. The tax was increased with each new entrant to the market, and the number of PSB channels in some EU countries (for instance, Germany, Sweden, Denmark and France) increased to match those of the terrestrial ‘competitors’. The system was therefore reinforced rather than weakened with each innovation. Thus in the UK, the BBC introduced colour television in 1964 just as commercial television reached full penetration, breakfast television in 1982 just as ITV did, independent programming in 1982 just as Channel 4 did, 24 hour news after SkyNews did, all paid for by the tax on television households.

The price paid for this continued expansion of television broadcasting hours was threefold:

- creation of an insatiable public appetite for further programming;
- increased television subsidies to PSB paid from central taxation or a tax on television households to match PSB funding to commercial rivals, apparently in perpetuity, and
- under-pricing of the huge amount of radio spectrum needed for this continued expansion in terrestrial broadcasting.

All three are threatened by cable and satellite entrants, whose viewers use no domestic spectrum, watch non-PSB (often exclusively foreign) programming in abundance, and whose viewers pay significant sums for tangible services, rather than the PSB-politician settlement. Indeed, these viewers' insatiable demand for visual sensual gratification often precludes the viewing of 'serious' merit good programming, and there is evidence that the trivial and superficial news reporting of CNN is favoured over the deeper analysis of the BBC News Directorate. The challenge of these new technologies is therefore to universal coverage, the license tax, and PSB programming.

Unlike in the US, the public service networks have seen relatively slow audience shrinkage. The Hollywood-produced programming of the non-terrestrial broadcasters has proved relatively unattractive to discerning viewers, though children's appetite for cartoons and commercials over factual educational content has resulted in a serious loss of terrestrial viewers. In this particular audience segment (children), the merit goods argument is so overwhelming, in the US as in Europe, that loss of audience actually feeds the moral and political argument for PSB funding. Further, multi-channel households are also voracious consumers of PSB programming via second and third household television sets, and PSBs with even 30 per cent audience share are able in that eight hour exposure each week to convince the audience to continue supporting the license tax. Terrestrial television remains an extraordinarily inexpensive medium to consume.

The current most significant challenges to the PSB model are in two areas: its inefficient use of spectrum and its failure to secure the rights to premium sports, especially football. It is here that the continued domination of broadcasting by terrestrial actors has faced its harshest test. In the case of spectrum, it has been under fire from government; in the case of football the European Commission and national governments have acted to save the terrestrials from pay-TV operators' and football clubs' attempt to raise the cost of viewing football to its real market level. The Competition Directorate General of the European Commission is actively investigating abuses of dominance and cartelisation in both sale and purchase of football rights (Ungerer, 2002a).

Government support for DTTV broadcasters can cynically be viewed as another Olivetti or the BBC or V2000. Is it simply trying to protect its own companies against foreign competition? Is it proportionate for government policy to protect domestic television transmission, production and manufacture from foreign competition? In the case of manufacturing, though the EU attempted in the 1980s to develop a pan-European system for both DTV and high-definition television, its role in the 1990s has been to act as sponsor rather than founder, and therefore to permit a range of proprietary standards to emerge subject to competition policy restraints. Overt government action in the 1980s to develop a single EU high definition standard (incompatible with US or Japanese standards) has been replaced by inaction in the 2000s when the government supported Multimedia Home Platform STB common standard has been rejected by rival platforms in favour of their own incompatible competitive systems. However, STB minimalism policy will be seen to be matched by DTTV maximalism, as the following section demonstrates.

DTTV AND THE SWITCH-OVER PROCESS

DTTV proponents, including governments, argue that availability of DTTV is a pre-requisite for the overall success of the switch-over strategy. Although pay-TV services are available to almost every EU home (be it through cable, satellite or terrestrial transmission), the majority of households has not subscribed yet and most likely will not. In countries where penetration of cable and satellite was already prominent in analogue format, pay-TV models did not provide for a good alternative at sufficiently low prices. This is why it seems reasonable to believe that pay-TV does not constitute the most effective driver to bring DTV into maturity. Rather, a FTA multi-channel offer will be essential for the transition process, particularly in the consolidation phase.

If this is so, the importance of DTTV would become apparent. The collapses of platform owners ITV Digital in the UK and Quiero TV in Spain in 2002 are far from optimistic experiences. If it is believed that DTTV is the best option to achieve universal coverage (a condition without which analogue switch-off would seem unacceptable) to ensure that consumers have access to FTA public service channels, markets alone might not deliver DTTV. Public intervention to sustain DTTV development would be necessary, assuming public interest justification. In fact, there is a policy trend to favour DTTV over other platforms in most Member States.

There are important risks associated with putting in place a policy of rapid implementation of a new technology and services when markets are still in the process of consolidation and when no equipment for reception is available. It

might be technologically unjustified and unfair from a competition law perspective. Although it is true that technological differences between platforms may require different regulation, the principle of technological neutrality should prevail when possible. Alternatively, the issue of how other platforms may contribute to deliver public policy objectives could be examined. Digital cable is not widely available yet and might never be, which would mean that, in some areas, if there are no DTTV services, satellite would be the only option available for consumers. This would create not only competition problems, but again give rise to pluralism concerns. It could then be argued that public support for DTTV is justified both from an economic perspective and under media policy considerations. In fact, there are certain limitations (mainly of geographical and physical character) which mean that cable and satellite will not bring universal coverage. Although other platforms can provide for a useful alternative to DTTV, it is unlikely that universality can be achieved without the DTTV platform.

DTTV and Analogue Spectrum Switch-off

In order for existing terrestrial services provided in analogue format to be widely available to viewers using DTTV sets, simulcast obligations have been enforced. During the simulcast phase the improvement in capacity will be limited because of the need to run analogue and digital in parallel. It is in the interest of governments to switch off the existing analogue network as soon as possible so that the radio spectrum can be released for other uses. Imposing simulcast obligations in order to provide continuity of service to all viewers results in a non-optimum duplicative use of the spectrum, and obliges operators to incur extra costs. Therefore, both governments and operators want a short simulcast period.

DTTV transmission uses the spectrum much more efficiently than analogue so that television broadcasting will require a smaller range of frequencies. Who is to benefit from such efficiency: are broadcasters to retain all the spectrum that they currently exploit or should some spectrum be freed up for public or other uses? Telecommunications operators are eager to employ those frequencies.⁷ The perceived benefits of analogue switch-off in terms of recouping switch-off

⁷ A competition concern might arise from the fact that, while DTV broadcasting networks represent a potential alternative to 3G networks for the delivery of content to mobile terminals, radio frequencies for television broadcasting have traditionally been available without frequency fees. This would give digital broadcasters a significant cost advantage with respect to mobile operators. The lack of telecoms operator interest in spectrum auctions in the UK in 2001-02 in for instance 2.4, 3.5 or 10GHz bands is an example of the fact that spectrum costs are actually very low (see Cave, 2002).

costs with spectrum sale may be limited in the medium term. In highly cabled countries, such as Benelux, the case for rapid analogue switch-off is stronger, dependent on replacement cost for portable terrestrial reception equipment. Where children's bedroom sets must be replaced, it is possible that a games station such as Sony's will be a more desirable option. It can be assumed that in the introduction of DTTV, analogue and digital transmissions will be simulcast for a significant period of time in most EU states.

We have seen that spectrum scarcity was a regulatory justification for intervention in television markets. Television spectrum planning was principally aimed at ensuring universal coverage and at avoiding interference between neighbouring countries. A major issue associated with analogue turn-off is the significant gain in terms of spectrum use that is expected. This has encouraged support for the creation of a private property regime arbitrated by the market. Some (Benkler, 1998b) have gone further and propose an alternative: that of treating the spectrum as a commons, believing that such a model could reduce concentration of ownership and increase the degree of self-governance.

Nevertheless, regulation in some form will certainly continue. The notion of spectrum scarcity and the need to avoid interference was never the sole basis of spectrum regulation. Indeed, spectrum planning was also instrumental to control entry via the licensing of television operators, and some argue that the end of scarcity will undermine the ability of governments to dictate policy outcomes through the control of market entry (Smith, 1999). The role of PSBs was deemed crucial as a cultural rationale, and certain content obligations and quality parameters were extracted from commercial broadcasters in return for the allocation of frequencies. For this reason there are good grounds to believe that statutory regulation will remain.

CONTENT AND NETWORKS: NATIONAL OR EUROPEAN POLICY?

The primary responsibility of public authorities is to protect the public interest, ensuring a clear and consistent regulatory framework. This is extremely complex in the case of multimedia industries because various players with incompatible interests are involved. The European Commission has emphasised the role of national governments in the DTV switch-over process and has recommended that Member States "create transparency as far as the conditions for the envisaged switch-over are concerned" (CEC, 2002h: 18). Although it is generally agreed that the switch-over process should be primarily market led, the role of governments to create the conditions that will make analogue switch-off possible will be crucial in later stages. Public authorities could introduce "a road

map, an assessment of market conditions, and possibly a date for the closure of analogue terrestrial television broadcasting which would enable the recovery and re-farming of frequencies” (CEC, 2002h: 18). We summarize briefly below the objectives and options for intervention.

1. *Ensure universal coverage and affordability*: meaning that all citizens can at least receive all current terrestrial channels. Access to information services should be ensured for all: a combination of transmission technologies such as DSL, cable, microwave and satellite could be encouraged. The key financial issue is whether there is scope for public subsidy. It is also important that there are no service interruptions. This is why all governments have introduced simulcast obligations.
2. *Guarantee the continuity of PSB*: The dominance of public television in terms of audience is still the most prominent factor in the EU broadcasting market. It is important to ensure that there will be no reduction of the analogue content during the migration phase, particularly of PSB content, which would leave analogue consumers with less choice.
3. *Promote digital content production*: Public financing mechanisms have been devised, generally using extended license fees. For instance, there is an ongoing discussion (particularly in Britain) about the viability of introducing an additional Digital License Fee in order to finance DTV programming and avoid charging analogue households for the development of DTV services that they do not receive. Some argue that such an idea risks slowing down the migration process. However, Creigh-Tyte (2000) considers that the negative effects of a DTV license fee on DTV take-up have been overestimated.
4. *Define flexible and realistic roadmaps*: Some countries have published migration plans describing the tasks to be undertaken, implementation time frames and responsibilities of the different players. Simulcasting is costly and delays lead to competitive advantages for cable and satellite.
5. *Set a switch-off date within a clear spectrum policy*: Switch-off is likely to happen at different dates across Europe. There are clear benefits attached to defining a date for analogue switch-off. This can be inferred from standards switch-off dates in national automobile and domestic electricity markets: the fact that people perceived transitions as necessary accelerated new technology penetration. Berlin’s media authority has set a precedent for a major EU market to switch off the terrestrial signal with clearly defined subsidy policies and a switch-off date of November 2003 (Grünwald & Wagner, 2003). BSkyB in the

UK switched off the analogue signal for 5 million households in 2001 without any significant market disruption or political interference, though clearly terrestrial switch-off is more problematic.

Governments should also carry out public consultations and studies (UK: Department for Culture, Media and Sports, 2001; Italy: AGCOM, 2000) to get a better idea of how the potential consequences of a DTV switch-over are perceived by consumers and market players. It is also important to generate consumer confidence through information campaigns.

National Content and European Network Regulation

It is important to recall that, while economic regulation rests on fairly straightforward principles, public interest objectives may vary from country to country. This is why, with respect to content issues, regulation will not only continue, but it can be expected that it will primarily remain national in scope, as the belief still exists that the cultural and political impact of broadcasting must be decided according to priorities established in each member state (Levy, 1997). At the EU level several actions have been taken in an attempt to harmonise different regulatory traditions and provide for a coherent approach to the convergence phenomenon. The Convergence Green Paper was meant to launch a discussion about what would be the most appropriate mid-term EU framework for all converging sectors. Yet, in the broadcasting sector, the effectiveness of EU intervention to establish a regulatory framework for DTV broadcasting has been limited and initiatives have been rebuffed by Member States. This could be attributed to differing administrative cultures and political concerns across Europe (Levy, 1999).⁸

The recent adoption of the ‘Regulatory Framework for Electronic Communications and Services’ is the culmination of the process started in 1997 (Marsden & Verhulst, 1999; CEC, 2002a-g). The New Framework embraces a horizontal and technologically neutral approach to regulation. DTV broadcasting is covered by the New Framework with respect to authorisation of communications networks and services, allocation and assignment of radio spectrum, must-carry obligations and access to networks and associated facilities. Regulation of content remains outside the scope of the new rules, although links between infrastructure and content are to be considered. Such requirement is only mentioned in Recital 7 (that mentions ‘broadcasting’ content and not general audiovisual content), and it is not to be found in the Directives.

⁸ By contrast, competition rules and merger control have had a strong impact in the regulation of the digital media at EU level (Ungerer, 2002b).

Some (Libertus, 2001) consider that the Framework fails to take sufficient account of those interdependencies. Television content regulation remains a national prerogative, but the regulation of the communications networks that deliver the content is subject to Commission scrutiny. This is a political outcome that is likely to result in administrative complication. Larouche (2001) remarks that the content/network distinction underlying the Directives is not straightforward; rather, there is a gradation from one end of the chain to the other. This is especially so in the case of associated facilities like electronic programme guides, which lie at the frontier since they present both technical and content related characteristics.

With respect to infrastructure challenges three major regulatory issues arise: access, standardisation and interoperability. Convergence and the transition to DTV may remove some obstacles (for instance market entry due to spectrum scarcity) but they create new ones. While in the analogue world the delivery process was perceived as the principal bottleneck, in the DTV environment a new series of bottlenecks have emerged at different levels of the supply chain. Thus, the focus of regulation has shifted from traditional concerns over natural monopolies towards the issue of gateway control (Veljanovski, 1999). If markets are vertically integrated and standards are proprietary the risks of abuse of dominance are particularly robust. These may be predominantly issues for competition authorities but there is still scope for sector specific regulation, particularly with respect to access regulation.

CONCLUSION: WHERE NEXT AFTER THE CURRENT TELECOMS-MEDIA-TECHNOLOGY DEPRESSION?

From the vantage point of 2003, amongst the dot-bomb wreckage, one can look at previous predictions of the development of DTV with new perspective. Marsden and Verhulst (1999) adopted a deliberately cynical approach towards predictions of the convergence thesis becoming a consumer reality, seeing EU policy being captured by incumbent telecom and broadcast companies whose approach was exceedingly incrementalist by the standards of dot-com euphoria then prevalent. What has changed since then to make even those cynical views appear ludicrously optimistic? Four separate factors: market, technology, consumer behaviour, and government policy.

Market

The market has reacted to the crash by punishing the earliest adopters of convergence strategies, digital cable and DTTV pioneers, notably: cable

operators NTL, UPC Chello and Telewest; DTTV consortia ITV Digital and Quiero TV; and pay-TV operators Canal Plus (Vivendi Universal) and Kirch. All were bankrupted or bailed out by senior debtholders in the period 2001-03. Arguably BSkyB's survival was not only due to the extremely conservative attitude of its chairman, Rupert Murdoch, but also to the pain it inflicted on its wholesale programming customers, the UK cable and DTTV companies above. The distress of the entire cable television sector was reflected in the destruction of UPC-Chello's share price jeopardising its entire broadband strategy, the difficulties of Deutsche Telekom's attempts to sell its cable network businesses to Callahan Associates or Liberty Media, and the pain of AOL-Time Warner's attempts to make any effective synergies between audiovisual content and narrow- or broadband access. Broadband roll-out was generally astonishingly slow, with local loop unbundling a disaster for entrants except in Denmark (Jensen, 2002), and it took until 2003 for aggressive incumbent broadband marketing to reinforce their dominance in narrowband access. By contrast, consumers in 2000-02, without a compelling DSL or cable offer, invested thousand of Euros in widescreen analogue television receivers, digital and analogue video cameras, digital still cameras and especially DVD players – but not DTV receivers.

Technology

Technological advances towards convergence also slowed in the period, though the huge processing and storage power of PCs began to significantly pressure Hollywood studios and especially record companies to advance digital rights management and streaming technologies, often in alliance with software companies, such as Microsoft, RealNetworks and even Napster, the partial P2P network bought by Bertelsmann in 2002. The Internet has allowed video capability to become a real consumer proposition in 2003, more so in Sweden, Japan and South Korea where multimegabit rates are available at prices affordable to consumers.⁹ DTV is therefore seeking markets in an environment where alternative paths to the home user are becoming a real possibility, at least for early adopters. This potentially splinters the television universe further than

⁹ The enormous decrease in costs of transporting and storing very large data files, including movies, will transform the economics of network transmission. Consider: in February 2003, users of the P2P network Direct Connect were sharing over a petabit of data, enough to store 1.5 million full-length films in DivX format; a 2-hour DivX film can be downloaded on a 512Kb/s connection in under an hour and stored on a CD-Rom; a 100Gb hard disk drive, standard issue in top-end PCs for home use, can store 150 movies; and, for MP3 digital music capacity, multiply the number of movies by 200. Sharing video programming over the Internet is no longer a theoretical possibility.

in information rich and poor television households, but into post-television households who choose entertainment from the Internet. If the Internet Protocol version 6 (IPv6), the next-generation Internet, is adopted successfully in the next decade, the user experience in the Internet will further approach the quality of television viewing.

Consumer Behaviour

For most users, the choices are satellite, cable or DTTV, even if the household budget is spent more on ‘peripherals’ (DVD players, broadband connectivity, PCs, video cameras). The competition is far broader than, say, in the 1960s, when households substituted television viewing for cinema attendance. The temptation to compare DTV with the introduction of colour suffers from too changed an environment, though it does at least permit the cynical observation that colour television took at least 20 years to finally replace monochrome in most states, and that DTV on that basis will entirely replace analogue in 2016-20. Where governments are taking analogue switch-off seriously, as in Germany and the US, the switchover to DTV is meeting significant obstacles from consumer preferences for either genuinely interactive digital platforms or ‘old’ analogue systems. The hybrid nature of DTV, with no return path on satellite or DTTV, means that consumers fail to see it as anything significantly advanced over analogue pay-TV.

Government Policy

Given the lack of apparent demand for the spectrum in the current depressed economic environment, there appears to be no overwhelming reason for governments to encourage the market to switchover, except as in Berlin, where only a million Euros will permit complete analogue switch-off, and where the spectrum is densely populated. However, the nationwide case for such a policy, whether in Germany or France or the UK, appears weak currently.

This raises the fundamental set of policy issues for the Information Society:

- if broadband Internet access is not hype for the majority of the population, should government concentrate its resources on DTV or on broadband access?
- given the slow take-up of DTV, is the answer that the ‘S’ adoption curve will arrive in the next five years or that it is not anticipated?
- is the industry now too fragmented to adopt an integrated path towards DTV, as it did with the transition from monochrome to colour?

- should government encourage competition among platforms and standards, or within those platforms?
- is digital cable, as the only truly interactive platform, the path that should be adopted?

An introductory chapter can only lay out these questions. It should always be remembered that competition policy for most sectors, and even for most sectors of the Information Society is less ‘pure’ in DTV than elsewhere – all these case studies will illustrate the special case of television. The political power of television and mass media gives special structural and relational power to the broadcaster, which they can be anticipated to use to boost the medium to the exception of more interactive media such as broadband Internet. The oxygen of publicity which broadcasters provide to democratic politicians, whether in commercial or PSB, or some hybrid of the two, is such that policy in this field often appears to be made in a bubble, separated from considerations of the wider Information Society. Rather than use these exceptions to discount policy-making in digital television, readers are encouraged to acknowledge that this uniquely powerful medium is central to the Information Society, whatever its exceptionalism. With consumers spending 70 per cent of leisure time in front of the dumb box, its use is a vital ingredient in analysis of the Information Society generally. The following chapters investigate the extent to which digital television regulation is indeed converging with regulation of other platforms in the Information Society, and in particular whether we can expect digital television to be just hype, or the future of interactive consumer access to the services and products offered in the Digital Age.

REFERENCES

Bangemann Report, 1994, *Europe and the Global Information Society*, Brussels, May, <http://www.cyber-rights.org/documents/bangemann.htm> (accessed 16.03.03).

Benkler, Yochai, 1998a, ‘Communications infrastructure regulation and the distribution of control over content’, *Telecommunications Policy*, vol. 22, no. 3, 183-196, <http://www.benkler.org/PolTech.pdf> (accessed 16.03.03).

Benkler, Yochai, 1998b, ‘Overcoming agoraphobia: building the commons of the digitally networked environment’, *Harvard Journal of Law and Technology*,

vol. 11, 287-400, <http://www.law.nyu.edu/benkler/agoraphobia.pdf> (accessed 16.03.03).

Benkler, Yochai, 1999, 'Free as the air to common use: First Amendment constraints on enclosure of the public domain', *New York University Law Review*, vol. 74, 354-446, <http://www.nyu.edu/pages/lawreview/74/2/benkler.pdf> (accessed 16.03.03).

Briggs, Asa, and Joanna Spicer, 1985, *The BBC: The First Fifty Years*, Oxford University Press.

Cave, Martin, 2002, *Radio Spectrum Management Review Consultation Paper*, an independent review for the UK Department of Trade & Industry and H.M. Treasury, March, ('The Cave Report'), http://www.spectrumreview.radio.gov.uk/2002review/1_whole_job.pdf (accessed 15.03.03).

Cave, Martin and Campbell Cowie, 1996, 'Regulating conditional access in European pay broadcasting', *Communications and Strategies*, vol.23, no. 3, 119-42.

CEC (Commission of the European Communities), 1989, Council Directive 89/552/EEC 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, http://europa.eu.int/eur-lex/en/consleg/main/1989/en_1989L0552_index.html (consolidated version with text of EC/97/33) (accessed 16.03.03).

CEC, 2002a, Eighth report on the implementation of the telecommunications regulatory package, COM(2002) 695 final, Brussels, December, http://europa.eu.int/information_society/topics/telecoms/implementation/annual_report/8threport/finalreport/annex2.pdf (accessed 16.03.03).

CEC, 2002b, Directive 2002/21/EC of the European Parliament and of the Council on a common regulatory framework for electronic communications networks and services, ('Framework Directive'), OJL 108, 24 April, http://europa.eu.int/information_society/topics/telecoms/regulatory/maindocs/index_en.htm (accessed 16.03.03).

CEC, 2002c, Directive 2002/20/EC of the European Parliament and of the Council on the authorisation of electronic communications networks and services, ('Authorisation Directive'), OJL 108, 24 April, <http://europa.eu.int/>

information_society/topics/telecoms/regulatory/maindocs/index_en.htm (accessed 16.03.03).

CEC, 2002d, Directive 2002/19/EC of the European Parliament and of the Council on access to, and interconnection of, electronic communications networks and associated facilities ('Access Directive'), OJL 108, 24 April, http://europa.eu.int/information_society/topics/telecoms/regulatory/maindocs/index_en.htm (accessed 16.03.03).

CEC, 2002e, Directive 2002/22/EC of the European Parliament and of the Council on universal service and users' rights relating to electronic communications networks and services ('Universal Service Directive'), OJL 108, 24 April, http://europa.eu.int/information_society/topics/telecoms/regulatory/maindocs/index_en.htm (accessed 16.03.03).

CEC, 2002f, Directive 2002/58/EC of the European Parliament and of the Council of 12 July 2002 concerning the processing of personal data and the protection of privacy in the electronic communications sector ('Directive on Privacy and Electronic Communications'), OJL 108, 24 April, http://europa.eu.int/information_society/topics/telecoms/regulatory/maindocs/index_en.htm (accessed 16.03.03).

CEC, 2002g, Decision no. 676/2002/EC of the European Parliament and of the Council of 7 March 2002 on a regulatory framework for radio spectrum policy in the European Community ('Radio Spectrum Decision'), OJL 108, 24 April, http://europa.eu.int/information_society/topics/telecoms/regulatory/maindocs/index_en.htm (accessed 16.03.03).

CEC, 2002h, Communication of the Commission to the European Parliament, the Council, the Economic and Social Committee and the Committee of the Regions, *eEurope 2005: An information society for all*. COM(2002) 263 final, Brussels, May, http://europa.eu.int/information_society/eeurope/news_library/documents/eeurope2005/eeurope2005_en.pdf (accessed 16.03.03).

Coase, Ronald, 1950, *The BBC: A Study in Monopoly*, Longmans Green, <http://coase.org/coasepublications.htm> (accessed 16.03.03).

Cowie, Campbell and Christopher T. Marsden, 1999, 'Convergence, competition and regulation', *INFO*, no. 1, 53-66.

Creigh-Tyte, Stephen W., 2000, *The Impact of a Digital License Fee on Digital TV Adoption: An Assessment*, Department of Culture, Media and Sport, Technical Paper no. 1, London, February, <http://www.culture.gov.uk/pdf/dlic.pdf> (accessed 16.03.03).

Davies, Gavyn and Andrew Graham, 1997, *Broadcasting, Society and Policy in the Multimedia Age*, University of Luton Press.

Economist, The, 2003, 'The complete home entertainer?', 1 March, 64-66.

Fallenböck, Markus, 2003, 'On the technical protection of copyright: the Digital Millennium Copyright Act, the European Community Copyright Directive and their anticircumvention provisions', *International Journal of Communications Law and Policy*, no. 7, http://www.ijclp.org/7_2003/ijclp_webdoc_4_7_2003.htm (accessed 16.03.03).

Feintuck, Mike, 1999, *Media Regulation, Public Interest and the Law*, Edinburgh University Press.

Gibbons, Thomas, 2000, 'Pluralism, guidance and the new media', in Christopher T. Marsden (ed.), *Regulating the Global Information Society*, Routledge, 304-15.

Grünwald, Andreas and Christoph Wagner, 2003, 'DTV update: Berlin area completes switch-over by mid 2003', *International Journal of Communications Law and Policy*, issue 7, http://www.ijclp.org/7_2003/ijclp_webdoc_11_7_2003.htm (accessed 16.03.03).

Hugenholtz, Bernt, 1996, 'Copyright and multimedia: licensing in the digital era', in Santiago Muñoz Machado (ed.), *Derecho Europeo del Audiovisual*, ELE, 1393-1404.

Humphreys, Peter, 1996, *Mass Media and Media Policy in Western Europe*, Manchester University Press.

Italy: AGCOM, 2000, *Il libro bianco sulla TV digitale terrestre*, http://www.agcom.it/provv/libro_b_00/librobianco00.htm (accessed 15.03.03).

Jensen, Neils Erik, 2002, 'Interview with Martin Sims', *Intermedia*, <http://www.iicom.org/intermedia/login.html> (accessed 15.03.03).

Larouche, Pierre, 2001, 'Communications convergence and public service broadcasting', <http://infolab.kub.nl/uvtweb/bin.php3?id=00011353&mime=application/pdf&file=/tilec/publications/larouche2.pdf> (accessed 15.03.03).

Levy, David A., 1997, 'Regulating digital broadcasting in Europe: the limits of policy convergence', *West European Politics*, vol. 20, no. 4, 24-42.

Levy, David A., 1999, *Europe's Digital Revolution: Broadcasting Regulation, the EU and the Nation State*, Routledge.

Libertus, Michael, 2001, 'The EU regulatory framework for electronic communications and the Commission's proposal for a decision on a regulatory framework for radio spectrum policy in the Community', *International Journal of Communications Law and Policy*, no. 6, http://www.ijclp.org/6_2001/pdf/ijclp_webdoc_10_6_2001.pdf (accessed 16.03.03).

Liikanen, Erkki, 2002, 'Convergence and the information society', speech at the Conference on Media Convergence: Opportunities for a Closer Relationship between Europe and the Americas, Madrid, 13 May, http://europa.eu.int/comm/commissioners/liikanen/media/speeches/text_en.htm (accessed 16.03.03).

Malone, John, 1997, 'The multimedia revolution was just hype', *Broadcast Magazine*, London, 2 January, 10.

Marsden, Christopher T., 1999, 'Pluralism in the multi-channel market: suggestions for regulatory scrutiny', *International Journal of Communications Law and Policy*, no. 4, http://www.ijclp.org/4_2000/pdf/ijclp_webdoc_5_4_2000.pdf (accessed 16.03.03).

Marsden, Christopher T., 2000, 'Not so special? merging media pluralism with competition and industrial policy', *INFO*, vol.2, no. 1, 5-13.

Marsden, Christopher T., and Stefaan G. Verhulst, 1999, *Convergence in European Digital TV Regulation*, Blackstone Press.

McGonagle, Tarlach, 2001, 'Changing aspects of broadcasting: new territory and new challenges', *IRIS plus*, no. 10, December, http://www.obs.coe.int/oea_publ/iris/iris_plus/iplus10_2001.pdf.en (accessed 16.03.03).

Motta, Massimo, and Michele Polo, 1997, 'Concentration and public policies in the broadcasting industry: the future of TV', *Economic Policy*, no. 25, 295-334.

Negroponte Nicholas, 1995, *Being Digital*, Hodder and Stoughton.

Noam, Eli M., 2000, 'Future cyber trade wars', in Erik Bohlin *et al.* (eds.), *Convergence in Communications and Beyond*, Elsevier Science.

Noam, Eli M., (ed.), 2003, *Television over the Internet: Implications for Networks, Infrastructures, Strategy, Policy and Content*, Lawrence Erlbaum.

Nolan, Dermot, 1997, 'Bottlenecks in pay TV: impact on market development in Europe', *Telecommunications Policy*, vol. 21, no. 7, 597-610.

Samuelson, Pamela, 2000, 'Five challenges for regulating the global information society', in Christopher T. Marsden (ed.), *Regulating the Global Information Society*, Routledge, 316-30.

Smith, P., 1999, 'The politics of UK TV policy: the introduction of digital TV', presentation at Workshop 24, Regulating Communications in the 'Multimedia Age', European Consortium of Political Research, March.

Sutton, John, 1991, *Sunk Costs and Market Structure: Price Competition, Advertising, and the Evolution of Concentration*, MIT Press.

United Kingdom: Department for Culture, Media and Sports, 2001, *Digital TV Action Plan*, http://www.digitalTV.gov.uk/pdfs/draft_digital_TV_action_plan.pdf (accessed 15.03.03).

Ungerer, Herbert, 2002a, 'Converging technologies and regulations: broadcasting, datacasting, communications', speech at 23rd ETP Plenary Session, Brussels, 19 September, http://europa.eu.int/comm/competition/speeches/text/sp2002_031_en.pdf (accessed 16.03.03).

Ungerer, Herbert, 2002b, 'Media in Europe: media and EU competition law', speech at the Conference on Media in Poland, Polish Confederation of Private Employers, Warsaw, 13 February, http://europa.eu.int/comm/competition/speeches/text/sp2002_006_en.pdf (accessed 16.03.03).

Veljanovski, Cento, 1999, 'Competitive regulation of digital pay TV' in John Grayston (ed.), *European Economics and Law*, Palladian Law Publishing, 53-85.