

Access to Public Broadcasting Services across National Digital Delivery Systems

By

Ronan Callanan, B.Sc.

Submitted for the Degree of
Master of Arts

Presented to
Dublin City University

Research Supervisor

**Professor Farrel Corcoran,
School of Communications,
Dublin City University**

September 2001

I hereby certify that this material, which I now submit for assessment on the programme of study to the award of M A in Communications, is entirely my own work and has not been taken from the work of others save and to the extent that such work has been cited and acknowledged within the text of my work

Signed L. Gallanar

ID No 98970860

Date 24/09/01

Acknowledgements

I would like to thank the following people for their help throughout this project

- Farrel Corcoran, my research supervisor
- My friends and family, in particular Mam, Elizabeth, Kevin, and Paul for their huge support
- RTE and Esat Dıgıfone for their scholarship funding
- The individuals who agreed to an interview

INTRODUCTION

Introduction	1
Methodological Approach	2
Television	3
Convergence	5

CHAPTER ONE *Public Broadcasting*

Introduction	11
Public Sphere	12
Broadcasting and the Public Sphere	15
Public Sphere and Television Content	20
Separation of Content and Infrastructure	
Regulation	24
Conclusion	30

Diagrams

Figure 1 Development of Analogue Terrestrial Television	32
Figure 2 Development of Digital Media Services through the Digital Terrestrial Platform	33

CHAPTER TWO *Technological Barriers to Digital Broadcasting*

Introduction	34
Being Digital	35
Access to Transmission Signals	39
Access to Content through the Set-Top Box	47
Conclusion	55

Diagrams	
Figure 3 Development of Digital Broadcasting across all Platforms The Necessary Variables	58
Figure 4 Possible Digital Media Services to the Household	59
Figure 5 Current DVB-T Platform Operators in European Union	60
Figure 6 Comparison between Ireland and Launched DVB-T Platforms in European Countries	61
Figure 7 Internet Access Speeds to the Home	62
Figure 8 Possible Interactive Broadcasting Options	63
Figure 9 Development of iDTV sets across Digital Terrestrial Broadcasting	65

CHAPTER THREE *European Policy on Convergence*

Introduction	66
Broadcasting	67
Telecommunications	75
Digital Media and Telecommunications	82
Conclusion	88

Diagrams

Figure 10 Global Alliances and Mergers	92
---	----

CHAPTER FOUR *National Policy on Terrestrial Broadcasting*

Introduction	94
RTE	95
Proposed Broadcasting Bill (1999)	102
Broadcasting Bill Impact on ‘must carry’ of Digital Services	111
Conclusion	116

Diagrams

Figure 11 Broadcast Delivery Systems in Ireland	120
Figure 12 Telephone Subscriber Networks	123
Figure 13 Chorus Communications	125
Figure 14 Multiplex Breakdown for Irish Digital Terrestrial Platform	126
Figure 15 NTL	127
Figure 16 Main Players in Digital Broadcasting in Ireland	128

CHAPTER FIVE *ODTR Regulation*

Introduction	129
ODTR and Digital Terrestrial Broadcasting	130
Multiplex Access to the Fixed Line Network	136
Multiplex Access to the Cable Distribution System	143
Conclusion	146

Diagrams

Figure 17 Digital Terrestrial Broadcasting Developments in EU Countries	150
Figure 18 Eircom	153
Figure 19 Esat Telecom	154

CONCLUSION	155
------------	-----

APPENDIX

Glossary	169
Main Convergence Developments in Ireland	171
List of Individuals Interviewed	176
List of Individuals Unavailable for an Interview	177
Sample Lists of Questions from Interviews	178
Bibliography	187

Introduction

Traditionally broadcasting and telecommunications have been regarded as completely separate sectors. Broadcasting as a transmission system was inseparable from the broadcast content. Alternatively, telecommunication networks were the sole providers of voice and basic data telephony services. But as technology developed and both markets began to offer similar services, the regulatory dividing lines between Internet, broadcasting and telecommunications services have begun to blur. Broadcasting as a transmission system is becoming detached from the broadcast content. Even though these markets are technically converging the issue of access to content and the licensing of content providers over these new delivery platforms to carry their services remain unresolved. The liberalisation of both markets may make a significant difference to the production of content and the access of such programming content to pay-television and Free-to-Air viewers.

The transmission of similar services over previously distinct delivery systems has been categorised as convergence. This term is generally considered as a suitable representation of the hazy combination of different broadcast and point-to-point services that were once considered the domain of the telecommunications incumbent. Equally, the broadcast network was considered an indispensable part of the public broadcasting organisation in its provision of a single content service such as television programming. Today, digital technology and the liberalisation of the cable and telecommunications networks have allowed multiple content service providers to offer many different services over several networks.

Such technological convergence is delivering different services within each network. In the past, the analogue broadcast relationship involved the content provider, network operator and customer. Now, there are additional market players between the customer and the network operator called service providers who control different parts of the downstream and upstream dynamics. This paper hopes to highlight the potential impact of telecommunication liberalisation on broadcasting as network operators begin to

provide video and broadcast services while broadcast network operators transmit unicast and point-to-point services alongside their traditional broadcast service

Methodological Approach

In the research achieved during the last two years, my research methodology was based on both primary and secondary activities. There was analysis of the technological developments of both broadcasting and telecommunications industries such as the multiple delivery methods for the provision of media and telecommunication services to each household. By analysing national policy papers, media sources, trade magazines, and the experiences and opinions of the main strategy makers within communications companies, it was possible to highlight key findings on the future impact of the broadband¹ telecommunication networks on digital television services provided by the national broadcasting sector.

Due to the nascency of this topic and the lack of detailed research on the digital terrestrial platform, and indeed the place of public broadcasting within this arena, interviews have provided access to important responses in relation to the immediate regulatory issues and practical obstacles facing these new digital platforms and hardware services. Secondary research encompassed e-mail questionnaires and face-to-face interviews with a standard open-ended questions and answers format. These interviews provide more clarity on the main issues surrounding the development of the digital terrestrial platform and the role of the European Commission and national regulatory authorities in the converging area of broadcasting, telecommunications and computing.

The thesis includes a representative sample of interviews with personnel working in the academic, broadcasting regulatory, consulting, telecommunications, government and new

¹ I intend to use the European definition of broadband as 'applied to high speed telecommunications systems, e.g. those capable of simultaneously supporting multiple information formats such as voice, high speed data service and video services on demand' via a single digital bitstream. Broadband services can be placed in narrowband networks as long as the bandwidth capacity, using data compression, is limited to 2Mbps. A broadband network over a cable platform is able to transmit more than 10 Mbps for similar

media fields A list of individuals who agreed to be interviewed, as well as those who declined a meeting, has been listed in the Appendix Observational experiences during the interviews were noted and included in the transcribing of quotes in order to provide a more comprehensive understanding to the interviewees response

Television

Analogue terrestrial television is a one-to-many, linear broadcasting network The traditional broadcaster network operator who controlled access to the viewer's television screen was also the main programme maker From the 1960's, such Free-to-Air services were the sole distribution medium in the country for the transmission of national and indigenous programming These services were universally available to the general public within the public broadcasting remit of the national broadcasting organisation

For Williams (1974) the transmission technology logically came before television content Programming was seen as 'by-products of technology' whereby all that was required of the viewer was the purchase of a television set to view the content (Williams, 1974 29) Through a gradual process of service innovation and public demand, television transmission and reception, and content programming became inter-related As a technology based medium, all terrestrial broadcasting services were dependent on their proprietary transmission technology to translate these analogue signals into a programme to be viewed by a standard television receiver device The purchase of a television set and antenna was an essential prerequisite to signal reception This bond remained unchanged up to the arrival of new retransmission networks capable of providing similar services over different delivery systems to each household

But television has been regarded as more than a technology based information system Television became a part of national culture as services and programmes were created to meet the demands of the viewer and citizenry Television became acknowledged as

services, including digital television and on-line services (Commission of the European Communities, 1999b Annex III,61)

playing a dominant role informing, influencing and entertaining the public and society For Williams (1974), television is both a hybrid technology and cultural entity This has remained the case over the years as the popularity and success of television has transformed it into the most influential and dominant mass medium in society

Since the 1990's, new broadcasting paradigms have begun to adapt to the traditional broadcast experience The development of digital broadcasting services and the separation of content services have begun to transform such linear terrestrial networks into asymmetrical broadband distribution networks Cable, satellite and telecommunication networks are also evolving into comparable broadband networks with varying degrees of platform interoperability and two-way connectivity These changes have been coupled with the liberalisation of the telecommunication and cable sectors to provide a new range of broadcast services branded as 'digital television'

Digital television enables the supply of additional television channels of superior audio and video quality It is transmitted as one component in the provision of communication services delivered to the home thorough various telecommunication networks Digital television consists of a digitised and compressed television signal that is delivered over various platforms and then converted back to a video signal on a television or computer that can receive it in a digital form It is more of a technical misnomer than a comprehensive term for a wide selection of services that include multichannel television, Internet, data and voice telephony communications

In the short term, the benefits and disadvantages of each delivery platform will depend on the chosen transmission network and its set-top box capabilities The method of transmission made available by the network provider for the content providers will determine the range of services carried over each delivery system For instance, digital terrestrial broadcasting will have a finite selection of subscription and pay-per-view services, including its Free-to-Air offerings, due to spectrum limitations However, its interactive services may become compatible with rival platform operators' Set-Top

Boxes (STB) in order to provide a public selection of additional two-way and Internet-type services

This highlights each network operator's preference for proprietary box decoder receivers. Such decoders will allow for greater control in the downloading of information and interactive services. They may also provide access for the consumer to their gateway preferences such as their Conditional Access Services and Electronic Programme Guides provided by the network operator.

Of course, it may not be in the networks commercial interests to supply competing services from independent service providers. Such third party service providers will depend on the network operator for supplying their gateway services over their network and to each household on a fair, reasonable and non-discriminatory basis.

Convergence

The idea of convergence between traditionally separate industries can be traced back to attempts in the USA to provide telegraph and telephone services over the same network since the early 1870's. But from 1948, the bandwidth capacity of the telecommunications system has steadily increased with the application of digital technology to telephony services and the introduction of a more efficient management of bundled data and telephony services (Winston, 1998: 134).

It was not until 1995 with the rising popularity of the Internet, that the computer, media and telecommunication industries began to merge. The rapid development of digital compression technology, along with international telecommunication deregulation and standardisation saw a renewal in the concept of all delivery systems providing the same variety of broadcast, data and telephony services. The vision slowly developed away from a technical determinist view of the computer network and towards the coming together of the mass media networks, whose main asset is content, and

telecommunications, which provided point-to-point communication technology and was not content regulated

While Collins (196 247) believes that consumers are more interested in services than the detail of how these services are delivered, this claim is often based on the assumption that all delivery systems can provide similar content to the whole of the population

Transmission and reception technology can also be used to prevent the viewer from accessing Free-to-Air or universal broadcasting services via their chosen delivery networks and decoder set-top boxes Non-subscription consumers can be denied access even to basic communication and information resources deemed imperative for equal social and economic participation in society via that most widely used and relied upon mass medium, the television set

I hope to show how content and access both play an important role in infrastructural developments across all delivery systems Equally, infrastructural developments are crucial to the development and innovation of new digital services as the broadcast and telecommunication network operators attempt to attract viewers away from their analogue service to the digital domain Access to content will be dependent on the ability of services to be delivered and made readily accessible to the viewer in a technologically neutral manner across all digital platforms For the viewer and the citizen to receive all public digital services, these services will have to be accessible thorough all set-top-boxes or integrated digital television sets, regardless of the delivery system The separation of content regulation from infrastructure regulation will be a significant development in the regulation of the terrestrial platform But the availability of digital public broadcasting multiplex services across all networks has yet to be adequately guaranteed

The liberalisation of the telecommunications market has not yet had an extremely significant impact on the Irish broadcast sector However, the recent Office of the Director of Telecommunications Regulation (ODTR) consultation paper (2000a) on the licensing of broadcast services over the broadband asymmetrical digital subscriber lines (ADSL) network, which is a traditional twisted copper pair network, has highlighted the

potential of telecommunication networks to provide multichannel services as part of a wider selection of telephony, and Internet services. According to Clancy (RTÉ)², Eircom is 'actively trying to negotiate carriage of RTE' over its ADSL network. Equally, broadcasters are capable of providing multichannel services with voice telephony, data and Internet over the terrestrial broadband network. The terrestrial platform is becoming less of a broadcast network because of its ability to carry a variety of broad and unicast services over the universally accessible spectrum. Telecommunications and broadcasting services are converging into a single market.

Therefore, chapter one explores the work of Habermas in providing a theoretical framework for the role of public broadcasting within civil society. This deals with the importance of public service broadcasting in the provision of informational and cultural services to citizens. Since the public broadcasting ethos has had a significant impact on the regulation of the terrestrial network, this chapter will explore the main principles of market failure as telecommunication networks re-position themselves and as the infrastructural network operators and commercial broadcasters challenge the legitimacy of the public service remit. I hope to show how digital public services will require an equitable and non-discriminatory level of network, content and access control for its digital and interactive services across all platforms.

Another vital element in the traditional control of public broadcasters over the distribution network is the analogue issue of spectrum scarcity. Until now, the broadcast infrastructure has been regarded as a vital component in the terrestrial broadcasters' remit. Traditionally, the terrestrial broadcasting platform was an intrinsic part of delivering public broadcasting services. This was supported through licence fee investment in order to provide a universal service that was transmitted and made accessible to the general public. The launch of multiple delivery systems has seen the special consideration given to the terrestrial broadcast infrastructure diminish substantially.

² In conversation with Neil Clancy, Head of Interactive Services Unit, RTE, October 2000

Chapter two examines the development of main digital broadband delivery networks. In the past, the relationship between the viewer and the terrestrial broadcaster was relatively straightforward. For Free-to-Air broadcasters, spectrum capacity and the television receiver set were regarded as the main prerequisites for entry into each household. With the advent of multiple digital platforms, new electronic gateways will by-pass the role of the traditional terrestrial broadcaster to engage directly with the consumer. This allows telecommunication and cable operators to enter the broadcast market via control of conditional access and interactive services. This chapter examines the main issues facing access to digital terrestrial content and the fragmentation of digital services across each infrastructure. Multi Microwave Distribution (MMD) is noted as a wireless system equivalent to the cable operators network and as such, it will be associated with the cable network operator.

Chapter three examines the development of digital broadcasting services as they progress across the European policy front. Broadcasting policy is beginning to be absorbed into the regulatory and infrastructural environment of telecommunications under the Directives of the European Information Society Commission. The experience of telecommunication economies of scale and scope are allowing pay-television cable and telecommunication operators to conglomerate digital television, telephony and Internet services rather than develop them as independent service sectors. This integration across content producers, infrastructural networks and gateway software administrations could prevent network access for non-vertically aligned commercial and public broadcasters. In the case of public broadcasters, regulatory policy is forcing them to separate their network division from their content production while global media and telecommunication operators are creating international multi-media vertical alliances. For the European Commission, terrestrial broadcasting should be regulated as another technologically neutral transmission system similar to cable, satellite and telecommunication delivery systems.

Chapter four explores the progress of the national terrestrial delivery platform and the impact of the Broadcasting Bill published in 1999. It explores the problems confronting

the development of interactive services across the terrestrial network. Due to the technological restrictions of the terrestrial spectrum and the regulatory obligations surrounding the terrestrial platform, the provision of low powered two-way interactivity is limited. Public broadcasting may also find a role in the provision of interactive and enhanced information services to digital viewers across all transmission networks. This chapter asks whether it is possible to maintain public service principles within the creation and delivery of interactive services. It will be important to acknowledge broadcasting as a two-way network in the provision of digital services.

The last chapter examines the role of the Office of the Director of Telecommunications Regulation (ODTR) in the implementation of digital broadcasting services. Rollout will be crucial to the potential success of digital broadcasting services across all platforms. For the ODTR, the blurring of broadcast and telecommunication services into a 'single bitstream' to be received by a single decoder receiver is the ultimate objective of convergence. Although each delivery system may be defined relative to their technical and service abilities, the ODTR approach is to view each platform in a similar manner. For the Digital terrestrial television network (DTT) operator to provide bundled services similar to cable operators and, potentially, telecommunication operators, clear regulatory action will be required of the ODTR. This may occur by 2004, which is the date set for the cable licensing regime to be renewed. For network operators, digital broadcasting services are not solely related to content but will incorporate a high-speed network infrastructure providing a television portal with telephony and Internet access. The challenges for the ODTR will be to regulate bandwidth across all delivery systems and ensure that there is a fair and non-discriminatory process in place for all service providers, across incumbent or dominant network operators and their gateway services.

This paper deals with cable, which includes MMDS, telecommunication and terrestrial networks as they are liable to national regulatory obligations unlike satellite broadcasting which is the responsibility of the 'Television Without Frontiers' Directive, 1989.

In the broadband era, services that are currently free, widely accessible and paid by the licence fee will continue to be available across all digital delivery systems. But new digital services, created from public funds, may not be accessible to the same general public. Open network gateway services may produce more revenue for digital public service programming. As access to services turns into a commodity form, the challenges for regulators will be to shape a fair and reasonable procedure of access equality for all service providers and citizens across all distribution platforms. Similar regulated access to electronic gateways installed in the proprietary set-top box or standard integrated digital television set will also be necessary.

CHAPTER ONE

Introduction

Broadcasting has become the most effective communications source for the transmission of information to the public. A reflection of that importance can be gauged by the rise in the number of channels launched in Europe during the 1990's. Television stations have increased from 104 to 659 between 1990 and 1998 with an expected number of more than 1000 broadcast channels by the year, 2000 (Communication from the Commission to the Council, 1999). The average Irish adult, like their European counterparts, watches over 3 hours of television every day. Broadcasting holds a crucial position in society as the most popular mass medium used by the majority of the population to access news, entertainment, and information. It provides a vital public communication network for the dissemination of political and economic concerns of society.

This chapter will provide a general overview of the role of the public sphere within digital broadcasting and in the provision of television based interactivity. In the past, public ownership has been a crucial element in the transmission and accessibility of public broadcasting services. By paying a licence fee and purchasing a basic television reception antenna, an individual is automatically able to receive a limited number of Free-to-Air television channels. These terrestrial channels provide both commercial and public broadcasting services. Chapter one will explore the challenges facing public broadcasting as digital terrestrial television develops into a telecommunications network.

Viewers using one digital delivery system, like cable, may be refused access to a wider range of public Internet and broadcasting services on another distribution system, such as terrestrial. If the citizen cannot access these services over all platforms, they may lose out on full and active participation in social and cultural activities that have national significance. It is by examining the work of Habermas, and the importance of the public sphere, that an argument can begin to be made regarding equitable access of public broadcasting content across various distribution means.

Beginning with Habermas, early mass media communications systems will be shown to have played a significant role in advancing the principles of freedom of expression and right of access to public information. Such entitlements are considered a vital cornerstone to the daily functions of a modern democracy. Citizens can make informed choices about their political opinions through news and information services provided by television production organisations. This chapter will provide a general overview of the role of the public sphere within the ecology of broadcasting. It will ask whether public service broadcasting via state subsidisation will be relevant amongst the plethora of new digital transmission and reception technologies. Can the public sphere be maintained in the provision of digital media services to each consumer? Will public broadcasting continue to play a role in providing a more citizen-oriented alternative to commercial media services? This chapter examines the potential role of a revitalised modern public sphere as it relates to digital broadband services.

Public Sphere

The work of Habermas has been used to examine the development of mass media in society. Habermas's early work in 'The Structural Transformation of the Public Sphere' (1989) first expressed the notion of a public sphere through the activities of the print media. The book proffered an historical examination of the rise and fall of a public sphere created from the growth of the bourgeois society and the market economy.

According to Habermas, the development of the market economy during the seventeenth century created a new professional, salaried and white-collar group of workers. Called the middle class, they began to scrutinise the traditional power of the governing elite, such as the clergy and aristocrats. Meeting places sprang up around coffee shops and in people's homes to allow like-minded individuals to discuss political issues and other topics of economic and social relevance. These social meetings would nurture new expressions of opinion for each individual. They became a social venue where private individuals could publicly debate issues of national and social significance. When these debates achieved a

form of private consensus, a more measured public form of mass opinion-making emerged to challenge the status quo of the ruling classes and national institutions

These social or meeting spaces were separate from any state institution and social organisation, where 'private people gathered together as a public and expressed the needs of society' (Habermas, 1989 175-176) It was a realm or an arena for dialogue between individuals who had privately expressed a willingness to learn and develop their own opinion on a wide range of matters which they believed impacted on their lives, both culturally and economically Habermas regards this space as 'a realm of our social life in which something approaching public opinion can be formed Access is guaranteed to all citizens' (1997 116) In effect, the public sphere was not a physical public space or a specific location but a transient gathering for the collection and sharing of views, reactions and information The goal of equitable access to this social realm for all individuals is an essential condition to the healthy operation of a vibrant and egalitarian public sphere

The motivation for the bourgeoisie to persist in becoming a recognised and accepted voice was partially due to their sense of exclusion and disenfranchisement from the political process of the time The creation of this social realm or public sphere encouraged such individuals to foster a direct form of mass opinion from this social vacuum The bourgeois demanded equal participation in their governance along with a degree of fair and reasonable access to the pillars of authority

Over a period, this public sphere became a popular means for the exchange of information on economic, political and social issues As this bourgeois public realm grew, the newspaper industry began to broaden the reach of the public sphere beyond the coffee houses and into the wider society This ensured an increased dissipation of information to the general public Newspapers became the first mass medium for the widespread publication of such alternative viewpoints As the bourgeois public sphere grew, the newspaper industry also flourished Newspapers became a formidable expression of the public criticism of the ruling authorities through which private opinions

were transformed into public opinion. The early press soon appeared as the vanguard of new political issues originating from the public sphere. Financial independence and public support allowed newspapers to critically expose the failings of the state and its rulings. Such behaviour began to influence public policies and impact directly on state administration.

At the same time, government actions became more sensitive to public criticism and negative exposure. These state institutions and commercial companies decided to play a more active role in the public sphere and circulated their own public sphere missives. They were filled with opinions and social debate concerning their own perspectives. Private organisations, like newspaper owners and public relation firms, became financed by government organisations to influence the views of the public. Other organised bodies, such as trade unions, began to represent specific social and business groups that negotiated with the government to the benefit of their own private interests. As these events unfolded, the vestigials of the public sphere outside the persuasion of state agencies eventually collapsed.

In its place, regulation and competition rules were introduced to the press industry as the state actively monitored the development of public opinion via media reportage. The commercial success of the rapidly growing sector led to the merger of the smaller newspapers into national daily newspapers. These national papers chose to use their authority to control the impact of public opinion on government institutions rather than encourage the development of public opinion and public debate. The behaviour of the national press favourably strengthened their relationship with ruling powers whilst diminishing the dynamic of the public sphere across all social classes. Overall, this recreation of the public space isolated the individual from any political interests and directed the citizen towards the attractions of a passive mass culture of consumerism and 'apolitical sociability' (Calhoun, 1992: 24).

In retrospect, the main concept behind Habermas's public sphere was that it directly encouraged the participation of the individual in public life. Although it has many critics,

the public sphere has been accepted as a conceptual and inspirational model based on public service values in society (Calhoun, 1992, Dahlgren, 1995, Schudson 1997, and Garnham, 1983) In a democracy, the public sphere provides each citizen with equal access to quality and communal information resources for public participation. The public domain is outside of the commercial pressures of market forces and corporate agendas. It offers a basic level of entry to cultural and economic debate in society. In this context, access to quality information is essential to the formation of public opinion and cultural identities.

Broadcasting and the Public Sphere

Today, broadcasting is the most influential symbol of a modern public sphere. It has become the electronic agora of mass communications, providing an open and transparent forum for political debate on current affairs. It can provide the means of access to political information that represents and reflects the diversity of public and private opinion. Early public service television, in particular, concentrated on high cultural and educational programming that originated from public sector funds. According to Golding and Murdock, public service television represents a 'general [neo-Habermas] ideal of a communication system as a public cultural space that is open, diverse, and accessible, [and] provides the basic yardstick against which critical political economy measures the performance of existing systems' (Golding and Murdock, 1991: 22). Without the control of the infrastructural network, this civil right of access to this cultural space would be abandoned in the array of commercial offerings.

Just as every household possesses a television set, media services provided over the public terrestrial transmission network were considered an essential prerequisite to each person being part of a communications mediated society (Murdock and Golding, 1995). As the public sphere of the twentieth century, television provided the public with a medium that offered citizens the means to participate in society. The establishment and maintenance of the terrestrial transmission network and the creation of public television programming, ensured public access to at least one transmission network and its offerings.

as 'more of public life and national decision-making [was] played out in the media' (Jakubowicz, 1994 83)

The concern for broadcasting independence impacted greatly on the public sphere's ability to provide credible, apolitical debates that were removed from the interests of government authorities or commercial conglomerates. Broadcasting aspired to offer each individual a 'unitary public sphere' for the foundation and expression of public opinion on political, social and cultural issues (Curran, 1997 136). Notwithstanding the issue of spectrum scarcity, the success of the terrestrial network was equally dependent on its ability to provide a truly universal service for all.

From the 1970's onwards, the liberalisation and deregulation of former state monopolies across Europe made possible an increase in commercial terrestrial broadcasting stations. The adoption of free market ethics on former state-owned institutions slowly redefined the public sphere. For Dahlgren, this process of privatisation of new and traditional media delivery systems, and services which they carry, lead to the 'deconstruction of concepts of a public citizenry' (1991 12). The further privatisation of the public sphere was represented in the increased fragmentation of the television audience. It created an industry more accountable to the economic interests of the network owners and advertisers than its viewers. In turn, the effect on the production of news and educational and documentary services was substantial. Programmes were made to respond to the interests of the marketplace rather facilitate the expression of the free and equitable public debate.

Alternatively, the further commodification of information and entertainment indicted a subscription society dependent on the economic ability to pay. Based on the history of the mass media, Jakubowicz (1994) believes that the people who have gained the most, economically and culturally, are those already using new technology and not the wider social community. While subscription television and new media services will be affordable to a segment of society, the sense of national cohesion declines because of the cultural disenfranchisement of a substantial section of the population. The notion of equal

access is quickly abandoned and replaced by a depoliticised consumer culture. Melody (1990) agrees that pay television and new media services will be paid for by better educated, informed, richer individuals with no need for public services or who are unaffected by decreased public services. By reducing the need for public services, the more affluent are less affected by this cultural deficit. The common ground of identity becomes predominantly more exclusive as the public sphere becomes a citadel of private communication services. Therefore a sense of public ownership of media networks was essential to ensure a genuinely open, transparent, and accessible cultural space for all.

Collins (1993) takes a different perspective on the function of public ownership in mass media industries. Privatisation of the public sphere by the market can have positive effects on public service media. Collins writes that nowhere in Habermas's work does it 'specify that public ownership of the media is incompatible with a well functioning public sphere – as the privatisation of society was the means whereby a public sphere came into existence' (1993: 251-2). Even though Habermas considered electronic mass media as less intellectual to the print media for advancing the ideals of the public sphere, Collins (1993) applied the concept of the public sphere³ within the mixed Free-to-Air and subscription market and the public service broadcasting system in the UK.

In this instance, the ideals of British public service broadcasting were quite different to the Habermas concept of the public sphere as applied in its defence. These ideals placed almost total emphasis on a sense of cultural paternalism and unaccountable authoritarianism that was blended with an educational ethos. However, with the advent of digital technology and increased free market networks, Collins does suggest a possible neo-Habermas influence on the benefits of public funding in providing an added relevancy to public service values in this new broadband environment. The recognition of need for state subsidisation is a necessary ingredient to the future of public television.

³ Collins (1993) prefers the translation of 'public forum' to 'public sphere' of Habermas's term *Öffentlichkeit*.

Garnham (1983) contends that the competitive marketplace cannot provide equality in a manner similar to public service media. As commercial broadcasters are primarily accountable to their shareholders and advertisers, they cannot provide a truly open and accessible social sphere for each citizen. Instead, the rhetoric of the advantages of the free market guided by independent regulators is merely a cover for the creation of global communication oligarchies.

However, the liberalisation of the broadcasting and cable markets has seen significant expansion of commercial terrestrial channels. The free market belief is that commercial companies can provide the public with a level of information and cultural content that reflects their own shareholder agenda. A recent KPMG report, entitled 'Public Policy Issues Arising From Telecommunications and Audiovisual Convergence' (1996), stated that the demise of traditional public service support among the general public would be triggered by the arrival of multiple forms of digital delivery platforms. As convergence removes the spectrum scarcity issue, the audience for public broadcasting may also become limited as more services 'provide an alternative means of meeting paternalist objectives' (KPMG, 1996: 208). The report suggests that rather than a government re-examination of its interventionist role in public broadcasting, it should consider 'commissioning or producing cultural products on the open market' (KPMG, 1996: 212). This policy paper deemed public broadcasting as being indefensibly supported by public funds to compete unfairly with commercial television channels who have no similar guaranteed revenue resource.

This KPMG (1996) extract provides a liberal definition of public service broadcasting. Public broadcasting deliberately competes with commercial channels for high audience ratings in order to maintain their state funding. This creates an unfair competitive advantage because the public broadcasters can optimise audience ratings with a mixture of national and imported television content. The KPMG (1996) report assumes that viewers do not consider public service content as a superior media source to commercial news and production companies. In a similar paper assessing market consolidations across broadcast and telecommunications networks, Watson and Schoof (1995) suggest

that future public service funding should be granted on the 'same grounds as a universal service in telecommunications, the provision of a minimum of services, guaranteeing, inter alia, a certain degree of pluralism, including cultural diversity' (1995 333)

Therefore public service funding should be re-examined in tandem with its changing public service remit across all potential transmission delivery systems, including the Internet. The ability of other digital delivery systems to transmit a myriad selection television and new media services will hasten the decline of the bandwidth-constrained terrestrial platform.

In an attempt to challenge the old dogmas of Riechian⁴ paternalism and the state-subsidised dominance of the terrestrial network, Collins (1996) and Tracy (1999) believe that public broadcasters should try to attract and gain the support of the mass public in their programming schedules. While public broadcasting content is dependent on being accessible to the widest audience, the terrestrial system has become one of many distribution networks. In recognition of this, attention should focus on the quality of their services rather than the maintenance of the transmission network. By not directly competing for audience ratings, they emphasise their public service legitimacy. The level of programme diversity justifies the financial cost incurred in providing a comprehensive television schedule. For Collins (1996), the challenge for public broadcasters is to show that they can continue to be the viewer's preferred choice amongst television channel service providers.

Conversely, an element missing from Collin's critique on the future of public broadcasting is the role of market failure in ensuring the necessary investment in minority programming and services.

Public Sphere and Television Content

Broadcasting has significant values that are more than economic issues. The desire to measure programming in terms of its economic value has been based on the assumption that broadcasting can be regulated like any other economic good. Each programme is dependent on ratings as economic recognition of its market value, social worth and cultural popularity. But the value of television content can be judged as a public service when the wider social benefits of market failure are taken into account. These economic costs are not covered by audience ratings or advertising revenue. In the case of public broadcasting, widespread availability is prioritised over pay-only broadcast possibilities. For example, a viewer's enjoyment in watching a programme is not affected, in any way, by the number of people watching the same programme.

The more people watching a programme the cheaper and more efficient it is to deliver a particular programme to a mass audience as the marginal costs attached to these additional viewers is very low. Just as the viewer's enjoyment of a programme is not directly effected by the number of people watching the same channel, the wider the audience the cheaper the delivery will be. Although some viewers may choose to become 'free riders', the value of the Free-to-Air services will not decline with its consumption by other viewers. At the same time, the programme will not lose its maximum positive social benefit by being able to reach the widest section of society that is technically possible. In making a distinction between the social and economic benefits of programming making, a public good recognises the national and local cultural identities of the audience that extends beyond the 'reductionist approach related to ratings' (Collins, 1998a 126)

In terms of economic theory, a public good can represent one of the principles of public service broadcasting. Moynes (RTE)⁵, believes that 'there are actually other values that

⁴ John Reith was the pioneering Director General of the BBC, in the early 1920's. His objective was to provide a media service that would inform, educate and entertain all members of society. This independent broadcast network receives funding from a fixed licence fee.

⁵ In conversation with Adrian Moynes, Assistant to the Director General, RTE, October, 2000

are attracted to the activity of watching and listening and using communication services. These are values of citizenship and it seems to me that the technical regulation and the market regulation perspectives have traditionally failed to give sufficient attention to citizenship needs. The point that is made consistently is that if you look after the consumers, if you do that, if you protect the rights of the consumer, you've achieved a tremendous amount – but I don't think they are separated like that'. Affording fair and consistent regulation across all distribution systems is one appropriate measure in guaranteeing citizen rights to public broadcasting services.

Increased public service media may provide the social space for private and public reflection and scrutiny of democracy. In the case of commercial broadcasters, they are mainly accountable to their advertisers and shareholders. They will not produce a programme that has no revenue possibilities. For example, low advertising revenue will deter commercial broadcasters from investing in programming aimed at poor, religious, or old income demographic groups. On the other hand, public broadcasting can provide a certain threshold of home programming that moves beyond commercial agendas. It can attract social groups not interested in new digital media services by producing a mixed selection of information, entertainment and educational offerings. The public broadcasters' digital channels can lead by example in terms of content and production values.

This public service concept entails public ownership of the finite radio spectrum for the transmission of terrestrial television services. The national radio spectrum is regarded as a national resource, owned by the citizens of the state and controlled by state authorities. This is confirmed in the Irish Constitution (1937) in Article 10(1), where the State is the natural owner of the national radiocommunications spectrum⁶. This allows for greater government involvement and regulation in the technological development of the broadcasting and mobile telecommunications services.

⁶ Article 10.1 states that 'all natural resources, including the air and all forms of potential energy, within the jurisdiction of the Parliament and Government established by this Constitution, and all royalties and franchises within that jurisdiction belong to the State subject to all estates and interests therein for the time being lawfully vested in any person or body' (Hall, 1993: 321).

Besides this acceptance of public ownership of this communications resource, there is the legal recognition of free expression and the education of public opinion as a civil right under Article 40(6)(1)(i) of the Irish Constitution (1937) (Hall, 1996) In a manner similar to the Article 10, European Convention on Human Rights, each citizen has equal rights to access of fair and impartial information This framework of law re-enforces the individual's right 'to hold opinions and to receive and impart information and ideas without interference by public authority and regardless of frontiers' (Collins, 1996 11) This right to access of information fundamentally recognises the duties of mass media organisations, such as broadcasters, in providing a diverse range of television services and associated offerings Thus the economic costs of public broadcasting can, in theory, become arbitrarily absorbed by state subsidy By supporting a public service, positive social benefits are imposed on the whole of society

In the case of digital broadcasting, the owner of the transmission delivery system will control the distribution of all information sources This may create a considerable social division between those who can afford to pay and those who cannot or are unwilling to subscribe to new services Programming that was initially made available to the viewer at no additional cost may now only be made available to those willing to pay Consequently some social groups will rely more on Free-to-Air public broadcasting channels for a wide selection of information and entertainment offerings The same expectations of quality will remain

By excluding non-paying viewers, such as older and low income groups, broadcasters and network operators reduce the potential value of the public service Network operators may deliberately prevent viewers from accessing the service in order to sustain their subscription charges and the commercial appeal of pay-per-view content Thus a small number of subscribers could provide a profitable and private channel These viewers will not receive channels that are in the free domain of the terrestrial system, when transferred to a private network In addition, the expansion of pay and commercial television may

reflect a decline in minority television programme production as subscription television concentrates on niche channel and on-demand programming⁷

In contrast, public broadcasters are compelled to provide a more comprehensive range of services that are accessible to all sections of society. Where the free market, in its analogue or digital manifestation, is not willing to provide such programming, subsidisation is required to provide the service. Content produced for reasons based on diversity and plurality may not fit neo-classical economics in the supply and demand of products. As public broadcasters are the main recipients of subsidisation, their remit is to combine programme output with national and imported television content that comprehensively reflects the cultural identity and interests of society. Public broadcasters have obligations to acquire and supply content to meet the specific interests and demands of all its citizens. The economics of market failure accepts the need for state intervention via the licence in the recognition that the free market policies cannot fulfil all the conditions of the public service remit.

The public service broadcasting structure of public ownership of the transmission infrastructure, the production and distribution of programmes has contributed to the provision of a comprehensive selection of offerings. Due to the high costs of entry for competing broadcasters, public broadcasters have controlled the gateway to the radio spectrum for television transmissions. This public sector monopoly allowed the state broadcaster to reduce infrastructure expenses by owning the delivery system and transferring funds, when needed, from one broadcast area to another. It also ensured a universal reception of publicly funded services through its monopoly control of that scarce natural resource. For these reasons, the analogue terrestrial network was directly tied to the fortunes of the dominant television content provider.

⁷ A merit good, like a public service, is considered as extending the economic value of programme making into cultural and social benefits. It recognises that a particular programme or channel may not generate sufficient audience ratings to attract enough advertising revenue to make a profit or its production costs. Nevertheless, a programme can express a new level of understanding that the viewer may not have experienced. As the Davis Report states, 'consumers do not know what they are buying until they have experienced it - then they no longer need to buy it' (1999 Annex 1)

Separation of Content and Infrastructure Regulation

In the late 1990's, broadcasting and telecommunications regulation became more flexible in managing spectrum allocation. New interactive media services began to fall between telephony and broadcasting regulation. Examples include datacasting and telephony services that can be delivered over cable and telecommunication networks. New communications technologies, like xDSL, have begun to carry multichannel television offerings. In the past, the fixed line telecommunications network was a narrowband, one-to-one, service that provided unregulated content over ordinary fixed telephone lines. As the level of telecommunication provision between customers is a private development, only the transmission network has been regulated. Telecommunications regulation was specific to the carriage of data and voice telephony services between network operators. Effectively, regulation re-enforced the dichotomy between services and the provision of services over the transmission network. Emphasis was placed on infrastructure and distribution difficulties rather than content regulation.

Correspondingly Free-to-Air broadcasting has experienced a form of regulatory approach that has duly recognised the inherent bandwidth limitations of the network. Perfect and free market competition across this finite spectrum can never be realised due to its physical limitations (Preston, 1993). Instead, attention was focused on the social and cultural role broadcasting held in public life. The primary function of the network was to ensure the universality of broadcast services. The issue of content diversity was a separate regulatory matter with regard to providing the viewer with an adequate level of content services on the grounds of their social rather than consumer rights.

But as demand for radio spectrum grew for mobile Internet and advanced telephony services, both fixed line and broadcast networks have begun to deliver the same type of services over each transmission system. Due to these factors, both networks have started to technically converge into a generic broadband delivery system of television, Internet and telephony offerings. In effect, telecommunication networks owners began to regard television services as valid revenue resources in terms of providing a stand-alone service.

or bundled with telephony and Internet packages to their subscriber network. The traditional differences between the broadcast and telecommunication networks have begun to blur.

Bandwidth scarcity in terrestrial broadcasting allowed for the regulation of a limited range of channels based on general interest purposes such as diversity of views, pluralism of content and free, universal accessibility of services. However, Watson and Schoof claim that 'this view attempts to justify the application of public interest and cultural policy restrictions to the whole broadcasting sector. It will be increasingly hard to sustain intellectually and operationally. If broadcasting is not permitted to face up to the competitive threat posed by new services, service providers will progressively migrate to less regulated forms of service provision' (1995: 333). Nevertheless, this neglects the social function inherent in public broadcasting and the need to be accessible through broadband networks. It also fails to ensure that two-way interactive services, which carry public broadcasting content, are carried on cable, terrestrial and telecommunications platforms.

In essence, the role of the regulator is to intervene to protect the public interest. Market failure can readily occur in the prohibitive actions of transmission operators and their prerogative to control the type of content carried over their delivery systems. For instance, dominant cable or telecommunication operators can potentially abuse their market strengths by not allowing competitors access to their network on a 'technically and commercially viable' basis (Levy and Rogerson, 1999: 6). Such operators may have an even more significant influence over the type of content and programming received by the digital audience.

Branagan⁸ (RTE) believes that the commercial imperatives for most platform operators will be inimical to the interests of public broadcasters. 'What digital means for broadcasters is that previously in the analogue world, networks were completely transparent and there was no intervention whatsoever or there was no interest in the part

⁸ Interview conducted with Branagan, Digital Planning, RTE, in September, 2000.

of the independent network operator to intervene between the broadcaster and the viewer. In the future, there will be no completely neutral delivery platform every delivery platform will have its own agenda and that ultimately has a profound effect on the relationship between viewers, service providers and content creators', said Branagan [See Figure 1-2]. The set-top-box gateway will become the access point between the consumer and the content provider. Network operators will control this access point via their set-top box.

Reasonable access to the necessary infrastructure for the reception of these services becomes a vital regulatory condition. The responsibility for such issues will lie with the national regulatory bodies. Informed government policy should be necessary to protect the public interest and prevent the monopolisation of the nascent digital services by incumbent network operators. In the Irish context, the Office of the Director of Telecommunications Regulation is responsible for ensuring fair and consistent regulation across all transmission delivery systems.

For Massey and Shortall (1999), the main benefit with infrastructure regulation rests in its capacity to respond to immediate market problems. Regulation takes social and economic issues into consideration when intervening in a specific market scenario while competition law is often applied universally and not on a market-by-market case study. Another problem with the application of competition rules is the inability to take into account the specific social or economic requirements of each industry. One example is the conflict of interest between broadcasters, adhering to a public service remit, and network operators who refuse to carry their channels without a transmission fee. Indeed as new markets develop, any legal challenges between such companies may hinder the development of the digital television services. The potential benefits of liberalisation in delivering multichannel television and telephony services to the residential market may become lost in a drawn-out court battle.

Equally, the issue of fair pricing may be more quickly resolved via a regulatory agency than going through a court process which may impede the pace of service development in

the marketplace. For instance, if the national telecommunications regulatory body deems that carriage charges for interactive television and data production companies are fair and reasonable across digital cable and terrestrial networks, the production companies will be assured of achieving universal coverage. Meanwhile the public interest is protected by the universal reception of these services to households connected to either network and at a reasonable commercial charge. Thus public policy objectives can foster competition between service and network providers. This may, in turn, complement the convergence of broadcast and non-broadcast services over the telecommunications network as new technologies and services are launched onto the same market.

Where an operator controls access to viewers, or an alternative network may be too expensive for content providers to replicate, competitors will rely exclusively on the incumbent operator to access their market. If these networks exhibit unfair and inconsistent behaviour towards service providers, they are said to have a bottleneck control over that delivery system (Murrioni, 1998). These bottlenecks can be used to allow network owners to arbitrarily charge carriage fees and billing fees over normal operation costs and profit margins. The owners can prohibit viewers from accessing a television service that is not directly tied to the network's own subscription arrangements.

Digital media services, such as multichannel and interactive television offerings, can become controlled by such communication bottlenecks and impinge on the available range of public services. Ward (DV4)⁹ foresees distribution problems ahead if the small Irish market is fragmented into separate and independent distribution delivery systems. For instance, if an interactive element of an UK drama series is launched, national platform operators may have to translate it into their own networks' transmission standards. This may force each operator to invest substantially in reformatting such content for transmission in each network. The extra financial burden may divert limited funds away from any burgeoning Irish-based content towards the software costs incurred from the repurposing of the interactive television programme.

⁹ Interview conducted with Ward, Technical Director, DV4, in June, 2000. DV4 is an Irish-owned digital broadcasting and Wireless Application Protocol production and consultancy company.

Van Cuilenberg writes that there is a clear need for ‘unhindered and equal access and accessibility’ for diverse information and communication resources for all citizens (1994 203-4) In a cultural sense, regulation and government funding can create the social space in the digital communications media to express new and minority opinions and beliefs Regulation can be used to determine what the dominant network operator controls It will also provide the viewer with the knowledge of available media services and the price and quality of each product These transformations across the broadcast and telecommunications infrastructures may change the level of equal access to television programming schedules and associated interactive services

Just as broadcasting networks gradually provide the facilities of other broadband platforms, Mitchell writes that ‘access to the telecommunications network is the route by which individual consumers gain entry to the new information and communication technologies as well as to voice telephony’ (1997 445) Television content becomes one part of an overall communications presentation to each discerning consumer With digital transmission and compression technology, broadcasting may gradually become absorbed into a competitive telecommunications network with ‘viewers charged for the programmes they watch rather than paying for the majority of unwatched, unchosen programmes’ (Collins, 1996 140) However, Collins (1996) does not consider the positive values inherent in market failure subsidisation Public service content does not need to conform to restricted carriage rights in the delivery of its content over each different transmission network Public funding guarantees accessibility to Free-to-Air news, information and home produced programming These services can become an integral element of the digital public sphere that is non-platform specific

Apart from the digital terrestrial delivery system, there is no other universal platform that can provide a portable and mobile selection of digital channels and data services without forcing the viewer to pay a subscription charge This platform is obliged, by regulation, to provide the option of a range of digital Free-to-Air services The platform offers an optional tiered subscription package of multichannel and data services But it can also provide a basic level of digital media services to every household This threshold level

can be offered at a reasonable cost while maintaining the cultural sphere for political and social life that is outside the control of market interests. Learning from its analogue experience, the public broadcaster can provide additional digital Free-to-Air services to promote the take-up of the digital platform by the general public. This would bring the target date for the shutting down of the analogue transmission network closer to becoming a reality. This switching-off date would provide additional spectrum resources for voice and data telephony services for the mobile telecommunications and digital terrestrial operator.

Although commercial broadcasters and television companies offer a value system dominated by free market principles, it is a profit-driven operation, supplying services the market, rather than citizen, expects (Tracy, 1999). For instance, rather than relying on commercial broadcasters and interactive companies producing content that is mainly designed to appeal to advertisers, the public broadcaster can create content with a non-profit, public interest predetermination. According to Foley¹⁰ (Dublin Institute of Technology), 'if we get to a stage where a lot of public debates are taking place in, you know, in terms of e-mails and people generally talking to each other, then you could have a lot of people kept out, by not having access to pay-TV. The Free-To-Air services could become the poor people's, and marginalised, services which are universally accessible while a significant range of additional services are not available'. Market failure subsidisation will be essential in funding the future presence of an independent and electronic public sphere within the diverse range of Free-to-Air broadcasting and subscription media offerings.

In this context, Murray (RTE)¹¹, cites the provision of a Free-to-Air digital education channel [named 'Eolas'] being discussed with the government, the Department of Education and RTE, as another example of the public service remit disseminated across all broadband networks. The channel will provide an asymmetrical interactive learning process within the broadcast stream. Viewers will have the option of completing courses

¹⁰ Interview conducted with Foley, Media Lecturer, Dublin Institute of Technology, in September, 2000

¹¹ Interview conducted with Eugene Murray, Business Affairs, RTE, October, 2000

interactively via the television channel and finding out about new education services and social entitlements from other government information agencies

Conclusion

Market failure economics justifies the role of licence fee funding for public broadcasting as its remit is extended into the production of media digital content. Nonetheless, increased state subsidisation or commercial revenue will be essential in providing a comprehensive array of television and two-way services to all citizens. The arrival of additional platform operators and independent service providers has caused new digital multichannel and interactive television services to focus on commercial and not market failure objectives. Regulatory involvement may be required to prevent the evolution of anti-competitive behaviour between companies. Access to high quality, indigenous offerings for the entire population, must in turn be safeguarded.

The basic principles of public service broadcasting and market failure can continue to be successfully defended in the broadband and digital environment, whereby the main social, cultural and political function of television in a democratic society will not substantially alter. The universal service obligation will remain fundamental to public service broadcasting as television continues to provide the prevailing public sphere that is used in society. Examples include Irish language content, children's education and entertainment programming and disabled minority television productions. Infrastructure regulation will be required to ensure that any potential concentration of ownership does not prevent access to public broadcasting services on broadband delivery systems.

Only public broadcasting can create a democratic and social public space within this new digital medium by providing impartial information that is not produced solely to meet commercial concerns. The terrestrial platform can provide more public services that include two-way interactivity and World Wide Web access. Chatrooms and other television-based interactive services can create new forms of public communication. In the Information Society context, the seventeenth century coffee houses and social meeting

squares may be replaced by e-mail communication across all community organisations (Thornton, 1999) Such private communication may become a new public forum space that is not controlled by a concentration of network ownership but shared amongst a wide social community Digital terrestrial broadcasting can offer technological capabilities for potential community development, especially in the domain of datacasting services connected to other public databases The public service objective is to ensure that digital public services are carried across cable, terrestrial, and telecommunications distribution platforms In this sense, the issue of access to and reception of communication technologies will remain crucial

Therefore public broadcasters should be able to provide a two-way interactive system based on the principles of public broadcasting The interoperability of networks and services would allow all television and digital services to be accessed through any set-top box appliance across each transmission network Without interoperability, consumers may become attached to a proprietary network that will not permit access to content from different delivery systems Independent content and television service providers may be rendered incapable of offering audiences a range of services that are not exclusively selected by each competing network operator

Public broadcasters will need to overcome the platform differences in the broadband environment A greater understanding of the technical issues facing public broadcasters is crucial as they embark on ensuring a universal access of their services over all national distribution platforms Such awareness will provide a clearer understanding of the technological changes emerging from the transition of the radio spectrum, from the carriage of mainly analogue broadcasting services, into a digital telecommunications network The next chapter deals with the technological differences across each delivery system

Figure 1 Development of Analogue Terrestrial Television

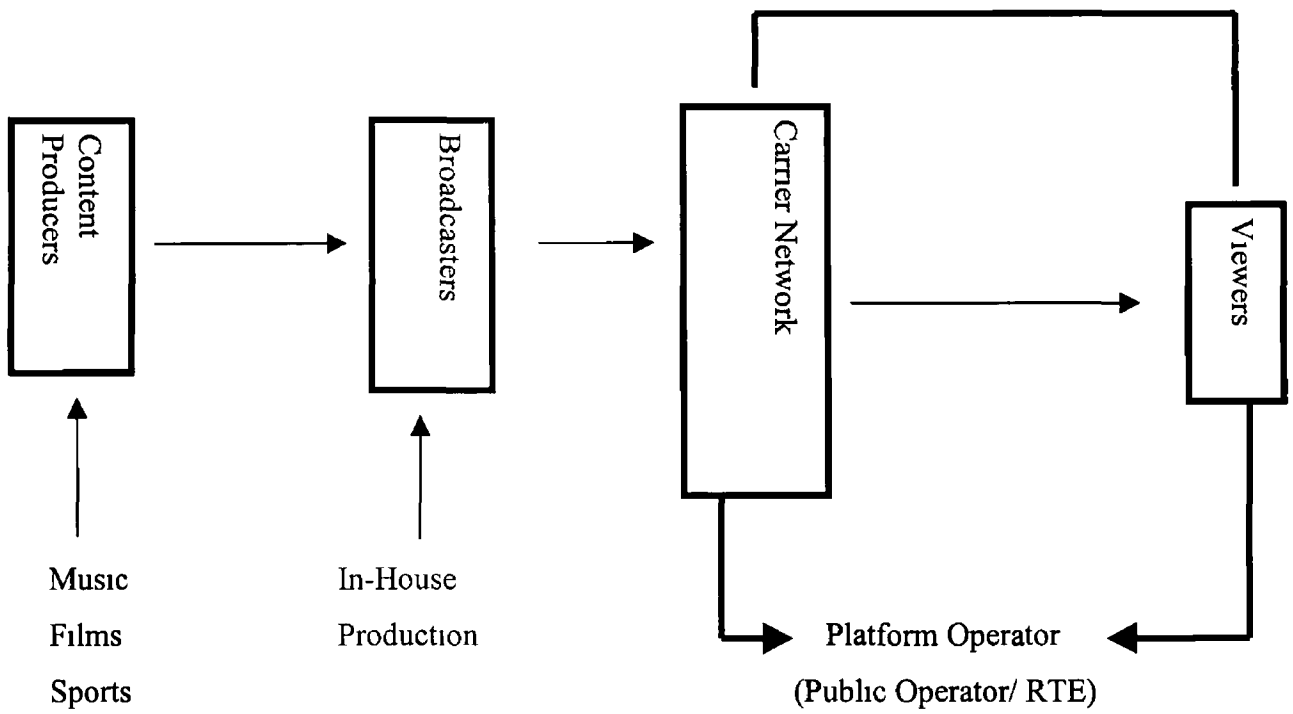
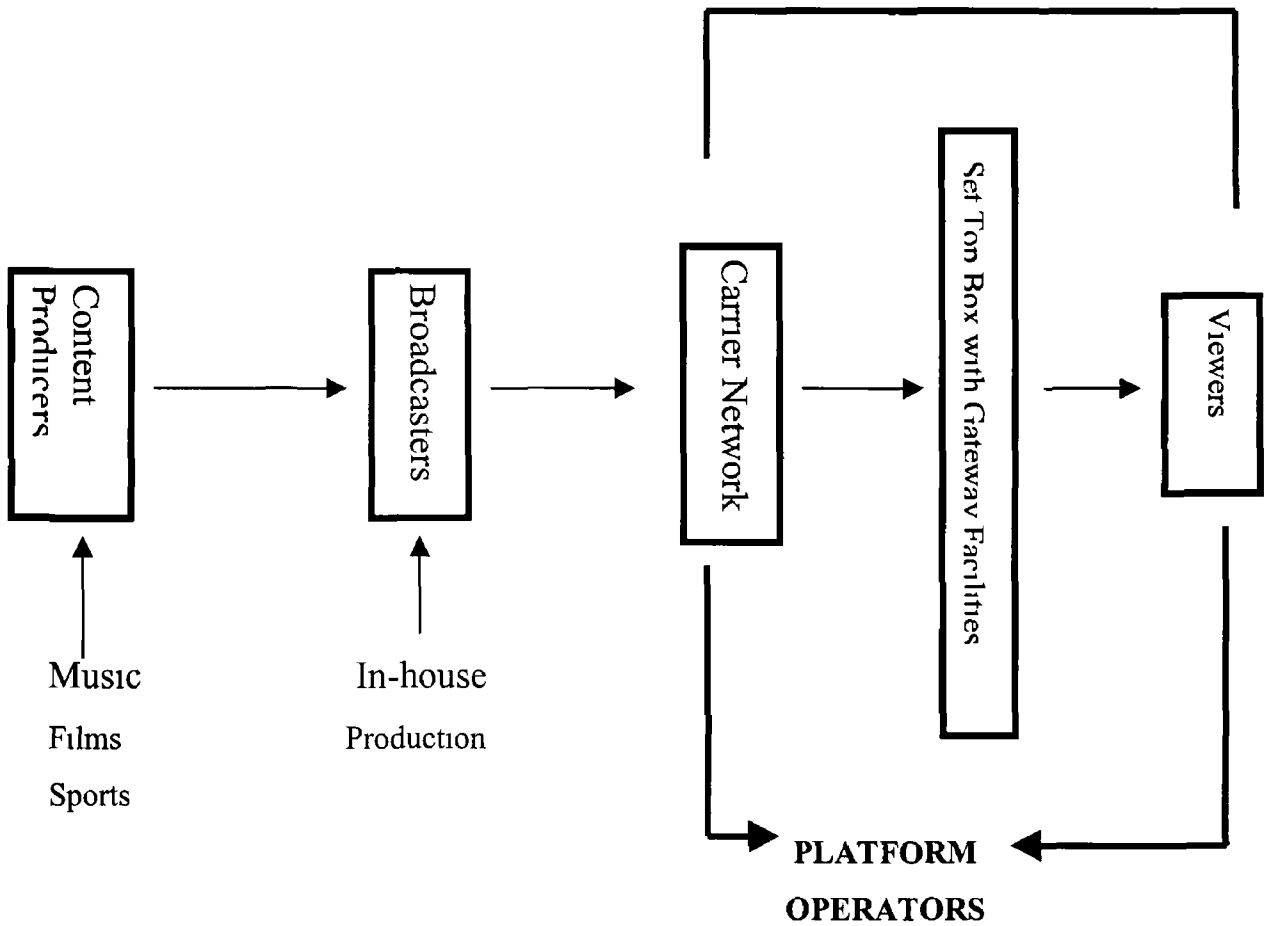


Figure 2 Development of Digital Media Services through the Digital Terrestrial Platform¹²



¹² Source Branagan (1999) , Callanan, BBC (1999)

CHAPTER TWO

Introduction

Since the early 1960's, terrestrial broadcasting was the first broadcast medium. The television aerial was, in a sense, the main access point for the reception of analogue terrestrial services. This delivery network could provide a limited number of television channels and one-way data communication services because of the finite radio spectrum resource. Nevertheless it did provide a universal reception for all Free-to-Air channels throughout the country.

In the 1990's, cable operators began competing with terrestrial broadcasting in the delivery of television signals to the home. When the terrestrial network was launched, it benefited from a ten to twenty year advantage over other infrastructure networks. This allowed the terrestrial system to create a universal network for the transmission of many public service channels. However, its competitive edge over other networks began to dwindle when cable networks began to establish a strong subscriber base for multichannel services. With the arrival of digital technology, these transmission networks began to gradually transform their linear delivery systems by providing bundled television, Internet, datacast and telephony services. This chapter will explore how the digital terrestrial platform will compete with cable and other telecommunications networks in the delivery of broadcasting, telephony and data services. The single most important component of digital broadcasting will be the set-top box.

This chapter will provide a background understanding of digital technology. There will be an examination of digital technology across the telecommunication and broadcasting sectors. The first step in understanding the change from analogue to digital is by separating the television signal from the distribution network. The analogue signal is the common television viewing experience for the individual. Indeed, with digital broadcasting, the visual experience will still be in the analogue format but the transmission of the picture to the television screen will be digitally enhanced. The

methods of distribution for delivering this digital signal will be over the terrestrial, cable and telecommunications platforms

Once the signal arrives to the television set, the picture must be converted back to its analogue form so the viewer may watch the programme. This is achieved by using the set-top box. This electronic television receiver device will translate the digital signal into a television programme. The box will control access regarding television content across all transmission networks. Perhaps this is the biggest electronic facilitator in the coming together of broadcast, cable and telecommunications networks. In the digital domain, the mechanics of television distribution and reception can be broken down into three divisions. The first describes analogue and digital as different physical signals that make up television content. The second explains the method of delivery for the television signal to each household, like terrestrial or cable. The last phase involves the reception and decoding of the digital signal back to its original analogue state with the help of electronic software in the set-top box.

An examination of the digital process will explain how services are carried across each delivery system [See Figure 3]. This section will inquire into the possibility of all delivery systems working together to provide the same services to each set-top box or digital television set. What will be the impact of digital compression on each delivery system? Which platform is most suitable for the delivery of a universal multichannel television service? This chapter will assess which decoder device is best suited for the open accessibility of digital public broadcasting and data services across each digital delivery system.

Being Digital

Since television services were launched, the analogue network has been used as the main form of broadcasting. Using an analogue signal, terrestrial broadcasting has been able to reach an almost universal coverage of households. However, one consistent problem with the analogue network has been with problems of signal distortion. The signal is very

susceptible to environmental interference as it travels from the transmitter to the antenna. Bad weather often affects the reception of the television signal. This can lead to a corresponding loss of audio and video quality. The reason behind signal distortion lies with the physical nature of the analogue waveform. This waveform is in a constant state of flux as it travels through the air. As the electronic signal is constantly modulating across the radio spectrum frequency, it becomes even more prone to interference from other radio signals. In this way, the television data carried over an analogue transmission network is very susceptible to signal distortion from external sources. This is why it is important to correctly position a television aerial in line with the local broadcast transmitter. This action will strengthen the analogue signal and its picture quality on the screen.

By switching to digital, the signal becomes less vulnerable to signal degradation. A digital signal is impervious to external interference, such as bad weather conditions, and noise corruption throughout the transmission process. In converting the analogue signal to digital, the condition and quality of television channels and other broadcast services improves significantly. The digital signal provides a more stable and robust delivery mechanism for the distribution of television and telephony content. This is due to the basic characteristics of the digital signal.

Each digital signal is composed of two fixed and distinct values, called binary digits. Within these binary digits are clearly defined electronic forms of data. They are called bits. When these values are then transmitted in a pulse form, the data is conveyed in the form of a long line of binary digits. The length of each binary impulse represents the type of content carried on the signal. Therefore, the sequence of these binary structures will determine the type of data being carried such as a television programme or a telephony service. In this way, all broadcast and telephony content will be converted into a basic binary digit form that can be carried in a similar fashion across all digital infrastructure networks. Effectively all content, such as television, voice and data will become a constant stream of digital bits.

For Branagan (RTE), digital television is 'only a subset of a range of digital services

[it] is the broadcast element of a very wide range of digital services which will include full broadcast multichannel television, high speed Internet, e-commerce [and] a whole range of voice telephony'¹³ Digital broadcasting will offer enhanced picture quality and mobile telephony within a panoptic range of digital content. It is an aggregate form of disparate services that consist of television programming alongside various bundled selections of web browsing, telephony, and interactive television [See Figure 4]. As networks carry more services, the need to condense this content across the bandwidth spectrum becomes crucial. By compressing a digital signal so that they require less transmission capacity, each network operator is able to provide digital media services over their delivery system.

Compression technology is used to place multiple channels into the same cable and spectrum frequencies. This means that digital data can be broken into a series of packets that can be rearranged separately as they are carried by each transmission system. The data packets are transmitted as a single digital bitstream. By distributing the data in packets, the network operator is assured that these packages are reunited into a digital signal by each decoder apparatus (Lebow, 1991). So digital takes up less space on the airwaves and can provide a wider range of services via this delivery system.

The digital signal does not effect the viewer's enjoyment of the programme. But the purpose of digital is to create more space in the signals bandwidth to deliver additional television channels. Compression takes advantage of the limited signal activity of a broadcast programme, like a news report, and utilises that space for more efficient spectrum usage. For example, the digital broadcast of a news programme will transmit the full image. The image will be continually refreshed as the newscaster moves or the background changes. The digital data that is carrying this programme consists of the moving image but not the areas on the television screen that remained motionless.

¹³ In conversation with Peter Branagan, Head of Digital Planning, RTE, October, 2000

This means that the amount of binary bits transmitted is relatively low in comparison to a high resolution sporting event. A sporting event would require a higher bit rate due to the motion and pace of the game and the need to devote more channel capacity to the broadcast signal. A similar analogue programme would require the full bandwidth capacity of the UHF signal as it repeatedly transmits the static or moving image. There would not be any reduction in the amount of frequency space used in the transmission of both programmes. This leads to a greater level of spectrum inefficiency in the delivery of services over the analogue broadcast network.

As the binary bit rate between programmes can vary, this allows network operators to divert channel capacity to services which may require more or less bandwidth space for the delivery of their programming content at any given time. The transmission of fewer digital binary bits will release spectrum space for the carriage of other services. This ability to carry new services is complemented by the adoption of compression techniques. By using the Motion Pictures Coding Experts Group standard (MPEG-2), digital packets can be distributed over a range of different delivery systems, like cable, terrestrial and telecommunications¹⁴. This has served to create an individual multimedia element within this 'single global bitstream' of television, radio, and Internet content (Collins, 1996: 2). However, Collins omits the ability of this bitstream to handle voice telephony which can be included in a range of additional media services.

Compression has the ability to reduce digital signals into a fixed frequency bandwidth. Without the ability to compress the digital signal into a smaller bandwidth, the same broadcast signal would require more bandwidth than one analogue channel. Compression can reduce the digital bit rate of an ordinary television programme to 3 Mbits/sec (bits per sample) with reasonable image quality. An uncompressed signal transmitted over an 8 Mhz Irish broadcast bandwidth for a television channel would need 200 Mbits/sec.

¹⁴ In the early 1990's, the European Digital Video Broadcasting (DVB) group chose the Motion Pictures Coding Experts Group (MPEG-2) signal as the approved standard for digital signal compression. The DVB group created digital terrestrial broadcasting standard, called DVB-T (Digital Video Broadcasting-Terrestrial) for the transmission of media content over the terrestrial platform. This has been accepted by the European Telecommunications Standards Institute (ETSI) and is currently used in over 50 countries worldwide including Ireland and the United Kingdom.

Nevertheless, an average television channel is capable of carrying only 24 to 38 Mbits/sec of uncompressed digital data. Therefore around five and eight analogue channels would be required to transmit one uncompressed digital signal (Ward, 1999). One uncompressed signal cannot be carried over a standard analogue channel. This example underlines the importance of compression in the efficient delivery of digital media services across all distribution delivery systems. It has allowed each network operator to increase their selection of services and the level of access over the broadband network. For instance, between six and eight digital broadcast channels will be carried over the same spectrum space as one analogue channel. This creates greater signal efficiency over each distribution network as more television channels and data services can now be carried.

Access to Transmission Signals

In the case of digital broadcasting, terrestrial's immediate advantage will be the delivery of a universal selection of media services through the existing antenna. This means that digital terrestrial television (DTT) will remove the distribution capacity restraints that previously prevented the establishment of new television channels. But due to the nature of digital signals, it will be important to have the correct type of antenna installed. The use of cheap, poor quality, below-standard aerials and signal interference from electrical appliances such as freezers can cause the digital signal to breakdown.

The platform will be divided into two sections, the multiplex operation and the terrestrial infrastructure network. Multiplex broadcasting transmits the television channels, voice and data services on a single transmission signal. The multiplex operator will control the number of channels, telephony and interactive services provided over each multiplex at a given moment. According to a recent European Commission report on 'The Development of the Market for Digital Television in the European Union' (1999), the multiplex operator will essentially manage spectrum efficiency and how the spectrum will be shared for each programme or service via statistical multiplexing.

This statistical multiplex operation will manage the bit rate capacity and quality of each programme [See Figure 5-6] The operator will carry the multiplex services over one or several channels to facilitate both one-way broadcasting and asymmetrical telecommunications services Multiplexing can be managed independently of the network operator, for instance a terrestrial or cable delivery system However, the multiplex role can also be left under the control of the network owner The main job of the network operator, like cable's NTL and Chorus, is to maintain and take care of the delivery system and ensure the reception of the digital multiplex signals to all homes

Digital terrestrial television expects to reach a near universal coverage of the population using the existing transmission infrastructure The ability of terrestrial television to deliver up to 30 channels will be subject to the cancellation of simulcast services, like simultaneous analogue and digital broadcasting The subsequent release of the analogue spectrum will provide more bandwidth for digital services The platform will remain the only delivery system that can provide full mobile and portable reception to television receiver devices According to Branagan (2000), the terrestrial system will provide both traditional broadcast content to large audiences plus data and unicast services, such as World Wide Web browsing

Current terrestrial research trials suggest that a narrowband terrestrial return channel may supply television interactivity¹⁵ The signal will be sent between the television user back to the broadcaster or service provider using radio frequency technology This will provide an alternative to connecting the set-top box to the telephone network Ireland is the only European country actively trialing the terrestrial return path option, although significant interest has been received by Italy and Sweden The terrestrial return channel will use the television antenna to relay data to the transmitter network (Francis, 2000a) As the wireless return path will 'always-be-on', the customer will not be obliged to pay an access fee for online and transactional services

¹⁵ The system is called the Wireless Interactive Network for Digital Services (WINDS) WINDS uses a low-power data signal from the television rooftop or antenna aerial back to the transmitter mast from up to 30km away (IDATE, 2000 9) This project was later renamed the 'Interactive Terrestrial Television

The wireless return will run upstream speeds at 10 Mbits/sec to 10 Kbits/sec from distances of 1 kilometre to 60 kilometres respectively between the terrestrial aerial and the transmitter. According to Branagan, (Digital Planning, RTE), Internet access speeds show a terrestrial network providing up to 400 Kbits/sec for video streaming per active subscriber. It may also provide digital terrestrial data services to mobile telephony in a manner similar to the Universal Mobile Telecommunications System (UMTS). This makes digital terrestrial more accessible in remote geographical areas that are not cabled.

However, doubt has been cast on the technical viability of the terrestrial network in providing a return channel for interactive purposes. Thom (ODTR) has expressed grave doubt in regard to the ability of terrestrial platform to provide high speed Internet access to the television set¹⁶. He believes that the Internet speed could only provide a maximum speed of 24 Kbits/sec to 1,000 online users even if one of the 24 Mbits/sec Multiplexes were used exclusively for the service. For a terrestrial network to use a low power DVB-terrestrial return path, the operator would need to apply for more spectrum frequency. This may provoke spectrum congestion across the national airwaves between commercial and public companies seeking additional radio capacity.

This viewpoint is supported by a spokesperson from the Department of Public Enterprise (Telecommunications Regulatory Affairs Division) who is uncertain about the terrestrial spectrum having enough capacity to provide high speed Internet access. It would depend on spectrum availability for broadcasting and two-way interactive services. By recognising this obstacle, it is accepted that without a proprietary return path, digital terrestrial broadcasting will be the only delivery system dependent on an external commercial competitor for a return path.

Integration' project and included in a newly funded EU research scheme called 'Witness'. This project brings together all previous organizations involved in the field of interactive terrestrial broadcasting.

¹⁶ In conversation with Dave Thom, Broadcast Regulator, Office of the Director of Telecommunications Regulation, October, 2000.

Until these issues are resolved, the terrestrial platform will remain unidirectional. According to Clancy (RTE), the initial return path will be over an ordinary two-way telephone network. In the short-term, the multiplex operator will provide interactive television and symmetrical data services through the old Postal Switched Telephone network (PSTN). A basic asymmetrical information return path will initially be provided by telephone. Using the telephone network requires at least a 28.8 Kbits/sec modem within the digital set top box. This facility will offer electronic mail and pay-per-view services with World Wide Web browsing capabilities. Digital terrestrial operators will use non-proprietary operating systems in their set-top boxes to translate Internet services for the television screen by resizing the text and reformatting the pictures. While the terrestrial network seeks to use ordinary telephone lines as a return path for interactive television, telecommunications operators are preparing to further modernize their own delivery system in an attempt to provide traditional television and video channels. Their preparation has been on going for almost twenty years.

In the early 1980's, telecommunications companies decided to provide services beyond their traditional target market. With consumer demand growing for fast Internet access to the home, the Integrated Services Digital network (ISDN) was introduced. Its objective was to supply high speed Internet, video and telephony services over a single digital connection. This service offers a full digital system, on the ordinary telephony line, between the telephone exchange and the home. The public telephone operator installed digital switching and routing technology for voice and computer data services. Digitalisation proved to be cheaper and faster than analogue circuits with a significant reduction in maintenance costs. Telecommunications operators began using digital compression and multiplexing technology to increase capacity. For example in the course of an ordinary telephone exchange, voice is broken down into digital signals and transmitted across channels along the analogue network before being reconverted, at the local telephone exchange, to analogue.

By using ISDN over the twisted pair of telephone copper wires, modem adapters were installed at both ends of the network to control the frequency signals for continuous end-

to-end connectivity. This service enables the subscriber to simultaneously make a telephone call and browse the high-speed Internet service at up to 128 Kbits/sec. In spite of this, ISDN services were only able to carry the lowest-quality 'VHS' video signal. The network could not find the bandwidth in the twisted copper wires to provide broadcast quality television services. Thus, the telecommunications operators were unable to enter the television retransmission business. However, by the late 1980's a faster and more sophisticated fixed line transmission technology emerged that could carry such video and television offerings.

In 1989, asymmetrical digital subscriber line (ADSL) technology was introduced as the delivery system capable of transforming the telecommunication sector into a broadband network. xDSL was the generic name given to all digital access subscriber line technologies from narrowband to asymmetrical telecommunications. In research trials (British Telecom, 1998), ADSL was shown to substantially increase the capacity of existing twisted copper telephone lines to carry television signals. The data compression levels allow for up to four concurrent television channels to be transmitted over a single telephone network on the non-voice frequency spectrum of the copper wire line. The bonus of ADSL technology is that operators do not have to upgrade the telephone network to hybrid fibre co-axial cable in order to provide television services. Instead, investment is placed in video servers, based from the telephone exchanges, and connected to their subscriber's set-top box.

Taking an insight from the ISDN history book, the ADSL network and service operator installs switching and routing modem equipment at both ends of the telephone line¹⁷. This ensures that the digital data has a direct journey across the transmission path and is unhindered by voice traffic¹⁸. Furthermore it compensates for the inability of the ADSL technology to provide a universal television service over its entire network. This means that this digital delivery system can only provide a limited television service within a 4

¹⁷ Integrated Services Digital network (ISDN) uses twisted copper pair lines for the delivery of high speed Internet services

km radius from each household to the local telephone exchange. This 'direct line of sight' from the exchange also determines the type of broadband services that can be delivered. For Hallahan¹⁹ (FutureTV), ADSL will never reach 100 per cent universal coverage. While three-quarters of the Irish population reside within a reasonable distance to a local exchange, only these households will be capable of having ADSL services delivered directly to their home. Rural areas outside of the 4km wingspan will not be connected to this subscription based network due to the substantial expenses incurred in establishing and maintaining a nationwide network.

Other problems experienced during ADSL trials include line interference, from voice telephony services, that could cause the viewer to lose the channel. To prevent this from happening, the twisted copper telephone wires may have to be replaced with upgraded copper to ensure an adequate level of quality of service. At the same time, British Telecom ADSL trials have shown telephone lines that are not able to carry more than 2.3 Mbits/sec (Davies, 2000a). This means that the picture quality is similar to an analogue television programme or an Internet video streaming event at 512 Kbits/sec. ADSL technology has yet to prove that it is capable of providing quality television signals beyond VHS video quality (European Broadcast Union, 1998).

However, there are computer manufacturers and telecommunication operators, such as BT, AT&T and Microsoft, who are working together to offer high speed Internet and multichannel television access to the home using ADSL technology. This alliance is called the ADSL Forum. The consortium believes that ADSL can merge the traditional forms of television programming with the interactive capabilities of the Internet and other digital media services. The group supports the development of a global ADSL transmission standard. Future objectives include the creation of a universal transmission standard for customer equipment, for instance a plug-and-play, 'always on' set-top box.

¹⁸ Due to the twisted copper wires across a telecommunications network, electrical interference can occur over the simultaneous transmission of fixed line voice telephony services. This can lead to signal distortion and slow data transmission speeds.

¹⁹ In conversation with Hallahan, Chief Operations Officer, FutureTV, Northern Europe, August, 2000.

As telecommunications operators continue to try to resolve the transmission of bandwidth-heavy services over twisted copper pair networks, cable operators have upgraded their own delivery systems to carry digital signals of telephony and Internet services alongside their television offerings. Like their competitors, cable is attempting to compete directly with telecommunications networks in providing similar services to the home.

Since its inception, cable television was intended as a basic retransmission technology service to bring terrestrial television services through co-axial wires to homes that were outside the range of terrestrial broadcast signals (Sussman, 1998). Television services were transferred from the main retransmission centre along cable pipes to each household. From the 1970's, cable developed from a local service provider of over-the-air television channels into a long-distance distributor network of microwave and satellite television programming. As consumer demand grew, cable operators began using co-axial cable systems to increase the number of subscription television channels.

During this time, cable struggled with its limited, unidirectional bandwidth in providing additional data offerings. Lack of corporate willingness to invest in the upgrading of infrastructure meant that the co-axial cables were mainly used for television distribution. However, the introduction of fibre-optics had a significant impact on the transmission capacity over the network. With hybrid fibre co-axial networks, the cable operators saw the opportunity to exploit the bandwidth capacity. It provided the technological impetus to switch to digital and compete with the telecommunications network.

To receive digital cable, the subscriber will need to be connected to a cable service provider and network operator. Both service provider and network operators are part of the same commercial entity. The digital cable network will deliver telephony and Internet services with a telecommunications backchannel²⁰. The cable operator provides a return path that is embedded within a hybrid fibre co-axial pipe. The digital infrastructure can

offer high speed Internet access, voice telephony and over 200 television channels as a single bitstream over the cable network. Each digital cable set-top box will enable the viewer to browse the Internet at speeds up to 1,000 times faster than any telephone modem [See Figure 7]. The shared nature of the cable distribution network between homes means that Internet speeds often slow down when the system has multiple online users. Unlike telecommunications networks, the main cable centre is not directly linked to each household. This means that the increased volume of traffic will lead to a slowdown in access speeds and online connectivity.

The digital backchannel will allow, for example, Wide Web browsing, on-line games and electronic mail interaction. Cable operators can offer subscriber packages where telephone line rental charges are bundled together with programming and Internet channels. Another cable advantage over its terrestrial competitor is that they can easily switch off their analogue transmission network by supplying their digital set-top receiver box when their networks are fully up-graded. They have no commercial obligation to make their proprietary boxes compatible with their cable competitors. This means that there is no single cable set-top box standard for the transmission of digital interactive television and one-way media services. Despite this, each digital cable network has more bandwidth capacity to deliver more services over its single pipe network. Digital cable has more broadband capability, than any other delivery system, such as terrestrial or ADSL networks. As a common carrier network, cable networks have the greatest potential for the joint provision of telecommunication and broadcasting services, such as voice telephony, video-on-demand and interactive services to the home.

As transmission systems are being built to supply similar services, the type of content that can be accessed by the viewer will become conditional on the set-top box or integrated digital television set. This means that the reception of signals will not necessarily allow customers to access the available content. Controlling access to digital services through the set-top box and integrated digital television set will become an important consumer

²⁰ A backchannel is a telecommunications return path required for the sending of asymmetrical and World Wide Web services. By the using this return channel, an interactive television user connects to a one-to-one

issue for both broadcast operators and television viewers (Steemers, 1997) With digital broadcasting, the conditional access systems (CAS) that are provided by the network operator will manage the selection of television packages and interactive television services through the set-top box Therefore network operators may replace the traditional role of the broadcasters by controlling access to all television schedules, channels and communications services [See Figure 8] In effect, terrestrial broadcasters may become content providers while the transmission networks, which include all delivery systems, dictate the technical conditions that determine the level of accessibility of these content providers for the general public

Access to Content through the Set-top Box

While the transmission networks provide telephony, television and Internet offerings over each delivery system, the set-top box is responsible for the access of all media services to the consumer The set-top box on the television set will be the dominant access point for the delivery of the digital broadcasting experience It will be the electronic gatekeeper through which all Free-to-Air and subscription services are received

The set-top box is a small hardware computer device that decodes the digital broadcast signal into the analogue signal of a conventional television set (Kleinsteuber, 1996) The digital set-top box is plugged into the television set and aerial Digital services are broadcast in a scrambled transmission signal that is decoded by a conditional access system The provision of broadcasting services occurs after the viewer has registered their set-top box with their network operator For instance, an individual wanting to receive a digital terrestrial offer of increased television channels would first contact the franchise operator to receive their set-top box After that, the viewer can choose their preferred Free-to-Air or subscription interactive television options

Within each set-top box rests the network operator's chosen software system called the Conditional Access (CA) system This electronic software will determine access to the

or unicast service provided alongside the traditional media content

television and multimedia service. It allows for the descrambling of the digital signal into a television channel or a teletext service. Reception of an interactive television service will be conditional to the technical and economic demands of access system. A credit card subscriber management system, programmed within the access system, ensures that consumers receive only the channels and services that they have paid for. The viewer must insert a proprietary 'Smartcard' of credit card, provided by each network operator, to activate the in-built CA system. According to de Brum (1999), a CA system will be essential for pay-TV, pay-per-view, and near on-demand services²¹. A consumer will need to be authorized by the service provider to allow the programmes to be decrypted by the set-top box CA system. This system will relay like Free-to-Air, terrestrial and interactive services between the service provider and the consumer.

For Branagan²² (RTE), the access system is more than the electronic method of controlling viewer access. It is the 'only means of uniquely identifying one customer from another, so it's much more than just the restriction of what the customer can see. Without a CA system, your interactive services fall over because you don't know who your customer is', Branagan said. Each CA system can compile the viewing habits of each viewer. The set-top box owner can efficiently monitor, for instance, the viewer's interactive programming, teleshopping tastes and programme choices. Data can be compiled with regard to each individual's viewing choices and consumer habits without their approval.

As this information on restricted viewing will have strong commercial value, consumer choice can be limited to the interests of their conditional access operator. It is for this reason that each digital delivery system will be aligned to their set-top boxes. Network service providers can restrict content choice by focusing on sales of such specialised customer information to marketing institutions. In turn, these network operators will be able to create a revenue generating system from their subscriber and non-subscriber base.

²¹ Pay-TV relates to subscription services such as multichannel offering of niche and Free-to-Air television channels that are distributed by each network operator. Pay-per-view relates to specific sporting events or film premiers that a subscriber can view for a once-off fee. Near on-demand offers a more regular supply of sporting or premier film occasions at a defined access charge.

whilst monitoring services offered by independent content suppliers. The return channel will allow service providers to create individual services tailored to the viewer's demands.

A terrestrial integrated digital television set (iDTV) will require an embedded terrestrial CA system to provide Free-to-Air and subscription services. While each iDTV set will also have an embedded set-top box within its architecture, a smartcard will be required to access CA systems. But this iDTV set will not be compatible with, for instance, cable television set top boxes, as each platform will have separate multi-media software and modulation standards. For instance in Ireland, television channels are broadcast at different frequencies across the radio spectrum and cable delivery systems. Integrated digital television sets tuned for terrestrial broadcasting will remain on UHF and VHF spectrum frequencies²³. This will ensure that a CA system downloaded from the air will only work with iDTV sets approved by the terrestrial network operator. Branagan (RTE) expects iDTV sets to become available on the Irish market at the same time as the launch of the terrestrial network.

The introduction of digital terrestrial broadcasting may be delayed by consumer confusion of various competing delivery platforms that will essentially possess the same technical ability to provide digital services. RTE (1998), in taking this view, does not mention that there are very few iDTV sets available on the Irish market which can compete with free or subsidised set-top box offers from cable network operators, like NTL or Chorus. In the RTE's response paper to the ODTR's 'The Way Forward For DTV' (1998), it states that integrated digital television sets rather than set-top boxes will be the driving force behind the take-up of digital terrestrial broadcasting services, as set-top boxes are mainly being promoted for the cable pay-TV market (1998: 16). However, the pay-television market may deter the take-up of iDTV hardware as once consumers receive a set-top box, they are unlikely to purchase an iDTV, regardless of the benefits of

²² In conversation with Peter Branagan, Head of Digital Planning, RTE, October 2000.

²³ UHF relates to the Ultra High Frequency range in the radio spectrum. In Ireland, this terrestrial bandwidth transmits RTE1 and Network2. VHF means Very High Frequency and TG4 and TV3 is carried over this part of the radio spectrum.

digital terrestrial television. In spite of this, it appears that the digital terrestrial platform operator will be the main supporter of iDTV sets while cable operators will prefer set-top box proprietary control [See Figure 9]

Another factor to influence consumer choice in deciding between an iDTV set or set-top box will be the level of interactivity provided by each decoder receiver. This first level of restricted interactivity, available on both devices, will allow the viewer to search and access enhanced unidirectional data broadcast services provided by the network operator. This does not include a return path between the viewer and the content provider. The interactive relationship lies between the user and CA system. The viewer interacts with services that are downloaded into the hard drive of the set-top box. For instance, the digital teletext service is stored in the hard drive of the box and the user can request personal information services by ringing a predetermined fixed line telephone number. This level of interactivity operates within a non-linear medium between the service provider and the consumer.

Data broadcasting is another form of one-way data and Internet-type services but without the freedom to access Internet sites on the World Wide Web. Datacasting allows the network operator to collect data over regular and continuous periods via a data carousel that can be constantly up-dated. It is transmitted alongside the broadcast programme within the Vertical Blanking Interval of the digital signal. This interactive television service is a complementary element to the programmes but it is not an essential ingredient to the television programme. Digital teletext, onscreen icons clicking to additional information, news-on-demand, sports results, event guides, multiple camera angle choices for sporting events, enhanced advertising, data services, video sites and programmes are all one-way offerings that can be stored and preselected within the set-top box.

The box provides the Electronic Programme Guide (EPG). The basic EPG is a menu-based list of programmes and digital services that can be downloaded from the broadcaster to the viewer's digital box. The content listing will be the first screen image

that the digital viewer will see and the first interactive digital broadcasting application to be used by the audience. The guide will offer many personalised viewing touches. For instance, it can bring particular programmes and services on offer over the channels to the viewer's attention. It can make the consumer aware of any available programmes. This navigational system will steer the viewer through the menu list of channels and interactive services. The viewer can customise a list of theme channels and on-line services around their own watching time. The guide can select specific genres or types of programmes across all available channels that may suit the consumer's personal tastes (Brown, 2000b). The set-top box will store the selected services in a software memory file²⁴

In the UK where there are roughly 4.25 million digital broadcasting households, only two EPG operating system interfaces exist, ONdigital and BSkyB (Brown, 2000a). The guide has shown an increase in awareness of Near-Video-on-Demand (NVOD) film channels. The viewer is informed of the start of a chosen broadcast feature film which is usually staggered over 15 minute intervals. There has been a corresponding increase in pay-per-view film sales. Unlike the traditional 'channel hopping' experience of analogue viewing, this information portal provides a more competitive viewing menu schedule for terrestrial broadcasters.

The issue of a single national terrestrial EPG, used across all delivery systems, has yet to be resolved amongst Irish indigenous broadcasters. For Murray (RTE), there is 'a very strong case for all of us, ourselves and TV3 and others to come together and make a joint bid, even with UTV, for an EPG and to have a partnership of all players on the market to make sure that we get it right'. Indeed, this comment could be reflected in a recent Residential Survey on consumers' use of digital television. It was carried out by the UK's Office of Telecommunications (2000). The report found that the EPG was the most used new digital service with almost half of these households using 'the 'favourites' function on the programme guide, enabling them to produce a customised listing of their favourite

²⁴ Set-top boxes are initially produced for pay-per-view subscription services. In more recent times, they have begun to adopt interactive possibilities of many-to-many communication services, like the Internet.

programmes' (Office of Telecommunications, 2000 <http>) By agreeing on a broad consensus for a common and equitable guide for all broadcasters, the obligation for positive positioning of national channels could be achieved across the terrestrial platform

Another significant element in a set-top box is the programme interface hardware This hardware is crucial in deciding whether an EPG or another CA software service should be downloaded or removed from a set-top box For this to occur, a separate computer system controls the hardware memory This system is called the application programme interface (API) Broadcasters or content providers who control this particular gateway can decide how long applications remain in the set-top box By holding proprietary control over their set-top boxes, multiplex and network operators are in a strong position to dictate any future development of their software system They can discriminate in favour of particular subscription, pay-per-view services or computer applications by choosing an EPG with limited memory and two-way interactivity (Nolan, 1997) Thus the system interface can be restricted to understand specific services with certain technical specifications that may benefit the content supply of the network operators, like NTL, rather than the independent service providers, such as RTE (Mardsen, 1999)

The API is not an operating system but an electronic software gateway system that allows the viewer to access the operating system in the box The software interface operates between the viewer, who can access services that are provided by the platforms' service providers, and the CA system within the digital box It controls access to all programming, transaction, data and two-way interactive television services

This second level of interactivity, in addition to the EPG and datacast services, offers a narrowband return channel for the user to directly request and choose additional services The viewer will be able to find, select and respond to information This can be achieved through a two-way form of communication across the delivery network It is at this level of television interactivity that multi-media software will be required to provide interactive services and designing Internet content for television viewing Access will be offered via

(Kleinsteuber, 1998)

a telephone, cable or terrestrial return path Hincy²⁵ (ODTR) purports, 'essentially, that's a cross hybrid between a television service and a telecommunications type service [and] you're approaching a converged environment there' Such enhanced channels include e-mail and chatroom services that allow the user to create their own information 'in a two-way system, to be stored in real time' (Jens, 1999 189) These services can be connected to traditional broadcast programmes through a linked service that allows the viewer to automatically move from the viewed programme to a World Wide Web site for further data or video information Each set-top box will have an application programme interface to run the software required for this type of interactivity The interface can define how an interactive service will look and function on the television screen

For instance, a network operator can manufacture their own API to regulate public television services to a low channel number on the EPG This means that the public broadcaster 'would become dependent on the pay TV company to reach these digital viewers via their package' (Brandrud, 1999 134) At the same time, the network operator may not readily accept public service digital channels that do not achieve sufficiently high audience ratings Such commercial objectives may lead to a reduction in public broadcasting's interactive television market share, as viewers will be unable to access public media services in a reasonable manner

In Europe, the development of pay-TV digital broadcasting has consolidated the use of proprietorial APIs, such as NTL's Diva software and BSkyB's OpenTV, across the leading digital infrastructure operators Satellite set-top boxes, using OpenTV software, will not be able to access services transmitted by another network operator, such as Diva software These interactive services may be authored to only run on the software controlled by each network operator While this market structure may have been required to generate a successful commercial digital broadcasting market and establish a critical mass, its net effect has been the adoption of incompatible software used in each of the network's decoder receivers (Peek, 2000)

²⁵ In conversation with Hincy, Broadcast Regulator, Office of the Department of Telecommunications Regulation October, 2000

But for Watson-Brown (DG13 Advisor on Information Society Directorate), it is possible to have similar levels of connectivity and interoperability across broadcast networks that exist between the telecommunication networks and the Internet 'In the early stages of any market, proprietary solutions are rather common everyone wants to mark out territory [although] open standards face much less scrutiny from ex ante regulators and competition authorities This is an important advantage because it provides easy access and great freedom of manoeuvre The adoption of the DVB's Multimedia Home Platform (MHP) by European Telecommunications Standards Institute (ETSI)²⁶ is very positive in this respect because it uses an open API and facilitates the possibility of migration from first generation decoders', Watson-Brown said²⁷

An open software system offers regular upgrades to ensure that consumers do not buy rapidly outdated and incompatible set-top box digital equipment It is designed to be technologically neutral between all digital platforms Such interoperability would allow interactive and data services to traverse across different set-top boxes and integrated digital television sets Without this ability to handle different types of digital content over all networks, interactive programming will have to be individually written for the boxes used on each terrestrial, telecommunication and cable platform This will fragment the digital broadcasting audience, as each platform will own an individual proprietorial API system The development of domestic interactive television services will be hampered by the additional expense of re-authoring individual programmes for each platform

On the other hand, network operators can claim that if they use the MHP standard, the set-top box will have a reduced capacity to download their competitor's software and content services (Atkins, 2000) In turn, network operators may want to control access to their network and return channels, regardless of its responsibility to provide reasonable, fair and non-discriminatory access to their set-top boxes According to Atkins (1999),

²⁶ Established in 1987, the European Telecommunications Standards Institute regulates digital broadcasting transmission standards

providing access to viewers, through the MHP standard, may not be enough if there are on-going capacity constraints or if the network operator uses dominant 'first screen positioning' and branding. The dominant network operators will still continue to control and enforce preconditions to digital multiplex services by other content suppliers.

The establishment of proprietary hard and software funded by the network operators may have already captured dominant market share. However, several public broadcasters, such as the BBC, have openly supported the need to make a basic level of technical information available to all interactive television content providers. This would offer a limited degree of interoperability between the interfaces and authoring tools used across all platforms (BBC, 2000a). Such detailed information would allow independent content suppliers to produce interactive and datacast services in accordance with the proprietary standards of each broadband network. This would ensure the delivery of broadcast services to viewers although the network operators will control the degree of access to these services.

Conclusion

Due to the unrestricted nature of the cable network, digital cable could be truly considered the most digitally converged network. Like ADSL, digital terrestrial continues to suffer from the physical bandwidth limitations in the digital environment. But the digital terrestrial network is the only truly universal and portable transmission system. With the recent approval of the MHP terrestrial return path by the European Telecommunications Standards Institute, the technical barriers that prevented the terrestrial network from competing on an equal basis with digital cable are being overcome. The digital terrestrial system has been proven to be a viable two-way broadband infrastructure for interactive television and telephony services. A return channel will allow full interactivity of television channels and Internet services over the terrestrial delivery network.

²⁷ In February 2000, the DVB group officially announced the launch of the MHP platform that will provide interoperability across all delivery platforms whilst allowing the broadcaster to choose their proprietary

Branagan (RTE) believes that as delivery platforms evolve into powerful 'almost editorial tools', the public broadcaster needs to maintain a presence on at least one system in order to have any influence on the development of the platform, such as digital terrestrial. This emphasis takes on more urgency as broadcasting amalgamates into a telecommunications network. The terrestrial network is becoming another method of delivering the 'same multiplexed bitstream of broadcast or telephony services over a platform or on the television screen' (Argyris, 2000: 2)

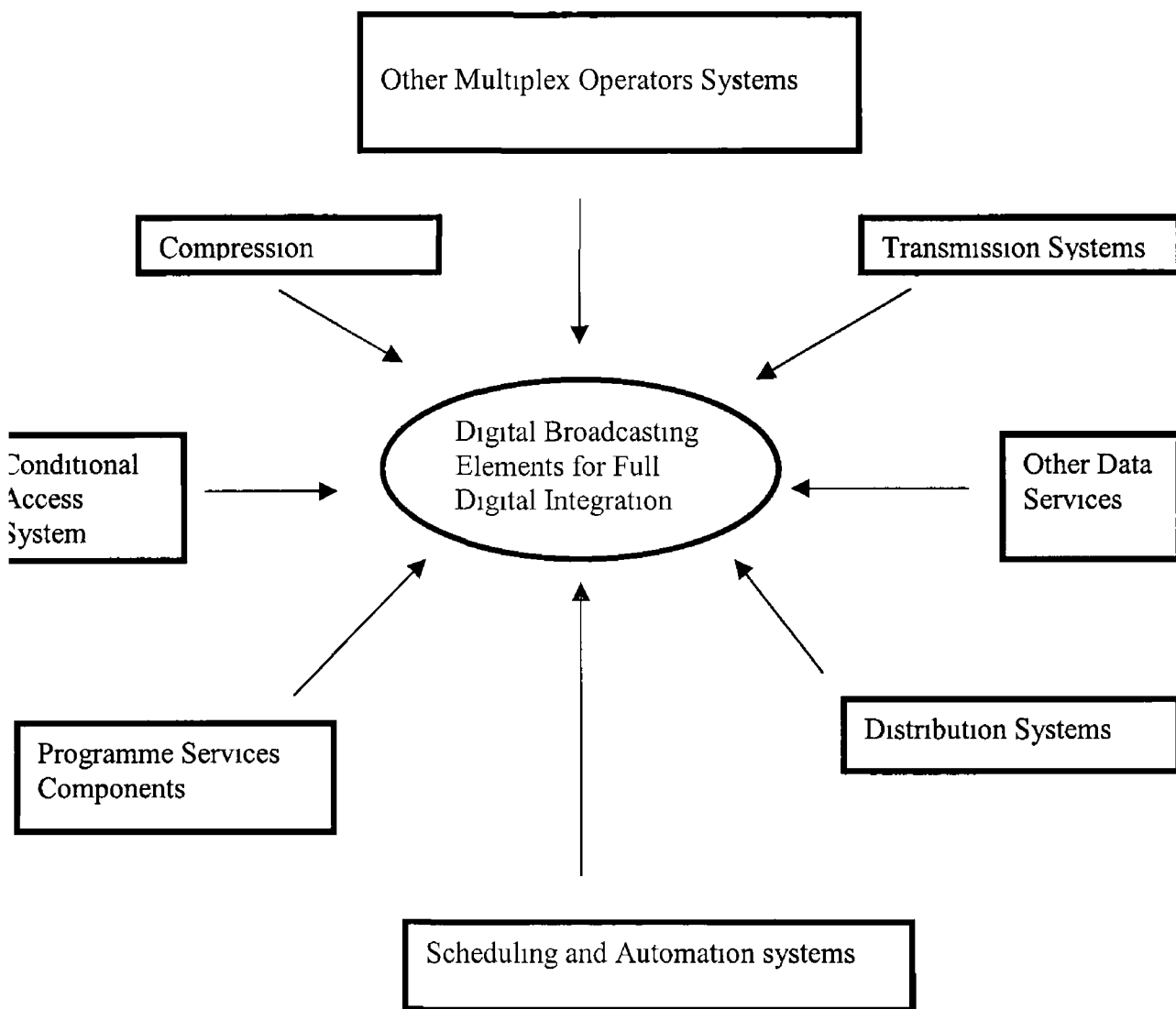
Similarly the role of interactivity is subject to the chosen distribution medium, like the copper wire, fibre optic or terrestrial network. Interactivity will depend on physical infrastructure, software services and delivery systems to carry these broadcast and telephony services. Digital technology and new transmission networks, like the Internet, have made it technically possible for traditionally separate networks to carry the same types of services to the television. Network operators have decided to use their proprietary electronic software knowledge to control access to all services, including the EPG. If this behaviour blocks or obstructs access to indigenous services on the menu guide, regulation will be required to ensure fair and non-discriminatory access to public multiplex broadcasting services. Platform compatibility is a technical possibility but it is an unviable proposition in commercial and economic terms. The commercial demands of the free market will decide the level of network compatibility required for the delivery of interactive public television programming.

Marsden writes, 'without means of access to consumers, public service programming is futile' (2000: 18). An open and common electronic gateway will be crucial to the carriage of public multiplex digital services across cable and telecommunication delivery systems. Public service content will need to be re-authored for each digital platform in order to deliver its digital interactive services to every household, over every viable distribution platform. The non-compatibility of all set-top boxes could inevitably restrict the availability of broadcast services over cable and telecommunication networks on purely commercial imperatives rather than on public interest and universal service objectives.

The software interface issue, concerning application programmes and EPGs, highlights the access problems that will be experienced by viewer's receiving digital broadcasting services. Furthermore, there will be problems for service providers in their attempt to access digital networks that will be supplying similar services. Overall, the Multimedia Home Platform standard offers an open technical standard for running applications on advanced set top boxes and television sets, irrespective of the distribution method. This standard will ensure that public multiplex services are carried on all communication networks.

Effectively, the European Commission will become responsible for the development of digital broadcasting regulation across all Member States. It will have a crucial role in the regulatory conditions that will enable each network to provide a full range of broadcasting, Internet and most importantly, voice telephony services. The following chapter explores the regulatory requirements for digital broadcasting across European Union policies and its impact on national broadcasting and telecommunication companies.

Figure 3 Development of Digital Broadcasting across all Platforms The Necessary Variables²⁸



²⁸ Source Brooks (2000)

Figure 4 Possible Digital Media Services to the Household²⁹.

<u>Broadcast</u> <u>Medium</u>	<u>Receiver Interfaces</u>	<u>Telecommunications</u> <u>Medium</u>
Electronic Programme Guide	TV, PC, Radio	Electronic Programme Guide
Data-casting	TV, PC, Radio	Data-casting
Pay-Per-View	TV, PC	Pay-Per-View
Near Video On Demand	TV, PC	Near Video On Demand
Home Banking	TV, PC, Radio	Home Banking
TV and PC Games	TV, PC	TV and PC Games
Internet-Type Services	TV, PC, Radio	Internet
Internet	TV, PC	Cable Telephony
	TV, PC	Internet/World Wide Web
Mobile Services	Telephone	Mobile and Fixed Services

²⁹ Source Ronan Callanan

Figure 5 Current DVB-Terrestrial Platform Operators in European Union³⁰

<i>Multiplex Operators</i>	<i>Launch Date</i>	<i>Owners</i>	<i>Broadcast model</i>	<i>Country</i>	<i>Channel Services</i>	<i>Interactive Services</i>
ONdigital	1998	Granada and Carlton Communications (50 50 stake)	Encrypted Pay-TV	UK	12 Thematic, 2 Free, 5 Premium	E-mail, interactive Advertising
BBC Digital/ITV/SDN	1999	BBC, Carlton, Channel 5, SC4, Granada	Free-to-Air, Encrypted Pay-TV	UK	7 FTA, 5 Thematic, 1 Premium	Unknown
Onda	2000	Retavisión (49 per cent stake)	Encrypted Pay-TV	Spain	14 including PPV	Interactive Services
Senda	1999	Teracom and SVT (50 50 stake)	Free-to-Air, Encrypted Pay-TV	Sweden	12 Primary in each region	EPG Interactive services
Digico	2002	RTE (28 per cent stake)	Free-to-Air, Encrypted Pay-TV	Ireland	11 FTA, 25 PPV, subscription	EPG Interactive services

³⁰ Source IDATE (2000 58), Baldi (2000), Ronan Callanan

Figure 6 Comparison between Ireland and Digital Terrestrial Platforms in European Countries³¹

	<i>Type of Digital Terrestrial licence</i>	<i>Households with TV sets</i>	<i>Households with 2 or more TV sets (and VCRS)</i>	<i>Per cent of Analogue Cable homes</i>	<i>Per cent of Analogue of DTH (Satellite) homes</i>	<i>Per cent of Analogue Free-to-Air Terrestrial homes only</i>
UK (1998)	Multiplex	24 million	Not Known	25	19	70
Sweden (1999)	Service	4 million	Not Known	63	20	17
Finland (2000)	Service	2.2 million	Not Known	47 [including MMDS]	4	49
Ireland (mid-2002)	Hybrid	1.13 million	840,000	53 (360,000) [including MMDS]	10 (116,000)	40

³¹ Source: Blomberg (2000), IDATE (2000), Ronan Callanan

Figure 7 Internet Access Speeds to the Home³²

Carrier network medium	Fixed Line copper pairs	Cable		Satellite		Hybrid cable/ satellite and copper wire	
		Analogue	Digital	Analogue	Digital	Analogue	Digital
Transmission protocols via modems							
(Dial-up) 14 4 Kbits/sec 28 8 Kbits/sec (standard analogue speed) 33 6 Kbits/sec, 56 Kbits/sec	PC	None	None	None	None	ALL	ALL
ISDN, 64 Kbits/sec	PC	None	None	None	None	PC	PC
ADSL, 64 Kbits/sec 124 Kbits/sec	ALL ALL	None	None	None	None	None	ALL ALL
Satellite, 400 Kbits/sec	None	None	None	PC	ALL	None	ALL
Cable, 124 Kbits/sec 256 Kbits/sec	None None	PC, TV PC, TV	All All	None None	None None	PC, TV PC, TV	ALL ALL
Terrestrial, 400 Kbits/sec	None	None	TV	None	None	TV	TV

³² Source Ronan Callanan

Figure 8 Possible Interactive Broadcasting Options³³

<i>Delivery Platform</i>	<i>Applied Programme Interface Technology</i>	<i>Conditional Access System</i>	<i>Services</i>	<i>World Wide Web</i>
Satellite	OpenTV	Proprietary	E-mail, home-shopping and banking, EPG	Not yet
Cable	PowerTV	Open - IP based	E-mail, TV-Internet, EPG	DVB/DAVIC standard
	NTL OpenTV	Proprietary	E-mail, home-shopping and banking, EPG	Not yet
	Diva DTV Navigator	Open - IP based	E-mail, TV-Internet, EPG	MCNS/DOCSIS standard
Wireless Terrestrial	DVB MHP	Open - IP based	E-mail, home-shopping and banking, EPG, Teletext	Not yet
Terrestrial - dial-up	DVB MHP	Open - IP based	E-mail, WebTV	Standard not known
Telephone (ADSL)	Under trial	Open - IP based	E-mail, e-commerce, video-on-demand	DVB/DAVIC standard
All Platforms	Multimedia Home Platform	Open - IP based	E-mail, home-shopping and banking, EPG	DVB standard
Cable /	Microsoft CE, NTL,	Proprietary	E-mail, WebTV	Standard not known

³³ Source Ronan Callanan

CAS/DVB (Conditional Access System/ Digital Video Broadcasting) - A pay-television standard allowing compatibility between Cable, Satellite and MMDS platform

DVB/DAVIC (Digital Video Broadcasting/Digital Audio-Visual Council) - Joint European standards body for the broadcasting of television and multimedia content across all digital delivery systems. It is suited for interactive television applications, relying on the MPEG-2 standard to carry data streams.

MCNS/DOCSIS (Multimedia Cable Network System/Data Over Cable Service Interface Specifications) - American cable standards body using cable modem IP protocols

Figure 9 Development of iDTV sets across Digital Terrestrial Broadcasting³⁴

Third Threshold Tier

Value Added for Home Networks – DVD, PC, Memory Stick High levels of Interactivity in Digital Terrestrial Television set, VCR, Stereo and Telephone Low Viewing Hours Internet Links



Second Threshold Tier

Optional Common Interface Module – Pay-Per-View, near Video on Demand via Cable/ADSL, Pay TV (BSkyB, Canal+) Medium levels of Interactivity via PCMCIA Card for Conditional Access to PAY TV services and Pay-Per-View Functionality Few Viewing Hours Return Channel for Interactive Advertising, Home Shopping, Pay-Per-View, NVoD Internet Links



First Threshold Tier

Basic “Free To Air” iDTV and Set-Top-Box - Multichannels, Widescreen Broadcasting, MHP Applications, ‘Digital’ Picture Quality Low Levels of interactivity with iDTV set EPG, Data and Additional Information with programmes Maximum viewing hours

³⁴ Source Northover Smith (2000)

CHAPTER THREE

Introduction

Prior to digitalisation, broadcast and telecommunication services were considered as two distinct markets with separate technical capabilities and duties. They carried different services and were regulated independently with different public policy goals. National fixed line networks carried voice telephony while television content was distributed exclusively by broadcast and cable networks. The introduction of digital compression has caused these traditional distinctions to overlap. Technological barriers are being overcome as voice telephony, Internet services and broadcasting are carried as a single multiplex bitstream. They are transmitted over increased bandwidth frequencies across all platforms.

This chapter will look at the changing European regulatory approach to each distribution system, as television services become a division of the telecommunication networks. This section will question the role of European regulation on the evolving telecommunications and broadcasting sectors. In broadcasting, television has been controlled for mainly political, economic and social reasons. Regulation of terrestrial broadcasting has occurred due to the technical scarcity of spectrum frequencies for multiple television channels. The network operator took responsibility for providing universal coverage and access to Free-to-Air television throughout the country. In Ireland the owner of the analogue terrestrial infrastructure is the public broadcaster, RTE. Both network and content production was funded by a joint licence fee and advertising revenue mechanism. This approach represented national policy for public service television.

Chapter three will trace the position of the European Commission with regard to the funding of public service broadcasting. Does the European Commission support the values of public broadcasting? Is the Commission's regulatory approach to digital broadcasting removed from national social and cultural responsibilities? These questions

will highlight how European policy has continued to look on the broadcasting industry from more of an economic position than a socio-cultural and linguistic perspective

Attempts by the European Commission to separate public funding from infrastructure regulation will be examined. As the set-top box becomes the mini-computer that will control access to all television services, this chapter explores the regulatory conduct of the European Commission in encouraging a fair and non-discriminatory development of conditional access systems within each television decoder receiver. Can a single set-top box supply public media services across all platform systems? The section will assess the challenges faced by the universal reception of digital public service content to each viewer. European regulation may aspire to regulate all broadband networks equally but terrestrial broadcasting is the only network to deliver a universal range of public services that are free at the point of delivery.

Broadcasting

From the mid-1970's, the establishment of commercial television channels across Europe began to influence the traditional terrestrial monopoly of broadcasting television. Cable and satellite retransmission systems competed with the terrestrial platform for the delivery of television channels to each household. The European Commission supported this growth in competition between transmission networks. According to Collins, the objective was to create a single television market within Europe which redefined television 'as a service traded within and between European Member States and subject to European competition regulation' (1998a: 51). Each distribution system was just another delivery medium in the production and transmission of television channels. The Commission wanted to create a pan-European independent television market, in line with its other industrial policies, based on the competition rules of the Treaty of Rome (1957).

These sentiments were expressed by the former European Competition Minister, Karl van Miert who claims that 'competition is not in fact an end or goal in itself. It is simply the most effective and least risky strategy we have for achieving our real policy goals

concerning economic growth and efficient public service' (Collins, 1998b 363) The market rather than the public sector was considered as the best method to secure the public interest in the provision of digital media and communication services This belief in market economics was accepted by national governments which in turn accompanied the liberalisation process of the telecommunications network Collins writes that the principles for European economic regulation are 'to prevent concentration of power, anti-competitive behaviour and to allow regulators to administer internal affairs of telecommunications' (1996 167)

Generally, the European Competition Directorate (DG IV) uses the Treaty of Rome³⁵ to validate its assertion that television should be considered a service like any other economic commodity and 'without exclusion on grounds of their cultural or other content' (Venturelli, 1993 505) The 'Television Without Frontiers' directive (1989) allows Member States to receive any European television channel over their national broadcast networks subject to specific European Community content conditions (Venturelli, 1993) The function of 'Television Without Frontiers' is to nurture the launch of the satellite transmission network Under this directive, broadcasting is considered an economic service similar to other European trade sectors, like telecommunications or computer industries

The DG XIII believes that public broadcast services should adhere to the same competition rules as commercial broadcasters Articles 85 and 86 of the Treaty of Rome, as applied to public broadcasters, suggested that they were in breach of the Treaty's trade conditions on state aid to industry Taking direction from these Articles, the DG XIII maintains that public broadcasters are in a dominant market position which can distort the broadcast market and award an unfair commercial advantage over its competitors The DG XIII considered the licence fee as a form of state aid, which should be used to finance only public service activities and delivery systems (Bundschuh, 1998) With this in mind, commercial broadcasters legally challenged the public funding of public service

³⁵ The Treaty of Rome charter (1957) established the European Economic Community, later abridged to the European Union, which is currently composed of fifteen Member States

broadcasters, like RTE who combine licence fee money with advertising revenues. Commercial broadcasters claim that this leads to unfair economic advantages. These broadcasters support the foundation of a new funding mechanism that would be fully compatible with European competition rules. For broadcasters who received licence fee and advertising revenue, the onus would be placed on them to defend the use of public funds on programmes that would compete with commercial channels for audience ratings. Public broadcasters should be required to provide financial transparency in their commissions and foreign acquisitions of television content.

For Collins (1998b), this form of dual funded state aid to public broadcasters is incompatible with the free market tenets of the Treaty of Rome. This led to some European public broadcasters being investigated by the DG XIII on behalf of commercial channels. One case, against the Portuguese public broadcaster, Radiotelevisao Portuguesa (RTP), was recently resolved in the European court. In this instance, state funding allowed the public broadcaster to produce clearly defined programmes that commercial channels were not required to perform, such as certain cultural and national events (Michalis, 1999). Similarly other European public broadcasters, like RTE, believed that they were exempt from European competition regulation. Their obligations in the provision of public programming fall within the economic domain of market failure, as they are essential services which transcend the economic structures of the Treaty of Rome. They contend that public television is subject to national regulatory decisions based on the cultural, linguistic and social considerations of its citizens.

These issues were addressed in the Maastricht Treaty (1992) which made changes to the Treaty of Rome (1957). Maastricht amended Article 92 of the Treaty of Rome, by classifying state aid as the promotion of 'culture and heritage conservation where such aid does not affect trading conditions and competition in the Community to an extent that is contrary to the common interest' (Collins, 1998b: 371). However, this provision categorised public broadcasting alongside items of historical worth and cultural exclusion and removed public service broadcasting duties to provide popular as well as minority services. The amendment ignored the public service remit that required popular and

minority programming schedules to justify their public funding. By providing an inclusive selection of international acquisitions and indigenous programming, public channels maintain a wide viewing audience. The role of public broadcasters, in offering television programmes with mass appeal, was legitimised as part of their social and cultural responsibilities.

In 1997, the Amsterdam protocol, Number 32, took the first step in promoting European Union legitimacy to public broadcasting. The protocol states, 'the provision of this Treaty shall be without prejudice to the competence of the Member States to provide for the funding of public services in so far as such funding is granted to broadcasting organisations for the fulfilment of the public service remit as conferred, defined and organised for each Member State' (Collins, 1998b: 371). The protocol recognised that national governments and not regional authorities, like the European Commission, best determine the public service remit. State funds with a dual funded public broadcaster should be used to fund programmes and services deemed as part of their social, political and economic obligations. A legal framework for the use of the licence fee was left to each Member State to define on social and cultural grounds as each Member State ratified this concept of public broadcasting.

Yet, the issue of dual funding for public service broadcasting in Europe has not been resolved by the Amsterdam protocol (1997). A subclause was added to the protocol, stating that the public service remit should be compatible with 'the Community interest with regard to services of general economic interest [that] shall respect the principle of proportionality and not effect trading conditions and competition in the Community to an extent contrary to the common interest, in accordance with Article 86 (2) of the Treaty, as interpreted by the Protocol (while the realisation of the remit of that public service shall be taken into account) and the case law of the Court of Justice' (Communication from the Commission to the Council, 1999a: 12). As a consequence, the Commission attempts to balance the cultural and linguistic requirement of broadcasting within each Member State with the competitive obligations outlined in the development of a single market European Union.

One significant problem was the Protocol's vagueness in creating a precise definition of public service broadcasting. Such attempts of 'competence' were left to each Member State to provide a funding structure considered appropriate to their country. The debate surrounding this level of competence has led to several commercial broadcasters initiating European court cases against what they look upon as unfair use of public funds by state broadcasters. In recognition of this continued absence of a clearly defined public service remit, the DG VIII tried to develop specific guidelines on state subsidization in the broadcasting sector. While the Amsterdam Protocol (1997)³⁶ views public broadcasting as a vital cultural service, national institutions should nonetheless adhere to European competition treaties. This free market disposition is reflected in the DG XIII's conviction that licence fee funding should go to specific programmes or channels which are not in direct competition with commercial broadcasters.

Alternatively a KPMG report, entitled 'Public Policy Issues Arising From Telecommunications and Audiovisual Convergence' (1996), suggests the formation of a public body to independently commission public service programmes between independent television companies and not public broadcasting organisations. This could provide a more balanced economic framework between public and private broadcasters. In this way, public interest obligations would not necessarily rest with public broadcasters. However, this suggestion does not recognise the innate profit-driven nature of the commercial broadcasting sector which may not produce particularly, low rating television genres. On the other hand, public broadcasting is an organisation that uses its programme schedule to serve the widest possible audience that should encompass all demographic categories.

The Amsterdam Protocol (1997) accepted the relationship between the particular social and cultural needs of national communities and their public service broadcasters. The Protocol recognizes the importance of 'sports coverage as part of [that] cultural heritage and the non-availability of exclusive pay-per-view services' (Raboy, 1998: 168). For these

³⁶ The Protocol (1997) states that "the system of public broadcasting in the Member States is directly related to the democratic, social and cultural needs of each society."

reasons, national events and other cultural occasions will remain a Free-to-Air service that grants universal access for the general public. Without such a decree, cable and telecommunications operators could transform such occasions into pay-television opportunities for a smaller select audience. For Murrioni, this pan-European regulatory action was the first time that governments had to separate content which citizens are entitled to receive as a right, as opposed to 'that which we are individually free to buy at market price' (1998: 22).

Therefore each country defines its own form of public television. The main options are either by direct licence fee subsidy or a combination of mainly advertising revenue and licence funding. Collins writes, 'there is nothing specific about European media policy; it is not only a technical issue but an ongoing struggle of national states to maintain control of cultural identities and strategic resources' (1996: 141). Each European government will support public television to the degree that it reflects the community and it can afford the financial burden in sustaining a dynamic and comprehensive broadcast service. In the Irish broadcasting instance, the Protocol encouraged the government to define its own public service remit as applicable to RTE, under section 24 of the Broadcasting Bill, 1999. In this Broadcasting Bill, clause 24 (3) (a) allows the Minister to add specific services to be included within the public service remit, 'by adding thereto provisions specifying categories of programmes that shall be included in the programme schedules referred to [the Minister]' (1999: 25).

In 1999, the Broadcasting (Major Events Television Coverage) Act, was passed to allow for the implementation of the Amended 'Television Without Frontiers' directive (1997)³⁷ (Dail Debates, 1999a). The Broadcasting Act (1999) acknowledges the need to maintain a mass audience level of reception and find a 'balance between the rights of events

³⁷ The Amended 'Television Without Frontiers' directive (1997), Article 3a, makes clear that 'Each Member State may take measures in accordance with Community law to ensure that broadcasters under its jurisdiction do not broadcast on an exclusive basis events which are regarded by that Member State as being of major importance for society in such a way as to deprive a substantial proportion of the public in that Member State of the possibility of following such events via live coverage or deferred coverage on free television. If it does so, the Member State concerned shall draw up a list of designated events, national or non-national, which it considers to be of major importance for society. It shall do so in a clear and transparent manner in due and effective time.'

organisers to sell the broadcast rights to sports events and the rights of the general public to continue to see major sports events on free television or near universal coverage, ... it must be recognised that the citizen has rights too and these must be safeguarded' (Dáil Debates, 1999b:http). At the time of writing, the Department of the Arts, Gaeltacht and the Islands have submitted a report to senior management suggesting appropriate sporting and cultural events deemed suitable for protection under this Act³⁸.

After the Amsterdam protocol (1997), complaints of market distortion between public and private broadcasters needed to show how the dual funded broadcast service is negatively affecting the internal European market. Raboy writes that public broadcasting services were accused of going 'beyond what is justified by the public service remit' (1998:168). For instance, Ireland's main commercial broadcasters, TV3, is currently taking RTE to court on grounds of providing services beyond their public service remit. However, the protocol may effectively remove the legal argument against TV3's current European court case. According to McGarry (1999), TV3 submitted an anti-competitive complaint against RTE to the DG XIII Commissioner in March, 1999, alleging that RTE should not be allowed to include sport and entertainment programming in public broadcasting as long as a commercial profit is made over the costs of production and transmission.

TV3 contend that the public service remit should be linked to a transparent accounting system to make sure that their public funding and commercial revenues go towards fulfilling this public remit. If not, TV3 believe that they would be able to provide additional public service programming to their schedule for 'a share of the licence fee fund' (Moynes, 1999:http). However, the interpretation of what is a reasonable proportion of public funded programmes and the provision of Irish language services is not clearly defined by the commercial station. It is also not known the extent to which

³⁸ In personal correspondence with John O'Donoghue, Broadcasting Division, Department of the Arts, Gaeltacht and the Islands, October, 2000. A list of protected events has yet to be published.

TV3 have performed their public service duties, and indigenous programme commissions, under the 1988 Radio and Television Act³⁹

Venturelli writes that support for public broadcasting, based on a cultural and social framework, cannot be compatible with the European focus on 'free movement of all services' in an open market (1989 505). Public service has a political and cultural dimension. By removing the cultural and social aspects of these services which are both time and context specific, it may encourage the development of public services into a more commercially pressurised market. However, the Amsterdam Protocol (1997) recognises the cultural aspects of public broadcasting and attempts to place the regulation of television content within national boundaries.

While the European Commission may be sympathetic to the need for public funds in relation to the production of television content, it does not readily accept that this should be repeated with the digital infrastructural network. In this instance, the Commission's objectives are firmly rooted in the freedoms of the single market and the development of trans-European telecommunication networks. This includes the radio spectrum and the broadcasting network. Turner (1997) believes that in the development of competitiveness, the free distribution and access of goods and services are a crucial component to European industrial policy. In this sense, the broadcasting network is just one element of the total telecommunications infrastructure. By maintaining ownership of the distribution network, public broadcasters become subject to the European Union's rules on competition. The distribution of content is a separate regulatory issue from the funding of content.

³⁹ Section 18 (3) (a) of the Radio and Television Act (1988) states that the commercial broadcaster shall 'be responsive to the interests and concerns of the whole community, ensure that the programmes reflect the varied elements which make up the culture of the people of the whole island of Ireland, and have special regard for the elements which distinguish that culture and in particular for the Irish language'. Section 18 (4) (b) states that the Irish Radio and Television Commission will ensure that 'a reasonable proportion of

Telecommunications

From the mid-1980's, the European Commission created a plan, for Europe as a whole, to liberalise the movement of network hardware throughout the Community. In 1987, this was instigated by the 'European Open Network Provision' directive. The ruling compelled all national fixed line infrastructures to be accessible to other European service providers. At this time most fixed line networks were run as state monopolies. The need to invest in new technologies was often hampered by the bureaucracy of the nationalised fixed line network. In Europe the economic climate began to favour the privatisation of these networks in order to maintain a healthy pace of development in the global telecommunications market.

When the Treaty of Rome (1957), under Article 90, was applied to the liberalisation of the fixed line market, the European Directorate on competition (DG XIII) began to have an increased role in this sector. This directorate established itself as a significant regulatory influence on telecommunications development across all Member States. Its objective is to monitor the commercial behaviour of each national delivery system. The European authority can take direct action against any network operator in safeguarding the entry of new telephony operators on fair and reasonable terms of access. In this way, the Commission has been able to issue a wide range of directives from voice telephony, cable and mobile communications.

For Bruin, this directive (1987) led to the standardization of telecommunications technical equipment for the 'free movement of physical goods across borders' (1999:96). The directive (1987) hoped to achieve a full liberalisation of digital network services and infrastructure. It was envisaged that these practices would facilitate the path to full competition across the former public telecommunication networks. While this ruling took several years to implement, the outcome witnessed Member States agreeing to the full liberalisation of the voice telephony market telecommunications sector, by the 1st of

the programme service ... is devoted to original programme material produced therein by persons other than the contractor, his subsidiary, his parent or existing broadcasting organisations'.

January, 1998 In the Irish sector, telecommunications liberalisation was achieved in early November of that year

According to Watson and Schoof, this green paper (1987) instigated ‘the long-term convergence with audiovisual technologies [It] is precisely this convergence of audiovisual and telecommunications that characterises the information society’ (1995 330) In its digital manifestation, the possibility of multichannel television and on-demand video becoming available over the system was beginning to generate new market possibilities The technological capability of delivering multiple telephony, data and television services became feasible with the use of an open and compatible fixed line network With this in mind, the Competition Directorate (DG IV) approved cable networks to carry voice telephony services Thus the cable infrastructure owner could offer both telecommunications and television services to the domestic household (Ungerer, 1995) For the European Commission, the objective was to increase competition between cable and telecommunications networks in the delivery of telephony and Internet services to each household

Support for the delivery of broadcasting and telecommunication services over each delivery system was again highlighted in the Bangemann report (1994) This report instigated a discussion on the role of the Information Society in Europe and its potential to create information and communication technologies High speed Internet access and interactive television were included Developments in these markets were directly connected to the free market values of deregulation and privatisation, while increasing industrial competitiveness across each Member State Like the Internet, the information society is a seamless two-way ‘web of communications networks’ (Tsagarousianou, 1998 41-59) The aim of the Bangemann report (1994) envisaged the growth of an Information Society that would create the social and economic demands for the evolution of digital services across all Member States

But this growth was conditional to the liberalisation of the broadcasting, cable and telecommunications sectors The report claims that only digital cable and

telecommunications distribution technologies can provide a comprehensive range of communications and media services to all its citizens. There is no mention of the broadband capabilities of the digital terrestrial platform. Furthermore, no discussion takes place on the future social and political role of the terrestrial network within this arena of converged digital services.

Turner's description of an Information Society 'involves the mass consumption of advanced, and ultimately broadband services' (1997: 10). As broadcasting becomes another method of delivering any kind of digital service, it will be crucial that there is a readily available access system to each decoder receiver in the home, either the set-top box or the integrated digital television set. The technical compatibility between the hardware and software of each receiver box and the digital delivery system will grant the viewer access to multichannel television and associated multiplex data. Indeed, the liberalisation of services is incumbent upon the quality of distribution technologies to deliver such content to the set-top box.

In Europe, cable and telecommunications developed their services to ensure that access was inseparable from subscription to their digital delivery system. Fixed line telecommunication operators moved from their established market policy of responding to market demand, for instance the residential telephony market, towards the proactive search for new subscribers. This was achieved through the delivery of television and on-demand video productions. The funding of digital fixed line networks, like Asymmetrical Digital Subscriber Line (ADSL) technology, and on-line content production reflects these changes. Network operators began to invest in ADSL access networks to deliver broadcast channels and on-line services to their telephony subscribers. Direct competition with cable and terrestrial operators, who offer the same range of services, also occurred.

In effect, the European Commission began to recognise the economic importance of access to multichannel, Internet and telephony services across all platforms. From the mid-1990s, the cable and telecommunications network providers began to play a dominant role in the development of digital access software. These networks invested in

computer technology to control the viewer's degree of television access via the set-top box. By controlling entry into the receivers, the network provider can monopolise the range of services available through the network. Thus the availability of Free-to-Air channels can no longer be guaranteed carriage over each digital distribution system. Networks can refuse broadcasters access to their network due to the dominant market power of the transmission operator.

The Commission decided to respond to the issue of access to terrestrial content within this hybrid media and telecommunications structure. In 1995, the 'Advanced Television Standards' directive (ATVS) was published. The paper provided a general set of guidelines over the implementation of conditional access standards on each platform. The intention was to prevent a monopoly structure of access gateways within each set-top box⁴⁰. The directive (1995) supported conditional access systems that would provide consumers with the knowledge that particular set-top boxes are only compatible with specific delivery systems. For example, a set-top box provided by a cable operator, like NTL, will not receive any services from a terrestrial delivery system, like ONdigital. The consumer will need to be fully informed of the platform differences between each distribution network rather than open access to the whole range of multichannel and interactive television services.

The ATVS directive (1995) attempted to ensure that broadcast content, including terrestrial television, was made accessible without unfair or discriminatory commercial behaviour across the distribution network. The paper directed that access licenses should be supplied in a reasonable manner for all broadcast services available through iDTV sets and set-top boxes (ATVS, 1995). This means that independent service providers, like television broadcasters, are entitled to fair access to all digital transmission networks. The Commission's goal was to create a successful digital pay-television sector that would not have dominant infrastructure players.

⁴⁰ Access gateways are the entrance points of multichannel and interactive services, through the set-top box, to the television set. Electronic access, or gatekeeping, conditions allow for the reception of these services across each distribution system. The set-top box controls the entire distribution system with the operator becoming the gatekeeper to public and commercial services.

However Levy (1997a) writes that the ATVS directive (1995) placed less priority on the compatibility of services and applications across its various platforms than previously achieved in the telecommunications sector. The Commission allowed each distribution operator to decide which conditional access system they wanted to include in their set-top box. By permitting the operators to control their conditional access system, they were able to protect the commercial investment accrued by the construction of their digital network and proprietary set-top box. Without any clear European regulatory obligations on each telecommunication or cable operator to provide independent content suppliers, like public broadcasters, with direct access to their networks, commercial networks are in a position to dictate the type of services available to the viewer (BBC, 2000a). In this way, the incumbent network operator is able to maintain a dominant position in the delivery of multichannel television and interactive content. Each network operator will use their technology in the hope that it will become a de facto standard over their chosen platform as network operators absorb the transmission costs for the delivery of the digital boxes to the consumers.

With this in mind, Wiedemann (1999) claims that the 'Advanced Television Standards' directive re-enforced ownership control over set-top-box technology. The directive provides little commercial incentive for integrating open and accessible software between the manufacturers of set-top boxes and the owners of each distribution network. It also prevents the creation of a 'horizontal market in which any application provided by any programme service provider via any network can be understood by all receivers' (Wiedemann, 1999: 3). This means that a television company will be forced to re-design each interactive television programme for each transmission network. These additional production costs will increase the expense of interactive content. The lack of interoperability across these closed, proprietary services may continue to ensure content exclusivity.

But for terrestrial broadcasters, Article 4 (a)(2) of the 'Advanced Television Standards' directive (1995) allows traditional Free-to-Air channels to be accessed through all set-top boxes, regardless of the conditional access system. This suggests that the success of the

pay-television digital channels will be partially dependent on terrestrial broadcasting content. Network operators intend to generate a subscription rate of pay-per-view services alongside Free-to-Air programmes. However, this does not include digital teletext, electronic programme guides or interactive services. These terrestrial multiplex services will not be accessible through the platform's conditional access system without a commercial agreement (de Cockborne and Watson Brown, 1999).

This directive enables each platform operator to use their conditional access system and thereby become dominant service operators. However, this situation leaves non-vertically aligned companies⁴¹ and terrestrial broadcasters at a distinct disadvantage. Television companies are not able to ensure that their digital interactive and information services will be carried over such networks. For public broadcasting, an agreement may not be reached for the carriage of their multiplex services over such networks. Alternatively, cable and fixed line telecommunications network operators, via alliances with media content producers, may create a network monopoly structure.

The need to re-examine these approaches in the early establishment of the digital broadcasting market led to the publication of the discussion document, 'Green Paper on the Convergence of the Telecommunications, Media and Information Technology Sectors, and the Implications for Regulation' (1997). The paper concentrates on two main issues. The first issue re-affirms the Commission's viewpoint that similar communication services are distributed over each digital network. Therefore a new regulatory structure is required to ensure that such digital services, like telephony or multichannel television, should be regulated fairly and equally over each platform. Such regulation would be non-platform specific. This means that each distribution system should be capable of offering any kind of service, telephony or television, to each residential home. The consumer should also be capable of deciding their own media and telecommunications choices, regardless of the distribution system to the home. The Commission has labeled this form of infrastructure regulation as technologically neutral.

This means that 'regulation should neither impose nor discriminate in favour of the use of a particular type of technology' (Watson-Brown, 2000)⁴² By supporting the concept of technological neutrality, broadcasters and television companies can produce an interactive service or software application that will be carried by any digital platform and decoded by any set-top box. It is the European Commission's intention that this form of regulation will be introduced, across all broadband networks, as content services and infrastructure networks develop into single telecommunications and media groups.

On the second issue of content regulation, the green paper targets specific public policy interests to represent the social and cultural characteristics of each country. It supports the generation of a suitable competitive environment for new media services that benefits both content and distribution companies. The paper recognises that there cannot be a clear demarcation line drawn between viewers' access to digital services and broadcasting content. This means that issues relating to the provision of public television and interactive services within the electronic programme guide have a direct impact on the consumers' access to content and the production of news and current affairs services. To be equitable and competitive, all distribution companies should provide both public broadcasting services. The green paper (1997) advocates continued national regulatory action for these cultural and social circumstances. For example, public service content should have a strong prominence within the television listing guides on each distribution system.

As electronic monopolies develop across closed broadband networks, the green paper maintains a high regard for the use of competition rules to 'prevent the emergence of new anti-competitive gatekeeper positions or bottlenecks' (1997 vii). The paper suggests that such rules will prove a more effective mechanism than independent regulatory institutions. While broadcasting is a vital economic sector for the indigenous television market, increased competition between each distribution system will promote the

⁴¹ Vertical alliances describe the integration of production, packaging and distribution companies that had previously existed as separate entities, into one company. This form of vertical integration enables the consolidated company to achieve a strong commercial position in a developing sector.

development of television and telephony services across a European telecommunications market. Moreover, the Commission continues to challenge the legitimacy of dual funded public broadcasting organisations. Such funding is considered as an unfair economic advantage against commercial broadcasters. This discussion paper (1997) accepts that technological convergence is evolving between broadcasting, telecommunications and cable distribution networks, but it does not advocate the introduction of mandatory software standards for interactive content on all television decoder devices. Instead, this measure gives the network owners of the set-top box more leeway to control the conditional access and interactive software facilities contained in each receiver apparatus.

Digital Media and Telecommunications

A recent European Commission review report assessed the 'Advanced Television Standards' directive (1995) on the digital broadcasting, cable and telecommunications market. The report, entitled 'Development of the Market for Digital Television in the European Union' (Commission of the European Communities, 1999c), states that a common software interface in the set-top box will be a crucial element in the provision of an editorially independent electronic programme guide. A neutral interface will be essential for other 'on-demand services and electronic services running on digital television decoders' that provide a broad range of media content (Commission of the European Communities, 1999c 22). Therefore open access to the platform's conditional access system and central information portal is vital, especially in offering multiplex services from terrestrial broadcasters.

The report (1999c) accepts that the ATVS directive (1995) did not include such digital Air multiplex services that include interactive, data and Internet access. This means that each alternative distribution network is not obliged to carry all public service television and data channels. Digital content that is financed by the licence fee payer will not be accessible on each broadband delivery system. The consumer will have to pay for public

⁴² Reply from completed questionnaire by Watson-Brown, DG XIII, Advisor on Information Society Directorate, October, 2000

television services that they are not receiving on their subscription network. Conversely the 'Development of the Market for Digital Television in the European Union' (1999c) paper contends that the introduction of an open and common interactive software standard, called the integrated Multimedia Home Platform (MHP), will allow for software interoperability across all set-top boxes and integrated television sets. This software would allow for the reception of public service multiplex content on any network. Thus the viewer can seek different kinds of broadcast services on any digital network. This creates the opportunity for true technological neutrality on each network as the same television content is delivered over a range of different distribution systems.

But for Thom⁴³ (ODTR), the decision by the European Commission not to make the MHP a voluntary standard was a significant mistake. He believes that 'it's a major let down for the consumers and also a major let down for the industry, as in the content provision industry, because had it been made a mandatory standard, then there would have been one standard for people to develop software from and consumers would have got familiar with that and one box would have worked with the next. Now we're left with fragmentation'. For instance, in the UK the development of interactive television services across each proprietary system can be proved by the degree of electronic gateways that have occurred within each digital network. Experience with the electronic programme guide on BSkyB's satellite network has shown an unambiguous priority for their own channels on its satellite network. Less commercially oriented public services are very far down the programme listing.

Thus network operators will have a stronger commercial preference to high audience ratings and subscription channels in place of public television and multiplex offerings. For instance, Irish public broadcasting services that are regulated to low positions on the menu guide may negatively affect audience levels and prevent viewer's from making informed choices about the selection of public services available on the platform. A significant decline in viewership may question the need to invest in the development of public service content across each distribution system.

⁴³ In conversation with Thom, Broadcast Regulator, ODTR, October 2000.

Due to the rapidly evolving pace of software technology, Watson-Brown⁴⁴ believes that a mandate of a single interface would not have succeeded. He claims that no single regulatory requirement would completely standardise the introduction of all digital media services. The most appropriate regulatory approach is to provide a minimum level of software application information which should be available on a non-discriminatory basis. For Watson-Brown, 'this translates into a more horizontal approach to regulation with homogenous [regulatory] treatment of all transport network infrastructure and associated services, irrespective of the types of services carried'. Watson-Brown supports the adoption of pan-European structures for fair and non-discriminatory regulation of digital distribution systems.

Such regulatory structures relate to the carriage of media services and equal treatment of service providers over each network. The recognition for 'access rules for new proprietary facilities like application programme interfaces' accepts that technology may be moving too fast to mandate an open standard (Commission of the European Communities, 1999: 5). This means that a limited form of regulation can have a positive role in monitoring how the network operator controls access to viewers. This would ensure that service providers have access to audiences, via the network's set-top box, on reasonable and non-discriminatory commercial terms. In order to reach their universal audience, broadcasters may have to pay a substantial access cost to the platform operator rather than on further programme productions.

Complete control of the set-top box interface module by network operators could restrict access to terrestrial broadcast services. The national telecommunications regulator, Office of the Director of Telecommunications Regulation (ODTR), recognises that information portals, like the electronic programme guide, will become the interface between the transmission functions of both broadcasters. Therefore the regulatory authority will reserve the right to 'investigate charges imposed by the licensee on broadcasters and to direct they be modified, if necessary' (ODTR, 1999a: 8).

⁴⁴ In completed questionnaire from Watson-Brown, DG XIII, Advisor on Information Society Directorate, October, 2000.

In order to avoid social exclusion, Hughes (2000) states that broadband services should be made available to the maximum number of citizens as cheaply as possible. Hughes writes that 'without ownership access or government intervention these small players cannot be guaranteed non-discriminatory access to the key delivery platforms' (2000:3). Within a free market environment, no obligations will be placed upon distributors to provide an open and common programme interface. The only interactive and on-line content available is commercially contracted with the network operator. In this way, the gateway operators can use their closed proprietorial boxes to 'deny rival service providers access to their customers, and to limit the range of services their consumers can access' (2000a:http). Therefore a coherent national regulatory process or continued level of public ownership of a dominant platform can prevent transmission and content monopolies from restricting consumer access.

Murray⁴⁵ (RTÉ) believes that the software interface can be used as a blocking and enabling device. Such software can restrict information access and the viewer's ability to find or become aware of services. Murray claims that 'the API [programme interface] should be regulated and secondly I think that there is an argument to be made ... that the electronic programme guide be spec'ed in the public interest and [it] will have a requirement that all providers of services of an indigenous nature should have prominence'. Thus a software interface can be used to either promote or restrict viewing, depending on what services are being provided by different companies and what the consumer can afford. Furthermore access to content and services is crucial to the development of services, and in particular public broadcasting services over such vertically aligned delivery systems. A recent BBC report (2000a) supports this claim by stating network operators will find an economic advantage in reducing Free-to-Air content to their subscribers, who may have watched a lot of public service content during their viewing time in an analogue platform, with pay-television content.

One of the consequences of closed programme interfaces will be the economic benefits for content suppliers in creating alliances with distribution companies and set-top box

⁴⁵ In conversation with Eugene Murray, Business Planning, RTÉ, October, 2000.

manufacturers. The consortium can control the production, distribution and packaging of interactive and online applications. An alliance between delivery systems and television companies can lead to the development of cartels across the developing digital broadcasting sector. Since access to television content will depend on the dominance of the distribution companies, this bottleneck approach will have an advantage over independent content providers, like multiplex broadcasters, who do not have similar vertically integrated structures (BBC, 2000a) [See Figure 10]. This means that, content broadcasters that are not involved within a vertical alliance will not receive preferential channel positioning in the electronic programme guide.

At the same time, television viewers will be allowed limited access to interactive television content through a walled garden service within the set-top box. Network companies can choose the type of television services available on their distribution system, like text and shopping services. These companies can negotiate terms of carriage for Free-to-Air broadcasting channels as well as access to the platforms' electronic programme guide. A walled garden approach establishes technical barriers to entry for independent interactive television services as well as access to the World Wide Web. Restricted access is established around services so that they can be fully controlled and developed by the network operator. By preventing consumer access to external television and on-line content providers, the possibility of providing a range of programmes by independent content suppliers, is insurmountable.

With no agreed programme interface, transmission networks will favour content suppliers that can integrate easily with their own set-top box standards. Branagan (RTE) claims that the creation of these alliances has seen the integration of platform operators and content providers, such as TV3 and Granada, in order to control the packaging and distribution of services down to the set-top box. He states that, 'in the case of the Irish government and listening to the arguments in TV3, they want to fragment everything [to do with digital terrestrial broadcasting]'. Meanwhile, the cable platform is evolving into a vertically integrated commercial entity with distinct commercial advantages in the provision of bundled telephony, Internet and multichannel packages. Therefore the digital

terrestrial system is the only network obliged to carry multiplex television while not being allowed to create similar vertical alliances with content providers

Ennis (TV3)⁴⁶ believes that there are clear benefits in the creation of vertical alliances. He claims that 'that any broadcaster that does not seek alliances with distribution companies, in some way, shape or form won't survive. I don't believe any of us will try and say we're content providers, yea, we're platform neutral. But at the same time you have to secure creative alliances with platform operators to ensure your content has access to those [consumers]. We'd like to think legislatively and regulatory that we would be guaranteed equality of access. [But] it doesn't work that way. It won't happen. Our past experience, not only here but elsewhere, has certainly lead one to believe that you've got to be proactive. You've got to go and force those alliances yourself'⁴⁷

It is with this issue in mind that the European Communications Review report (1999b) addresses the area of vertical alliances within the telecommunications network⁴⁸. The European Commission noticed that consolidation across these networks would be detrimental to the creation of a competitive digital broadcasting market. Without the enforcement of equal regulation across all delivery networks and services, vertically structured media and telecommunications groups would hold a strong economic advantage over non-integrated companies. Market dominance creates technical barriers that can prevent the viewer from accessing the broadcaster's multiplex content on their network. The report (1999b) acknowledges the dominance of a particular network as having significant market power (SMP) advantage over independent service providers in giving access to their consumers. Significant market power is defined as an operator who would control over 25 per cent of the market (Communications Review, 1999b). A communications company considered as a dominant network operator may also supply vertically integrated broadcasting and telecommunications services. This may distort the

⁴⁶ In conversation with Peter Ennis, Director of Planning, TV3, October, 2000

⁴⁷ Shortly after the interview, TV3 announced the sale of 48 per cent of the station to the UK based Granada media group. Granada owns 50 per cent of the leading digital terrestrial transmission network, ONdigital. In 2001, ONdigital plans to launch its own sports channel to compete directly with BSkyB's digital sports channels.

development of competition in the communications market because the terrestrial network cannot offer consumers a similar range of integrated digital services

Hobson⁴⁹ (Department of Public Enterprise) considers that the development of European and national policy and its role in regulating a comprehensive communications network includes broadcasting and telecommunications. Similar regulation should be applied equally across all delivery systems. For Hobson (Department of Public Enterprise), this means that 'the regulators would have the power to define areas of market failure'. The establishment of electronic barriers, like the application programme interface and programme guides, which prevent the development of competition between distribution networks and content suppliers, will necessitate further regulatory responses from the European Directorate on Competition (DG XIII). This includes the provision of independent online and interactive services that are outside the control of the network operator. Thus, national telecommunications regulators, like the ODTR, will be empowered to determine which operator will have a significant market advantage. After a period of examination and consultation, they can impose additional obligations on networks in order to prevent anti-competitive behaviour.

Conclusion

European directives and discussion papers have successfully pushed forward the liberalisation of the telecommunications market in most Member States. Liberalisation has enabled telecommunication operators to diversify from the provision of telephony to high speed Internet services. The upgrading of cable networks to deliver television, telephony and Internet bundles has been made possible by the regulatory actions of the European competition Directorate. The final delivery system to be liberalized will be the digital terrestrial delivery network. This regulatory process will quicken the technical and economic harmonisation between cable, terrestrial and telecommunications platforms. As

⁴⁸ The Communications Review report (1999b) renamed telecommunications systems as 'electronic communications network'.

digital technology carries both television and telephony signals over each distribution system, telecommunications operators will be technically capable of offering broadcast services to their telephone consumers on the ordinary fixed line network

The European Commission intends to apply the same minimum, non-obhgatory level of regulation in the delivery of media and telephony services over each network. The Commission's objective is to create a single, pan-European communications network across the cable, terrestrial and telecommunication platforms. For Higuera (2000), as broadcasting separates from its network, it becomes only a small element in future communications regulation. He writes, 'it seems that for the EU, in the Information Society (which is about to come) media (as mass media) will only be a little part, and not the most important one, in the middle of the converged reality. Content is more and more reduced into bits of information that can be delivered through a network, and less as the social and political institution they used to be' (Higuera, 2000 [http](#))

The adoption of the Amsterdam Treaty (1997) across national broadcasting policies has allowed for the continued funding of public service broadcasting. As new digital services become available, public broadcasters regard the funding of new on-line and interactive services as natural extensions to their public service remit. However, commercial content suppliers believe that such funding, coupled by investments into digital terrestrial and Internet distribution systems, will lead to market distortion and unfair commercial advantages. Therefore commercial broadcasters and network owners support the European Commission's position of removing public broadcasters from any direct alliance with transmission operators. Public broadcasters are becoming mainly content suppliers at the same time as digital distribution systems and commercial broadcasters are forming vertical alliances in order to consolidate their market position. This pushes the public broadcaster, minus their infrastructure network, into becoming solely dependent on the owners of each digital network to carry their multiplex services.

⁴⁹ In conversation with Hobson, Telecommunications Regulatory Advisor, Department of Public Enterprise, September, 2000

As conditional access systems are developed for the commercial interests of each network operator, the European Commission has decided that this electronic barrier will be left unregulated. This means that issues of access to Free-to-Air multiplexes on cable and telecommunications platforms will remain unresolved. Public broadcasting will no longer be assured of their digital Free-to-Air channels and associated services being delivered and accessible to all television viewers. The cultural and social impact of public service content on each distribution network is being overtaken by the European Commission's single market priorities.

As each digital broadcasting platform develops its own distribution and content alliance, on the grounds of inappropriate use of state funds, the European Commission Competition Directorate (DG XIII) may directly challenge the partial ownership of the terrestrial system with the public broadcaster. This alliance would be challenged in the European law courts as distorting terrestrial competition in the Irish broadcasting market. While the Commission believes that each platform should be regulated in the exact same manner, it fails to acknowledge the historical role of the terrestrial network in the dissemination of public digital media services. Only digital terrestrial broadcasting can ensure a universal delivery of all public multiplex services over its network and the option of both free and pay-television channels.

Branagan (RTE) states that 'there is no prospect whatsoever of commercial viability of DTT if they don't have converged services, which is multichannel, high speed Internet access and voice telephony'. The terrestrial operator will have to provide a return channel for interactivity as well as voice and data telephony services. If not, they will be reliant on other platform operators, like the telecommunications network, to provide the two-way bandwidth facility. Access terms will be determined by the network owner's interests to reach a commercial agreement. If a public broadcaster were to join a vertical alliance with a network operator, it would then be able to compete with its cable and telecommunications counterparts in supplying television, Internet and telephony services to the home.

The terrestrial operator will be obliged to offer an open and common decoder standard across its set-top box and all integrated television sets sold in the country. This places an additional financial burden on the platform operator who will be forced to supply a conditional access module to all integrated television sets for Free-to-Air reception, regardless of the viewer becoming a subscriber of multichannel services. Cable and fixed line network operators who do not have such problems, as they effectively own their boxes, will be using a proprietorial conditional access and interface system for the reception of their bundled television, telephony and data services. By protecting their own technologically advanced infrastructures, dominant network operators hope to govern market entry and gateway facilities in the digital pay-television market.

As the increased number of television channels will require more content, public broadcasting will be a key force in the take-up of interactive television and online services through the television set. National infrastructure regulatory objectives will require the terrestrial network to transmit certain Free-to-Air televisual and sporting events to all of society. While public broadcasting may provide more content to meet these digital demands, regulatory measures will be needed to ensure that each licence payer can access all public multichannel and interactive content services. In Ireland, public broadcasting will remain the leading content producer for indigenous programme making and national interactive television services. The following chapter explores the development of the national terrestrial infrastructure network and services that have traditionally been left to public broadcasting through the use of the dual funding doctrine.

Figure 10 Global Alliances and Mergers

<i>Vertical Alliances</i>	<i>TV</i>	<i>Telecom</i>	<i>Internet</i>	<u>Description</u>
NBC and Microsoft (1996)	Production	Cable	MSNBC com	Content and Distribution alliance
AOL - Time Warner (1999)	Production	Cable	AOL com	Content and Distribution alliance to provide content for its ISP
Telefonica and Endemol (2000)	Production	Cable	Terra Networks and Lycos	Content and Distribution alliance
UFA/CLT (1996) =Audiofina and Bertelsmann RLT Group (2000) = UFA/CLT, Audiofina TV network (Belgium), Bertellsmann's TV assets and Pearson TV Merger	Production	Cable	Unknown	Content and Distribution (FTA Broadcast) alliance

<i>Conglomerate Integration Mergers</i>	<i>TV/Film</i>	<i>Telecom/ Cable</i>	<i>Internet</i>	<i>Description</i>
Vivendi Universal with Vivendi, Seagram acquisition, Canal Plus (2000)	49 per cent stake in Canal Plus France, Universal Studios	Canal Plus Technologies and 14m DST subscribers, French Cable operator stake in NC Numericable	Vizzavi portal, 55 per cent in AOL- France	Content and Distribution of content

<i>Horizontal Alliances</i>	<i>TV</i>	<i>Telecom</i>	<i>Internet</i>	<i>Description</i>
'Grand @lliance' with Carlton Communications, Kirch Group, Mediaset, TF1, Telecomco (2000)	Commercial Broadcasters	Unknown	Unknown	Internet and interactive venture

CHAPTER FOUR

Introduction

Under the 1960 Broadcasting Authority Act, the development of the terrestrial infrastructure network and services has been entrusted to the national public broadcasting organisation, Radio Telefis Eireann (RTE). Responsibility for the provision of the broadcast signal throughout the country has been a historical part of RTE's public service obligations. With the arrival of new delivery systems that are able to carry broadcast services, national regulatory policy began to re-assess the role of RTE over the terrestrial network. This is reflected in a recent Dail debate on the Broadcasting Bill (1999), where de Valera, Minister of Arts, Culture, Gealtacht and the Islands, stated that 'RTE's position as transmitter operator as well as broadcaster is as much an accident of history as it is an element of broadcasting policy' (2000 [http](http://www.rte.ie)). Ownership of the transmission network is no longer required to provide a universal service within the terms of public broadcasting.

Irish broadcasting cannot ignore the developments happening in the UK market. In 1998, for example, ONdigital, the leading UK terrestrial broadcasting operator, launched its digital service in Northern Ireland. BSkyB, the digital satellite operator, has joined with Eircom, the leading telecommunications operator. They are currently offering Irish consumers a combined multichannel, telephony and Internet access service. Meanwhile Chorus have claimed to be the first national transmission operator to offer a complete bundled service of indigenous and UK terrestrial channels alongside telephony and Internet access. Digital broadcasting has arrived and the terrestrial broadcasting network will be the last distribution system to stumble off the racing block.

In the analogue domain, RTE's role within the terrestrial platform has been mainly associated with the production of content programming and the distribution of these broadcast services. This chapter examines the early stages of the digital terrestrial distribution network in Ireland. Is there a coherent regulatory framework for the

introduction of digital terrestrial television? What are RTE's plans for digital broadcasting? This section will explore the implications of the Broadcasting Bill (1999) on the terrestrial network

This chapter will analyse the significance of the terrestrial infrastructure in the delivery of public broadcasting services within the context of the Broadcasting Bill (1999) Should all distribution systems be obliged to carry new public television content under 'must carry' conditions? This section looks at the background to the statutory obligations on cable networks to distribute public service broadcasting Will the 'must carry' mandate be continued to interactive public broadcast services across digital cable platforms? The universal availability of publicly funded services to all citizens, regardless of the method of delivery, will be seriously challenged by the dominance of digital network operators throughout Ireland [See Figure 11-12]

RTE

Since the 1960's, the state's industrial policy aims, have often expressed economic and commercial objectives rather than cultural goals Ireland's industrial development has been dependent on foreign industrialisation with the state focusing on export-oriented foreign companies to invest in this country The national interest was seen in terms of employment and stable economic growth In the national development of radio (1929) and television (1961), these services were considered as vital symbols of cultural nationalism and economic development As early as 1958 with the establishment of the Irish Television Commission, television was seen as a vital element to the programme for economic development (Savage, 1996) The birth of the organisation was based around the BBC model of public television This incorporated a state appointed governing body, called the RTE authority

Funding for RTE has mainly relied on licence fee, sponsorship and advertising revenue for the maintenance of its transmission network and programme output The public broadcaster currently provides two television stations, four radio stations and two

national orchestras (Moynes, 1999) Indeed, the relationship between the public broadcaster and government broadcasting policy has often swayed from declarations of RTE being a state-controlled national institution to statements of a more independent and Reithian nature⁵⁰ Overall, RTE's television schedule includes roughly 60 per cent of acquired programming (Irish Film Industry, 1999) It mainly relies on UK and American produced programming Unlike BBC1, where its level of original programming is 87 per cent, the annual budget of RTE reaches to £190 million This is equal to the BBC's annual current affairs budget (Salmon, 2000)

Until 1989, RTE had a monopoly over television revenue in Ireland By this time, the 1988 Radio and Television Act had licensed the operation of a private commercial broadcasting network via the establishment of the Independent Radio and Television Committee Two years later, section three of the Broadcasting Act (1990) placed a legal restriction on RTE's advertising revenue in order to help commercial radio and television broadcasters establish themselves within their respective markets The consequences of the Act (1990) were reflected in the decrease in funding for television programme production, including local reporting in current affairs, and a lack of investment in the terrestrial infrastructure This was removed by the Broadcasting (Amendment) Act (1993) This Act (1993) required the public broadcaster to provide a daily schedule input of one hour of programming for TG4⁵¹ along with the transfer of £17 million from RTE funds⁵² The terrestrial platform is the most universal broadcast distribution network in Ireland It covers over 90 per cent of the population Meanwhile, RTE One and Network 2 are the only channels with universal coverage (Medialive, 2000) By the end of 1998, their national viewing share reached 57 per cent of the total television audience (Moynes, 1999)

Truetzschler (1992) purports that the national policy on broadcasting is in line with the changes in the European market Irish governments have widely accepted the

⁵⁰ Former Taoiseach, M1 Lemass viewed RTE 'as an instrument of public policy and as such is responsible to the Government [and not] completely independent on Government supervision' (Hall, 1993 273)

⁵¹ In 1999, Teilifis na Gaeilge was relaunched as TG4 Teilifis na Gaeilge was launch in 1996

⁵² This amounts to £5.7m annually (Kenny, 1999)

broadcasting policies introduced by European Directives and Commission Reports. This is reflected in the removal of state monopolies, privatisation of state enterprises and finally the commercialisation of broadcasting (Truetzschler, 1992). However, as can be seen in the document entitled 'Active or Passive? Broadcasting in the Future Tense Green Paper on Broadcasting' (1995), there has developed a more independent, national movement concerning a joint cultural and broadcasting policy and the possible impact of regulatory decisions made outside the jurisdiction of the state.

The intention of the 'Active or Passive? Broadcasting in the Future' (1995) paper was to instigate a debate pertaining to the future of Irish broadcasting within a cultural context in society. The document advocated a re-valuation of the values of public broadcasting within the environment of increased competition from extraterritorial transmission networks and commercial Free-to-Air broadcasters. The paper attempted to examine how the political ideals of citizenship and active participation in society are intertwined with the concepts of the public service as economic and global. Effectively multi-national communication industries attempt to convert the social benefits of broadcasting to private, consumable commodities. By 1997, a change in Government led to a change in broadcast policy and these suggestions, which included the concept of the independent transmission authority, were removed from future legislative proposals. Another problem with the paper (1995) was that it contained no mention of digital broadcasting and future public broadcasting challenges in the development of on-line and interactive television services.

Until the launch of the green paper (1995), this evolution in Irish broadcasting has partly been in response to developments in the UK, like the launch of their Free-to-Air public and commercial broadcasting channels (BBC and ITV). This had a significant impact on the broadcast sector, from the setting-up of RTE to the transition from black and white television sets to colour and the demand for multichannel services. In the 1960's, the development of a sustained national economic climate directly affected the purchase of consumer goods such as television sets. For example, due to an economic crisis in the early 1970's, government policy led to reductions in consumer import goods (Fisher,

1978) This prevented the take-up of television sets, but once the restrictions were lifted, the consumers and RTE quickly moved to colour. Technology was a key motivator in the historical development of broadcasting in Ireland.

Since the late 1980's, the government policy moved from intervention to protect the cultural identity of the nation to interventions supporting the 'interests of private investors' (Bell and Meehan, 1989-90). The technological changes in the telecommunications sector and the growth in television stations began to challenge the legitimacy of the public broadcasting institutions across the European Union. Bell and Meehan wrote, that 'broadcasting and telecommunications are being integrated into an international marketplace for communication products and services, dominated by US transnational corporations' for their own economic interests (1989-92). Broadcast policy attempts to deregulate the public broadcasting network in order to incorporate the national broadcasting markets into a service sector. Their writing anticipates a rapid pace of integration between the broadcasting and telecommunications sectors. This national broadcasting policy began to reflect the global economic restructuring of media and telecommunications companies.

Although this vision has only now begun a slow and cautious evolution to distribution and service integration across each delivery system, Bell and Meehan fail to highlight the social and cultural impact of computer technology in the reception of television programme services via the set-top box. Instead they focused on the change in government policy from 'culture and identity preservation to the integration of the small Irish television industry into an international marketplace for programming' (Bell and Meehan, 1989: 106). A slow irreversible position will occur in government policy against the public service ideal and reflected in the privatisation of all national communications networks. The increase in the number of Free-to-Air and subscription channels will occur at the same time as public service broadcasters undergo a substantial fall in licence fee funding. By applying these statements to digital broadcasting in Ireland, it can be ascertained that the current level of public funding for pioneering interactive television and World Wide Web services is quite restricted. This is due to the low licence fee cost.

and the limitation on the number of advertising time per hour allowed on each public service channel.

In 1986, RTÉ had 45 per cent of total revenue from advertising and that level increased to 64 per cent in 1997 (Collins, 1997). This is a 19 per cent increase in eleven years. Revenue from the licence fee has stabilised to roughly one third of revenue receipts. Clearly, RTÉ has continued to rely heavily on commercial revenue to maintain a public broadcasting service. Thus Goan's call for increased public funding underlines the dependency of the national public broadcaster on commercial advertising revenue over direct public funding resources. Without increased public funds to create more indigenous programmes across its digital multiplex, Goan (2000) describes these new digital services as the 'bleeding edge technologies'. This means that they require a considerable level of investment and future demand for such services is difficult to predict. This uncertainty is exacerbated by the need to find new ways of funding, for these new non-linear services in a determined manner. Success will be contingent on fair and equal accessibility terms across other delivery systems and not just the terrestrial network.

A Norcontel (1997) report, commissioned by the Culture and Media General Directorate (DG X), stated audio-visual expenditure is expected to rise from ECU 308.8 million in 1995 to ECU 492 million by 2005⁵³. Licence fee revenue is anticipated to decline by 12.5 per cent during the same period (Norcontel, 1997)⁵⁴. The data shows the level of licence fee revenue, from 1990 to 1995, decline by 2.2 per cent or ECU 1.4 million, while the average rate of television advertising is expected to grow by 3.7 per cent during 2000 to 2005. This means that licence fees are expected to decline while commercial advertising expenditure and subscription services increase. This could impact on the quality of home produced programming and the level of viewers watching public broadcasting services.

⁵³ £1 punt roughly equals €0.80 ecu, thus €308.8 million equals £247.4 million

⁵⁴ Audio-visual content include Film and video productions as well as broadcasting, on-line and multimedia services. The Norcontel report (1997) states that these 'audio-visual markets are characterised by the simultaneous provision and reception of sound and moving images, irrespective of the means of delivery to the public at large or to individuals at their own request, and irrespective of the technical means of distribution or transmission, be it terrestrial, satellite, cable, packaged media or any other technical device'.

Substantially low audience share levels could reduce the legitimacy of a licence fee for the provision of a public service when alternative entertainment and information sources are available through cable, satellite and Internet platforms

Terrestrial multiplex and interactive television services may become important revenue sources as advertising expenditure drops. Branagan⁵⁵ (RTE) believes that RTE would primarily be interested in terrestrial interactivity to enhance its commercial revenue and commends the public broadcaster in venturing into these new fields of on-line activity. The public broadcaster would generate substantial revenue takings from these digital services by providing interactive possibilities related to their broadcast programmes. Indeed as the demand for subscription and pay-per-view services increases, the former Director General of RTE, Collins, accepts that future 'commercial and audience size considerations' may determine public service programming schedules (1997: 25). The pay-per-view concept provides audiences with a wide selection of services centred on their own viewing schedules rather than the content provider.

RTE may attempt to balance popular programming with niche audience demands as well as learn from the 'principles of telecommunications to adjust its market share', such as its distribution network and economies of scope (Collins, 1997: 25). For instance, RTE would need to incorporate a telecommunications return path delivery system within its public service remit to ensure the delivery and reception of its universal services across all platforms. However, there is currently no legal framework that recognises the specific role of public broadcasting in national broadcasting and telecommunications legislation. Without the introduction of new legislative and regulatory procedures, the role of terrestrial broadcasting may be undermined by the actions of its competitors before the platform is launched. Therefore, the first step in the development of this digital network required legislation to formalise the public service broadcast remit and allow for the separation of broadcast services from the terrestrial delivery system.

⁵⁵ In conversation with Peter Branagan, Head of Digital Planning, RTE, October, 2000

The Broadcasting Bill (1999) is the first piece of legislation to address the separation of programme services from the terrestrial platform since the 1926 Wireless Act. The 1926 Act defined the analogue broadcast network as a linear, one-to-many transmission system. It was structurally different to all other platforms, like the telecommunications delivery system. According to a spokesperson from the Department of Public Enterprise, 'in the past, our whole definition of broadcasting came from controlling the apparatus for Wireless Telegraphy'. This means that due to the lack of alternative delivery systems to the household, the technical act of transmitting television channels over the air was a defining part of the terrestrial network. The broadcast service was uniquely associated with the terrestrial transmission system.

For the Office of the Director of Telecommunications Regulation (ODTR), the regulatory and licensing distinction between broadcasting and telecommunications was created within the Wireless Act, 1926. According to the ODTR, the Act 'provides for the licensing of wireless telegraphy apparatus, which was traditionally used for the purpose of broadcast transmission, in contrast to wire based point to point communication' (2000a: 5). This Act (1926) does not envisage the possibility of broadcast services being provided over multiple delivery systems such as cable and telecommunication networks. For that reason, the Wireless Act does not allow for broadcast services to be transmitted over telecommunication networks. It also did not foresee the network operator offering mobile telephony and two-way interactive television services.

With the introduction of digitalisation, broadcasting is developing similarities with the telecommunications network in the provision of interactive, non-broadcast media services such as the World Wide Web. This change is accompanied by the provision of multichannel, and asymmetrical services over digital cable and fixed line telephony networks. A spokesperson from the Department of Public Enterprise⁵⁶ claims that 'the technological barriers have been removed or are certainly diminishing rapidly but the legal basis still remains and that is going to take a little bit of extra time'. As a result of

⁵⁶ In agreeing to the interview, the spokesperson, Department of Public Enterprise, Telecommunications Regulatory Affairs Division, chose not to be named in the thesis.

these anomalies in the 1926 Act, a new broadcasting framework was required to include these considerations in the development of digital terrestrial broadcasting

Proposed Broadcasting Bill (1999)

The establishment of a digital terrestrial network is an important component in the national policy on the development of broadband services to both the household and business sector. De Valera, Minister for the Arts, Gaeltacht and the Islands, has openly declared her government's support for the terrestrial delivery system. This network will 'promote the development of multi-media services and the Information Society' throughout the country (Dáil Debates, 2000c 1228). It is the view of the government that the success of the terrestrial network is predicated on the universal access of the digital media and telecommunication services. For Larkin (Department of Arts, Gaeltacht and the Islands)⁵⁷, 'that's the main reason why DTT seems so important. It has the greatest potential to be universal [and] to guarantee that the Irish indigenous services will be available, free'. With this overriding objective, the Broadcasting Bill was introduced to the Dáil (1999). At the moment, the Bill is passing through the Committee stage of regulatory debates in the Seanad.

The proposed Broadcasting Bill (1999) will provide a framework for the structural and organisational introduction of digital terrestrial broadcasting. RTE's television production facilities will be separated from the transmission network. This means that the Bill (1999) will authorise the establishment of a new national broadcasting commission called the Broadcasting Commission of Ireland (BCI). The Commission will incorporate the Independent Radio and Television Committee (IRTC). The BCI will regulate programme content and monitor levels of decency and codes of content across all national distribution television systems.

The Broadcasting Commission will work alongside the ODTR 'with respect to the format in which the information in relation to schedules of programme material provided by

⁵⁷ In conversation with John Larkin, Legislator, Department of Arts, Gaeltacht and the Islands

electronic programmes guides may be presented' (1999 16 [Section 13]) This means that their objective is to prevent discrimination of channel positioning on the programme guide across the terrestrial and cable delivery systems For O'Brien (IRTC)⁵⁸, 'the role of the IRTC will be to draw up a non-technical rule guide for EPG's The word 'non-technically' will refer to non-discriminatory type information and how it will look and feel [in] priority to Irish channels' This course of action will be the maximum level of IRTC involvement in the regulation of digital broadcasting across the digital cable and terrestrial networks

After the passing of the Broadcasting Bill (1999), this joint ODTR/BCI regulatory approach will ensure that a common programme menu list is produced The design of the guide will be produced in conjunction with terrestrial broadcasters and the network operators The Bill (1999) mandates all programme information provided by RTE, TV3, TG4, and the UK based Free-to-Air channels received in Northern Ireland to be 'easily used by a member of the public to access information in relation to the schedules of programme material' across all transmission networks (1999 15, [Section 12(5) and 12(5)(a), (b)]) This means that the creation of a single EPG, in the set-top box, will be agreed amongst all Free-to-Air broadcasters and other television programme providers before the launch of the digital terrestrial system

The Bill (1999) also gives a clear legal commitment to RTE to provide a Free-to-Air public broadcasting service to viewers and listeners Section 24 of the Bill deals with the public service remit RTE will be entrusted to reflect the cultural and linguistic diversity throughout the island of Ireland It will provide general and minority programming across the whole community, including major sporting and cultural events under the Amsterdam Protocol (1997) The BCI, along with the ODTR, will provide the operators of the digital delivery systems with programme content and electronic programme guide contracts (Broadcasting Bill, 1999 [Section 10, 11, 12, 13])

⁵⁸ Interview conducted with O'Brien, Broadcast Regulator, Independent Radio and Television Committee (IRTC)

RTE will provide a comprehensive range of news and current affairs services in the English and Irish languages, as well as broadcasting European and national political proceedings. The Bill allows the Minister to include, at a later date, specific types of programmes not explicitly mentioned in the paper (Broadcasting Bill, 1999 [Section 24 3(a)]) For example the Minister can include future sporting or cultural events of national significance that may otherwise be watched through a pay-per-view or subscription basis. In this instance, the content is delivered to each home without being exclusively formatted to each distribution system. Therefore viewers are guaranteed access to such occasions, regardless of the method of delivery of the event on either Free-to-Air or cable transmission networks.

According to O'Rourke and O'Neill, RTÉ will be 'required to provide an annual report on how television licence revenue has been expended' according to its public service remit (1999 [http](#)). At the moment, it is uncertain how RTE will approach this particular issue of separating public from non-public services, particularly its interactive services. The RTE Authority will remain outside the power of the Commission as long as it continues to provide a universal Free-to-Air service (Foley, 1999).

Section 24 does not allow RTE to use its public funds for the development of its on-line and broadband services (Broadcasting Bill, 1999). If RTE transmits their services over the Internet, it cannot be funded by the licence fee. The costs incurred in the transmission of Internet services are not considered as part of the public broadcasting definition as outlined by the Broadcasting Bill. This is in contrast to the historical role public broadcasters have played by introducing analogue television services, such as teletext, to the general public. In the past, broadcasting organisations have actively supported the adoption of new television services. But in the distribution of two-way services, this level of activity is considered suitable only for private, subscription-based network operators.

Section 24 of the Bill (1999) may also hinder the development of new media services with a distinct public service mandate. This viewpoint can be placed within the free market position against public broadcasters preventing them from using licence fee funds.

for the distribution of new media services. Both the KMPG report, entitled 'Public Policy Issues Arising From Telecommunications and Audiovisual Convergence' (1996), and the European Commission's Convergence Green Paper (1997) state that public service broadcasters should not be allowed entry to new media markets by the exploitation of their licence fee funding. The Convergence paper (1997) argues that if public broadcasters were to 'cross subsidise (via state funds) these new activities or the use of new technological platforms, such as the Internet, then such practices would be subject to the Treaty rules on competition and the freedom to provide services' (1997: 29). Equally, this would curtail the public broadcaster from fulfilling their cultural and linguistic public service remit in delivering their digital media services across all platforms in a manner similar to their traditional public service remit.

The Broadcasting Bill (1999) does not include the clause contained in the 'Clear Focus' (1997) paper allowing 'RTE to engage in the provision of telecommunications services subject to the approval of the Commission and the Minister for Transport, Energy and Communications' (Clear Focus, 1997: 61-2). This proposal had been prone to the accusation of market distortion, through state aid, in allowing a public broadcaster to provide telecommunications services considered beyond its public service remit. It may have opened up anti-competitive accusations by commercial broadcasters and telecommunication operators.

Under the proposals outlined in the Broadcasting Bill (1999), the terrestrial transmission network will be privatised. RTE will receive a 28 per cent equity stake in the new transmission agency, provisionally named Netco, in return for the handing over of its analogue transmission network to a commercial owner. Terrestrial broadcasters will be required to pay a transmission fee, under Section 11(4), for the universal transmission of their services in both analogue and digital format (Broadcasting Bill, 1999). They will also pay an annual fee to the multiplex operator. The ODTR has proposed to call this licence, the Transmission Licence. This licence will allow the DTT transmission service provider to modulate and transmit the multiplex services (ODTR, 2000a).

RTÉ will pay an agreed commercial auction price for this minority shareholding in the terrestrial transmission system. However, by maintaining a stake in the terrestrial network, accusations of market advantage continue. Ennis claims that RTÉ's stake in Netco is anti-competitive. He asserts that 'We [TV3] don't believe that only one competitor in a commercially competitive marketplace should have the right by law to have a stake in this entity. And to have that stake guaranteed by law, we think that's unfair and anti-competitive ... it's a retrograde step. It's another Irish solution to an Irish problem'⁵⁹. While accepting that TV3 are not prohibited from investing in Netco, TV3 intends to continue lobbying for RTÉ's removal from the transmission platform until legislation is passed.

This stance is supported by NTL. Brophy (NTL) believes that RTÉ's stake in the digital terrestrial network is a political compromise between the state broadcasters and the government. NTL regards the broadcasters shareholding position as a legacy of transmission ownership from the state that prevented RTÉ selling off the whole terrestrial network. For that reason, Brophy believes that there is 'no logical or rational reason' for a state broadcaster to be awarded a stake in the transmission delivery system⁶⁰.

These accusations of political favouritism, including little economic justification for a minority stake, are rejected by RTÉ. Moynes (RTÉ) claims that 'public ownership has a legitimate interest in these [major national distribution systems], in the signals being available to the citizen. Now whether you set-up a transmission authority to guarantee that, where you make it a task of the national public service broadcaster, to that extent, it doesn't seem to me to be a terribly big deal ... If you were involved in the bundling of services and the retailing of them to customers, I would think that would be very problematic for competitor broadcasters'⁶¹. As public service broadcaster will not control the network, it cannot become the main network operator over other content suppliers.

⁵⁹ In conversation with Peter Ennis, Director of Operations and Technology, TV3, October, 2000

⁶⁰ In conversation with Ed Brophy, Regulatory Affairs Manager, NTL, October, 2000

⁶¹ In conversation with Adrian Moynes, General Assistant to the Director General, RTÉ, October, 2000.

According to Larkin (Department of Arts, Gealtacht and the Islands), if the government had decided to allow RTE to be stakeholders in the transmission network and the multiplex services, the European Commission have regarded these actions as an unfair form of state aid. This would breach European competition rules and expose the government to a European Court action on the basis of transgressing Articles 85 and 86 of the Treaty of Rome. The money from the sale of the transmission network can be legitimately given to RTE because it is an established publicly funded entity. But the multiplex operation has no such legacy as it has yet to be established. If the multiplex licence was given to RTE, then commercial broadcasters could rightly question the incumbent's advantage in choosing the terms on which television services can be launched on the multiplex channels. Therefore the Broadcasting Bill (1999) will allow for the provision of separate transmission provider and multiplex operator licenses.

Within the Broadcasting Bill (1999) recommendations, the multiplex operator will act as an aggregator of content, carrying all national Free-to-Air, subscription and data services over the terrestrial platform. The Broadcasting Bill (1999) does not mention any 'must carry' obligations for the carriage of two-way interactive services on the terrestrial network. This means that the Multiplex broadcasters are released from any legal obligation to carry digital services, like teletext and interactive content. Each terrestrial multiplex operator will be able to bundle different tiers of data and multichannel offerings in a manner similar to the cable networks operators, such as Chorus [See Figure 13] and NTL.

RTE will receive one of the six terrestrial multiplexes. Each multiplex will have the ability to provide six to eight television channels. Goan expects the national broadcasters additional channels to consist of an educational and learning channel, youth channel, and a 24-hour news and information channel (Goan, 2000). There will be an increase in regional news and parliamentary coverage while an extra £3 million will be spent on home-produced drama. Apart from these multichannel offerings, RTE intends to provide other forms of multiplex content such as teletext, subtitles, audio channels, e-commerce, web access, e-mail and home shopping (Baldi, 2000a). Interactivity will be a prominent

feature on the new digital channels. These services will provide chatroom and two-way interactive services through a cable, telecommunications or terrestrial return path network [See Figure 14]

TG4 and TV3 will receive half a multiplex each. It is not known how they will fill their extra channel capacity. Under the rules of the Broadcasting Bill (1999), if the additional digital capacity space is not used by the broadcaster within an appropriate time, it is returned to the multiplex operator. The return of spectrum frequency would be subject to licence agreements with the BCI, multiplex and terrestrial broadcaster. O'Brien (IRTC) claims that this issue could be averted by the broadcaster entering 'into a contract agreement with somebody else and sign-off their capacity to somebody else provided they are Free-to-Air'. For example, TV3's extra channel capacity could be used by its parent company, Granada, to broadcast a Free-to-Air comedy channel based around their archival material. The remaining four multiplexes, totalling fourteen to eighteen channels, will be reserved for the re-transmission of the UK terrestrial channels and pay-per-view programmes.

After the Broadcasting Bill is accepted by the Oireachtas, the multiplex operator will be chosen by the 'Multiplex Project Management Consultant' group. This consultancy committee was established by the Department of Arts, Culture and the Gaeltacht in 1999⁶². This group will select the licence holder, to be named Muxco, after the sale of the transmission network. The Committee will set the market value of the multiple channels and judge the most suitable strategic partner for the terrestrial platform operator. The assessment process for the granting of the Muxco licence is expected to take into consideration the applicant's transmission roll-out dates, performance objectives and the universal service availability of television and data services. The winning licence holder will also need to provide financial estimates for the provision of digital Free-to-Air services to viewers who do not subscribe to either multichannel television or telephony.

⁶² There is a separate committee already working with the Department of Arts, Gaeltacht and the Islands on the sale of the terrestrial transmission network. This Transmission Management Committee Group includes, inter alia, the Department of Public Enterprise, Department of Finance, Department of Arts, Gaeltacht and the Islands, ODTR, Mason Communications and A I B consultants.

services. The granting of the Muxco licence will be conducted in an open and transparent judging process.

If the licensing process is not conducted in an open, transparent and accountable manner, O'Brien (IRTC), envisages 'some kind of judicial review proceedings which could even further delay the introduction of DTT [digital terrestrial television]. Somebody may just apply for the multiplex licence and delay the process while proceedings are taking place'. The behaviour of the Committee to award the multiplex contract will impact greatly on the immediate launch of the digital terrestrial network. Until the steering Committee awards the multiplex licence, the terrestrial network will not be able to supply any service. Although two separate licenses will be awarded prior to the launch of the digital terrestrial network, one company can still acquire both transmission and multiplex licenses. According to O'Brien (IRTC), if both licenses were given to the same company, there would be no protracted contract negotiations. This would hasten the launch of the digital terrestrial network. Thus RTE may inadvertently acquire a share of the multiplex licence through its stake in the transmission network.

When the transmission network and multiplex licenses are awarded, the ODTR will be responsible for regulating the digital terrestrial network. The multiplex operator will allow each broadcaster to transmit their digital signals, such as their programme services, into each television channel (ODTR, 1999). The ODTR will impose the conditions of the licence and regulate delivery and access to the multiplex services. This means that the broadcast licence will permit one-way, unidirectional channels and the transmission of electronic data that 'is ancillary to the carriage of programme material' (ODTR, 1999: 5). However, there is some confusion within the broadcast sector over the role of the ODTR in licensing the multiplex operator.

The Broadcasting Bill (1999) states that RTE One, Network 2, TG4 and TV3 are Free-to-Air services and must be carried over cable networks. The distribution of additional digital media channels is an optional service. For Ennis (TV3), 'we think all platform providers, the [bandwidth] pipes, should be controlled by the ODTR. What goes down

those pipes should be controlled by the Broadcast Commission' TV3 believe that the Broadcasting Commission should determine and enforce 'must carry' regulation and 'must carry' with position. Similarly, the BCI should also be responsible for the placement of indigenous Information Society services along the 'must carry' with position obligation. As the multiplex broadcaster is seen as a content provider, the ODTR should have no role in content regulation. Therefore the role of the ODTR in regulating this company will infer content responsibilities on that telecommunications authority.

Hinchy (ODTR) concurs, the national telecommunications regulator does not regard the Multiplex operation as a broadcast-type service. Asked whether the ODTR could be responsible for controlling what content is transmitted, Hinchy⁶³ (ODTR) replied 'no, not really, the Multiplex operation is simply the gathering together of different services and the selling of these to customers. In short, the multiplex operator does not control content'. But the ODTR acknowledges that if it has some responsibilities in respect of programme content, these duties are not specified in national legislation. The ODTR (1998c) maintain that their duties relate only to ensuring that cable and terrestrial networks give reasonable channel positioning on their electronic programmes guides to indigenous broadcasters. In practice, the ODTR will regulate two-way forms of interactive television content, including broadcasting services, across RTE, TV3 and TG4 channels.

Until their duties in relation to interactive television are clarified within legislation, the ODTR will take the regulatory initiative by overseeing the authorisation and compliance of the Multiplex licence. For Thom (ODTR), 'the role of the multiplex operator is up to this office to regulate unless primary legislation decides otherwise'. Furthermore the ODTR will have powers to attach additional licence conditions to ensure that 'must carry' with positioning is applied to Free-to-Air broadcasters. However, by conferring 'must carry' duties for cable operators' licenses on the ODTR, they become involved in content

⁶³ In conversation with Rory Hinchy, Spectrum Regulator, Office of the Director of Telecommunications Regulation, October, 2000

regulation. In the words of O'Halloran (McCann-Fitzgerald)⁶⁴, 'it's not pure broadcasting, but it is a content-type operation'. O'Halloran insists that the Multiplex operation is a broadcast-type service. The ODTR will become content regulators as the Multiplex operation relates to the control of the content that is transmitted.

Ennis (TV3), provides no short-term solution to the confusion over the regulatory role of the ODTR and its regulation of multiplex content, stating, 'I couldn't give you a definitive TV3 position on who should operate the Muxco operator or who they should be regulated by. Yes, we believe they should be regulated but it is entirely possible that the Multiplex operators will be subjected to regulation by two separate regulators. Now, on the content side, the broadcast commission and on the bandwidth side, the ODTR. And that's a likely scenario'. O'Halloran (McCann-Fitzgerald) is satisfied that there is a need for more clarity and consistency across all delivery systems in controlling access to all content services. Incorporating the notion of 'must carry' with priority positioning on all electronic programme guides across broadband networks can safeguard the importance of accessibility to public multiplex broadcasters.

Broadcasting Bill Impact on 'must carry' of Digital Services

The origins of 'must carry' obligations come from the Wireless Telegraphy Act, 1926. In 1974 cable operators began to provide an analogue multichannel service, Minister for Communications used his discretionary capabilities, within the 1926 Act, to include certain conditions as part of the cable licensing procedure. These included 'must carry' obligations to transmit RTÉ 1 and RTÉ 2⁶⁵ while ensuring the universal availability of public broadcasting services, over the cable networks⁶⁶. In 1989, the Minister of Communications transferred such 'must carry' duties to the responsibility of the Department of Transport, Energy and Communications⁶⁷. In 1996, the

⁶⁴ Conversation with Susan O'Halloran, Regulatory Affairs, McCann-Fitzgerald Solicitors, October, 2000

⁶⁵ In 1997, RTÉ 2 was relaunched as Network 2.

⁶⁶ This is contained under Section 6(1) of the Wireless Act, 1926.

⁶⁷ The Statutory Instrument Number 67 of 1974, Section 9 (c), Section 12 (a), (i), (ii) and Section 13 (Statutory Instruments, 1974) and the Statutory Instrument Number 39 of 1989, Section 11 gave the Department of Transport, Energy and Communications responsibility for the cable and MMDS systems

Telecommunications (Miscellaneous Provisions) Act allowed for the establishment of the Office of the Director of Telecommunications Regulation (ODTR). These statutory powers were moved to this new managing division. Legislation permits the office to amend transmission licence conditions after consultations with the distribution owners.

The conflict surrounding the channel positioning of indigenous television channels on distribution systems has highlighted the problems of providing equal access to broadcasters on the cable system. For example, during the two and a half year disagreement with TV3 and Cablelink, over channel positioning on the cable network, the ODTR viewed this issue from a purely market driven perspective. They believed that no form of regulatory intervention was required as there was no breach in the cable licensing conditions.

According to Ennis, 'the ODTR regulations state very clearly that TV3 [and] national terrestrial services which are must carry, must be passed in the broadcast [frequency] bands. TV3 was placed in a position significantly outside those band services. We were not consulted because we were told where we were going. We were not given any opportunity to influence that position. We then discovered that the ODTR had no power, no real power to compel Cablelink to comply. We also found that Cablelink were not transmitting TV3 on their MMDS network on the Eastern half of the Country. And again, short of withdrawing their licence, the ODTR had no effective sanction. But what was most worrying was the ODTR did not attempt to take any action against Cablelink and applied the regulations which were quite clear in a very unclear and inconsistent manner'. Ennis believes that the ODTR chose not to use their powers to change the conditions of licenses. TV3 claim that this lack of prime channel positioning within the cable network, which reaches over 80 per cent of all households in the greater Dublin area, cost them around £5 million in lost advertising revenue⁶⁸.

(Statutory Instruments, 1989) The Department of Public Enterprise was formed out of the Department of Transport, Energy and Communications.

⁶⁸ Hetherington (2000), Managing Director and CEO of TV3, provided this figure at the Irish Business and Employers Confederation (IBEC) Audiovisual Seminar, 'Content is King'.

In 2000, TV3 and TG4 resolved the issue of channel positioning with the new owners of the Cablelink delivery system, NTL⁶⁹. They agreed to reposition TV3 and TG4 beside RTE One and Network 2 as a compact selection of national broadcast services. Channel reposition occurred in early September, 1999 (Cradden, 2000). At the same time, TV3 agreed to remove its longstanding High Court legal challenge against the cable operator that began before NTL purchased Cablelink in 1999 [See Figure 15]. NTL's decision also coincided with the planned launch of its digital cable operation to provide a bundled selection of the national channels on its own electronic programme guide. These obligations were outlined in the Broadcasting Bill (1999).

TV3 believes that the ODTR should have used the principles of fair and reasonable, non-discriminatory access with NTL but they chose against this form of regulatory action. Ennis (TV3), states, 'we do not believe the ODTR acted prudently in dealing with the situation with Cablelink. We believe that the main reason that Cablelink didn't place TV3 In-Band channel or In-Band reception, was that they feared the disruption it would cause their pay-TV services. And you've a clear example where pay-TV took primacy over and took precedence over Free-to-Air television'. Although this issue was resolved, the situation may re-occur due to the provision of terrestrial multiplex services over digital cable and fixed line platforms.

In relation to criticisms surrounding the ODTR's selective handling of the Cablelink/TV3 issue, the ODTR believe that the issue was between the network operator, Cablelink, and the broadcaster, TV3. The ODTR claims that it does not regulate what is carried over the networks and therefore it had no reason to intervene. Hinczy⁷⁰ (ODTR) states that 'some of that [Cablelink/TV3 incident] is standard commercial procedure if somebody doesn't want to let you access something, at all times, any operator will always have the option to turn around and say, I am not going to provide that particular service on a network' due to solely commercial reasons'. A platform operator can provide independent television services as part of the network's overall terms and conditions. Any

⁶⁹ In 1999, the Cablelink network with 360,000 subscribers was sold to NTL for £535 million.

difficulties with the provision of digital services over cable networks are primarily a commercial issue

These access difficulties experienced by national commercial broadcasters in the carriage of their analogue services reflect the level of control that each network operator has over content providers. This regulatory issue could be re-visited by the ODTR in the manner of fair and non-discriminatory access for indigenous interactive content providers across all digital broadband networks. It appears that such access issues will be left to market forces with limited intervention from the national telecommunications authority. In the provision of public interactive services that may have no commercial return, regulatory action will be necessary to ensure universal delivery and accessibility of publicly funded interactive television services.

From a public policy perspective, NTL claim that cable operators cannot provide non-commercial services. According to Galvin, 'we're [NTL] in the business of providing premium content to the consumer at the best possible price'. As long as public broadcasting maintains high audience ratings, approaching a 40 per cent audience share, network operators will want to retransmit these national television services regardless of the 'must carry' obligation. It remains to be seen if less popular public interactive services will also be rewarded with similar premium positions across that cable network.

On the issue of whether cable operators 'must carry' digital multiplex services, Larkin (Department of Arts, Gealtacht and the Islands) believes 'if it's of value and it's going to be interactive on DTT and people were demanding it, it would probably be provided. If it was a public service and [there's] no big demand for it, then in the future, there may be some benefit for some regulation'. Until this unspecified time, the carriage of multiplex services over cable should be considered a commercial matter. Indigenous broadcasters on the digital terrestrial platform will be required to pay for the distribution of their Multiplex services.

⁷⁰ In conversation with Roíy Hincý, Broadcast Regulator, Office of the Department of Telecommunications Regulation, October, 2000.

Galvin (NTL) believes that Irish interactive services carried on the terrestrial platform will also be carried on the cable networks. She claims that all 'interactive services and other service providers will want to be available on all platforms. So, it'll be in their interests to make sure that they're available via each of the providers technology'⁷¹. The onus will rest on the public and commercial service providers to use NTL's proprietary technology. NTL declined to comment on the Cablelink/TV3 disagreement.

While cable operators may be obliged to carry Free-to-Air channel services on their networks, free of charge, the issue of carrying the digital public broadcasting multiplex and associated services is unresolved. For Branagan (RTE), 'they [cable operators] are not obliged to carry a multiplex (pause) because a multiplex is a situation where the whole is much more than the sum of its parts. The multiplex has all that relationship between all those different programmes which can be quite complex and enhancing of the overall programmes. [In] the case of (pause) 'must carry', its 'must carry' of individual programmes on cable. The DTT operator would be very happy to have a situation where RTE and TV3 were 'must carry' for free on the DTT platform. But, of course, they wouldn't get a multiplex. [and] because cable operators are not obliged to carry a RTE multiplex of programmes, they are only obliged to carry individual elements.'

For the cable operator, these individual elements are the current analogue selection of indigenous Free-to-Air television channels. But as broadcasters evolve into multiplex content providers, the kind of content that will be carried over each channel will diversify. This means that broadcasters will be producing a range of programming, such as broadband teletext and interactive television services. But if services fall outside of the cable operator's current licence, awarded by the ODTR, the carriage of the digital multiplex will be subject to the network's terms of agreement. Cable operators, like NTL and Chorus, will provide access to terrestrial broadcasting services on the condition that the cable networks are allowed to charge the broadcasters a transmission fee. If not, the broadcasts' role in providing channels and additional services may be replaced by imported television channels.

⁷¹ In conversation with Patricia Galvin, Public Affairs, NTL, September, 2000

The ODTR believes that 'must carry' obligations, free of charge, should not be reserved for all network operators, like NTL and Chorus, in order to provide a universal coverage of multiplex broadcast services. Some form of compensation process will be required to assess the economic value that each service brings to the network (ODTR, 2000b). For instance, compensation for the terrestrial network operator may be high due to radio spectrum's finite bandwidth capacity. Alternatively, the carriage fee for a cable network operator may be set at a much lower value due to the abundance of bandwidth capacity over its hybrid fibre co-axial cable system. Ultimately, the telecommunications regulator believes that the issue of compensation for multiplex services is an issue for 'broadcasting policy authorities' alone (ODTR, 2000c).

Chorus have criticised the Broadcasting Bill (1999)⁷². While the terrestrial network operator will be allowed to charge all broadcasting content providers for the cost of transmission of their channels, cable operators are not allowed to charge similar expenses. They believe that this anti-competitive behaviour will be augmented by RTE's stake in the digital terrestrial operation. Chorus claim that the loss of potential earnings from subscription or pay-per-view services in the carriage of public broadcasting services has not been taken into consideration by the decision not to establish such carriage fees. The company has brought this issue to the attention of DGIV, claiming that this regulatory measure will distort competition in the digital transmission sector.

Conclusion

For the first time, the Broadcasting Bill (1999) introduces a framework for the launch of digital terrestrial broadcasting alongside other platforms. It also separates the terrestrial transmission network from its television content. Under the Bill (1999), broadcasting is regarded as a one-way network that can provide limited two-way interactive television services. Lack of recognition, that the terrestrial platform is technically able to provide Internet, telephony and asymmetrical data services, places the platform at a distinct commercial and regulatory disadvantage amongst its network competitors. The

⁷²In 2000, Irish Multichannel re-launched as Chorus Communications.

Broadcasting Bill (1999) does not allow for the delivery of data over all platforms on an equal and fair basis. This could be considered a discriminatory measure against the natural development of terrestrial digital services in tandem with other transmission platforms. However, terrestrial broadcasting can become the pivotal medium of Internet access for all its citizens. For this to occur, the Irish Information Commission has proposed that the 'government should consider subsidising access through the DTT medium to online public information and interactive services' (Information Society Commission, 1999: 44).

The provision of interactive public services over cable, terrestrial and telecommunications networks is not a purely economic issue. These services possess a political and cultural significance that can prevent the disenfranchisement of citizens who may not be able to pay for the full panoply of digital services in the digital broadcasting domain. 'Must carry' of multiplex services will be crucial in allowing all viewers to access licence fee funded Internet and interactive broadcast services transmitted across any delivery systems. The Irish market has a high cable penetration level amongst its 1.1 million households with a strong demand for UK based terrestrial multichannel television⁷³. No legislation is currently in place to ensure the distribution and reception of public television multiplex services on all digital delivery systems, especially cable.

A recent IDATE report (2000, 28) states that the higher the number of European households with cable and satellite penetration, the lower the percentage of homes connected to a terrestrial network. It will be vital for RTE and TG4 that their content will be universally delivered and readily accessible with priority positioning in the electronic programme guide. When the terrestrial platform is launched, it will be the only distribution system to provide each citizen with access to digital Free-to-Air television channels and advanced Information Society services without having to pay a subscription fee.

⁷³ The national cable penetration rate is 55 per cent of the population (Forfas, 1999).

For public broadcasters, content that can be configured and distributed to each platform specification will be crucial in delivering their digital services. The challenge to all indigenous broadcasters will be to adapt their content in order to overcome the compatibility barriers across the distribution systems and set-top box receiver devices. After the Oireachtas passes the Broadcasting Bill (1999), further regulation may be required to ensure that public broadcasting services are allowed to enter new distribution markets in order to fulfil their public service mandate across all delivery systems, regardless of conditional access technology.

Changes to the Broadcasting Bill (1999) will be required to ensure the universal availability of public multiplex television services across all other network systems. These 'must carry' duties, that impose universal reception on each broadband delivery system, may entitle the network operator to some form of financial compensation. The final decision on this issue may rest with each of the Member State's legislative regime in the application of reasonable, transparent and non-discriminatory terms of distribution for these 'must carry with position' services across each delivery system [See Figure 16]. In the case of Free-to-Air broadcasting, the Amsterdam Protocol (1997) and the Broadcasting Bill (1999) will enforce the carriage of the current selection of indigenous television services across all networks. The transmission of additional digital public multiplex services, like teletext or programme guide, on the cable and fixed networks has yet to be agreed. This means that publicly funded television content may not be available to cable or fixed line subscribers. The universal availability of public multiplex services will be restricted to digital terrestrial television viewers.

The Broadcasting Bill (1999) should be amended to give the terrestrial platform more scope to provide additional services, such as a terrestrial return channel required to offer a range of one-to-one interactive television services. For Branagan (RTE), 'it could well be to the very significant advantage of Muxco if in the [Broadcasting] Bill, there is nothing that will preclude the licensing of local multiplexes on the one hand and the terrestrial return [path] on the other'. By not preventing the establishment of a terrestrial return path, the network can compete with its competitors in the provision of interactive

television and telephony services by applying for a telecommunications licence. The challenge for the Muxco operator will be to incorporate a terrestrial return channel into its digital terrestrial broadcasting system. This will be dependent on the licensing of a return channel for such telecommunications services over the broadcast spectrum.

Chapter five looks at the possible implementation of telecommunications policies across broadcast, cable and fixed line networks. Broadcasting and telecommunications services are no longer separated by technology. The final chapter will examine the work of the ODTR in applying its regulatory powers across each communications network. The telecommunications regulator will try to prevent unfair competitive activities in the provision of information and content service across each platform. New policies are required for these converging areas.

Figure 11 Broadcast Delivery Systems in Ireland

<i>Platform</i>	<i>Coverage</i>	<i>Current Situation</i>	<i>Services</i>	<i>Hybrid Delivery Platforms</i>
Analogue terrestrial	Widespread television coverage	Main platform for free-to-air delivery and for the foreseeable future	RTE 1, Network 2, TnaG, TV 3, Teletext service Some UK coverage in some areas	Phasing out period dependent on regulatory and market factors Sold to business sector
Digital terrestrial television (DTT)	Almost nationwide coverage via an integrated television or a set-top box to the television, computer	Not available Begin transmission by the year 2002	6 multiplexes proposed for 30 channels Tiered bundled channels Packages may include free-to-air, pay alternatives, Internet services, enhanced Teletext service and datacasting No UK coverage Potential use of the radio spectrum to provide interactive services through DTT only	Terrestrial/Telephone for interactive services such as e-mail, on-line banking, home shopping, high speed Internet access and video game services To be replaced with the DTT platform for all services Initial use of PSTN line for interactive services
Analogue radio	Nationwide	Main platform for radio stations	Local and national stations	Radio and Analogue – Terrestrial, Cable and Satellite simulcasting and radio channels

<i>Platform</i>	<i>Coverage</i>	<i>Current Situation</i>	<i>Services</i>	<i>Hybrid Delivery Platforms</i>
Digital audio (DAB)	Nationwide with digital receivers	Not available	Quality, CD sound, niche stations	DAB across all platforms for audio, datacasting, Internet services, on-line banking to the television, computer, and mobile radio
Analogue satellite	Nationwide coverage	Not widely subscribed	Mix of UK pay channels Increased number of pay-TV channels	Satellite/Telephone for basic two way services
Digital satellite direct to the home (DTH)	Nationwide coverage via a set-top box or integrated television set	Not widely available Initially, targeting analogue satellite consumers	Increased number of pay-TV channels, high-speed Internet access services, enhanced Teletext and datacasting Greater capacity than digital terrestrial	Satellite/Telephone (the return path) for home shopping, interactive services similar to digital terrestrial
Analogue multi-point microwave distribution system (MMDS)	“Wireless cable”, Regional franchises	Used in rural areas Upgrading needed for new services	UK and other pay television channels	MMDS/ Telephone for a return path connection

<i>Platform</i>	<i>Coverage</i>	<i>Current Situation</i>	<i>Services</i>	<i>Hybrid Delivery Platforms</i>
Digital Multi Microwave Delivery System	Rural franchises	Testing Local MDS and the Microwave Video Delivery	Increased channels, enhanced Teletext and datacasting services to the computer and television	LMDS/Telephone for a return path connection for limited interactive services
Analogue deflectors	Local coverage	Unlicensed but provides a low cost service	UK television channels	To be phased out due to regulatory and technological factors
Analogue cable	Regional franchises (city based)	Mainly used in urban areas Upgrading needed for new services	Irish, UK and other pay television channels Internet services available in few urban areas	Cable/Telephone for basic two way interactive services, home shopping, on-line banking and entertainment
Digital cable	Regional franchises	Considerable upgrading needed for new services via a modem or set-top box	Increased channels, interactive services, voice telephony, Internet Protocol (IP) telephony and Internet services It has a greater capacity than DTT and digital satellite for interactivity	Cable/Telephone for two-way communications to the television and computer In the long term, digital cable will have a built-in return path to offer simple voice telephony and sophisticated interactive services without a telephone line

Figure 12 Telephone Subscriber Networks

<i>Network</i>	<i>Coverage</i>	<i>Current Services</i>	<i>Hybrid Delivery Platforms</i>	<i>Future Services</i>
Analogue fixed lines	Nationwide, over twisted copper pair wires Analogue modems used for Internet access	Voice and IP telephony, text and datacasting, and Internet services to the computer	Telephone/Internet for Internet and datacasting services	Voice telephony and datacasting services limited by bandwidth capability
Fixed integrated services digital network (ISDN)	Nationwide over the existing network via terminal adapters	Faster telephony and Internet service than analogue lines Datacasting and limited multimedia services to the computer	Coupled with digital delivery platforms to carry fast return path interactivity	Limited additional services due to bandwidth in copper lines that allow for low quality digital signals
Fixed asymmetrical digital subscriber line (ASDL)	Limited coverage to area around telephone exchange, approx 5,000 metres via terminal adapters	Broadband multimedia telephony especially video-on-demand, high-speed Internet access to the television and computer	Network communications with all digital platforms to offer real-time video, telephony, and high speed Internet access services to the TV and PC	Real-time multimedia, Compatible with digital broadcasting systems to provide joint services such as video servers

<i>Network</i>	<i>Coverage</i>	<i>Current Services</i>	<i>Hybrid Delivery Platforms</i>	<i>Future Services</i>
Analogue cellular	Nationwide, over radio spectrum	Voice telephony, and datacasting, including E-mail to the computer	Cable/Telephone offers voice telephony, high speed Internet services datacasting, and television channels	Limited to current services due to bandwidth capability
Digital cellular	Nationwide, over radio spectrum	Voice telephony, datacasting, and limited Internet service	Network communications with virtual reality services alongside broadband communications services	Voice telephony, Internet-type services, datacasting (news services) graphical displays and scrolling devices navigational menus Efficient telephone billing systems

o

Figure 13 Chorus Communications

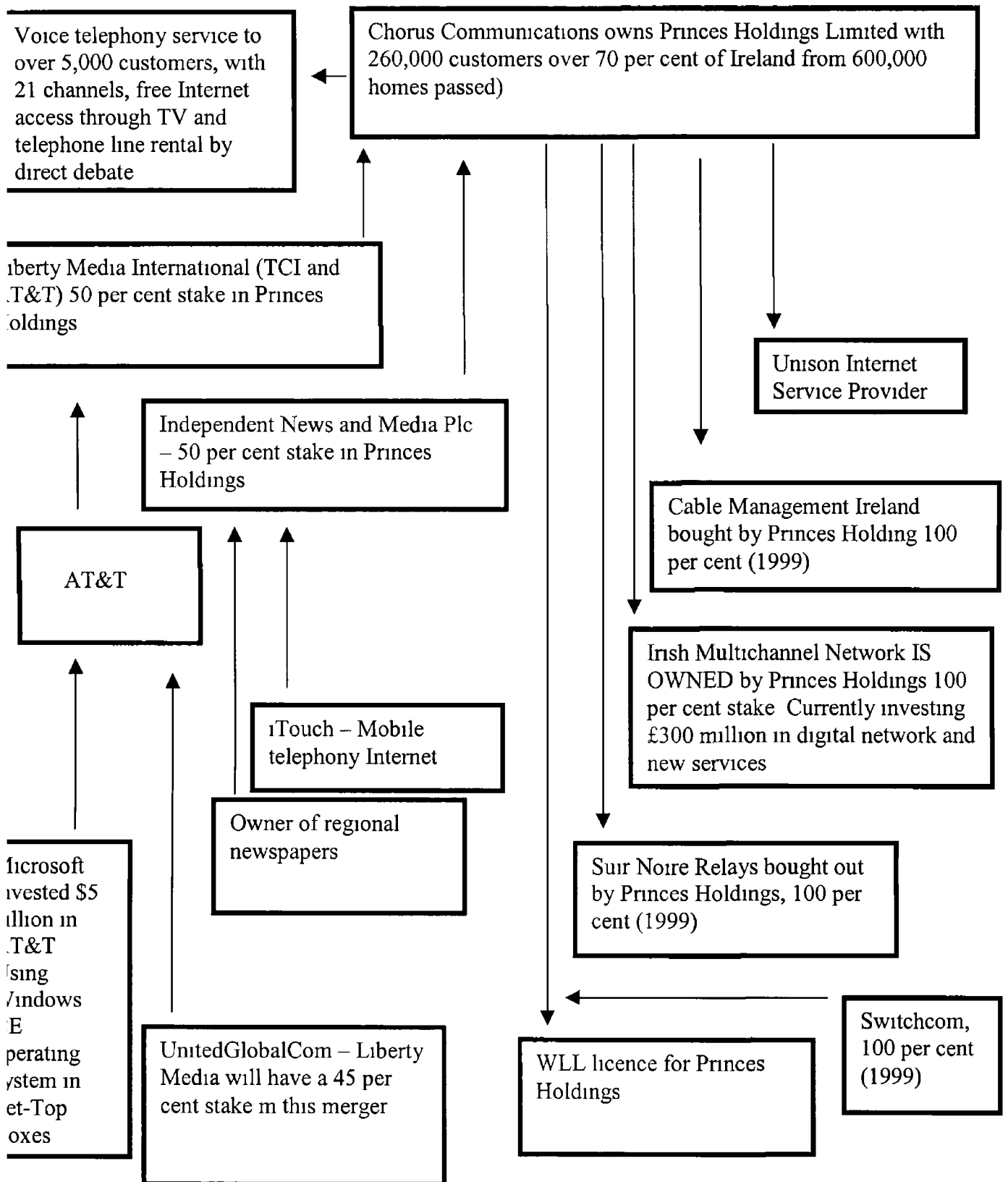


Figure 14 Multiplex Breakdown for Irish Digital Terrestrial Platform⁷⁴

<i>Multiplex</i>	<i>Simulcast</i>	<i>Free-to-Air (FTA)/PAY</i>	<i>Content Provider</i>	<i>Television Channels</i>	<i>Interactive Services</i>
1	YES	FTA	RTE	RTE 1, Network 2, RTE News24, RTE Learning, RTE Youth	Linear and asymmetrical Interactive Services
2	YES	FTA	TG4, TV3	TG4, TV3	Unknown
3	NO	Pay	UK FTA	BBC1 NI, BBC2 NI, UTV, C4, C5	Unknown
4	NO	Pay, Pay-Per-View	Unknown	Pay-Per-View, subscription	Internet, Interactive Services
5	NO	Pay, Pay-Per-View	Unknown	Unknown	Unknown
6	NO	Pay, Pay-Per-View	Unknown	Unknown	Unknown

NI - Northern Ireland, Pay – Subscription, FTA - Free-to-Air

⁷⁴ Source IDATE (2000), Baldi (2000), Ronan Callanan

Figure 15: NTL

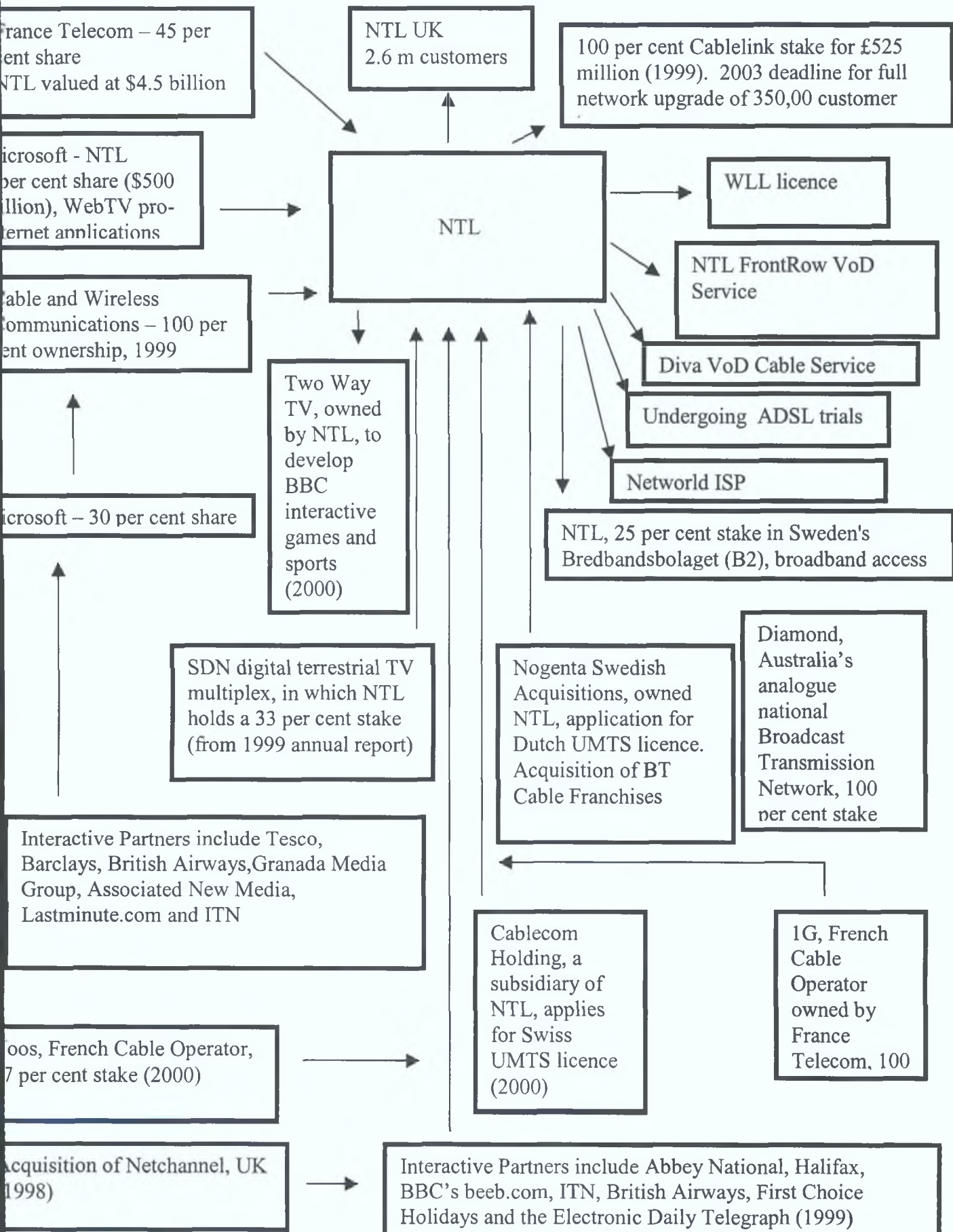


Figure 16 Main Players in Digital Broadcasting in Ireland ⁷⁵

	<i>Digico</i>	<i>Eircom</i>	<i>Chorus</i>	<i>NTL</i>	<i>Esat Telecom</i>	<i>BSkyB</i>
Backed by	RTÉ, Commercial venture	Comsource, Share- holders	Liberty Media, Independent Media	France Telecom, Microsoft,	BT	Murdock News Corp
Carriage of Free-to- Air services	YES	NO	YES	YES	NO	NO
Pay-TV	YES	YES	YES	YES	YES	YES
API and encryption	DVB-MHP	Closed Portal	Closed	Closed	Closed	OpenTV (Closed)
Telecom Return Channel	PSTN, trailing Wireless	ADSL, PSTN	Fibre Optics	Fibre Optics	ADSL, PSTN	PSTN

⁷⁵ Source Baldi (2000), Ronan Callanan

CHAPTER FIVE

Introduction

The Office of the Director of Telecommunications Regulation (ODTR) was formed in response to the liberalisation of the fixed line telecommunications market across the Member States of the European Union⁷⁶. Initially, this regulatory body was established to manage the transition from a state owned monopoly organisation to an open and competitive telephony market. The ODTR states that ‘telecommunications, as a consequence of Ireland’s established membership of the European Union, has joined a long list of sectors where policy is now primarily formulated in the European [Union]. Ireland has acted as a policy-taker in relation to the European framework’ (Doyle, 2000:5).

In 1997, Telecom Eireann was the only licensed operator of voice and data telephony services. In late 1998, the sector was opened with the licensing of 21 telecommunication operators (ODTR, 2000). By the end of 1999, the Irish market was valued at £1.66 billion, representing 2.5 per cent of GNP, with over forty general telecommunication operators⁷⁷. The telephony market is recognised as an important sector in the Irish economy. The decision to liberalise the telecommunication sector was an important catalyst in the generation of a competitive telecommunications market.

Chapter five explores the policy objectives of the ODTR. The organisation’s duties include the management of the radio spectrum and the licensing of the analogue and digital terrestrial broadcasting systems. Other responsibilities include regulating access to digital communications networks and ensuring the delivery of digital services on

⁷⁶ The formation of the ODTR was initiated under the European Commission’s DG XIII’s ‘Telecommunication Services’ Directive (1990). In 1991, the European Court of Justice adopted the directive under Articles 90 and 85 of the Treaty of Rome (Kiessling and Blondeel, 1998). This means that each Member State was obliged to implement the agreement into national regulations.

⁷⁷ By 2000, the ODTR awarded licences to 22 basic and general telecommunications (Doyle, 1999). These provide telephony and network services to residential users. The basic licence allows the operator’s to provide data only services. The general licence allows the telecommunications operator to provide a complete telecom broadband network service, including voice and data telephony.

broadband networks with an adherence to universal service obligations (Winsbury, 1999) It reviews the management of digital terrestrial multiplexes This chapter assesses the role of the ODTR in the distribution of the public service multiplex on each delivery system What role will the ODTR have in relation to the development of a digital terrestrial return path? The challenges facing multiplex broadcasters in the delivery of their digital services on fixed line and cable systems are varied

Chapter five provides an overview of the communications regulatory framework that will allow fixed line operators to carry television services There will be an examination of the difficulties facing the closedown of the analogue terrestrial system Will the increased demands of radio spectrum for mobile telephony services impact on interactive terrestrial television? The availability of an additional frequency spectrum may offer both delivery systems the opportunity to expand their digital services Indeed it is the ODTR's role to encourage the development of a competitive radio spectrum environment for the mobile telecommunications network which shares the airwaves with Free-to-Air broadcasters This section will assess the regulatory changes across each national distribution system for the provision of digital public multiplex services to the residential market Will the ODTR regulate the transmission of television services on the fixed line network in the same way as broadcast and cable delivery systems? This section will begin with an analysis of the viability of multiplex broadcasters gaining a telecommunication licence to provide telephony and two-way interactive television services

ODTR and Digital Terrestrial Broadcasting

The ODTR has responsibilities for the efficient management of the radio spectrum This falls into three categories They are digital terrestrial broadcasting, mobile telephony and multimedia data services While, the ODTR's consultation paper, 'Licensing Digital Terrestrial Television' (1999a), outlined its intentions for the introduction of digital terrestrial broadcasting, its main objectives are to ensure the universal availability of national and UK television services The ODTR will ensure that the delivery and

universality of broadcast television services are maintained in the transition to digital broadcasting

The ODTR will be responsible for the simulcasting of television services. This means that the cable and terrestrial networks will be obliged to transmit all national terrestrial channels on both analogue and digital frequencies. The decision to switch-off the analogue network will be decided by government policy. Advice will come from the Broadcasting Commission of Ireland (BCI), national broadcasting organisations, like TV3 and RTE, and the Departments of Public Enterprise and the Arts, Heritage, Gaeltacht and the Islands. This date will not be decided by the ODTR. Nonetheless the telecommunications agency believes that the digital terrestrial network will be received by 65 per cent of the population in the first year of operation. Within four years, the network is expected to reach 99 per cent of the population (ODTR, 1999a). This percentage will pass the universal level of 95 per cent required to allow for the switching-off of the analogue broadcast network. However, the analogue closedown will depend on the majority of viewers receiving digital Free-to-Air broadcasting services through either a set-top box or an iDTV set.

Thom (ODTR) does not expect the analogue system to be switched off for at least 15 years⁷⁸. This timeframe for the digital switch-over is supported by the current Minister of the Arts, Gaeltacht and the Islands, Ms de Valera. In a recent Dail debate on the Broadcasting Bill, 1999, Minister de Valera stated that 'the final decisions on the closedown date will be taken in light of the penetration of receivers capable of digital reception, a closedown date could be announced when, for example, a significant penetration of digital receivers or set top boxes, such as 50 per cent of television households, has occurred' (Dail Debates, 1999a).

For Branagan (RTE) the lack of available integrated digital television (iDTV) sets would further delay the switching off of the analogue spectrum. In the UK, for example, the

⁷⁸ Thom (ODTR) believes that there will be 135,000 digital homes across the digital cable and satellite networks in Ireland by Christmas 2001.

government is beginning to provide support in the terrestrial set-top box market in order to increase the take-up of digital broadcasting services. Without some form of intervention, British officials do not expect the digital spectrum space to become available after 2020. This delay would impede the launch of additional terrestrial multiplex content and mobile telephony services. Branagan (RTE) claims that the UK government is considering the provision of free digital-to-analogue converters to the public after 2006-7. These basic set-top boxes would allow the viewer to receive digital Free-to-Air television channels with an electronic programme guide but without the need to subscribe to a network. Branagan (RTE) suggests that a similar broadcasting policy would be implemented by the ODTR. A government subsidy would be required to rollout the set-top box technology while the ODTR would continue to monitor the availability of spectrum during the transition to digital terrestrial broadcasting.

The released spectrum will provide mobile telecommunications operators with increased telephony and Internet bandwidth for additional data and video content. In the UK, the recent auction of mobile broadband licences for third generation telephony services amounted to £22.4774 billion (Radiocommunications Agency, 1999). This figure reflects the value of the terrestrial spectrum for the transmission of mobile telephony services over broadcast channels. The terrestrial spectrum has become a valuable economic resource. In the UK, this financial windfall for the government exchequer increased the political and economic calls for the switching off of the analogue network at the earliest possible date.⁷⁹

In Europe the recent auctions of radio spectrum for the Universal Mobile Telecommunications system (UMTS) highlights the increased value of spectrum frequencies in offering datacasting and telephony services.⁸⁰ In Ireland, the ODTR will

⁷⁹ BSkyB claim that auctioning the spare UK UHF frequencies would generate roughly £8 billion, based as the 3G mobile auction process (New Media Markets, 2000:3). Irish broadcasters transmit on UHF and VHF radio frequencies, so the auctioning of both frequencies could bring substantial licensing fees.

⁸⁰ In the European Union, the mobile telephony market is worth over £46 billion punts and is growing by around 20 per cent each year (Communication from the Commission to the Council, 2000a). Recent European licensing processes and auctions for UMTS telephony services have generated over £80 billion punts in revenue for national governments. Mobile operators have begun to concentrate on data and high speed Internet access rather than voice telephony services.

licence the UMTS services subject to the availability of the spectrum⁸¹ These UMTS data services can also be transmitted over the terrestrial television network This means that digital broadcasters can use their delivery system to provide the same kind of data services with a terrestrial return channel If the terrestrial broadcaster were allowed to offer similar services without having to pay a similar telecommunications licence fee, the economic value of third generation mobile telephony licences would be dramatically reduced (Kaufhold, 2000)

However, digital terrestrial broadcasting is the only delivery system without a licensed proprietary return channel for each multiplex broadcaster This means that the digital terrestrial viewer needs to connect to a fixed line telecommunications or cable network in order to participate in two-way interactive television content The consumer is connected to a telecommunications network, like Eircom's telephone system This telephony return channel for terrestrial programming remains under the control of the telecommunication network operator For Clancy (RTE), such influence will allow 'telecom operators [Eircom and Esat Telecom] to be the custodians of the nation's information'⁸²

This sentiment expresses the difficulty in ensuring that universal access is achieved for digital public service programming While interactivity has significant community potential, like education and government content, RTÉ's public service information may not be accessible without open access to a return channel on a digital telecommunications or cable platform, like Eircom and NTL Broadcasters will have to lease bandwidth capacity from these networks in order to offer the viewer a full multiplex service For example, by having to rely on Eircom's telecommunications network for a return channel, the access charges for public digital services may become prohibitively expensive for public service content providers This means that the network operator will have leverage over the terms in which RTE supply their multiplex content to the network's subscribers

⁸¹ The ODTR recently announced that universal mobile telecommunication system (UMTS), using Wireless Application Protocol (WAP) technology, would be auction from early 2001 (Murphy, 2000) The ODTR intends to licence UMTS services by February 2001

⁸² In conversation with Neil Clancy, Head of Interactive Services Unit, RTE, October, 2000

The consumer may only receive interactive information if negotiations between the network operator and public service broadcaster are commercially successful. But the challenges remain for public broadcasters in the delivery of television content with little commercial value. According to Clancy 'if I [as a public service broadcaster] want to use your network for free, I don't know how we settle it because I do believe that a lot of what has to be done has no commercial return. How do you get them [network operators] to buy into the fact that you're going to use the same resources for free on one hand but for money on the other?' Open access to the return channel on all digital transmission networks is needed to give universal access to public multiplex broadcasting service.

While the Broadcasting Bill (1999) allows broadcasters to carry unlimited amounts of datacasting services over their networks, this only allows for one-way interactive services, like electronic programme guides and digital teletext. This restriction will prevent the terrestrial multiplex from providing a wide scope of telecommunications services under the digital terrestrial multiple licence (Broadcasting Bill, 1999). At the same time, it will provide a significant advantage to the cable and fixed line operators. These networks are licensed to offer unrestricted data carriage delivery for their telephony, multichannel and asymmetrical interactive television services.

The ODTR believes that there are two separate forms of interactivity within digital broadcasting. These forms should be individually licensed. The ODTR has decided that linear interactive content, linked around the broadcast programme, does not require any form of regulation for the terrestrial network. For Thom (ODTR) such interactivity includes, 'game shows, any data carried with game shows, any alternative camera shots, player profile carried with sports, [anything] that's programme related so you can have as much [as that] as you like. What we're doing is enhancing the real interactivity, the cross over between broadcasting and Web services'. For example, if an education programme is broadcast over the terrestrial network and the data required to carry diagrams and exercises comes over the data stream, there will be no restrictions to the amount of data that can be carried. The interactive service is part of the broadcast programme.

While the Broadcasting Bill (1999) allows the multiplex operator to carry linear interactive television channels, the range of asymmetrical and telecommunication services provided on the broadcast channel will be limited (ODTR, 1999) The ODTR (1999a) believes that no more than 10 to 15 per cent of each terrestrial multiplex should go to non-broadcasting services. If the digital broadcaster provides two-way digital media services, then a separate telecommunications licence will be needed. For example, the supply of asymmetrical, non-programme related services beyond the 15 per cent restriction level, such as the World Wide Web, would require a telephony licence. These interactive services are not part of the broadcast programme and therefore are regarded as a second form of interactivity on the digital terrestrial network.

Consequently the terrestrial Multiplex operator would need to apply for extra broadcast spectrum in a manner similar to mobile telephony operators. The license would be awarded on a competitive basis and under European telecommunications agreements. The ODTR and European Commission both support this regulatory position. According to the current Director-General of the Information Society, 'there should not be special privileges for digital terrestrial television that would disadvantage other delivery mechanisms able to carry similar services' (Argyris, 2000: 4). This means that the judging procedure for a terrestrial return channel would need to reflect the ODTR's non-discriminatory and neutral regulatory approach on all distribution systems. For the ODTR, there should be no regulatory difference between the licensing of a UMTS service and a digital terrestrial television return channel over this scarce natural resource.

According to Thom (ODTR), 'we can't gift or guarantee that frequency to the [service provider], it has to be auctioned or a beauty contest has to be done – so, needless to say, you can see how a dedicated data multiplex wouldn't fit into the government plan because the government would be asking us to do something illegal by assigning that to RTE without having a [fair and transparent] competition of some sort for it'⁸³. The use of extra radio spectrum for an interactive terrestrial return channel would require a decision

⁸³ In conversation with Dave Thom, Broadcast Regulator, ODTR, October, 2000

at World Radiocommunications Conferences (WRC)⁸⁴ The licensing of a terrestrial return path would rest with frequency replanning considerations that are drafted on a WRC basis. The next meeting occurs in 2004 when a decision will be made on the allocation of radio spectrum space for a terrestrial return channel. Following their approval, the technology used by the return channel would need to be standardised by the European Telecommunications Standards Institute (ETSI). When these procedures are finalised, the national regulatory authority will license this telecommunications service as part of the digital terrestrial broadcasting system [See Figure 17]

According to the spokesperson from the Department of Public Enterprise, there will be a commercial battle between mobile telephony companies, looking to expand their UMTS services, and multiplex broadcaster's wanting to have their own return channel for interactive television content. But until the frequency spectrum is made available to multiplex companies, the terrestrial broadcaster will depend on the fixed line network operator, namely Eircom, to deliver asymmetrical content to the viewer.

Multiplex access to the Fixed Line Network

The Irish Association of Licensed Telecommunications Operators (ALTO) (2000) believes that the development of digital services, like RTE's interactive television content, has been impeded by the monopoly control of the local loop by the incumbent fixed line operator⁸⁵. Privatisation of the fixed line network did not force the network operator to branch out into the provision of high-speed Internet and television services to the residential market. Thus, ALTO (2000) called on Eircom to open up their local loop network as the last phase in the complete liberalisation of the telecommunication market. The local loop is the last physical connection from the local telephone exchange to the

⁸⁴ The World Radiocommunications Conference (WRC) is an international telecommunications event where national radio frequencies are co-ordinated across each country. These regulation conferences make sure that each country fulfils their international treaty obligations on the use of the radio spectrum. These conferences allocate the supply of radio spectrum for specific industries like telecommunications and broadcasting. Ireland is a member of this 190-strong committee (Commission of the European Communities, 2000a).

⁸⁵ Formed in 1998, the Irish Association of Licensed Telecommunications Operators includes all national telecommunications and cable network owners and operators except Eircom.

household telephone. By keeping control of the local loop, the telecommunications operator can dictate access to the network for its competitors. This has deterred independent voice and data telephony companies from competing in new digital markets because they cannot afford to enter this closed fixed line network.

Watson Brown (Information Society Directorate) believes that the 'regulation on unbundled access to the local loop will allow new entrants to offer consumers fast Internet access over the traditional telephone line, without recourse to either the telecommunications incumbent or the cable television operator. Thus the effect of the regulation will be to increase significantly the competitive nature of the market for access to Internet and to other digital services'⁸⁶ This opening of the local loop will enable competitors to lease the fixed line network from the incumbent operator and deliver their own voice telephony services as well as the retransmission of television channels. The ALTO consortium (2000) strongly supports the opening of the national fixed line network in the provision of a comprehensive range of digital services. The physical unbundling of the local loop would allow competitors to lease lines from Eircom in order to install their own set-top box receivers. The costs of these leased local loop lines will depend on the negotiated carriage rates between the ADSL operator and the network owner (Sweeney, 2000).

If the control of the local loop is removed from the dominant service provider, the consumer can select from a range of independent television and telephony suppliers rather than the incumbent network operator for the delivery of digital services⁸⁷. Eircom would be obliged to provide access 'with the same facilities as those that it provides to itself or to associated companies, and in the same timescales' (ALTO, 2000: 7). If Eircom refused to open their network, ALTO believe that European competition rules could be enforced to make Eircom unbundle the local loop under the Treaty of Rome (1957). The State would be identified as supporting the incumbent's network exclusivity by inadvertently allowing Eircom to continue with their monopoly practice in breach of

⁸⁶ In questionnaire from the Watson-Brown, advisor on the Information Society Directorate (DG XIII)

Article 86 (1) on unfair market advantage (ALTO, 2000) This would impinge on single market rules between Member States because the incumbent operator would be recognised as having significant market power advantage over other service providers

In response to these calls for the unbundling of the local loop, Eircom have called for regulatory changes to allow telecommunication operators to retransmit broadcast services on their fixed line network. As cable operators are now licensed for telephony services, Eircom claims that the national telecommunications operator should be licensed to carry broadcast services over their ADSL network. This would increase competition within the telephony and television retransmission markets. Indeed Eircom's interest in ADSL prompted the ODTR to publish a discussion paper on the platforms ability to provide video, data and voice telephony services

The ODTR paper, entitled 'Delivery of Licensed Programme Services Consultation Paper' (2000a), focused on the technical and economic issues facing the delivery of pay-per-view and broadcast content over the ADSL network. The discussion document (2000a) found that the licensing requirements of the delivery of programme services on the ADSL system, is similar to the regulatory demands expected from licensed digital cable networks. However Eircom's licence would be conditional on the opening of the fixed line network to allow competitors to offer similar ADSL services⁸⁸. The programme licence would not offer digital terrestrial multiplex services, only analogue programme services. This means that the ADSL service provider will select the type of content to be carried over the fixed line television network.

The recent European ruling on the deregulation of the fixed line local loop network (2000) will effect the licensing of broadcast services on the telecommunications network. The decree, entitled, 'Regulation of the European Parliament and of the Council on

⁸⁷ Independent suppliers will not have to invest in physically building their own fixed line connection to each household

⁸⁸ In a response to my e-mail questionnaire, Waston-Brown, DG XIII, states 'this sweeping access measure [of local loop unbundling legislation] is justified by the legacy market power that ex-incumbents still enjoy even after their monopolies/special and exclusive rights have been terminated and by the quasi-public nature of the investment in infrastructure over the past fifty years'

Unbundled Access to the Local Loop' (Commission of the European Communities, 2000), states that incumbent fixed line operators should provide an unbundled local loop service. This means that the dominant operator will have to open its local loop and create an adequate environment for fair competition on the fixed line network. For instance, Eircom will be required to supply a list of terms stating how prices and access conditions will be provided to their competitors.

Taking direction from the European Commission's ruling (2000), the ODTR will require the dominant market operator to 'provide information and unbundled access to third parties under the same conditions and of the same quality as they provide for their own services or those of their subsidiaries or partners' (Commission of the European Communities, 2000:4). This European statute empowers each national telecommunications regulator to administer fair ADSL carriage rates and high-speed Internet access prices (Commission of the European Communities, 2000) between service providers. The European Commission (2000) believes that this ruling will ensure more competition between cable and telecommunications companies in the provision of telephony, television and Internet services to consumers.

In response to the European Commission's liberalisation of Eircom's local loop network (Commission of the European Communities, 2000), the Department of Public Enterprise produced a discussion paper outlining a new telecommunications regulatory framework. The document, entitled 'Outline Legislative Proposals in relation to the regulation of the Communications Sector' (2000), supports the Commission's intentions to open the fixed line network. The report advocates the formation of a new telecommunications division to deal with these increased responsibilities in relation to local loop unbundling and significant market power (Department of Public Enterprise, 2000). The Department proposes the replacement of the ODTR with a new regulatory body, called the Commission for Communications Regulation (CCR).

The Commission for Communications Regulation will comprise of three members, from the ODTR and Department of Public Enterprise, and carry over the telecommunications

and spectrum management responsibilities of its predecessor. This change will give the agency greater flexibility in enforcing the recent European regulation on local loop network unbundling. The new Commission will be given wider regulatory powers to increase penalty fines and apply additional duties on incumbent telecommunication operators or on network operators with significant market power. Up until now, the ODTR had no legal mandate to implement full physical unbundling of the local loop.

According to Hobson (Department of Public Enterprise), when the dominant players are recognised, 'the regime allows the regulators to impose additional obligations on the operators designated as having significant market power'⁸⁹. However, the difficulty lies in defining market power and the terms under which telecommunications and cable operators will be classified as having a network monopoly. The CCR will ensure that a network operator with 25 per cent or more of a market share will be examined as being in a position of network dominance. Therefore as new competitors enter into this market, ex ante obligations may arise. This means that the regulator does not have to prove that a distortion in the market, or restricted access to digital services, has occurred before compulsory conditions are applied. As new markets emerge, the threshold level of 25 per cent may be adjusted in consideration of specific developments on each delivery system⁹⁰. In effect regulation is left to the discretion of national telecommunications regulators in applying access conditions where it deems appropriate.

Since the liberalisation of the telecommunications sector, Eircom has continued to possess complete control over access to the fixed line network. From the ODTR's 'Significant Market Power in Telecommunications' paper (1999), Eircom is acknowledged as the fixed line operator with a monopoly over the telephony market [See Figure 18-19]. Three years after the privatisation of the fixed line telephony market,

⁸⁹ In conversation with Adrian Hobson, Telecommunications Regulatory Advisor, Department of Public Enterprise, October, 2000.

⁹⁰ The digital terrestrial system, as a finite resource, is not regarded as having significant market power because of its physical limitations in providing telecom services. The scarcity of the spectrum resource exempts the adoption of local loop unbundling regulation for the transmission of services across the terrestrial delivery system (Commission of the European Communities 1999b Annex B, 12).

Eircom has a market share of 96 per cent (Thesing, 1999)⁹¹ Another factor, which constitutes *ex ante* behaviour, is the construction of 'entry barriers arising from vertical integration, [as well as] economies of scale or scope not available to other competitors' (ODTR, 1999 15) Their market dominance has provided the telecommunication operator with the autonomy to control the pace of development for new digital services, like pay television, across the fixed line network This gateway controller can also obstruct access to emerging content, like public service multiplex broadcasters, on the digital network In this case, the terms of the ODTR licence for the delivery of television channels over a communications network may include 'must carry' obligations for the delivery of public broadcasting and interactive services

In recognition of these market failure attributes, the European Commission's objective is to prevent Eircom from 'acting in an unfairly discriminatory or unduly preferential way as between its affiliates/downstream arms and licensed competitors' (ODTR, 2000a 13) This means that if the incumbent fixed line operator continues to have complete control of the network, independent content supplier of digital terrestrial programming, like RTE's multiplex, will be prevented from accessing consumers on that delivery system By the time the network operator allows entry to the market, competition may already be foreclosed For this reason, *ex ante* regulation would be required to prevent excessive commercial advantage for operators with significant market power Without regulatory intervention, the dominant player may keep the most profitable ADSL exchanges for their own digital services If necessary, the Commission for Communications Regulation will have the responsibility for ensuring that all public broadcasting and terrestrial multiplex channels will be accessed on the digital fixed line network

Anticipation of the removal of such regulatory restrictions can be seen from Eircom's ADSL trials of digital services It recently signed a content deal with two UK content and service providers, YesTV and FutureTV (O'Keeffe, 2000) The network operator's ADSL trial, run with software provider Newbridge Networks, targeted the urban Dublin area

⁹¹ The Eircom backbone network claims to be 100 per cent digital, with 98 per cent on optical fibre and the rest being digital radio and co-axial cables Telecom Eireann, renamed Eircom (2000), was established in

This service offered high speed Internet access, pay-per-view and around thirty premium subscription channels. From this it was discovered that ADSL could develop into a broadband service complementing Eircom's dominant telephony and Internet access market share⁹². The company expects to invest £500 million into ADSL technology for the delivery of television services to the home.

Eircom believe that ADSL has a viable market in the urban cable franchise areas⁹³. Like the cable networks, ADSL operators hope to carry the popular national Free-to-Air and UK television channels as a subscription package. Eircom regards ADSL as a contender against cable operator's bundled services. But the current restriction on telecommunication companies in providing such services would need to be replaced with an ODTR television service licence agreement. This would allow the supply of digital media content to their telephony subscribers⁹⁴. At the same time, this regulatory decision may impact greatly on the exclusivity rights of the cable networks, namely Chorus Communications and NTL.

In 1999, the ODTR transposed the European Directive on Cable TV (1995) into national legislation. From 1999, cable operators were given a five-year licence to provide television, telephony and interactive data services to residential markets. This was regarded as a sufficient timeframe for cable companies to gain substantial investment returns from the construction of their broadband networks. The two leading cable distribution operators, NTL and Chorus Communications, are allowed a network monopoly until April 2004 (Competition Authority, 1999). But for NTL the importance of network exclusivity is gradually diminishing. In the past the reason for exclusivity was to ensure that the network operators made money from their only licensed service. This was the retransmission of broadcast channels over their cable network. But this has changed with the provision of telephony and high-speed Internet services on the digital cable system as well as the increased competition from other digital delivery systems.

1984 as a state owned company to operate the national telecommunications network

⁹² Eircom has over 1.6 million subscribers connected to their fixed line network (Murphy, 2000)

⁹³ Private conversation with Eircom personnel, Regulatory Division

Brophy (NTL) suggests that network exclusivity in providing bundled services will be cancelled out by the ODTR's review of cable licenses in 2004. According to Brophy (NTL), 'if exclusivity did convey special and exclusive rights and confer some sort of advantage, it's not one that's going to be around for an awful lot longer. Exclusivity is something that is not necessarily as big a deal for us, or as key to our business as it would have been'.⁹⁵ The bundling of digital services has replaced the sole provision of retransmitting television channels. Instead cable operators expect to make their money from a combination of multichannel, Internet and voice telephony offerings.

Whilst Eircom is obliged to provide an open access network to other content suppliers, European and national regulation on local loop unbundling does not apply to cable local loop networks. In the case of a cable franchise area, like NTL's Dublin licence, the operator can refuse a multiplex service provider, like RTE, access to their subscribers. At the moment, cable operators give preference to their own bundled services without any regulatory obligations to open their distribution system to independent telecommunications and broadcasting companies. This means that the range of services on offer from the public broadcaster's multiplex may not be carried on the digital cable network, like the NTL or Chorus platform. This will prevent cable viewers from accessing public service content that they have paid for via their licence fee.

Multiplex access to the Cable Distribution System

Despite these anomalies, in Ireland the cable delivery system has one of the highest levels of television subscription throughout Europe. The two cable operators, Chorus and NTL, have a national reach of over 80 per cent of all households. According to a recent Forfas report (1999), the national cable penetration rate is 55 per cent of the population. Dublin has the highest level of homes fully connected to the cable network in any city in Europe with 83 per cent of the urban population having direct access to this transmission medium (Travers, 1999). An estimated 77 per cent of these homes receiving cable services

⁹⁴ In the UK, telecommunications operators will be able to provide broadcast services to their subscribers from 1 January 2001 (Chalaby, 1999)

subscribe to at least one basic channel bouquet with about 20 per cent availing of additional premium services such as sports or film channels (Competition Authority, 1999) Therefore in terms of significant market power, the digital cable operator in the Dublin area, NTL, can be described as having dominant network status in the delivery of analogue television services⁹⁶

As Eircom prepares to unbundle the local loop in terms of ADSL services, Hallahan (FutureTV)⁹⁷ queries whether ‘the cable operators [will] be required to unbundle their local loop and allow Eircom to offer its ADSL-based services as a package onto the cable network That would be true competition because then you’re not using a discreet technological barrier to differentiate between one [platform] from the other one and impede, to the detriment of the end-user, access to services’ Ex ante regulation is required to ensure open access to the cable network for other service providers Hallahan supports the imposition of the same regulatory rules for all digital network operators who are defined as having significant market advantage, like the cable networks

Brophy (NTL) claims that the cable networks do not have any form market dominance in the provision of television services Cable operators have exclusivity deals for franchised areas but the terrestrial and telecommunications platforms are universal distribution systems Therefore the argument that cable operators possess market dominance is undermined by the universal availability of the terrestrial delivery system and the dominance of Eircom in the mobile telephony and fixed line markets Watson Brown (Information Society Directorate) supports Brophy’s (NTL) position Watson Brown believes that, ‘if there are any incumbents in broadcasting, these are certainly the well-established terrestrial broadcasters that are seeking access to facilities and infrastructures established by more recent market entrants like pay TV broadcasters and cable TV

⁹⁵ In conversation with Ed Brophy, Regulatory Affairs Manager, NTL, October, 2000

⁹⁶ A recent research profile on future increases in cable revenue via bundled services predicts a 22 per cent subscriber increase (to 758,000 households) in Ireland from 1999 to 2010 Estimates for cable TV revenue per subscriber is expected to jump from around £158 pints to £273 pints by the year 2010, a 42 per cent increase within 11 years (Ghayur, 2000)

⁹⁷ In conversation with Hallahan, Chief Operations Officer FutureTV Northern Europe, October, 2000

companies',⁹⁸ The concept of the cable network having an unfair commercial advantage over a terrestrial broadcaster is rejected

ALTO (2000) has a strong position on this debate concerning the unbundling of the cable system. They claim that 'cable cannot be considered an appropriate substitute for local loop unbundling given that the combined subscriber base is significantly less than that of the incumbent wire line provider and given that access to the cable network is currently limited to one operator in each metropolitan/call area' (2000: 7). Furthermore, a 25 per cent or more of a market share cannot equate with market dominance because the current regulatory regime does not allow the ODTR to decide on carriage costs only conditions of access to networks.

Unlike the fixed line network, the technology is not available to allow immediate access to the local loop across the cable networks. Therefore the deregulation of the cable network is premature. If unbundling the local loop were applied immediately across all cable networks, the network operators would be punished for merely being the licensed network operator and not because of any proven measure of market distortion. This regulatory step would prevent the cable system from realizing the full value of their financial investment in up-grading to a digital network. ALTO (2000) expects the upgrading of the cable networks into two-way broadband systems to take 4-5 years.

A spokesperson from the Department of Public Enterprise agrees that the issue of unbundling the cable network has yet to be dealt with. The fundamental objective of cable exclusivity was to allow new entrants to build their network and gain a foothold in the market. Moreover, it is the incumbent telecommunications network owner, Eircom, and not the cable operators, like NTL, that possess a dominant monopoly position in the delivery of Internet broadband services. Cable networks are still undergoing significant upgrading and investment. When the cable networks have fully rolled out their digital services, the issue of unbundling the cable network may need to be re-examined.

⁹⁸ In replied questionnaire from Watson Brown, advisor on Information Society Directorate (DGXIII), October 2000.

Eircom believes that the European Commission's intention to apply the same regulatory obligations to all delivery systems is contradicted by its refusal to deregulate the cable local loop network across all Member States. Eircom contends that 'there can be no justification for communications regulation which favours cable over copper or which prevents cable network operators or telecommunications network operators from providing converged services' (Stanton, 1999 [http](http://)). As Ireland has a higher than European level of cable penetration across most households, the decision not to mandate open access across all cable networks may create further market distortions between cable, ADSL operators and terrestrial multiplex broadcasters.

According to O'Halloran (McCann-Fitzgerald), if the cable network operator is forced to open their digital delivery system, the consequences for public service broadcasting are significant. If a domestic multiplex broadcaster were to have access difficulties with a cable operator, they could complain to the national regulatory agency on the basis of the operator not fulfilling their *ex ante* obligations. For example, a public broadcaster could allege that the refusal by the cable operator to carry all or part of their multiplex signal would create an unfair competitive advantage for other content providers. The same kind of competition issues that surround the current licence fee debate on whether public funds can be used by the public broadcaster to ensure that their digital services are received on the cable network. In this instance, the cable network operator could be accused of using its market power to distort competition against the terrestrial multiplex broadcaster. Effectively broadcasters could ensure non-discriminatory access to their digital services over cable and telecommunications delivery systems by upholding the competition principles of the Treaty of Rome (1957).

Conclusion

While the pace of liberalisation in the telecommunications field is proceeding at a faster rate than in the broadcasting sector, the telecommunications and cable networks will soon become identical in the provision of interactive television and telephony services. This is reflected in the ODTR's claim that 'cable is a cornerstone of future competition [with

Eircom] in telephony and the provision of interactive services in urban areas' (1998a 4) Its growth as a digital medium is also required. The cable network is the regulators preferred delivery system to compete with the fixed line network in the residential voice and data telephony market.

However, the ODTR fails to recognise the capability of digital terrestrial broadcasting to compete with both systems in the delivery of voice telephony and interactive television content. This failure will prevent the digital terrestrial network from offering its own high speed Internet, telephony and asymmetrical interactive services. In these early stages of digital broadcasting, the ODTR will regulate the terrestrial network as a one-way, linear transmission medium. It is difficult to imagine how the ODTR will regulate each delivery system equally when the digital terrestrial system is immediately disadvantaged by such regulatory actions.

The digital multiplex broadcaster will need to apply for a licence for the transmission of multiplex television content as well as a separate telecommunications licence for the provision of two-way interactive television, telephony and World Wide Web services. The terrestrial broadcaster will have to compete with mobile telecommunications operators for this additional radio spectrum. Requests by multiplex operators for a two-way return path to complement the full range of digital terrestrial services may be challenged by mobile telephony operators who also require radio spectrum to expand their own services. This means that the multiplex broadcaster, like RTE or TV3, will have to compete for a telecommunications licence under the same commercial terms as any other telecommunications network operator. The ODTR will decide the regulatory terms for this mobile telecommunications licence.

Accordingly, it is important to recognise that digital terrestrial broadcasting is capable of providing telecommunications services as well as broadcast content. Public broadcasters can justifiably claim that an asymmetrical broadcasting service is imperative for the provision of digital public services. While the Broadcasting Bill (1999) does not explicitly accept that the digital broadcast system can offer a full range of

telecommunication services, each public multiplex broadcaster, like RTE, will not be prevented from acquiring a terrestrial bandwidth for two-way interactive services. The success of digital terrestrial broadcasting will depend on the ability to develop mobile data, interactive television and telephony services (Baldi, 2000)

In keeping with the European Commission's ruling on the opening of the fixed line delivery system, the ODTR will allow the national telecommunications operator to provide broadcast content as a quid pro quo for the unbundling the fixed line local loop network. The ODTR anticipates that such deregulation will introduce more competition to the delivery of television, high speed Internet and telephony services over the cable and telecommunication networks. As this broadband market evolves, the ODTR will try to create an environment where independent content providers are able to access these networks in a fair and non-discriminatory manner.

When the digital cable network is fully operational, its dominance in urban areas may compel the soon-to-be appointed Commission for Communications Regulation to apply the regulatory policy of significant market power. This means the national Commission will attempt to prevent the market dominance of the broadband network operators, like Eircom and NTL, over emerging independent digital services and content suppliers, like TV3 and RTE. The European Commission's ruling (Commission of the European Communities, 2000) on opening the fixed line network to independent telephony and content suppliers will be applied to any digital cable operator portraying signs of market dominance. This will ensure that terrestrial multiplex content is carried on the cable system and made easily available to the consumer. It will allow other cable and ADSL service providers to access viewers who were formerly under the exclusive control of an incumbent cable operator. In the telecommunications medium, unbundling the fixed line local loop will provide each multiplex broadcaster with the option of using an ADSL upstream network as a two-way, interactive return channel source.

In the BBC's opinion, each digital platform will be regarded 'as an individual market within its designated area' (BBC, 2000a [http](#)) This means that the development of each

distribution system will be exclusively aligned to their own digital services and set-top box receivers. It will not be in their commercial interests to deliver a supply of independent content services that are not related to their bundled multichannel and telephony packages. For example, vertically integrated networks may use their dominance over one part of the market, like telephony, to gain control over a related market, such as the delivery of public service multiplex content. In the short term, the bundling of telephony, Internet services and interactive multichannel television will be to develop electronic barriers in accessing public digital services.

Unbundling the local loop on each delivery system is crucial to the growth and innovation of digital services. For the digital multiplex broadcaster, like RTE, unbundling the local loop has the same level of importance as 'must carry' obligations for public broadcasting services. Without agreement on the accessibility of public service content on all delivery systems, each consumer will be faced with considerable costs in switching from one distribution network to another. This will force the customer to choose between network operators who may or may not carry public Free-to-Air multiplex services. If these digital delivery systems do carry the public service multiplex, access will be conditioned by the individual's ability to pay. Without the digital terrestrial platform, access to interactive content will become a commodity created for the personal use of the consumer. Interactivity will respond to the interests of the marketplace rather than increase citizen access to digital broadcasting services. Therefore the break-up of the terrestrial transmission monopoly will place political pressure on RTE, as the public broadcaster to make sure that all citizens receive the full array of public multiplex services, regardless of the delivery system.

Figure 17 Digital Terrestrial Broadcasting Developments in EU Countries⁹⁹

<i>National Transmission Operators</i>	<i>Application Programme Interface</i>	<i>Conditional Access System</i>	<i>Common Interface</i>	<i>Simulcast</i>	<i>Interactive Services</i>	<i>Population Coverage</i>
Ireland - 'Digico' with 6 Multiplexes RTE with 28 per cent stake of Netco	DVB-T MHP, non proprietary	Single Open Access system	DVB Compliant	YES	PSTN (telephone line) Will use a Wireless Return path	First year - 75 per cent
Sweden - (State owned) Teracom launches with 3 Multiplexes at launch, with 3 more by analogue switch off Managed by Senda	OpenTV and proprietary Internet browser/ DVB-T MHP	Single Open Access system Currently Nagravision/ Senda V1Access	DVB Compliant with return path	YES	EPG with return path	By 2001 - 70 per cent
Spain - Retevisión (49 % and Carlton with 75%) 'Quiero' will launch with 6 Multiplexes, with 5 more when analogue switches off ¹⁰⁰	OpenTV leading to DVB-T MHP	Single Open access Currently Nagravision with V90, 56Kbit/sec STB modem	DVB Compliant	YES	Internet access via TV	End of 2001 - 80 per cent

⁹⁹ Source Baldi (2000), IDATE (2000), Ronan Callanan

<i>National Transmission Operators</i>	<i>Application Programme Interface</i>	<i>Conditional Access System</i>	<i>Common Interface</i>	<i>Simulcast</i>	<i>Interactive Services</i>	<i>Population Coverage</i>
Germany – 3 Multiplexes at launch	DVB-T MHP	Several Proprietary	Unknown	Yes	Unknown	Regional Coverage
Finland - 'Digita Oy' (PSB) with 3 Multiplexes at launch, rising to 7 at analogue switch off	MHP	Single Open Access	Unknown	Yes	PSTN return path	Unknown
Italy – RAI/Mediaset with 2/3 Multiplexes at launch, rising to 4	EuroMHEG/ DVB MHP	Unknown	Unknown	Yes	PSTN return path	Unknown
UK - 'ONdigital' Crown Castle and NTL with 6 Multiplexes	MHEG-5	Media-Guard	Unknown	YES	Plans 2 nd STB with hard disc and ADSL return path services	Unknown
Holland - 'Digitenne' with 5/6 Multiplexes	EuroMHEG/ DVB MHP	Unknown	Unknown	Yes	PSTN return path	Launch - 18 per cent at launch 2002 - 52 per cent

¹⁰⁰ Potential hybrid use of interactive channels across terrestrial and satellite platforms

<i>National Transmission Operators</i>	<i>Application Programme Interface</i>	<i>Conditional Access System</i>	<i>Common Interface</i>	<i>Simulcast</i>	<i>Interactive Services</i>	<i>Population Coverage</i>
Norway – 'Norking' with 3 Multiplexes	Unknown	Unknown	Unknown	Yes	PSTN return path	Unknown
France – Canal Plus' with 6 Multiplexes	Unknown	Unknown	Unknown	YES	Unknown	Unknown
Denmark – SBC – Ameritech/ TeleDemark Multiplexes not decided	Unknown	Unknown	Unknown	Yes	PSTN return path	Unknown
Portugal – 3 Multiplexes at launch	Unknown	Unknown	Unknown	Yes	PSTN return path	Unknown

Figure 18 Eircom

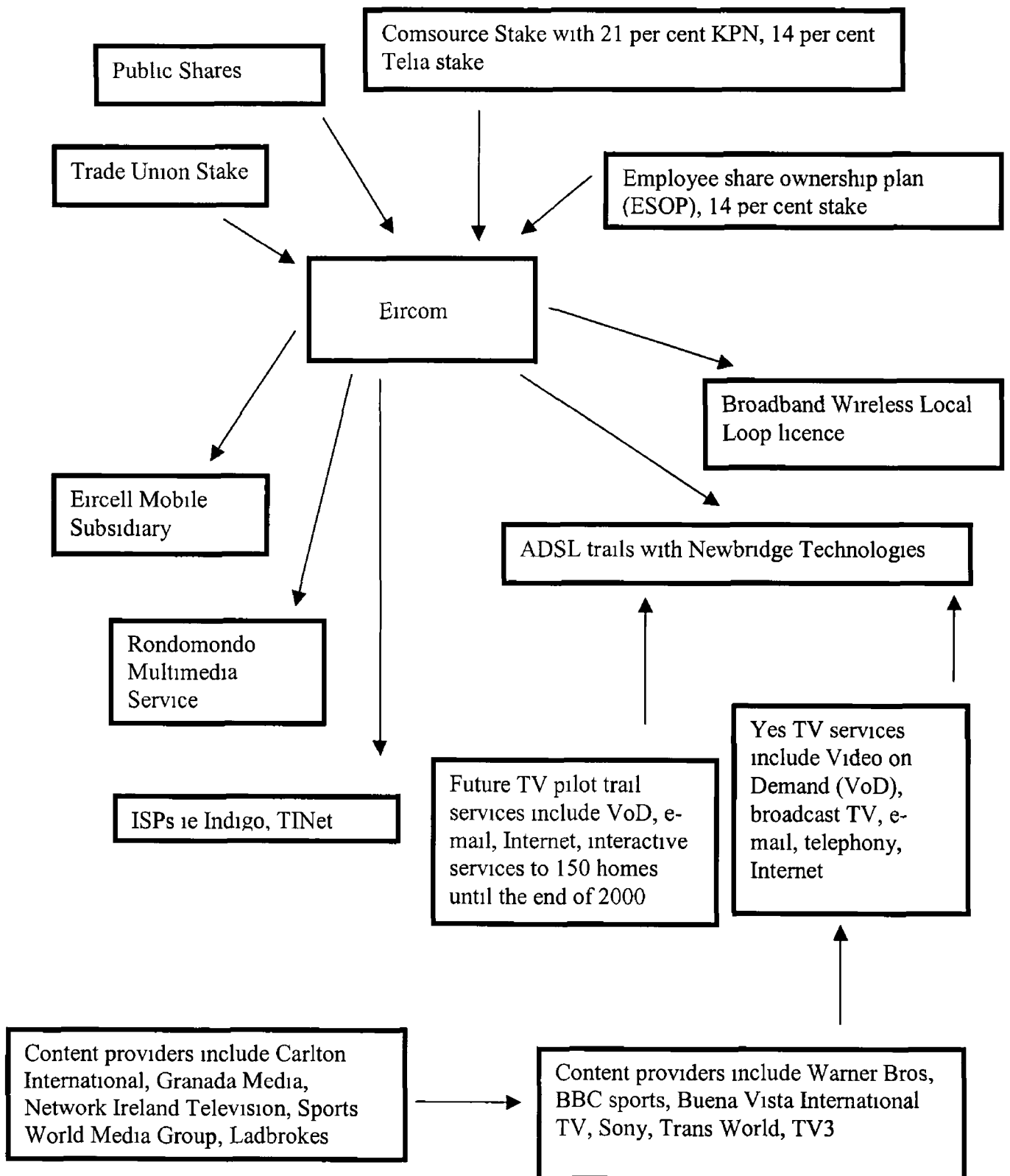
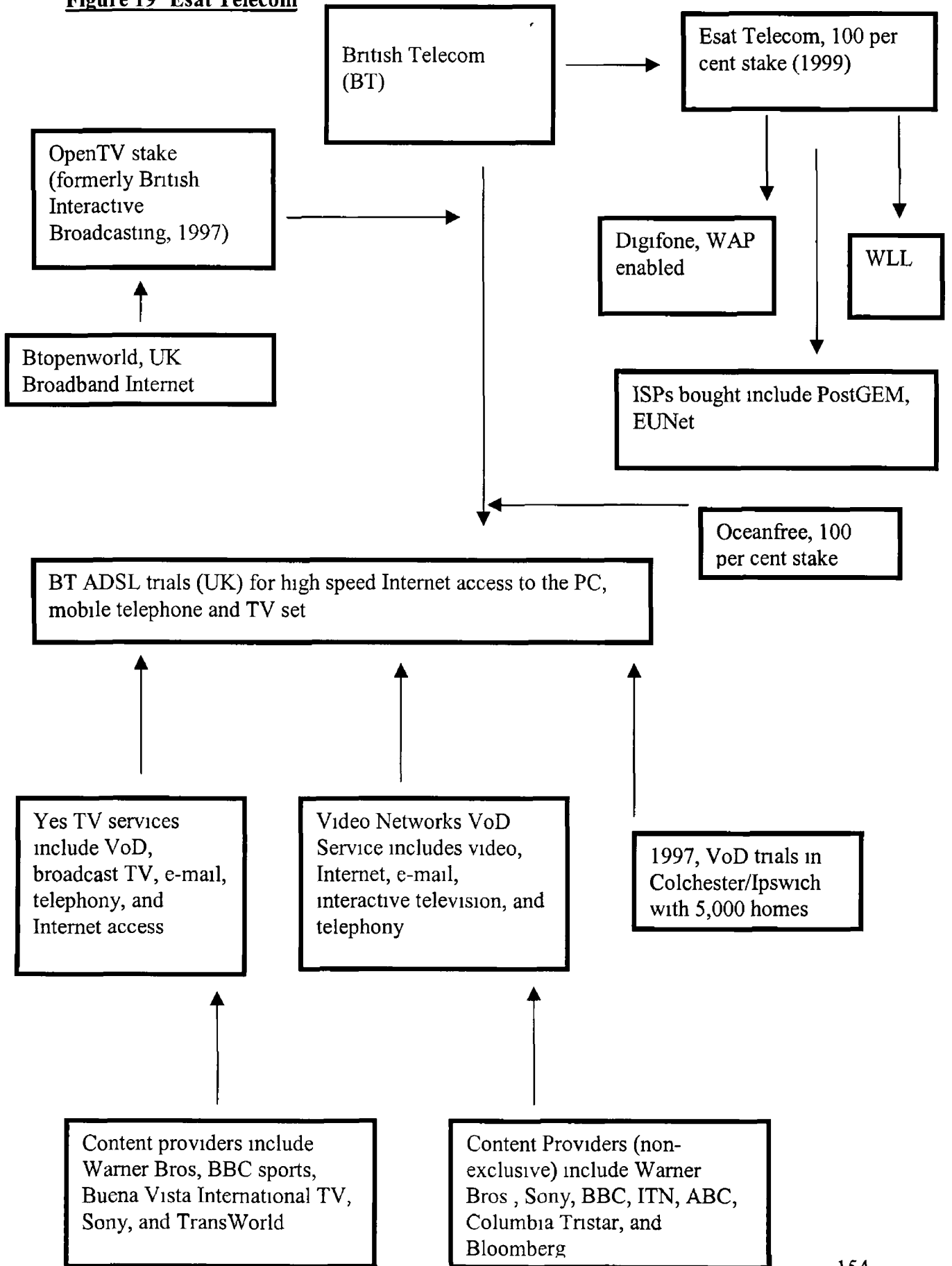


Figure 19 Esat Telecom



CONCLUSION

In the analogue format, public broadcasting constituted the production and transmission of programming content. By controlling the terrestrial network, the public broadcaster was able to ensure the universal distribution and accessibility of public content, like news and current affairs programming. In the digital era, broadcasting will improve the picture and sound quality of television programming. At the same time content producers, like public service broadcasters, will produce more Free-to-Air television channels and associated services, like interactive content and programme guides. In this way, the consumer will be offered a selection of services that include multichannel television, voice telephony and Internet access. While the purpose of the public broadcaster will remain resolute in serving the public interest, new distribution networks will offer new methods of delivering this content to the viewer. If public broadcasters do not distribute their content on emerging transmission systems, like digital cable and Internet networks, they may limit the level of accessibility to their services. In turn, public broadcasting may become a niche cultural product.

Influenced by Habermas's public sphere, broadcasting can offer quality and communal information services that facilitate the participation of the individual in public life. Public service broadcasting proffers an open, accessible and transparent public space for opinion formation. This arena can reflect the various cultural interests in the wider social community while preventing the political disenfranchisement of minority or low income groups. Without access to information, viewers cannot be empowered to learn and develop their opinions on matters which effect their own lives. In this way public broadcasting operates on the precondition of equitable access for all citizens. This ensures that active dialogue between individuals, outside of the commercial pressures of the free market, will remain an important element of the public sphere in the digital domain. Overall public broadcasting content will continue to offer an independent and non-partisan cultural space for social and political debate.

Presently dual funding for public broadcasting provides a range of programming that includes content of little or no economic value. Yet subsidisation, in the form of state aid or licence fees, allows for these types of cultural programmes, such as minority language and religious programming, to be produced and accessed by the general public. The social and cultural benefits expressed in these programme services ensures the civic engagement and cultural participation of viewers in the electronic forum of the public broadcasting medium. In the digital environment, public service content can generate a public sphere for a diverse selection of cultural and linguistic programming. It can continue to promote vibrant political and cultural debates in the sphere of digital multiplex broadcasting. Digital terrestrial television can become one viable transmission medium, amongst many, that can deliver a digital multiplex service which represents the local public sphere and cultural values of the society.

As shown in Chapter Three, the European Commission supports the position that digital public broadcasting can serve a national cultural remit outside of the normal competition rules of other industries. However the Amsterdam Protocol (1997) states that the European Commission cannot decide what is economically appropriate for the funding of public broadcasting across each Member State. Thus public broadcasting organisations are allowed the benefit of state subsidisation in the form of licence fee funding. Public broadcasters are not susceptible to the Treaty of Rome (1957) competition rules because of their non-commercial, social and cultural remit to each nation's democracy. In Ireland, the Broadcast Bill (1999) will define the responsibilities of RTÉ's public service remit and its future funding mechanism.

Through recognising the need for national content to be provided to Irish viewers, regardless of the delivery system, national governments across the European Union are committed to the future survival of public service broadcasting. It is a citizens right to have such content offered as a Free-to-Air service, as opposed to buying access to this content at a market price. For example, the Protocol (1999) accepts that a viewer does not have to pay to watch a GAA match because it has a cultural significance beyond the economic advantages of a pay-per-view television event. It is a culturally symbolic event.

of national importance that entitles citizens to watch the event as a right, as opposed to individually paying a market price for access. The regulation of broadcast content will be left to national regulators.

However, certain types of television programming, like international sports and premier film rights, which commercial broadcasters believe fall outside of the public broadcasters remit, may become influenced by the competition rules enshrined in the Treaty of Rome (1957). This regulatory area of contention between the public and commercial broadcaster is presently undergoing further debate within the European Commission. It seems likely that any resolution to this issue will be based on the particular social and economic circumstances surrounding each Member State and their interpretation of competition rules in the national legislation.

As described in Chapter Two, digitalisation will remove the technological exclusivity that associated one service with one distribution system, like the telephony service with a telecommunications network. Technically, consumers will no longer use different networks to seek different types of broadcast content. Instead, each delivery system will carry the same kind of broadcast and telecommunications services. For example, cable networks will become telecommunications operators offering telephony and broadcast services. At the same time, the digital terrestrial platform will develop into a telecommunications network. Television programmes will become one of many forms of content on offer to the consumer from the network operator. For the digital terrestrial viewer, a standard aerial upgrade and set-top box will be connected to the television set to decode the digital multiplex signals. Alternatively, when consumers buy an iDTV set with an upgraded aerial, they will also be offered up to thirty free and pay television channels with asymmetrical interactive services. In effect, digital terrestrial broadcasting will become a broadband network.

For Hallahan (FutureTV), the future for broadcasting is envisaged in the following example, 'you go to the Eircom channel or your ADSL network and you log into that, insert your smartcard. Then you should notionally be offered the option to log into their

services, their multimedia services or whatever it might comprise of or click onto the Irish Multichannel [Chorus] service, or whatever, to go to the different services. Somewhat analogous to going to different television channels now but now you're going to service channels instead'.¹⁰¹ Similarly, the terrestrial multiplex operator will offer similar tiers of digital multichannel and telephony services. Access to these additional television and interactive services will require a similar credit smartcard.

In Ireland, the Broadcast Bill (1999) will provide each terrestrial television viewer with universal access to indigenous Free-to-Air digital programme channels on the digital terrestrial platform. The Bill (1999) will ensure that the licensed multiplex broadcaster will provide Internet and two-way interactive television services via the adaptation of a fixed line telephone connection. In this regard, the benefits of interactivity will depend on the regulatory conditions applied to the transmission network and its set-top box capabilities. The Broadcast Bill (1999) will allow each multiplex broadcaster to transmit up to five digital terrestrial channels as well as providing a limited amount of radio spectrum of two-way interactive services, like Internet access and asymmetrical data services. The criteria for the establishment of digital terrestrial broadcasting will involve the privatisation of the transmission network and a detailed submission plan for the licensing of the multiplex operation.

The transmission licence will be conditional to the universal provision of Free-to-Air and pay television channels, available to 95 per cent of the population after five years. The multiplex licence will oblige the holder to offer other associated services, like a fast and easily navigable electronic programme guide, with their television channels. The incumbent national broadcasters, like RTE and TV3, will be guaranteed the terrestrial spectrum capacity to operate their own digital multiplexes. With the option of both free and pay television channels, digital terrestrial broadcasting is the only broadband network that can ensure the universal delivery of all public and commercial broadcasting services. The ability of the terrestrial broadcaster to provide a universal and comprehensive array of multiplex services will depend on the switching off of the analogue network at the

¹⁰¹ In conversation with Hallahan, Chief Operations Officer, FutureTV Northern Europe, October, 2000.

earliest possible date. When contract negotiations for the awarding of the transmission network and multiplex licenses are resolved, the launch of digital terrestrial broadcasting is expected between January, 2002 and June, 2002¹⁰². At the moment, the government has not yet decided on the closedown of the analogue network. This decision will depend on the successful take-up of set-top boxes and iDTV sets for the reception of digital terrestrial services.

Free set-top boxes for low income or disadvantage communities may stimulate the take-up of digital terrestrial multiplex services. Subsidising access to digital terrestrial network may convert viewers to the benefits of the Information Society by offering on-line public information, Internet access and interactive services through the terrestrial set-top box. Digital terrestrial broadcasting can become the most universal access point for World Wide Web browsing and e-mail communication. In effect, digital content that is financed by the licence fee payer should be accessible on any national broadband delivery system. Further research is required to determine whether RTE or licence fee funds should be appropriated to provide basic analogue-to-digital converters for the reception of digital multiplex services to the home.

As the old technical restrictions on the radio spectrum are removed, the need for multiplex broadcasters to acquire a return telecommunications path for their interactive content will increase. Interactive access will be an essential technological component of public broadcasting in the digital environment. Without this, the digital terrestrial network will be dependent on other network delivery systems to provide a plethora of public multiplex services. By losing control of the return channel, the terrestrial system will remain a linear, one-way content provider. However the Broadcast Bill (1999) states that all multiplex broadcasters will not be licensed to carry telephony services or World Wide Web access. This will restrict the public multiplex broadcaster from offering on-line content and telephony services in tandem with their traditional television programme offerings. Additional frequency allocation for terrestrial multiplex broadcasters will

¹⁰² This coincides with Eircom's anticipated roll-out of its ADSL network, for urban areas, from early April, 2002 (Smyth, 2001).

become an important issue as asymmetrical services are offered to the Free-to-Air and pay terrestrial viewer

While the radio spectrum will remain a scarce resource, it has become a valuable communications medium for the rapidly expanding mobile telephony market. Radio spectrum used for television content is beginning to be reassessed in conjunction with the commercial demands of third generation mobile telephony and on-line services from the telecommunication networks. Broadcasters, like RTE, will face a strong financial challenge in their attempts to gain more frequency space against the substantial reserves of the leading transnational mobile telephony operators, like the Vodafone (potential buyer of Eircell) and British Telecom (owner of Esat DigiFone) mobile telephony operators. More research on the regulatory framework that allocates spectrum frequencies for telephony and broadcasting networks is needed. This structure will need to examine the economic and cultural conflict between the expansion demands of the mobile telephony operators and the need for public broadcasters to provide a terrestrial return channel for their interactive services.

The European Commission recognises that 'the co-ordination of access to spectrum for broadcasting systems is so far not covered by a specific Community policy' (Commission of the European Communities, 2000a 5). Current European Union regulatory rules state that the supply and access of public service broadcasting across each Member State is a vital component of the radio spectrum regulation environment. The European Commission envisages that future policy will have to contend with the demands of mobile telephony operators and public service multiplex broadcasters in the application of their universal service obligations. As outlined in Chapter Four, by 2004, the meeting of the World Radiocommunications Conference (WRC) on terrestrial frequency planning may be an opportune occasion for digital multiplex broadcasters to defend their position in the need for a terrestrial telecommunications return path.

Looking back at the emerging digital broadcasting market in Ireland, regulation has been an accepted form of market intervention in order to protect the public's interest and

prevent market distortion between delivery systems. The responsibility to intervene and ensure the universal provision of digital broadcasting services to the general public will belong with the Office of the Director of Telecommunications Regulation (ODTR). In general, its main regulatory objective is for all viewers, both Free-to-Air and pay television consumers, to choose their preferred television content and telephony services separately, regardless of the transmission medium. In the long term, consumers should not become tied to a pay television paradigm in order to receive digital services.

Like RTE's historical role in the universal transmission of broadcasting channels, a similar type of network dominance may evolve between each digital broadcasting platform. For example, cable subscribers may be prevented from accessing Free-to-Air multiplex broadcasting services via their decoder set-top box. This highlights the fact that the reception of television content could become more dependent on the decoder devices, like set-top boxes. The network owner of the set-top box will dictate the television services accessible to each viewer.

In the main urban areas, less than 40 per cent of the Irish population are limited to the terrestrial systems to receive their four indigenous Free-to-Air channels. This means that the majority of television viewers subscribe to a multichannel cable network, like NTL and Chorus Communications. These cable networks have overtaken the broadcast system in the delivery of public broadcasting services to television viewers. Each cable system has become the preferred pay television system for viewers to gain access to Free-to-Air and multichannels. For terrestrial multiplex operators developing universal and public service content, it will be important that they have access to these cable consumers. In ensuring that public multiplex content is accessible to all viewers, regardless of the delivery system, the consequences of this sort of network dominance will be substantial for publicly funded broadcast services. Broadcast content providers, like RTE, will rely more on cable and fixed line operators to distribute their multiplex content at the same time as cable and ADSL networks develop their own pay television services.

The need for RTE to ensure that their multiplex content is carried on these platforms may become just as great as cable and telecommunications platforms in not wanting to distribute less profitable content on the public broadcasting multiplex. This means that the digital public multiplex is in danger of becoming split into two separate strands. One service will supply the traditional Free-to-Air television content for cable and ADSL network operators while the multiplex service will only be available on the digital terrestrial system. This will inevitably fragment the number of viewers who are able to access the full public multiplex service. In turn, public broadcasting may become a conditional content provider on dominant digital platforms, like NTL and Chorus Communications. This situation may undermine RTE's universal service obligations and their efforts to reach the widest audience possible in the most economically efficient manner.

As such with the passing of the Broadcast Bill (1999), the universal reception of indigenous multiplex broadcasting services will be available through the terrestrial distribution platform. Cable networks will be obliged to transmit national Free-to-Air channels, like RTE1 and TV3, on their network for no commercial fee. But they will not be obliged to carry other multiplex services, like interactive content and electronic programme information. Instead, they can dictate the costs of access and distribution of these emerging services on their network. It remains unclear whether broadcasters will pay cable and fixed line operators for the carriage of their digital media content. On the other hand, broadband networks could pay the digital terrestrial content providers for their permission in providing these channels on their bundled multichannel and telephony subscription offerings. By having a minority stake in the terrestrial network, RTE could be in a strong position to gain leverage over the access terms and commercial charges of their content on other broadband delivery systems. Either way, the consequences will necessitate the regulatory intervention of the ODTR to ensure a reasonable and non-discriminatory commercial carriage agreement between content producers, like RTE, and network operators, like NTL.

Due to the substantial level of commercial investment in the production of proprietary set-top box receivers, the possibilities of each transmission adopting a common set-top box standard is very remote. Each network operator will want to adopt their proprietary electronic software to control access to interactive content, like the electronic programme and teletext guide. Network operators will try to manage their electronic gateways in order to promote the rate of expansion and potential revenue for emerging digital services carried on their transmission system.

Software technology in the set-top box will influence the carriage and reception of digital broadcasting services. This software issue, concerning electronic programme guides and access to interactive services, highlights the access problems that television viewers will experience in receiving public multiplex content. The European Commission's response has been to publicly support the adoption of the Multimedia Home Platform (MHP) standard for all set-top box devices. This standard offers an open technical system for the running of broadcast and interactive applications on each set top box and iDTV set, irrespective of the distribution method. By embedding the MHP software standard into the network operator's set-top box, the terrestrial content provider can be assured that their public multiplex services will be accessible on that delivery system.

The MHP standard can prevent unfair competition amongst horizontal and vertically integrated network and content companies. Although vertically aligned companies will control the transmission of television channels to the viewer's set-top box, content from the multiplex broadcaster will not need to be reconfigured for each delivery system. This will ensure a minimum level of software compatibility for public service content, thereby reducing the cost for interactive television programming and universal accessibility. However the MHP is not a pan-European mandatory standard. This means that the opportunity to guarantee independent content suppliers a certain degree of set-top box compatibility for their products will be impossible. Therefore non-mandatory regulations for digital cable and fixed line networks will not remove the electronic barriers embedded in proprietary set-top boxes for public multiplex services.

Lack of interoperability across each digital delivery system will ensure that television receivers like set-top boxes and iDTV sets, will become function specific. This means that television services carried over one delivery network will not be accessible on a different network. The consumer will be bound to the services available on that particular network via the set-top box. Such incompatibility across each digital delivery system will limit the individual's choice for public interactive content. Viewers will be denied access to public communication and information resources that they will have paid for via the licence fee and produced by the public service multiplex broadcaster on their behalf. This will impact on the production of television content having little commercial value because of the added economic costs in reformatting content for each distribution network. Further research is required to assess the non-compatibility of terrestrial, cable and ADSL set-top boxes in the reception of interactive services and its effect on public service content production.

The main objective of the European Commission will be to create a single broadband network across all telecommunications and broadcasting transmission platforms. The Commission believes that each delivery system should be regulated in the exact same manner. The regulation of all distribution systems should be applied in a fair, reasonable and non-discriminatory manner. For this to occur, the European Commission supports the enforcement of competition rules to develop the digital broadcasting market. But these rules, as explored in Chapter Three, are often applied after a case of market dominance has been established. Electronic barriers within set-top boxes will not witness a quick resolution by competition alone.

The European Commission has failed to acknowledge the historical role of the terrestrial network in the dissemination of public media services. The Commission, and the ODTR, has yet to acknowledge that only digital terrestrial broadcasting provides both Free-to-Air and pay television channels. Yet multiplex broadcasters are unable to offer the same level of services as their cable and fixed line competitors. Effectively the Commission has not openly supported the underlying economic structure of digital terrestrial broadcasting which depends on the ability to transmit multichannel, high speed Internet and voice

telephony services to the residential market. As long as national and European telecommunications regulators obviate the terrestrial multiple broadcaster from offering these services to the residential market, the terrestrial network cannot compete fairly with its cable and telecommunications adversaries. While the European Union and ODTR aspire to treat each digital distribution system with the same regulatory approach, they seem to discriminate against the digital terrestrial network by not allowing multiplex broadcasters to transmit telephony and two-way interactive services.

With the European Commission lacking in policy direction on multiplex regulation, the ODTR will need to produce a coherent approach to the management of national terrestrial multiplexes. Lack of regulatory action would ensure that access to terrestrial multiplex content on cable and fixed line networks would be difficult to enforce. This would have serious consequences for the public service remit of the public multiplex broadcaster, RTE, because their digital content may not be readily accessible on each platform.

With the passing of the Broadcast Bill (1999), the ODTR will have an active role in the regulation of digital terrestrial broadcasting. The ODTR will monitor the level of interactive content on the terrestrial delivery system. For instance it will allow for only a limited form of asymmetrical interactive content to be offered by each multiplex broadcaster. As the multiplex operation is basically related to content, the ODTR will have a strong influence on the development of indigenous two-way television services. By monitoring interactive television services, especially asymmetrical public content, the ODTR will become a content regulator. This responsibility may partially overrule the role of the Broadcasting Commission of Ireland in regulating programme content across the national distribution television systems.

If the ODTR does not ensure that the broadcasters multiplex content is carried on cable or fixed line networks, network operators will control the terms of distribution of multiplex content to their pay television viewers. As described in Chapter Four, the ODTR may have set a precedent in their relationship with potential conflicts of access between content suppliers, like RTE, and network operators, like NTL. Previous experience with

the Cablelink/TV3 debacle suggests that the regulatory agency is wary of intervening in matters which it perceives to be content-related. This will not be beneficial for the public broadcaster because each network operator will be able to choose a pay television event or their own interactive service to accompany their digital content. They can refuse to carry RTE's public multiplex services that are directly connected with the public broadcaster's television programme. This may lead to a reduction in viewers partaking in multiplex interactive services, like children's programming, and access to information essential to the formation of public opinion and cultural identities.

At the moment, the national cable networks are the exclusive licensed operators of television, Internet and telephony services. Fixed line telecommunication operators and terrestrial multiplex broadcasters have not yet been awarded regulatory licenses to provide similar services. The dominance of the cable networks in urban areas may compel the soon-to-be appointed Commission for Communications Regulation (replacing the ODTR) to apply the regulatory policy of significant market power. This means that when the incumbent operator begins to portray signs of anti-competitive behaviour or market distortion against new service providers, the up-graded network may be opened to independent television and telephony service providers. For multiplex broadcasters this means that independent content organisations, like RTE, will be carried and made easily available to the viewer on the cable broadband network. The exclusive control of incumbent cable or fixed line operators, like NTL or Eircom, will be continually monitored. During this time, the regulator will support the development of competition between digital suppliers of telephony, on-demand video and pay television services to the residential market. Conversely the Commission for Communications Regulation should licence telecommunications operators, like Eircom, to offer broadcast services to their telephony customers on their fixed line network.

Ultimately the joint European Commission and national regulatory policy on opening the telecommunications network to more competition will allow other telephony operators the option of using ADSL access technology to offer pay television and telephony services on Eircom's telephone line. This means that customers will be able to choose

between cable and telecommunications operators for the supply of pay and Free-to-Air multiplex television services. Multiplex broadcasters will be allowed the choice of using the ADSL network as a two-way, interactive return channel for their digital content.

As cable networks upgrade their distribution systems to provide telephony and Internet, the telecommunications systems are developing their fixed line system to carry television channels and on-demand video services. This is already happening on the island of Ireland. Eircom (Northern Ireland) was recently awarded an ADSL licence for the delivery of multichannel services over the British Telecom's fixed line local loop network (Independent Television Commission, 2000). From early 2001, this non-exclusive licence will allow Eircom to provide broadband services over all UK cable networks. In time, Eircom could provide a similar service to the whole island of Ireland and therefore become the sole transmission network to carry pay television, Internet and telephony services through the entire 32 counties.

This example reflects how on-demand video and pay television will be used to complement voice and data telephony services to the residential market. Cable and fixed line network operators will become equal competitors in the delivery of telephony and television content. Meanwhile the terrestrial system has yet to be given similar market opportunities. National regulation and government policy fails to recognise the digital terrestrial network as the sole provider of digital multichannel and data services whereby viewers are not obliged to subscribe to a subscription fee.

While commercial broadcasters continue to address the European Commission with complaints of unfair, anti-competitive advantages against RTE's use of licence fee funds, the public broadcaster may be able to utilise the Commission's regulatory policies of significant market power to force the cable and fixed line broadband networks into carrying their multiplex content. On the grounds of market distortion and anti-competitiveness, the Treaty of Rome (1957) competition rules, that have been applied against public broadcasting may soon be directed towards digital communications platforms that do not allow public service access to their networks. This means that all

subscription delivery systems may be obliged to deliver public multiplex services with channel positioning on their distribution networks 'Must carry' obligations for digital public multiplex services, and not just television programming, on all digital transmission networks will become a significant issue for RTE and other terrestrial broadcasters

With the passing of the Broadcast Bill (1999) the distribution of traditional Free-to-Air television content will be obligatory on digital cable and terrestrial delivery systems Legislation may be required to ensure the distribution and universal reach of public television multiplex services on all national digital telecommunication platforms In the ecology of digital broadcasting, the guaranteed supply of a universal range of digital Free-to-Air channels and associated multiplex services will remain a core remit of RTE's public service responsibilities in the broadband era

Appendix

Exp. 1

2

3

List of Abbreviations

ATVS	Advanced Television Standards Directive
API	Application Programme Interface
ATLO	Association of Licensed Telecommunications Operators
FCC	American Federal Communication Commission
ADSL	Asymmetrical Digital Subscriber Line
AOL	America On-Line
ATSC	Advanced Television Systems Committee
BCI	Broadcasting Commission of Ireland
BT	British Telecom
CAS	Conditional Access System
CCR	Commission for Communications Regulation
DCT	Digital Cable Television
DG	European Directorate
DG IV	European Director General for Competition
DG VIII	European Director General for Telecommunications
DSL	Digital Subscriber Line
DST	Digital Satellite Television
DTH	Direct-To-Home Satellite Service
DTT	Digital Terrestrial Television
DTV	Digital Television
DVB	Digital Video Broadcasting
DVB-T	Digital Video Broadcasting Terrestrial
EPG	Electronic Programme Guide
ETSI	European Telecommunications Standards Institute
EU	European Union
GATT	General Agreement on Tariffs and Trade
HDTV	High Definition Television
IP	Internet Protocol

iDTV	Integrated Digital Television set
ISDN	Integrated Services Digital Network
ITU	International Telecommunications Union
IRTC	Independent Radio and Television Commission
MPEG	Motion Pictures Coding Experts Group
MHP	Multimedia Home Platform
MMDS	Multi Microwave Distribution System
NvoD	Near-Video-on-Demand
ODTR	Office of the Department of Telecommunications Regulation
Oftel	Office of Telecommunications
PTO	Public Telecommunication Operators
PSTN	Postal Switched Telephone Network
PSB	Public Service Broadcasting
SMP	Significant Market Player
SMS	Subscriber Management System
SDTV	Standard Definition Television
STB	Set-Top Box
TVWF	Television without Frontiers Directive
UMTS	Universal Mobile Telecommunications System
VSB	Vestigial Sideband Modulation System
WINDS	Wireless Interactive Network for Digital Services

Main Convergence Developments in Ireland:

2000 – Granada (who owns ONdigital with Charlton) buys 48% stake in TV3

2000 – Irish Multichannel, renamed Chorus, announces plans to introduce an interactive TV portal with 60-channel EPG and PPV service using Open TV operating system¹⁰³

Chorus claims to be the first digital re-transmission broadcasting company providing convergence services in Ireland over a single cable pipe network They also were awarded broadband, narrowband and deflector licences from the ODTR with a £300m network investment for their 250,000 subscribers

2000 – Broadcasting Bill expected to be amended in the Dail by end of year

2000 – Government allows for the formation of DTT network

2000 – Cablelink renamed NTL NTL plan to provide a simultaneous digital cable, high speed Internet access and telephony service by the end of 2000¹⁰⁴

2000 - NTL have launched a £25m fund for content that can be used for broadband Internet and interactive services for the UK market Independent Irish production companies are eligible but services are solely for the UK broadcasting channels

2000 – NTL and Irish Multichannel cable operators announce digital multichannel services only

2000 – BBC launches Northern Ireland digital channel ITV launches digital ‘ITV You’ channel

2000 – Eircom announces ADSL broadband trials

2000 – ODTR announces decision on 3G licences awarding procedure by November Intends to award four UMTS licences

2000 – Esat Telecom Group (formed in 1991) sold to BT for £1.9bn Esat Telecom was awarded long distance licence in 1992, Esat Digifone (Esat Telecom, Telenor, Private Investors) was awarded the second mobile telephone licence in 1995 for £15m, launches its Internet service (Esat Clear in 1998), loses bid (£410m) for Cablelink sale (£525m)

¹⁰³ Screen Digest ‘interactive cable TV for germany and ireland’ June 2000, p173

- 1999 – Relaunch of TnaG, renamed TG4 provides six hours of Irish programming a day
- 1999 - Broadcasting Bill White paper introduced to the Dail
- 1999 – Introduction of digital satellite service to satellite viewers
- 1999 - European Commission launches Green Paper on Radio Spectrum
- 1999 – European Commission Communication From The Commission To The European Parliament, The Council, The Economic And Social Committee And The Committee Of The Regions *‘Towards A New Framework For Electronic Communications Infrastructure And Associated Services The 1999 Communications Review’*
- 1999 – Communication From The Commission To The European Parliament, The Council, The Economic And Social Committee And The Committee Of The Regions *‘The Development Of The Market For Digital Television In The European Union’* DG 13
- 1999 – Communication From The Commission To The European Parliament, The Council, The Economic And Social Committee And The Committee Of The Regions *‘Fifth Report on the Implementation Of The Telecommunications Regulatory Package’* DG 13
- 1999 – ForFas report on Broadband Society
- 1999 – Second report of the Irish Information Commission
- 1999 – Esat Telecom bought-out by BT for £2 billion
- 1999 – Telecom Eireann privatised and renamed Eircom
- 1999 – Cablelink network with 360,000 subscribers sold to NTL for £535 million
- 1999 – Irish Multichannel offers telephony services
- 1999 – BSkyB launch digital satellite service in Ireland (and begins showing Irish Advertising)
- 1998 - Cable Management Ireland offers Internet access to the home via cable in Dublin franchise area
- 1998 – Launch of TV3
- 1998 – Launch of DTT operator, ONdigital, in the UK with full N Ireland geographical coverage by March, 2000

¹⁰⁴ Screen Digest (2000) ‘European Broadband Internet Market’ February, p60 Magee, Matthew (2000) ‘FF with Brian Moore, NTL’ Electricnews At URL <<http://www.electricnews.net/sh334x1817.html>>

- 1998 – Launch of digital satellite network, BSkyB, one month before ONdigital
- 1998 – Ireland liberalises its telecom sector, ahead of its derogating date for 2001
- 1998 – First report of the Irish Information Commission
- 1998 – Government decide to privatise Cablelink and Telecom Eireann Supported by the Irish Information Commission, Advisory Committee on Telecommunications, IBEC, and Forfas
- 1998 – Draft Broadcasting Bill paper
-
- 1997 – RTE 2 relaunched as Network 2
- 1997 – Amsterdam Protocol implemented across Member States
- 1997 – ODTR established Duties to efficiently manage the telecom sector and the broadcast terrestrial spectrum
- 1997 – Government green paper on broadcasting, entitled '*Active or Passive Broadcasting in the Information Age*'
- 1997 – European Commission '*Green Paper On The Convergence Of The Telecommunications, Media And Information Technology Sectors, And The Implications For Regulation Towards An Information Society Approach*'
- 1997 – Launch of digital Mobile telephony by both Telecom Eireann and Esat Telecom of their Eircell and DigiFone services, respectfully
- 1987 – European Commission Open Network Directive on fixed and mobile line interoperability
- 1997 – CanWest Global (Canada with TV interests in Australia and New Zealand) takes 45% stake in TV3
- 1997 – TVWF Directive Amendment adopted by the European Commission
-
- 1996 – KPMG report for the European Commission '*Public Policy Issues Arising From The Telecommunications And Audiovisual Convergence*'
- 1996 – UTV forced to sell TV3 stake by IRTC
- 1996 – TnaG launched RTE supplies one free hour of news programming per day

1995 - European Commission 'Television Standards Directive' by the DVB

1994 – EEC changes name to EU under the Maastricht Treaty

1994 – BT launch VoD trials

1993 – HD-MAC standard proposed by Eureka 95 group No further action

1993 – Establishment of DVB by Eureka personnel

1992 – Internet becomes commercial network as US Federal National Science Foundation funding is removed

1992 – EU deadline set for full Telecom liberalisation It is set for January 1st, 1998

1992 – Esat Telecom award telephony licence

1992 – Establishment of the European Single Market

1990 – *'EU Directive On The Establishment Of The Internal Market For Telecommunications Services Through The Implementation Of Open Provision'* (90/387/EEC)

1990 – Break up of ITV network in the UK, UTV is formed Today UTV shareholders include CanWest Global (29.9%), Scottish Media Group (18.2%) Leonard J Asper, President CEO of CanWest Global Communication, stated that their TV3 stake, 'managing director and majority of the board of directors' The CanWest role in Irish Broadcasting is 'essentially an all-Ireland duopoly' of private terrestrial broadcasting in Ireland¹⁰⁵

1989 – Television without Frontiers Directive published

1989 – IRTC awards broadcast licence to TV3 consortium with UTV as shareholder

1988 – Broadcasting Act Establishment of the IRTC

¹⁰⁵ Interview with Leonard J Asper (1999) Wall Streets Transcript At URL <<http://www.canwestglobal.com/press/111299.htm>> Visited 08/02/00

1987 – ETSI established

1986 – Cablelink established with the merger of RTE Relays, Marlin Communal and Phoenix Relays¹⁰⁶

1986 – EU establish ‘Eureka 95’ project to fund European HDTV project

1981 – EU discussion group on analogue HDTV

1978 – RTE 2 launched

¹⁰⁶ TV International (2000) *TV International* Volume 8, Number 11, May 11th, p6

List of Individuals Interviewed

Branagan, Peter, Digital Planning, RTE
Brophy, Edward, Regulatory Affairs, NTL
Clancy, Neil, Interactive Services, RTÉ
Ennis, Peter, Director of Operations and Technology, TV3
Hallahan, Brendan, Chief Operations Officer, FutureTV Northern Europe
Hinchy, Dave, Broadcast Division, ODTR
Hobson, Aidan, Telecommunications Division, Department of Public Enterprise
Hughes, Declan, Regulatory Planning, ForFás
Foley, Micheal, Lecturer, Dublin Institute of Technology
Galvin, Patricia, Public Policy Affairs, NTL
Larkin, John, Broadcasting Section, Department of Arts, Gealtacht and the Islands
Moynes, Adrian, General Assistant to the Director General, RTE
Murray, Eugene, Business Planning, RTE
O'Halloran, Susan, Regulatory Affairs, McCann-Fitzgerald Solicitors
O'Brien, Neil, Broadcast Division, IRTC
Spokesperson, Telecommunication Advisory Committee, Department of Public Enterprise
Thom, David, Broadcast Division, ODTR
Ward, Liam, Co-ordinator, Advisory Group on Information Technology and Telecommunications Standards
Watson-Brown, Adam, DG13 Advisor on Information Society Directorate, European Commission

List of Individuals Unavailable for an Interview

Bogdanovic, Yvonne, Regulatory Affairs, Chorus
Buttle, Eamonn, Chairman, Independent Broadcasters of Ireland
Daly, P , Telecommunications Consultant, Norcontel
Kenny, Colum, Lecturer, Dublin City University
King, Derick, Regulatory Affairs, Eircom
Martin, Helen, Regulatory Affairs, Esat Telecom
Ní Raghallaigh, Suin, Managing Director, TG4
O’Ciaradha, Pdraig, Head of Television, TG4
O’Sullivan, John, E-TV Division, Eircom
Stanton, Helen, Regulatory Affairs, Eircom
Redmond, Ronan, Sales Manager (Ireland), BSkyB

Sample Lists of Questions from Interviews

Sample 1, European Commission

- 1 Do you think that convergence regulation is a learning curve experience?**
- 2 Recent European Commission reports on the development of a new communications and infrastructural regulatory framework avoid including broadcasting and information society services. Why is this the case?**
- 3 How would you distinguish between content regulation and infrastructure regulation in the provision of digital television services?**
- 4 Do you see the European Commission applying 'Open Network Provision' rules and regulatory principles on interoperability throughout the digital broadcasting sector?**
- 5 Do you think that EU broadcasting policy focuses mainly on the technological and economic issues concerning the convergence market with little similar regard for social and cultural factors?**
- 6 Would you consider the European Commission's single market policies more supportive of digital cable and satellite networks rather than terrestrial?**
- 7 In your opinion, what are the main issues preventing telecom operators from broadcasting TV services?**
- 8 Why are cable operators protected from open competition across their networks, as outlined in the Communications Review 1999?**
- 9 Do you think that interactive digital television services are a telecom regulatory responsibility?**
- 10 Do you think telecom and broadcasting regulatory frameworks will converge?**
- 11 Do you believe that it is possible to have similar levels of connectivity and interoperability across broadcast networks that exist between the telecom networks and the Internet? How would this evolve?**

12. xDSL operators have the same 'must carry' responsibilities as cable operators? Is there a role for regulation if telecom operators choose commercial broadcast services over new digital public broadcasting and information society services?
13. Is gateway regulation necessary for third party access to STBs in order to access the viewer?
14. Is it possible to support 'technological neutrality' across all platforms when there is no compatible Applied Programme Interface system between each transmission operator's set-top box (STB)?
15. Do you think that the development of vertically integrated alliances will push the Commission's aim for 'technological neutrality' further into the future?
16. What is your view as to the efficiency of the 95/47 Directive in creating an environment of non-discriminatory access to all networks for all third party service providers?
17. Do you think that the 95/47 EU Directive has limited the role of government regulatory actions in adopting CA System rules to specific national scenarios?
18. Broadband cable operators are currently up-grading their networks to provide bundled television, Internet and telephony services. Do you think that such operators may have an unfair market advantage over telecom operators who cannot provide broadcast services and digital terrestrial broadcasters who cannot provide telephony services?
19. Do you believe that terrestrial broadcasters have yet to face up to the competitive threat posed by new, less regulated delivery systems services?
20. What is your thinking on the European Commission's view of licence fee-State aid as an anti-competitive element in the broadcasting sector?
21. Should public broadcast funding be granted on the same grounds as for a universal service in telecommunications?

- 22 The European Commission believes that the digital television market will start to widen from a vertical niche of early adopters and pay-TV subscribers to a more horizontal, mass-market structure as the market develops. How would you see this market evolve without creating a social and economic gap between the Information Society ‘haves and have nots’?**
- 23 How would you define information society services?**
- 24 What are your views on the European Commission’s belief that the commercial viability of DTT has been questioned for many years due to its finite spectrum capacity and mobile telephony value?**

Sample Number 2, Telecommunications Sector

Convergence and Universality of Access

- 1 Do you see the blurring of video telecommunication services and interactive broadcast services as changing the character of the broadcast sector?
- 2 Is convergence regulation a learning curve experience? Is regulation a barrier to convergence?
- 3 How significant is the break-up of the Irish telecom market on the broadcasting sector?
- 4 How would you distinguish between the transmission of signals and content?

Interactivity

- 5 Could control of the Set-Top Box (STB) by telecom operators restrict access to public broadcasting services for certain, non-subscription, viewers? Could this be regulated by the ODTR or the IRTC?
- 6 How important are public policy principles of consumer access to content with regard to EPGs and the application of 'must carry rule' over cable and terrestrial platforms for free and subscription terrestrial channels and services?
– See danger in the NTL and TV3/TG4 listing experience?
- 7 Who will regulate the multiplex operator?
- 8 Is time running out for DTT to compete with DCT?
- 9 Is deregulation of the Local Loop important for Digital terrestrial and telecom interoperability of services?
- 10 Do you believe that the digital terrestrial return paths could be classified by the ODTR as telephony services?
- 11 Is it possible to support 'technological neutrality' across all platforms when there is no compatible STB system between each transmission operator?
- 12 Should telecom operators become broadcasters?

Standards

- 13 Do you think that the European Commission has had too much of an influence over the liberalisation of the Irish telecom market? View on the Communications Review 1999?

- 14 Do you believe that the Electronic Programme Guide (EPG) and Application Programme Interface (API) can be considered as a 'technical telecom bottleneck and a broadcast programming bottleneck' that can be regulated as an access issue between the ODTR and the IRTC?
- 15 Should regulation ensure the use of one Smartcard to access all services for the viewer and 'non-discriminatory access to the networks'? Should DTV services be platform compatible? Is this not possible due to proprietary STB standards controlling access eg NTH and its STB and channel positions?
- 16 what is your view on the recent DG13 report on 'the Development of the Market for Digital Television in the European Union paper'? What impact will the CAS standards (95/47) have on the IRISH Pay-TV market?
17. NB-Will Open Network Plan (ONP) rules on interoperability be applied to the digital broadcasting sector? Will this happen only if there is a separation of content and carriage regulation in broadcasting?
- 18 In relation to the 95/47 European Directive, the transcontrol option allows cable network operators to maintain control over their networks and their CA system What is your view as to the efficiency of this Directive in creating an environment of non-discriminatory access to all networks for all third party service providers?
- 19 Do you think that the 95/47 Directive has limited the role of government regulatory actions in adopting CAS rules to specific national scenarios? Why did the regulators and government bodies decide to rely more on EU directives than their own national regulation decision-making processes?
20. Do you believe that the Multimedia Home Platform (MHP) standard may be the best option for interoperability across all Set-Top-Boxes and delivery systems? Why is the MHP only voluntary and not obligatory?

Cable, ADSL and DTT

- 21 Could cable operators use their bundled service to Compete against Eircom's telephony services and Digico's terrestrial platform? Is that an unfair market advantage for NTL over these operators?

- 22 Do you think that digital TV is beginning to be confused with the provision of bundled television, Internet and telephony services?**
- 23 Why are 'Digital Roll Out plans' a key aspect to the current digital cable broadcasting regime? Will this be applied to terrestrial broadcasting?**
- 24 Do you think that ADSL is a commercially viable platform?**
- 25 What are your views of the suggestion, in the Broadcasting Bill, that additional spectrum channels not used to their maximum efficiency will be re-appropriated by the ODTR? Is there a time limit for this action?**

Sample Number 3, Broadcast Sector

Convergence

- 1 How significant is the break-up of the Irish telecom market on the broadcasting sector?**
- 2 The Former DG of RTE Mr Collins, wrote in relation to future challenges facing RTE that they may learn from the ‘principles of telecommunications to adjust its market share’, especially in the area of pay-per-view What would your opinion be of RTE applying telecoms-style economies of scale and scope to the broadcast industry?**
- 3 Is convergence regulation a learning curve experience?**
- 4 What is your opinion of the Broadcasting Bill?**
- 5 In your opinion should there be separate content and distribution regulation over The DTT platform but not for cable and possibly telecoms? Ie THE prevention of DTT to carry voice telephony, internet and multichannels yet their competitors are allowed these bundled digital services?**

Standards

- 6 Is it possible to support ‘technological neutrality’ across all platforms when there is no compatible Set-Top Box (STB) system between each transmission network?**
- 7 Should the market decide which CAS and Applied Programme Interface (API) will succeed or should the government ensure an open CA system standard?**
- 8. Should there be interoperable standards for STB systems and return channels across all platforms?**
- 9. Is deregulation of the Local Loop important for Digital terrestrial and telecom interoperability of services?**
- 10 In the development of interactive services, How important is an open access system across all platforms?**

- 11 Do you believe that gateway regulation is vital for third party access to STB technology in order to reach the viewer?
- 12 Do you believe that the development of interactive services will be hindered if independent service providers have to re-format their content for the technical specificities of each STB platform?

Public Policy

- 13 Is there a national strategy on the development of Information Society Services in Ireland?
- 14 The 1997 Draft Broadcasting Proposal, 'Clear Focus' suggested the setting up of a 'Transmission Agency' under the newly established Irish Broadcasting Commission. What would you say were the reasons behind that idea being rejected?
- 15 Why has DTT, in Information Society documents, been stated as a prime driver in the provision of Information Society services and not Digital Cable or Digital MMDS?
- 16 Do you think that as long as the principles of PSBing remain, there will be a future for public broadcasting in DTV? What are those principles?
- 17 What would be the nature of interactivity that you would see on DTT?
- 18 How would you see market failure principles being applied to interactive services?
- 19 Is there enough co-ordination between the various public bodies, telecom and broadcasting sectors in developing a national strategy for digital Terrestrial? (ODTR, Info Soc, Dept of the Arts, Public Enterprise, IRTC, Consumer Affairs, and the Competition Authority)
- 20 Is there a case for establishing a working group on the development of DTT including broadcasters, STB manufacturers, network operators and the viewers?
- 21 A recent Information Society paper states 'the availability of broadband service will be a key factor in ensuring that the EU can make the transition to the Information Society' (p39). Would you see such broadband services being mandated by the current Broadcasting Bill?

- 22. The Information Commission believes that the ‘government should consider subsidising access through the DTT medium to online public information and interactive services’ (1999 ‘Second Report of Ireland’s Information Society Commission) Should this be applied across all DTV platforms?**
- 23 Would universal access to these services be achieved at a lower cost through broadcasting rather than telecom delivery systems?**
- 24 How important is universal access to interactive services, if such services cannot interoperate between all delivery systems?**
- 25 Is an ‘open access’ regulatory approach used in telecom networks more suitable than a ‘must carry’ tradition used for cable operators in allowing broadcast service providers’ access to their digital network?**
- 26 What is your thinking on the European Commission’s view of licence fee-State aid as an anti-competitive element in the broadcasting sector? Should public broadcast funding be granted on the same grounds as for a universal service in telecommunications?**

Bibliography

A

Adler, Tim 'Yes TV Demands Access to Kingston Communications Subscribers in Hull' *New Media Markets* Volume 18, Number 21

Advanced Television Systems Committee (ATSC) 'Review of the Commission's Rules and Policies Affecting the Conversion to Digital Television Comments of the Advanced Television Systems Committee' *Advanced Television Systems Committee* At URL <[Http //www atsc org](http://www.atsc.org)> Visited 18/10/00

Advanced Television Systems Committee (ATSC) (1999), 'ATSC Standards' *Advanced Television Systems Committee* At URL <[Http //www atsc org](http://www.atsc.org)> Visited 18/10/00

Advisory Committee on Telecommunications (ACT) (1998) 'Report of the Advisory Committee on Telecommunications to the Minister for Public Enterprise' *Advisory Committee on Telecommunications* Dublin Department of Public Enterprise

Advisory Committee on Telecommunications (1999) 'Irish Convergence Background to the IOL Telecom Report' *Advisory Committee On Telecommunications* At URL <[Http //act iol i e](http://act.iol.ie)> Visited 06/02/00

Aird, Brian (2000) 'New Trails for Television' *TVBEurope* At URL <[Http //www tvbeurope com/current _issue/n4 html](http://www.tvbeurope.com/current_issue/n4.html)> Visited 02/08/00

Ang, Ien (1996) '*Living Room Wars*' Routledge London

Argyris, Nicholas (2000) 'Digital Terrestrial Television and the Global Information Society – Towards a new Role?' Director-General Information Society *European Commission* Conference on Digital Terrestrial Television, Lisbon, February, 17-18th

Asper, Leonard (1999) *Wall Street Transcript* At URL

<[Http //www canwestglobal com/press/111299 htm](http://www.canwestglobal.com/press/111299.htm)> Visited 08/02/00

Atkins, William (Editor) (1999) 'Clean Room for DVB Interactivity, But Euro Gatekeepers Remain' *Context* pp 20-26, p24

Atkins, William (Editor) (1999) 'US Digital TV Players Fiddle while the Platform Burns' *Context* pp 20-26, p24

AT&T (1998) 'IP Telephony Tutorial' *AT&T* At URL

<[Http //www ipservices att com](http://www.ipservices.att.com)> Visited 18/10/00

Aufderheide, Patricia (1991) 'Public Television and The Public Sphere' *Critical Studies In Mass Communication* Volume 16, pp 168-183

B

Baldi, Paolo (Ed) (2000) 'The Position of Digital Terrestrial Television in Selected European Markets' *Strategic Information Service, European Broadcasting Union (EBU)/ Digital Terrestrial Television Action Group (DigiTAG)* EBU Grand-Saconnex, p11

Baldi, Paolo (editor) (2000a) 'DigiTAG European Service Models for DTT Synoptic Table of the Replies to the Questionnaire 1999' *Strategic Information Service, European Broadcasting Union (EBU)* EBU Grand-Saconnex

Baldwin, Robert and Cave, Martin (1999) '*Understanding Regulation Theory, Strategy, and Practice*' Oxford Oxford University Press

Bangemann Report. European Commission. (1994). 'Opinion on Europe's Way to the Info Society Report: An Action Plan'. *Commission of the European Communities*. COM (94) 440. Brussels: European Commission.

Bangemann Group. (1994). 'Europe and the Global Information Society'. *Commission of the European Communities*. European Council: Brussels.

Barket, Jolyon. (1996). 'He Who Hesitates Has No Audience'. *Broadcast*. May 10th.

Barbrook, R. (1992). 'Broadcasting and National Identity in Ireland'. *Media, Culture and Society*. Volume 14, pp 203-27.

Barca, Flavia (1999). 'The Local Television Broadcasting System in Italy'. *Media, Culture and Society*. Volume 21, Number 1, January.

Behrens, Steve (1997). 'PBS Carries Signal for a Contender in the 'Push' Sweepstakes'. At URL: <[Http://www.current.org/in/in704w.html](http://www.current.org/in/in704w.html)>. Visited 18/10/00.

Bell, Desmond and Niall Meehan. (1989). 'Cable, Satellite and the Emergence of Private TV in Ireland: From Public Service to Managed Monopoly'. *Media, Culture and Society*. Volume 11, Number 5, pp 89-114.

Bertz, Rudy and Michael Schmidbauer.(1983). '*Media for Interactive Communication*'. Sage: London, pp 9-28, pp 13-14.

Birt, John (1999). 'The Prize and the Price'. *British Broadcasting Corporation*. At URL: <[Http://www.bbc.co.uk/info/speech](http://www.bbc.co.uk/info/speech)>. Visited on 10/10/00.

Birt, John (1999). 'The BBC Is A Civilising Force and It Must Be Protected'. *Guardian*. At URL: <[Http://www.guardianunlimited.co.uk/Archive/Article/0,4273,3881171,00.html](http://www.guardianunlimited.co.uk/Archive/Article/0,4273,3881171,00.html)>. Visited 18/12/00.

Bland, Christopher (1999). 'Building The Life Raft'. *The Journal Of The Royal Television Society*. Volume 36, Number 2, April, pp 6-7, 32.

- Blackall, Laurence and Monica Giles. (1996). 'Interactive TV: A Revolution in Global Broadcasting'. *Financial Times Management Reports*. Financial Times Telecoms and Media: London, pp 90-93.
- Blomberg, Esa. (2000). 'The Finnish Way To Digital TV'. *DVB-T Conference*. February, 17-18th,
- Blumler, Jay (ed.) (1992). *Television and The Public Interest: Vulnerable Values In West European Broadcasting*. London: Sage Publications, pp 1-42.
- Blumler, Jay and Wolfgang Hofmann-Riem (1992). 'New Roles For Public Service Television' and 'Toward Renewed Public Accountability In Broadcasting'. In Blumler, Jay (1992), *Television and The Public Interest: Vulnerable Values In West European Broadcasting*. London: Sage Publications, pp 202-217, 218-228.
- Bischofberger, Catherine. (1998) 'Cable: Backpath To The Future?'. *International Broadcasting*. January/February, Volume 21, Number 1.
- Bragg, Melvyn (1999). 'Culture Shock'. *Guardian*. June 21st. At URL:<[Http://www.guardianunlimited.co.uk/Archive/Article/0,4273,3876806,00.html](http://www.guardianunlimited.co.uk/Archive/Article/0,4273,3876806,00.html)> . Visited 19/11/00.
- Branagan, Peter. (1999). 'DigiTAG Seminar: The Need for Low-Cost Wireless Return Channels the Need for Low-Cost Wireless Return Channels'. *Digital Terrestrial Television Action Group*. Brussels: European Broadcast Union.
- Brandrud, Rolf. (1999). 'Digital TV and Public Service in the Nordic Countries'. In Jensen, Jens and Cathy Toscan (Ed.). (1999). *Interactive Television: TV of the Future or the Future of TV*. Aalborg University Press: Aalborg, pp 119-148, p121.
- British Broadcasting Corporation. (2000a). 'The 1999 Communications Review: BBC Response'. *British Broadcasting Corporation*. At URL: <[Http://www.ispo.cec.be/infosoc/telecompolicy/review99/comments/bbc25b.htm](http://www.ispo.cec.be/infosoc/telecompolicy/review99/comments/bbc25b.htm)> . Visited 06/06/00.

British Broadcasting Corporation (2000b) 'BBC Response To the DG Information Society Working Papers On the Communications Review' *British Broadcasting Corporation* At URL

<[Http //www ispo cec be/infosoc/telecompolicy/review99/nrfwd/bbc19e htm](http://www.ispocec.be/infosoc/telecompolicy/review99/nrfwd/bbc19e.htm)>

Visited 02/06/00

Brown, Maggie (2000a) 'Digital Gains Critical Mass' *Guardian* At URL

<[Http //www guardianunlimited co uk/media/story/0,3605,341533,00 html](http://www.guardianunlimited.co.uk/media/story/0,3605,341533,00.html)> Visited

13/07/00

Brown, Maggie (2000b) 'Man's New Electronic Friend' *Guardian* At URL

<[Http //www guardianunlimited co uk/media/story/0,3605,341536,00 html](http://www.guardianunlimited.co.uk/media/story/0,3605,341536,00.html)> Visited

13/07/00

Broadcasting Bill (1999) Second Stage (Resumed) *Dail Eireann Debates Official*

Report At URL <[Http //www irlgov ie 80/debates-99/10nov99/sect5a htm](http://www.irlgov.ie/80/debates-99/10nov99/sect5a.htm)> Visited

19/10/00

Brooks, Mike (2000) 'Hang On, I've Got An Idea Data Service Integration From Conception To Launch' *NTL* In 'Seminar on Added Value Services for DTT' *Digital Terrestrial Television Action Group* Dublin European Broadcast Union

De Bruin, Ronald and Jan Smits (1999) '*Digital Video Broadcasting Technology Standards and Regulations*' Artech House London

Bundschuh, Anja (1998) 'New Horizons The Future of the Dual Broadcasting System in the Age of Digital Technology' *Bulletin* Volume 15, Number 4

Burke, Sandra (2000) 'Business Will Never Be the Same As Mergers Take Over' *Irish Times* 27th, March, p 19

Bugailiskis, John (2000) 'Interactive Television Poised for Prime Time' *Broadcaster* Volume 59, Number 4, p12-16

Butts, Tom (ed) (2000) 'Ondigital To Launch Intenet Service This Fall' *Digital Broadcasting Com* At URL

<[Http //www.digitalbroadcasting.com/content/news/article.asp?docid=percent7b0e93e8c1percent2d58dfpercent2d11d4percent2d8c55percent2d009027de0829percent7d&bucket=industry+news](http://www.digitalbroadcasting.com/content/news/article.asp?docid=percent7b0e93e8c1percent2d58dfpercent2d11d4percent2d8c55percent2d009027de0829percent7d&bucket=industry+news)> Visited 14/07/00

C

Calhoun, C (ed) (1992) 'Introduction Habermas and The Public Sphere' In
Calhoun, C (ed) (1992) *Habermas and The Public Sphere* London MIT Press pp 1-57

Cave, Martin (1997) 'Regulating Digital Television' *Telecommunication Policy* Volume 21, Number 7, pp 575-596

Caby, Laurence and Vedel, Thierry (eds) (1998) '*Changing Relationships in an Information Society*' Amsterdam Boom Publishers

Cairncross, Francis (1998) *Death of Distance* London Orion Business Publications

Carolan, Mary (2000) 'Multiple Action On Telecom Licences' *Irish Times* At URL <[Http //scripts.ireland.com/search/highlight.plx?TextRes=Multiplepercent20Actionpercent20Onpercent20Telecompercent20Licences&Path=/newspaper/finance/2000/0405/fin14.htm](http://scripts.ireland.com/search/highlight.plx?TextRes=Multiplepercent20Actionpercent20Onpercent20Telecompercent20Licences&Path=/newspaper/finance/2000/0405/fin14.htm)> Visited 05/04/00

Clark, David (1998) 'Computer Companies Tune in to Set-Top Boxes' *Computer* Volume 31, Number 3, March

Claudy, Lynn D (1999) 'Viewpoint How To Succeed At Digital TV Broadcasting' *IEEE Spectrum* January, Volume 36, Number 1

- CII Audiovisual Production Federation (1992) 'The Irish Audiovisual Production Sector Gearing To Exploit Remarkable demand forecast for Mid-1990's' (CII Press Release) *CII Audiovisual Production Federation* Dublin CII Audiovisual Production Federation
- Chalaby, Jean and Glen Segell (1999) 'The Broadcasting Media in the Age of Risk' *New Media and Society* Volume 1, Number 3, pp 351-368
- Collins, Bob (1997) 'Does Public Service Broadcasting really serve the Public' In Damien Kilberd (ed), *Media in Ireland The Search For Diversity* Dublin Open Air
- Collins, Richard (1998a) '*From Satellite to Single Market*' London Routledge
- Collins, Richard (1998b) 'Public Service and the Media Economy' *Gazette* Volume 60, Number 5, pp 363-376
- Collins, Richard (1998c) 'Back to the Future' *Telecommunications Policy* Volume 22, Number 4/5, pp 383-396
- Collins, Richard (1998d) 'Supper with the Devil - A Case Study in Private/Public Collaboration in Broadcasting The Genesis of Eurosport' *Media, Culture and Society* Volume 20, pp 653-663
- Collins, Richard and Cristina Murroni (1997) 'Future Directions in Telecom Regulation The Case of the United Kingdom' In Melody, William (ed), (1997) '*Telecom Reform Principles, Policies and Regulatory Practices*' Lyngby Technical University of Denmark, pp 473-486
- Collins, Richard and Cristina Murroni (1996) '*New Media, New Policies*' London Polity Press
- Collins, Richard, Nicholas Garnham and Gareth Locksley (eds) (1988) '*The Economics of Television*' London Sage Publications

- Coleman, Stephen (1999) 'The New Media and Democratic Politics' *New Media and Society* Volume 1, Number 1, pp 67-74
- Collins, Richard (1996) 'Satellite Television in Europe' In Dutton, William, H (ed) (1996) *Information and Communication Technologies Visions and Realities* Oxford University Press
- Collins, Richard and James Purnell (1996) 'The Future of the BBC' *Javnost/The Public* Volume 3, Number 2
- Collins, Richard (1993) 'Public Service Versus the Market Ten Years On, Reflections on Critical Theory and the Debate on Broadcasting Policy in the UK' *Screen* Volume 24, Number 3, pp 243-259
- Collins, Richard (2000) 'Review of Liberalizing the European Media, Politics, Regulation and the Public Sphere, Shalini Venturelli, Claredon Press Oxford, 1998' *Telecommunications Policy* Volume 24, pp 80-83
- Corcoran, Farrel (1996) 'The Ideal and Reality of Public Service Broadcasting' *Javnost/The Public* Volume 3, Number 2
- Corker, John (1999) 'The Future Of Audiovisual Content Regulation' *Intermedia* Volume 27, Number 4
- Corner, John (1999) '*Critical Ideas in Television Studies*' Oxford Claredon Press, p123
- Costello, J (1999) 'The Digital Revolution' *Communications Today* January, Volume 5, Number 10
- Commission of the European Communities (2000) 'Regulation of the European Parliament and of the Council on Unbundled Access to the Local Loop' COM (2000) 394 Final *Commission of the European Communities* Brussels European Commission

Commission of the European Communities (2000) 'Communication from the Commission Unbundled Access To the Local Loop Enabling the Competitive Provision of A Full Range of Electronic Communication Services Including Broadband Multimedia and High-Speed Internet' COM (2000) 237 *Commission of the European Communities* Brussels European Commission

Commission of the European Communities (2000) 'Proposal for a Directive of the European Parliament and of the Council On Universal Service and Users' Rights Relating To Electronic Communications Networks and Services' COM (2000) 392 *Commission of the European Communities* Brussels European Commission

Commission of the European Communities (2000) 'The Results of the Public Consultation On the 1999 Communications Review and Orientations for the New Regulatory Framework' COM(2000)239 Final *Commission of the European Communities* At URL

<[Http //www ispo cec be/infosoc/telecompolicy/review99/com2000-239en htm](http://www.ispocec.be/infosoc/telecompolicy/review99/com2000-239en.htm)>

Visited 02/06/00

Commission of the European Communities (2000a) 'Results of the World Radiocommunications Conference 2000 (WRC-2000) in the context of Radio Spectrum Policy in the European Community' COM (2000) 811 final *Commission of the European Communities*

Commission of the European Communities (1999b) 'EU Communications Review' COM (1999) 539 *Commission of the European Communities* Brussels European Commission

Commission of the European Communities (1999c) 'The Development of the Market for Digital Television in the European Union' COM (1999) 540 *Commission of the European Communities* Brussels European Commission

Commission To the Council, the European Parliament, the Economic and Social Committee and the Committee of the Regions (1999) 'Fifth Report On the

Implementation of the Telecommunications Regulatory Package' COM (1999) 537
Final Commission of the European Communities Brussels European Commission

Communication from the Commission to the Council, the European Parliament, the
Economic and Social Committee and the Committee of the Regions (1999a)
'Principles and Guidelines for the Community's Audiovisual Policy in the Digital
Age' COM (1999) 657 Final *Commission of the European Communities* Brussels
European Commission

Communication from the Commission to the Council, the European Parliament, the
Economic and social Committee and the Committee of the Regions (1999)
'Concerning a Proposal for a Programme in Support of the Audiovisual Industry'
*Communication from the Commission to the Council, the European Parliament, the
Economic and social Committee and the Committee of the Regions* Brussels
European Commission

Commission of the European Communities (1997) 'Towards a Dynamic European
Economy Green Paper on the Development of the Common Market for
Telecommunications Services and Equipment' COM (87) 290 *Commission of the
European Communities* Brussels European Commission

Commission of the European Communities (1997) 'Green Paper On the Convergence
of the Telecommunications, Media and Information Technology Sectors, and the
Implications for Regulation' *Commission of the European Communities* Brussels
European Commission, p1

Commission of the European Communities (1997) 'Commission Communication
Concerning the Review Under Competition Rules of the Joint Provision of
Telecommunications and Cable TV Networks By A Single Operator and the Abolition
of Restrictions On the Provision of Cable TV Capacity Over Telecommunications'
Commission of the European Communities At URL
<[Http //europa eu int/en/comm/dg04/lawliber/en/cabrev1 htm](http://europa.eu.int/en/comm/dg04/lawliber/en/cabrev1.htm)> Visited 02/06/00

Commission of the European Communities (1995) 'Amending Article 09/388/EC With Regard To the Abolition of the Restrictions On the Use of Cable Television Networks for the Provision of Already Liberalised Telecommunications Services' *Commission of the European Communities* Brussels European Commission

Commission of the European Communities (1989) '*Television Without Frontiers Directive*' COM (1989) 522 Commission of the European Communities Brussels European Commission

Competition Authority (1999) 'Competition Authority Report of Investigation of the Proposals Whereby (I) Princes Holdings Limited Would Acquire the Entire Issued Share Capital of Suir Nore Relays Limited and Liberty Media AI Inc, would Acquire the Entire Issued Share Capital of Aringour Limited' *Competition Authority* At URL <[Http //www entemp ie 80/cr/princprep htm](http://www.entemp.ie/80/cr/princprep.htm)> Visited 11/10/00

Council of the European Communities (1993) 'White Paper upon Growth, Competitiveness and Employment' *Council of the European Communities* COM (1993) 700 Brussels European Commission

Cradden, John (2000) 'NTL will give TV3 and TG4 prime cable slots' *Irish Times* At URL <[Http //scripts ireland com/search/highlight plx?TextRes=TV3&Path=/newspaper/ireland/2000/0824/hom25 htm](http://scripts.ireland.com/search/highlight.plx?TextRes=TV3&Path=/newspaper/ireland/2000/0824/hom25.htm)> Visited 24/09/00

Curran, James (1996) 'Reform of Public Service Broadcasting' *The Public/Javnost* Volume 3, Number 3

Curran, James (1991) 'Rethinking The Media As A Public Sphere' In Golding, Peter and Graham Murdock (1997), *The Political Economy of the Media*, Volume II, Cheltenham and Vermont Edward Elgar Publications, pp 120-150

Curran, James and Jean Seaton (1991) 'Alternative Approaches To Media Reform' In Golding, Peter and Graham Murdock (1997) *The Political Economy of the Media* Volume II, Cheltenham and Vermont Edward Elgar Publications, pp 562-611

D

Dail Debates (1999a) 'That the Bill be now read a Second Time ' Broadcasting Bill Second Stage (Resumed) At URL <[Http //www.irlgov.ie 80/debates-99/10nov99/sect5a.htm](http://www.irlgov.ie/80/debates-99/10nov99/sect5a.htm)> Visited 21/07/00

Dail Debates (1999b) 'Broadcasting (Major Events Television Coverage) Bill Changed From Major Events Television Coverage Bill, 1999 Second Stage Question Proposed That the Bill be now read a Second Time ' *Eireann Debates Official Report* At URL <[Http //www.irlgov.ie 80/debates-99/s3nov99/sect3.htm](http://www.irlgov.ie/80/debates-99/s3nov99/sect3.htm)> Visited 20/07/00

Dáil Debates (2000c) *Eireann Debates Official Report* Volume 515, Number 5, pp 1228

Davies, Gavyn (1999) 'The Future Funding of the BBC' *Department of Culture, Media and Sport* UK Government Publication

Davis, Howard and Carl Levy (1992) 'The Regulation and Deregulation Of Television A British/West European Comparison' In Golding, Peter and Graham Murdock (1997), *The Political Economy of the Media*, Volume II, Cheltenham and Vermont Edward Elgar Publications, pp 496-528

Davies, Paul, Davenport, Hugo (1998) 'BSkyB May Be Forced To Delay Launch Of Digital Satellite TV' *Financial Times New Media Markets* January 8th, Volume 16, Number 1

Davies, Paul (2000a) 'BSkyB and Ondigital Launch Bids to Grab Market for Integrated TVs' *New Media Markets* Volume 18, Number 17, p8

Davies, Paul (2000) 'Can High-Bidding NTL Make Soccer Pay-Per-View Pay or is it an Own Goal?' *New Media Markets* Volume 18, Number 22, p2

- Davies, Paul. (2000). 'Gloves Come Off in Battle for Subscribers'. *New Media Markets*. Volume 18, Number 20, p2.
- Davis, Paul. (2000). 'Streaming Wars'. *Cable and Satellite Europe*. May, pp 92-5.
- Davies, Paul. (2000). 'Yes Television, After NTL Blow, Faces Market Test and Key Choices'. *New Media Markets*. Volume 18, Number 13, p2.
- Dahlgren, Peter. (1996). 'The Not So Staunch Defense Of Swedish Public Service Broadcasting'. *Javnost/The Public*. Volume 3, Number 2.
- Dahlgren, Peter. (1995). *Television and The Public Sphere: Citizenship, Democracy and The Media*. London: Sage Publications.
- Dahlgren, Peter and Colin Sparks (eds). (1991). *Journalism and The Public Sphere In The New Media Age*. London and New York: Routledge.
- Dahlgren, Peter. (1987). 'Ideology and Information In The Public Sphere'. In Slack, Jennifer Daryl and Fred Fejes (1987), *The Ideology Of The Information Age*. New Jersey: Ablex Publishing, pp 24-46
- Desmond, Edward, 'Malone Again', *Fortune*, February, 16th, Volume 137, Number 3, 1998
- Department for Arts, Culture and the Gaeltacht. (1999). 'Broadcasting Bill'. *Department for Arts, Culture and the Gaeltacht*. Dublin: Government Stationary Office.
- Department for Culture, Media and Sport. (1998). 'Broadband Britain: A Fresh Look at the Broadcast Entertainment Restrictions'. *Department for Culture, Media and Sport*. London: Communications and Information Industries Directorate.
- Department for Arts, Culture and the Gaeltacht. (1997a). 'Draft Memorandum for Government: Broadcasting Legislation'. *Department for Arts, Culture and the Gaeltacht*. Dublin: Government Stationary Office.

Department for Arts, Culture and the Gaeltacht (1997b) 'Clear Focus' *Department for Arts, Culture and the Gaeltacht* Dublin Government Stationary Office

Department for Arts, Culture and the Gaeltacht (1995) 'Active Or Passive? Broadcasting in the Future Tense Green Paper on Broadcasting' *Department of Arts, Culture and the Gaeltacht* Dublin Government Stationary Office

Department of Public Enterprise (2000) 'Outline Legislative Proposals in relation to the regulation of the Communications Sector' Department of Public Enterprise Dublin

Department of Enterprise (1999) 'Telecommunications (Infrastructure) Bill' *Department of Enterprise* Dublin Government Stationary Office

Department of Enterprise (1998) 'Report on the Advisory Committee on Telecommunications to the Minister for Public Enterprise' *Department of Enterprise* Dublin Government Stationary Office

Department for Arts, Culture and the Gaeltacht (1997a) 'Draft Memorandum for Government Broadcasting Legislation' *Department for Arts, Culture and the Gaeltacht* Dublin Government Stationary Office

De Cockborne, Jean-Erci, Bernard Clements and Adam Watson Brown (1999) 'EU Policy on Multimedia Regulation Symposium' *European Commission* Monreux European Commission

De Valera, Sile (2000) 'Private Members' Business Broadcasting Policy Motion' *Eireann Debates Official Report* At URL <[Http //www.irlgov.ie/80/debates-00/28march/sect6.htm](http://www.irlgov.ie/80/debates-00/28march/sect6.htm)> Visited 21/07/00

De Valera, Sile (1999) 'That the Bill Be Now Read A Second Time Broadcasting Bill Second Stage (Resumed)' *Eireann Debates Official Report* At URL <[Http //www.irlgov.ie/80/debates-99/10nov99/sect5a.htm](http://www.irlgov.ie/80/debates-99/10nov99/sect5a.htm)> Visited 21/07/00

Directorate General on the Internal Market. (1996). 'Economic Implications Of New Communications Technologies on the Audio-Visual Market'. *European Commission*.
At URL:

<[Http://europa.eu.int/comm/dg10/avpolicy/key_doc/new_comm/index.html](http://europa.eu.int/comm/dg10/avpolicy/key_doc/new_comm/index.html)>. Visited 18/04/00.

Digital Audio-Visual Council (2000), 'DAVIC's FAQs'. *Digital Audio-Visual Council*. At URL: <[Http://www.davic.org/faq.htm](http://www.davic.org/faq.htm)> . Visited 18/10/00.

Digital Consumer Formats (2000), 'Digital Consumer Formats'. *Digital Consumer Formats*. At URL: <[Http://viswiz.gmd.de/MultimediaInfo/dcf.html](http://viswiz.gmd.de/MultimediaInfo/dcf.html)>. Visited 18/10/00.

Digital Video Broadcasting. (2000) 'DVB Homepage'. *Digital Video Broadcasting*.
At URL: <[Http://www.dvb.org/latest.html](http://www.dvb.org/latest.html)> . Visited 18/10/00.

Digital Video Broadcasting. (1999). 'DVB and HDTV'. *Digital Video Broadcasting*.
At URL: <[Http://www.dvb.org/search/index.html](http://www.dvb.org/search/index.html)>. Visited 05/12/00.

Dijk, Jan A.G.M. (1999). 'The Reality of Virutal Communities'. *New Media Developments: Trends in Communications*. Boom: Amsterdam, pp 5-1739-63.

Digital Terrestrial Television Action Group. (2000). 'DigiTAG Response To the 'Green Paper' On Convergence'. *Digital Terrestrial Television Action Group*.
European Broadcast Union: Grand-Saconnex.

Digital Terrestrial Television Action Group (DigiTAG). (1999). 'Digital Terrestrial Television offers important Opportunities for Convergence in the European mass market'. *Digital Terrestrial Television Action Group*. At URL:
<[Http://www.digitag.org/dtg_greenpaper.html](http://www.digitag.org/dtg_greenpaper.html)> . Visited 02/04/00.

Digital Terrestrial Television Action Group. (1998). 'Commission Green Paper On Convergence, preparation of EBU Response'. *Digital Terrestrial Television Action Group*. European Broadcast Union: Grand-Saconnex.

Digital Terrestrial Television Action Group (2000) 'Ondigital Hits the Net' *Digital Terrestrial Television Action Group* At URL

<[Http //www digitag org/news/latestnews/uk/dtg_ondigital htm](http://www.digitag.org/news/latestnews/uk/dtg_ondigital.htm)> Visited 21/07/00

Donohoe, Michael (1997) 'What's on the Box' *Communicate* March, Volume 3, Number 1

Doyle, Eain (2000) ODTR, 'A Vision of the Irish Telecommunications Sector 2000+' Dublin Institute of Management Consultants in Ireland (IMCI) *Office of the Department of Telecommunications Regulation* Dublin Office of the Director of Telecommunications Regulation

Doyle, Eain (2000) 'EU Liberalisation and Its Impact on National Regulation Telecommunications' *Office of the Department of Telecommunications Regulation* Document Number 00/26 Dublin Office of the Director of Telecommunications Regulation

Doyle, Eain (2000) 'Paper to the Joint Oireachtas Committee on Public Enterprise and Transport' *Office of the Department of Telecommunications Regulation* Number Document Number 00/22 Dublin Office of the Director of Telecommunications Regulation

Doyle, Eain (2000) 'Independence From Government Vital If Regulators To Serve Public Interest' *Irish Times* July 24th, p 16

Doyle, Eain (1999) 'The Current Regulatory Climate ABN AMRO Institutional Equity Clients' *Office of the Department of Telecommunications Regulation* Document Number 99/63 Dublin Office of the Director of Telecommunications Regulation

Doyle, Eain (2000) 'Unleashing the Celtic Tiger – Irish Telecoms 2000+' *Office of the Department of Telecommunications Regulation* Number Document Number 00/19 Dublin Office of the Director of Telecommunications Regulation

Doyle, Eam (1998) 'Regulation Realities and Priorities' *Office of the Department of Telecommunications Regulation* Dublin Office of the Director of Telecommunications Regulation

Dolmen Research (2000) 'Statistics' *Dolmen Research* At URL
<[Http //www dbb ie/bi-monthly pdf](http://www.dbb.ie/bi-monthly.pdf)> Visited 10/01/00

Dunnett, Peter (1990) '*The World Television Industry*' Routledge London

E

Editorial (2000) 'Read the Runes' *New Scientist* Volume 165, Number 2231, p3

Editorial (1998) 'Irish Competition' *Competition Journal* Volume 51, Edition 3, p52

Editorial (1999) 'Race Is On To Capture Digital Market' *Irish Times* At URL
<[Http //scripts ireland com/search/highlight plx?TextRes= per cent27Race per cent20Is per cent20On per cent20To per cent20Capture per cent20Digital per cent20Market&Path=/newspaper/finance/1999/1105/fin5 htm](http://scripts.ireland.com/search/highlight.plx?TextRes=per%20cent27Race%20per%20cent20Is%20per%20cent20On%20per%20cent20To%20per%20cent20Capture%20per%20cent20Digital%20per%20cent20Market&Path=/newspaper/finance/1999/1105/fin5.htm)> Visited 05/11/99

Editorial (2000) 'ITC Responds To Sky Critique of Genesis Plan' *New Media Markets* Volume 18, Number 14, p3

Editorial (2000) *New Media Markets* Volume 18, Number 21, p4

Editorial (2000) 'ITC responds to Sky Critique of Genesis Plan' *New Media Markets* Volume 18, Number 14

Editorial (1999) 'The Wireless Revolution' *Economist* Volume 350, Number 8103, January 23rd

Editorial. (1999). 'Look, No Wires'. *Economist*. Volume 350, Number 8103 January 23rd.

Editorial. (1989). *Media, Culture and Society*. Volume 11, Number 2, April, pp 131-135.

Editorial. (1998). 'Content Issue'. *Gazette*. Volume 60, Number 5, pp 363-375.

Editorial. (1999). *Business and Finance*. 'Telecom Countdown'. Volume 35, Number 32, June 24th, pp 42-3.

Editorial. (1999). 'NTL May Offer Internet Via ADSL'. *New Media Markets*. Volume 17, Number 22, June 24th, pp 1-9.

Editorial. (1999). 'TV3 Begins its Cablelink Court Action'. *Irish Times*. At URL: <[Http://scripts.ireland.com/search/highlight.plx?TextRes=TV3 per cent20Begins per cent20its per cent20Cablelink per cent20Court per cent20Action&Path=/newspaper/finance/1999/0209/fin9.htm](http://scripts.ireland.com/search/highlight.plx?TextRes=TV3%20Begins%20its%20Cablelink%20Court%20Action&Path=/newspaper/finance/1999/0209/fin9.htm)>. Visited 09/11/99.

European Broadcast European Technical Department. (1998). 'Draft 2: Initial Comments On the Green Paper COM (97) 623 From A Technical Perspective: EBU/ DigiTAG GP2 Annex 2 Discussion Document'. *Digital Terrestrial Television Action Group*. European Broadcast Union: Grand-Saconnex.

European Bureau for Lesser-Used Languages. (2000). 'TV in A Digital Age: New Opportunities?'. *European Bureau for Lesser-Used Languages Seminar*. Dublin: European Bureau for Lesser-Used Languages.

Elstein, David. 2000. 'Time To End This Shrill Campaign'. *Guardian*. At URL: <[Http://www.guardianunlimited.co.uk/Archive/Article/0,4273,3959880,00.html](http://www.guardianunlimited.co.uk/Archive/Article/0,4273,3959880,00.html)>. Visited 07/02/00.

Evain, J-P. (1999). 'The Multimedia Home Platform – An Overview'. *European Broadcast Union Technical Department*. European Broadcast Union: Grand-Saconnex, p1-8.

F

Farrell, Grant and Sparks. (1999). 'Up-Date of the New Media Industry'. *Enterprise Ireland and the Information Society Commission*. Dublin: Farrell, Grant and Sparks.

Flichy, Patrice (1999). 'The Construction Of New Digital Media'. *New Media and Society*. Volume 1, Number 1, pp 33-39.

Fisher, Desmond. (1978). '*Broadcasting in Ireland*'. London: Routledge.

Financial Times Service. (1999). 'Communication Firms In Wireless Alliance'. *Irish Times*. February 9th.

Firth, Simon. (2000). 'The Black Box'. *Screen*. Volume 41, Number 1, Spring, pp 149-168.

Foley, Micheal. (1999). 'New Legislation provides for Digital TV'. *Irish Times*. At URL: <[Http://scripts.ireland.com/search/highlight.plx?TextRes=New per cent20Legislation per cent20provides per cent20for per cent20Digital per cent20TV&Path=/newspaper/ireland/1999/0528/hom8.htm](http://scripts.ireland.com/search/highlight.plx?TextRes=New%20Legislation%20provides%20for%20Digital%20TV&Path=/newspaper/ireland/1999/0528/hom8.htm)>. Visited 28/06/00.

ForFás. (1998). 'Broadband Telecommunications Investment in Ireland'. *ForFás*. At URL: <[Http://www.forfas.ie/report/bband.htm](http://www.forfas.ie/report/bband.htm)>. Visited 05/06/00.

Film Industry Strategic Review Group. (1999). 'The Strategic Development of the Irish Film and Television Industry 2000-2010'. *Final Report of the Film Industry Strategic Review Group*. Dublin: Department of Arts, Gealtacht and the Islands, p63.

Flaherty, Joe. (2000). 'Digital Television – A Metamorphosis'. *Journal of the Royal Television Society*. Volume 37, Number 5, pp 14-15.

Francis, Craig. (2000). 'Two Way Terrestrial TV Planned for Ireland'. *New Media Markets*. Volume 18, Number 18, p7.

Francis, Craig. (2000a). 'New Standard the Biggest Event 'Since the Internet''. *New Media Markets*, Volume 18, Number 7, p2.

Francis, Craig 2000. 'ONdigital Deal Promises Reformatted Web Pages. *New Media Markets*. Volume 18, Number 20, p5.

Fuchs, Gerhard. 'Interactive Television – A Shattered Dream'. In Jensen, Jens and Cathy Toscan (Ed). (1999). *Interactive Television: TV of the Future or the Future of TV*. Aalborg University Press: Aalborg, pp 91-118.

G

Garnham, Nicholas. (1997). 'Universal Service'. In Melody, William (ed). (1997). *Telecom Reform: Principles, Policies and Regulatory Practices*. Lyngby: Technical University of Denmark.

Garnham, Nicholas (1992). 'The Media and The Public Sphere'. In Calhoun, C (ed.) (1992). *Habermas and The Public Sphere*. London: MIT Press, pp 3539-3773.

Graham, Andrew (1998). 'Broadcasting Policy and The Digital Revolution', *politics and The Media*. Oxford: The Political Quarterly Publishing Company, pp 30- 42.

Garnham, Nicholas. (1996). 'Constraints On Multimedia Convergence'. In Dutton, William, H (ed.) (1996). *Information and Communication Technologies: Visions and Realities*. Oxford: University Press, pp 103-120.

Garnham, Nicholas. (1994). 'Editorial'. *Media and Culture and Society*. Volume 16, Number 1, pp 5-6.

Garnham, Nicholas. (1986). 'The Media and The Public Sphere'. In Golding, Peter and Graham Murdock and Philip Schlesinger (eds) *Communicating Politics*. New York: Holmes and Meier.

Garnham, Nicholas. (1983). 'Public Service Versus The Market'. *Screen*. Volume 24, Number 1, pp 6-27.

- Gerbarg, Darcy (ed) (1998) 'The Future Of Digital TV' *Prometheus* Volume 16, Number 2
- Ghayur, Aalia (2000) Global Cable Television *Cable and Satellite Europe* April, pp 64-67
- Gorham, M (1967) *40 Years Of Broadcasting* Dublin RTE
- Gibson, Janine (1999) 'Birt Warns Of Digital Danger' *Guardian* At URL
<[Http //www guardianunlimited co uk/Archive/Article/0,4273,3880948,00 html](http://www.guardianunlimited.co.uk/Archive/Article/0,4273,3880948,00.html)>
Visited 06/07/99
- Gibson, Janine (1999) 'Peter's Pledge' *Guardian* At URL
<[Http //www guardianunlimited co uk/Archive/Article/0,4273,3880656,00 html](http://www.guardianunlimited.co.uk/Archive/Article/0,4273,3880656,00.html)>
Visited 05/07/99
- Gibson, Janine and Kamal Ahmed (1999) 'Pressing Decisions Ahead' *Guardian* At URL
<[Http //www guardianunhmited co uk/Archive/Article/0,4273,3878208,00 html](http://www.guardianunhmited.co.uk/Archive/Article/0,4273,3878208,00.html)>
Visited 25/06/99
- Goan, Cathal (2000) 'TV in a Digital Age New Opportunities?' *European Bureau for Lesser-Used Languages* Dublin European Bureau for Lesser-Used Languages
- Godard, Francois (1998) 'Why Pay-Per-View Is No Killer Application' *Commercial Communications* Brussels European Commission
- Golding, Peter and Graham Murdock and Philip Schlesinger (eds) (1986) *Communicating Politics* New York, Leicester Holmes and Meiter, Leicester University Press
- Golding, Peter (1990) 'Political Communication and Citizenship The Media and Democracy In An Inegalitarian Social Order' In Goldmg, Peter and Graham Murdock

(1997), *The Political Economy of the Media*, Volume II, Cheltenham and Vermont Edward Elgar Publications, pp 668- 686

Golding, Peter and Graham Murdock, (Eds) (1997) '*The Political Economy of the Media*' Cheltenham Brookfield

Goodwin, Peter (1997) 'Public Service Broadcasting and New Media Technology' *The Public/Javnost* Volume 4, Number 4, pp 59-73

Groebel, Jo (ed) (1998) *New Media Developments* Amsterdam Boom Publishers

Graham, Andrew (1998) 'Broadcasting Policy and the Digital Revolution', *politics and the Media*, pp 30-43

Gray, John (1999) 'False Dawn' Granta London

Groebel, Jo (1999) 'New Media Development Stability and Change in Communication Behaviour' *New Media Developments Trends in Communications* Boom Amsterdam, pp 5-17, P15

Guice, Jon (1998) 'Looking Backward and Forward At The Internet' *Information Society* Volume 14, Number 3

H

Habermas, J (1992) 'Further Reflections On The Public Sphere' In Calhoun, C (ed) (1992) *Habermas and The Public Sphere* London MIT Press, pp 421-462

Habermas, Jurgen (1989) *The Structural Transformation Of The Public Sphere* Cambridge Polity Press, [original, 1962], pp 89-141, pp 159-236

Habermas, Jurgen (1979) [1964], 'The Public Sphere' In Golding, Peter and Graham Murdock (1997), *The Political Economy of the Media*, Volume II, Cheltenham and Vermont Edward Elgar Publications, pp 116-119 Reprinted by Sara Lennox and

- Frank Lennox (1974) *New German Critique*, Volume 3, Autumn Original Publication in the Fischer Lexicon (1964), *Staat und Politik*, Frankfurt am Main
- Hazelkorn, Ellen (1997) 'New Digital Technologies, Work Practices and Cultural Production In Ireland' *Economic and Social Review* Volume, 28, Number, 3, pp 235-259
- Hargreaves, Ian (1999) 'Why The Governors Must Change', *Guardian* At URL <http://www.guardianunhimited.co.uk/Archive/Article/0,4273,3878743,00.html> > Visited 28/06/99
- Hadden, Susan G and Edward Lenert (1995) 'Telecommunications Networks Are Not VCRs The Public Nature Of New Information Technologies For Universal Service' *Media, Culture and Society* Volume 17, pp 121-140
- Hare, David (1999) 'Cable/MMDS Companies Agree To New Licensing Regime in Ireland' *TV Express* February 25th, p3
- Hall, Eamonn G (1993) *The Electronic Age Telecommunication in Ireland* Oak Tree Press Dublin, p273
- Harding, James (2000) 'Ondigital Calls for Break-Up' *Financial Times* July 6th
- Hamm, Steve (1998) 'Microsoft's Future' *Business Week* January 19th
- Harding, James (2000) 'Keeper of the Jewel in Murdoch's Crown' *Financial Times* July 24th
- Heysse, Tim (1998) 'Freedom, Transparency and the Public Sphere' *The Public/Javnost*, Volume 4, Number 4, pp 5-18
- Herve Creff and Isabelle Brandt Canal+ (2000) 'Seminar On Added Value Services for DTT' 'Internet on TV the DVB Multimedia Home Platform Approach' *Digital Terrestrial Television Action Group* Dublin European Broadcast Union

- Hetherington, Rick (2000) 'Content is King' *Irish Business and Employers Confederation Audiovisual Seminar* Dublin Irish Business and Employers Confederation Audiovisual Seminar
- Higuera, Immaculada (2000) 'EU Policy beyond Digitalisation Digital Convergence and the Public Interest' *University of Turku* At URL <[Http //imguakieutu.fi/bredelli/workshop/higuera.htm](http://imguakieutu.fi/bredelli/workshop/higuera.htm)> Visited 19/09/00
- Hoyes, William (1994) '*Public Television For Sale*' Boulder Westview Press
- Horsman, Matthew (1999) 'Dyke's Dilemma', *Guardian* At URL <[Http //www.guardianunlimited.co.uk/Archive/Article/0,4273,3878573,00.html](http://www.guardianunlimited.co.uk/Archive/Article/0,4273,3878573,00.html)> AT URL 28/06/99
- Horwitz, Robert Britt (1989) 'Telecommunications and Their Deregulation An Introduction' In Golding, Peter and Graham Murdock (1997) *The Political Economy of the Media* Volume II, Cheltenham and Vermont Edward Elgar Publications, pp 365-419
- Hodgson, Jessica (1999) 'BBC is again urged to give up its 'Non-Core' Services' *Press Gazette* May, 28th, pp 7-8
- Hofmann-Riem, Wolfgang (1992) 'Defending Vulnerable Values Regulatory Measures and Enforcement Dilemmas' In Blumler, Jay (1992), *Television and The Public Interest Vulnerable Values In West European Broadcasting* London Sage Publications, pp 173-201
- Hohendahl, Peter Uwe (1974) 'Critical Theory, Public Sphere and Culture Jurgen Habermas and His Critics' *New German Critique* Number 16, Winter, pp 89-118
- Hohendahl, Peter Uwe (1974) 'Introduction to Habermas' *New German Critique* Volume 1, Number 3, Fall, pp 45-56

Hughes, Janice (2000). 'Equity and Access Delivered in a Market Context'. *Spectrum Strategy Consultants*. At URL: <[Http://www.culture.gov.uk/creative/dti-dcms_hughes.pdf](http://www.culture.gov.uk/creative/dti-dcms_hughes.pdf)>. Visited 11/12/00.

Hutton, Will (1999). 'Money, Or The Lack Of It, Is the Root Of all The BBC's Evils', *Guardian*. At URL:
<[Http://www.guardianunlimited.co.uk/Archive/Article/0,4273,3841470,00.html](http://www.guardianunlimited.co.uk/Archive/Article/0,4273,3841470,00.html)>.
Visited 21/03/00.

I

Institut de l'audiovisuel et des Télécommunications en Europe (IDATE). (1999). *Development of Digital Television in the European Union*. MED 70052 C (LME). Montpellier: Institut de l'audiovisuel et des Télécommunications en Europe.

Irish Business and Employers. (2000). 'Telecommunications After Liberalisation - One Year Plus'. Irish Business and Employers Confederation. At URL:
<[Http://www.ibec.ie/ibec/internet.nsf/LookupPageLink/Search_Opening](http://www.ibec.ie/ibec/internet.nsf/LookupPageLink/Search_Opening)>. Visited 18/12/00.

Irish Multichannel (Chorus). (2000). 'Response From Irish Multichannel On the 1999 Communications Review'. *Irish Multichannel (Chorus)*. AT URL:
<[Http://www.ispo.cec.be/infosoc/telecompolicy/review99/comments/iemulti24b.htm#response](http://www.ispo.cec.be/infosoc/telecompolicy/review99/comments/iemulti24b.htm#response)>. Visited 06/06/00.

International Organisation For Standardisation. (2000). 'About MPEG'. *International Organisation For Standardisation*. At URL:
<[Http://drogo.cselt.stet.it/mpeg/about_mpeg.html](http://drogo.cselt.stet.it/mpeg/about_mpeg.html)>. Visited 18/10/00.

Independent Television Commission Response (2000). 'Towards A New Framework for Electronic Communications Infrastructure and Associated Services: The 1999 Communications Review'. *Independent Television Commission*. At URL:

<[Http://www.itc.org.uk/news/news_releases/show_release.asp?article_id=376](http://www.itc.org.uk/news/news_releases/show_release.asp?article_id=376)>.

Visited 17/02/00.

Independent Television Commission. (2000). 'Award of Non-Exclusive Delivery Licence'. *Independent Television Commission*. At URL:

<[Http://www.itc.org.uk/news/news_releases/show_release.asp?articles_id=455](http://www.itc.org.uk/news/news_releases/show_release.asp?articles_id=455)>.

Visited 09/12/00.

Independent Television Commission. (2000). 'Interactive Television'. *Independent Television Commission*. AT URL: <[Http://www.itc.org.uk](http://www.itc.org.uk)> . Visited 17/02/00.

Information Society Commission. (1999). 'Second Report of Ireland's Information Society Commission'. *Information Society Commission*. Dublin: Government of Ireland.

J

Jackson, Micheal (1999). 'Four The Road'. *Guardian*. At URL:

<[Http://www.guardianunlimited.co.uk/Archive/Article/0,4273,3880651,00.html](http://www.guardianunlimited.co.uk/Archive/Article/0,4273,3880651,00.html)>.

Visited 05/07/99.

Jay, Peter (1984). 'Electronic Publishing'. In Golding, Peter and Graham Murdock (1997), *The Political Economy of the Media*, Volume II, Cheltenham and Vermont: Edward Elgar Publications, pp 331-342.

Jakubowiz, Karol. (1996). 'Civil Society and Public Service Broadcasting In Central and Eastern Europe'. *Javnost/The Public*. Volume 3, Number 2.

Jensen, K (1990). 'The Politics Of Polysemy: Television News, Everyday Consciousness and Political Action'. *Media, Culture and Society*. Volume 12, p 57-77.

Jensen Jen (1997) 'Interactivity' – Tracking A New Concept in Media and Communication Studies' In Mayer, Paul (Editor) (1999) *Computer Media and Communication* Oxford University Oxford, pp 160-179

Jensen, Jens and Cathy Toscan (Ed) (1999) *Interactive Television TV of the Future or the Future of TV* Aalborg University Press Aalborg, p15

Journal of the Royal Television Society (2000) 'Pretenders To the Home' *The Journal of the Royal Television Society* February

K

Kaufhold, Gerry (2000) 'The Top 10 Reasons Why Sinclairs COFDM Petition Should Be Rejected' *Cahners IN-STAT Group* San Jose Cahners IN-STAT Group, p9

Kenny, Colum (1999) 'Making Viewers Pay More Should Be RTE's Last Resort' *Sunday Independent* Volume 94, Number 38, pp 36L

Kenny, Enda (2000) 'Private Members' Business Broadcasting Policy Motion' *Eireann Debates Official Report* At URL <[Http //www irlgov ie 80/debates-00/28march/sect6 htm](http://www.irlgov.ie/80/debates-00/28march/sect6.htm)> Visited 28/03/00

Keane, John (1991) 'Public Service Media' In Golding, Peter and Graham Murdock (1997) *The Political Economy of the Media* Volume II, Cheltenham and Vermont Edward Elgar Publications, pp 621-667

Kiessling, J and Y Blondeel (1998) 'The EU Regulatory Framework in Telecommunications' *Telecommunications Policy* Volume 22, Number 7, pp 571-592

King, A (1998) 'Thatcherism and The Emergence Of Sky TV' *Media, Culture and Society* 20 (2) 277-94

Kleinsteuber, Hans (1996) 'The Development of Digital Television in Europe' *The European Research Group*

KPMG (1996) 'Public Policy Issues Arising From Telecommunications and Audiovisual Convergence' *KPMG Brussels European Commission*

Kofler, Angelika (1998) 'Digital Europe 1998' *Innovation* Volume 11, Number 1, pp 53-71

L

Lambert, Peter (1997), 'Interactive Television Prepares For Comeback' At URL [<Http //www zdnet com/mtweek/print/971208/inwk0002 html >](http://www.zdnet.com/mtweek/print/971208/inwk0002.html) Visited 08/12/97

Lange, Larry (1999) 'The Internet', *IEEE Spectrum*, January, Volume 36, Number 1

Lei, Joanna (1999) 'Beyond Technology a Consumer Market Perspective' *Intermedia* At URL [<Http //intermedia almamedia fi/1999/05/199927_05_04beyond.shtml>](http://intermedia.almamedia.fi/1999/05/199927_05_04beyond.shtml) Visited 18/10/00

Levy, David A L (1997) 'Regulating Digital Broadcasting in Europe The Limits of Policy Convergence' *West European Politics* Volume 20, Number 4, 24-42

Levy, David (1997a) 'The Regulation of Digital Conditional Access Systems' *Telecommunications Policy* Volume 12 Number7, pp 661-767

Lebow, Irwin (1991) *The Digital Connection* New York Freeman and Company

-
- Lee, Byeong Gi, and Kang, Minho and Lee Jonghee (1993) *Broadband Telecommunications Technology* Norwood Artech House
- Lennon, Tony (1997) 'Rupert's There' *Journalist* July/August
- Leonard, Tom (1999) 'BBC To Axe 'Populist' TV Shows' *Daily Telegraph* At URL <[Http //www telegraph co uk 80/et?ac=001723865129962&rtmo= VZZjPP4x&atmo=HHHHHHHL&pg=/et/99/6/24/nbeeb24.html](http://www.telegraph.co.uk/80/et?ac=001723865129962&rtmo=VZZjPP4x&atmo=HHHHHHHL&pg=/et/99/6/24/nbeeb24.html)> Visited 24/06/99
- Levin, Arthur (1999) 'Regulatory Challenges in the Digital Age' *InterMedia* Volume 27, Number 1, pp 4-9
- Lewin, Davis and David Rogerson (1999) 'A Review of the Interconnect Directive' *Ovum* London Ovum, p 6
- Ling, Rich and Siri Nilsen and Stephan Granhaug (1999) 'The Domestication of VideoOn-Demand' *New Media and Society* Volume 1, Number 1, pp 83-99
- Livingstone, Sonia (1999) 'New Media, New Audiences' *New Media and Society* Volume 1, Number 1, pp 59-66
- Licken, Eoin (1999) 'Mobile Phone Firms Ring In Changes', *Irish Times*, February 26th
- Licken, Eoin (1999) 'Technology Will Let Mobile Users Enjoy Net', *Irish Times*, March 5th
- Lillington, Karlin (1999) 'Global E-Commerce Centre For Telecom', *Irish Times*, February 27th
- Lillington, Karlin (1999) 'Telecom Eyes Up Niche Mobile Market in UK', *Irish Times*, February 10th

Lillington, Karen (2000) 'O'Rourke To Deregulated 'Last Mile' of Telecom Wire' *Irish Times* At URL <

[Http //www ireland com/newspaper/finance/2000/0628/fin3 htm](http://www.ireland.com/newspaper/finance/2000/0628/fin3.htm)> Visited 28/06/00

Logicast Inc (2000) 'Logicast Homepage' *Logicast Inc* At URL

<[Http //www logicast com](http://www.logicast.com)> Visited 18/10/00

Luther, Arch (1997) *Principles Of Digital Audio and Video* Norwood Artech House

M

Magee, Matthew (1999) 'Group urges unity in Digital TV' *Sunday Tribune* July 25th

Magee, Matthew (2000) 'FTF With Brian Moore, NTL' *Electricnews* At URL

<[Http //www electricnews net/sh334x1817 html](http://www.electricnews.net/sh334x1817.html)> Visited 20/07/00

Malbon, Justin (1998) 'Gaining Balance On the Regulatory Tightrope' In Hossain, Moazzem and Hustion Malbon (Eds) '*Who Benefits From Privatisation?*' London Routledge pp 10-11

Mansell, Robin (1999) 'New Media Competition and Access The Scarcity Abundance Dialectic' *New Media and Society* Volume 1, Number 2, pp 155-182

Mansell, Robin (1997) 'Designing Networks to Capture Customers Policy and Regulation Issues for the New Telecom Environment' In Melody, William (ed) (1997) '*Telecom Reform Principles, Policies and Regulatory Practices*' Lyngby Technical University of Denmark, pp 83-96

Mansell, Robin (1997) 'Designing Networks To Capture Customers Policy and Regulation Issues for the New Telecom Environment', Pp 83-96, P88 In Melody,

- William (ed) (1997) '*Telecom Reform Principles, Policies and Regulatory Practices*' Lyngby Technical University of Denmark, pp 11-28
- MacConghail, Muiris (1999) 'Nothing To Provide For Quality Television Viewers' *Irish Times* June 28th
- MacConghail, Muiris (1999) 'Television's Future', *Film West*, February, Issue 35, 1999, p20
- MacConghail, Muiris (1998) 'TV3 Says Programmes Will Target Young' *Irish Times*
At URL
<<http://www.ireland.com/scripts/search/highpath=/newspaper/opinion/1997/1103/opt2.htm>> Visited 10/10/98
- MacMahon, Sean (1995) 'Competition and Telecommunications Infrastructure in Ireland' *Telecommunications Policy* Volume 19, Number 4, pp 299-305
- Martinez, Elizabeth and Arnoldo Garcia (1997) 'What Is 'Neo-Liberalism'?' At URL <<http://www.igc.org/envjustice/neolib.html>> Visited 09/03/00
- Marshall, T H (1965) *Social Policy* London Hutchinson
- Marialuisa, Taddia and Paul Davies 'Vivendi Universal gets Leverage against Murdoch' *New Media Markets* Volume 18, Number 23, p5
- Marsden, Christopher T (2000) 'Pluralism in the Multi-Channel Market Suggestions for Regulatory Scrutiny' *International Journal of Communications Law and Policy* Issue 4, Winter, pp 5-57
- Mason, Robin (1998) 'Internet Telephony and the International Accounting Rate System' *Telecommunications Policy* Volume 22, Number 11

Massey, Patrick and Tony Shortall. Competition Authority. (1999). 'Competition and Regulation in Public Utility Industries: Discussion Paper, Number 7'. *Competition Authority*. At URL: <[Http://www.irlgov.ie:80/compauth/dis_doc7.htm](http://www.irlgov.ie:80/compauth/dis_doc7.htm)>, Visited 17/04/00.

Mattelart, Armand. (1996). *The Invention Of Communication*. Minnesota: University of Minnesota Press.

McChesney, Robert W. (1998). 'Capitalism and The Information Age'. In Robert W. McChesney, Ellen Meiksins Wood, John Bellamy Foster (eds). *The Political Economy Of Global Communication*. Monthly Review Press, p 1-27.

McEnaney, Tom. (1999). 'State Tips Cablelink Revenues To Hit £270m'. *Sunday Tribune*. February 21st.

McGarry, Patsy. (1999). 'RTÉ charged with breach of EU rules'. *Irish Times*. At URL: <[Http://www.ireland.com/scripts/search/hig...ath=/newspaper/ireland/1999/0909/hom6.htm](http://www.ireland.com/scripts/search/hig...ath=/newspaper/ireland/1999/0909/hom6.htm)>. Visited 09/09/99.

McGrath, Brendan. (2000). 'Eircom Shares Remain Steady'. *Irish Times*. At URL: <[Http://www.ireland.com/newspaper/finance/2000/0112/fin8.htm](http://www.ireland.com/newspaper/finance/2000/0112/fin8.htm)>. Visited 12/01/00.

McGuigan, Jim (1996). *Cultural and The Public Sphere*. London: Routledge.

Medialive. (2000). 'Get the Facts on RTÉ'. *Medialive*. At URL: <[Http://www.medialive.ie/banners/tvrte/thefacts.html](http://www.medialive.ie/banners/tvrte/thefacts.html)>. Visited at 14/02/00.

Melody, William. (1997). 'Policy Objectives and Models of Regulation'. In Melody, William (ed). (1997). *Telecom Reform: Principles, Policies and Regulatory Practices*. Lyngby: Technical University of Denmark, pp 11-28.

Melody, William H. (1996). 'Toward a Framework for Designing Information Society Policies'. *Telecommunications Policy*. Volume 20, Number 4, pp 243-259.

- Melody, W H (ed) (1997) *Telecom Reform- Principles, Policies and Regulatory Practices* Lyngby, Denmark Den Private Ingeniorfond
- Melody, W H (1999) 'Human Capital In Information Economics' *New Media and Society* Volume 1, Number 1, pp 39-46
- Meyer, Noel (1998) 'Who Plugged the Internet into the Phone Jack' *Cable and Satellite* Number 171, March 19th
- Michalis, Maria (1999) 'European Union Broadcasting and Telecoms' *European Journal Of Communication* Volume 12, Number 2, pp 147-171
- Millar, Paul (1999) 'Consumer Electronics' *IEEE Spectrum* January, Volume 36, Number 1
- Minges, Micheal (1997) 'Statistics for Regulators' In Melody, William (ed), (1997), '*Telecom Reform Principles, Policies and Regulatory Practices*' Lyngby Technical University of Denmark
- Mitchell, Jeremy (1997) 'Convergent Communications, Fragmented Principles and Practices' In Melody, William (ed), (1997), '*Telecom Reform Principles, Policies and Regulatory Practices*' Lyngby Technical University of Denmark
- Mole, Christopher and Ed Straw and Robert Boyle and Peter Winkler (2000) 'Consumers or Content? the Digital Dilemma European Digital Television Report 2000', *PriceWaterhouseCoopers*, PriceWaterhouseCoopers London, p12
- Morley, Davis and Kevin Robins (1995) *Spaces Of Identity Global Media, Electronic Landscapes and Cultural Boundaries* London Routledge
- Mosco, Vincent (1996) '*The Political Economy of Communication*' London Sage
- Mosco, Vincent (1990) 'The Mythology Of Telecommunications Deregulation' In Golding, Peter and Graham Murdock (1997) *The Political Economy of the Media* Volume II, Cheltenham and Vermont Edward Elgar Publications, pp 444-457

Moynes, Adrian (1999) 'Forging Policy in the Age of Convergence' *Intermedia* At URL <[Http //intermedia almamedia fi/1999/05/199927_05_10forging.shtml](http://intermedia.almamedia.fi/1999/05/199927_05_10forging.shtml)> Visited 18/10/00

Murdock, Graham and Peter Golding (1989) 'Information Poverty and Political Inequality Citizenship In The Age Of Privatized Communications' In Golding, Peter and Graham Murdock (1997) *The Political Economy of the Media* Volume II, Cheltenham and Vermont Edward Elgar Publications, pp 100-115

Murdock, Granham (1996) 'Television and Citizenship In Defense of Public Broadcasting' *Javnost/The Public* Volume 3, Number 2, pp 7-102

Murphy, David (1999) 'Banking on the Mobile' *Irish Independent* March 8th

Murphy, Miriam (1998) 'TV Remains Top Draw' *Marketing* Volume 9, Number 8, September

Murphy, David (2000) 'Internet Gets Connected to Cellular Phones in 2001' *Irish Independent* At URL <[Http //www independent ie/2000/82/b01e.shtml](http://www.independent.ie/2000/82/b01e.shtml)> Visited 23/03/00

Murphy, David (2000) 'Eircom Plans Pilot Scheme for Advanced Cable TV and Internet' *Irish Independent* At URL <[Http //www independent ie/2000/25/b171.shtml](http://www.independent.ie/2000/25/b171.shtml)> Visited 26/01/00

Murroni, Cristina and Nick Irvine (1998) 'Access Matters' Institute for Public Policy Research London

N

Nagaya, Tatsuhito (1999) 'The Impact of Changing Technology on Public Service Broadcasting - A Japanese Perspective' *InterMedia* Volume 27, Number 1, pp 27-34

- Negropontae, Nicholas (1995) *Being Digital* London Hodder and Stoughton
- National Competitiveness Council (1998a) 'Statement on Telecommunications A Key Factor in Electronic Commerce and Competitiveness' *National Competitiveness Council* At URL <[Http //www forfas ie/ncc/reports/ncctelecom htm](http://www.forfas.ie/ncc/reports/ncctelecom.htm)> Visited 18/12/00
- National Competitiveness Council (1998b) 'Statement on Telecommunications Preface' *National Competitiveness Council* At URL <[Http //www forfas ie/ncc/reports/ncctelecom htm](http://www.forfas.ie/ncc/reports/ncctelecom.htm) Visited 18/12/00
- National Economic Research Associates (NERA) and Smith System Engineering (1998a) 'The Future of Television Services in Ireland' *National Economic Research Associates and Smith System Engineering*
- National Economic Research Associates (NERA) and Smith System Engineering (1998b) 'A Study To Estimate The Economic Impact Of Government Policies Towards Digital Television', Appendix *National Economic Research Associates and Smith System Engineering* At URL <[Http //www culture gov uk/role/index html](http://www.culture.gov.uk/role/index.html)> Visited 18/12/00
- Net Gains (2000) 'Eircom Will No Longer Control the 'Last Mile' *Net Gains* Volume 2, Number 22
- Nicoll, Derek (1999) 'As Viewers Become Consumer-Users' In Jensen, Jens and Cathy Toscan (Ed) (1999) *Interactive Television TV of the Future or the Future of TV* Aalborg University Press Aalborg, pp 119-148, pp 191-231, p221-222
- Nolan, Dermot (1997) 'Bottlenecks in Pay Television Impact on Market Development in Europe' *Telecommunications Policy* Volume 21, Number 7, pp 596-610
- Northover Smith, Adrian (2000) 'The Future of TV' Conference Paper *IBC Conference* IBC Conference Amsterdam

Northover Smith, Adrian (2000) 'Interactive iDTV's' In 'Seminar on Added Value Services for DTT' *Digital Terrestrial Television Action Group* Dublin European Broadcast Union

Noam, Shl (1997) 'Beyond Spectrum Auctions' *Telecommunications Policy*, Volume 21, Number 5, pp 461-475

Noll, A Micheal (1998) 'The Digital Mystique A Review of Digital Technology and Its Application To Television', *Prometheus*, Volume 16, Number 2, P148

Norcontel (1997) 'Economic Implications of New Communication Technologies On the Audio-Visual Markets' *Norcontel* European Union DG X At URL <[Http //europa eu int/comm/dg10/avpolicy/key_doc/new_comm/mdex.html](http://europa.eu.int/comm/dg10/avpolicy/key_doc/new_comm/mdex.html)> Visited 18/12/00

NTL (1999) 'The UK DTT Network - Architecture, System Integration and Operation' *NTL* At URL <[Http //www ntl co uk/ibc99/conference-paper1/conference-paper34network.asp](http://www.ntl.co.uk/ibc99/conference-paper1/conference-paper34network.asp)> Visited 18/12/00

O

O'Connor, B (eds) (1997) *Irish Audiences, Power and Cultural Identity* Dublin UCD Press

O'Keefe, Barry (2000) 'Eircom Plans Range of New Services Via Cable TV' *Irish Times* At URL <[Http //www ireland com/newspaper/finance/2000/0316/fin4.htm](http://www.ireland.com/newspaper/finance/2000/0316/fin4.htm)> Visited 18/12/00

O'Keefe, Barry (1999) 'Princes To Enter Telephony Market', *Irish Times*, February 26th

O'Keefe, Barry (1999) 'UTV Focuses On Republic's Market', *Irish Times*, February 26th

O'Neill, Micheal and Feargal O'Rourke (1999) 'Broadcasting Bill Paves Way for the Digital Revolution' *Irish Times*

<[Http //www ireland com/scripts search/high_ath=/newspaper/finance/1999/0611/fin14 htm](http://www.ireland.com/scripts/search/high_ath=/newspaper/finance/1999/0611/fin14.htm)> Visited 06/11/99

O'Siochu, Sean (1999) 'Ireland Cable Television Licenses Renewed' *Bulletin* Volume 16, Number 1, pp 15

Organisation for Economic Co-Operation and Development, Directorate for Financial, Fiscal and Enterprise Affairs Committee On Competition Law and Policy (OECD) (1998) '*Regulation and Competition Issues in Broadcasting in the Light of Convergence*' Organisation for Economic Co-Operation and Development Paris, p31

Oreja (1997) 'Exclusive Rights for TV Broadcasting of Major (Sports) Events' *Commission of the European Communities* At URL

<[Http //europa eu int/en/record/other/tven htm](http://europa.eu.int/en/record/other/tven.htm)> Visited 06/06/00

Office of the Director of Telecommunications Regulation (2000a) 'Delivery of Licensed Programme Services Consultation Paper' *Office of the Department of Telecommunications Regulation* Document Number 00/51 Dublin Office of the Director of Telecommunications Regulation

Office of the Director of Telecommunications Regulation (2000b) 'ODTR Response Towards a new Framework for Electronic Communications Infrastructure and Associated Services, The 1999 Communications Review Communication from the Commission to the European Parliament, the Council, the Economic and Social Committee and the Committee of the Regions COM (1999) 539' *Office of the Department of Telecommunications Regulation* Document Number 00/12 Dublin Office of the Director of Telecommunications Regulation ODTR Annex D, p20

Office of the Director of Telecommunications Regulation (2000c) 'ODTR Response to New Regulatory Framework for Electronic Communications Infrastructure and Associated Services Commission Communication COM (2000) 239 (Final) and Associated Working Papers' *Office of the Department of Telecommunications Regulation* Document Number 00/34 Dublin Office of the Director of Telecommunications Regulation, pp14-16

Office of the Director of Telecommunications Regulation (2000) 'Consumers Will Demand More From The Liberalised Telecoms Market – Regulator Looks Forward To This Development' *Office of the Department of Telecommunications Regulation* Dublin Office of the Director of Telecommunications Regulation

Office of the Director of Telecommunications Regulation (ODTR) (2000) 'Licensing Digital Terrestrial Television A Consultation Paper' *Office of the Department of Telecommunications Regulation* Document Number 99/57 Dublin Office of the Director of Telecommunications Regulation, pp 15-16

Office of the Director of Telecommunications Regulation (2000) '1998-1999 Annual Report, Breaking Barriers, Facilitating Innovation' *Office of the Department of Telecommunications Regulation* At URL <[Http //www odtr ie](http://www.odtr.ie)> Visited 31/07/00

Office of the Director of Telecommunications Regulation (ODTR) (2000) 'ODTR Response Towards A New Framework for Electronic Communications Infrastructure and Associated Services, the 1999 Communications Review Communication From the Commission To the European Parliament, the Council, the Economic and Social Committee and the Committee of the Regions COM (1999) 539' *Office of the Department of Telecommunications Regulation* Document Number 00/12 Dublin Office of the Director of Telecommunications Regulation, p12

Office of the Director of Telecommunications Regulation (ODTR) (2000) 'Review of Major Activities of the ODTR, July 1999 – February 2000' *Office of the Department of Telecommunications Regulation* Document Number 00/18 Dublin Office of the Director of Telecommunications Regulation

Office of the Director of Telecommunications Regulation (1999) 'Office of the Director of Telecommunications Regulation (ODTR) to the Select Committee on Heritage and the Irish Language The Broadcast Bill (1999)' *Office of the Department of Telecommunications Regulation* Document Number 00/08 Dublin Office of the Director of Telecommunications Regulation

Office of the Department of Telecommunications Regulation (1999a) 'Licensing Digital Terrestrial Television Consultation Paper' *Office of the Department of Telecommunications Regulation* Dublin Office of the Director of Telecommunications Regulation

Office of the Department of Telecommunications Regulation (1999b) 'Text of Proposed Amended Programme Services Distribution Licence' *Office of the Department of Telecommunications Regulation* Dublin Office of the Director of Telecommunications Regulation

Office of the Department of Telecommunications Regulation (1999c) 'Television Deflector Licensing Report on the Consultation' *Office of the Department of Telecommunications Regulation* Dublin Office of the Director of Telecommunications Regulation

Office of the Department of Telecommunications Regulation (1998a) 'Television Transmission Licensing For Cable and MMDS Systems' *Office of the Department of Telecommunications Regulation* Dublin Office of the Director of Telecommunications Regulation

Office of the Department of Telecommunications Regulation (1998b) 'The Future of TV Transmission in Ireland The Way Forward' *Office of the Department of Telecommunications Regulation* Dublin Office of the Director of Telecommunications Regulation

Office of the Department of Telecommunications Regulation (1998c) 'Draft Conditions for the Operation of Conditional Access Systems' *Office of the*

Department of Telecommunications Regulation Document Number 98/68 Dublin
Office of the Director of Telecommunications Regulation

Office of the Department of Telecommunications Regulation (1998d) 'Draft Conditions for the Operation of Digital Cable Television Systems' *Office of the Department of Telecommunications Regulation* Dublin Office of the Director of Telecommunications Regulation

Office of the Director of Telecommunications Regulation (ODTR) (1998) 'Extending Choice Opening the Market for Fixed Wireless Point To Multi-Point Access Services Consultation Paper' *Office of the Department of Telecommunications Regulation* Document Number 98/32 Dublin Office of the Director of Telecommunications Regulation

Office of the Director of Telecommunications Regulation (1998) 'Television Transmission Licensing for Cable and MMDS Systems Report On the Consultation' Number ODTR 98/63 At URL <[Http //www odtr ie](http://www.odtr.ie)> Visited 31/07/00

Office of Telecommunications (2000) 'Residential Survey on Consumers' use of Digital Television' *Office of Telecommunications* At URL <[Http //www oftel co uk](http://www.oftel.co.uk)> Visited 21/08/00

Office of Telecommunications (1998) 'Beyond The Telephone, The Television and The PC - III' *Office of Telecommunications* UK Government publication

P

Peters, J (1993) 'Distrust of Representation Habermas on the Public Sphere' *Media, Culture and Society* Volume 15, pp 541-71

Peregine, Adrian (1998) 'Learning How To Surf' *Television Business International* May/June

Peek, Theo (2000) 'The DVB Momentum' *TVBEurope* At URL

<[Http //www tvbeurope com/](http://www.tvbeurope.com/)> Visited 31/05/00

Porter, Vincent (1999) 'Public Service Broadcasting and the New Global Information Order' *Intermedia* Volume 27, Number 4

Postal and Telecommunications Services (Amendment) Bill, 1998 Order for Second Stage Minister for Public Enterprise (Mrs O'Rourke) *Dail Debates Official Report* At URL <[Http //www irlgov ie/oireachtas/frame htm](http://www.irlgov.ie/oireachtas/frame.htm)> Visited 18/12/00

Price, Chris (2000) 'All in One Solution' *Cable and Satellite Europe* April, p4

Preston, Paschal and Andrea Grisold (1995) 'Unpacking the Concept of Competition in Media Policy Making the Case of Austria and Ireland' In *Democracy and Communication in the New Europe Change and Continuity in East and West* Corcoran, Farrel and Paschal Preston (Editors) Hamption Press New Jersey, pp 67-96

Preston, Paschal (1995) 'Competition in the Telecommunications Infrastructure' *Telecommunications Policy* Volume 19, Number 4, pp 253 – 271

Preston, Paschal (1994) 'Summary Notes and Commentaries on Recent Political, Economical and Communications Policy Documents' *Dublin City University* Dublin Dublin City University

Press Release (1999) 'Boost to Information Society as BT Signs up Suppliers for ADSL' *British Telecom* At URL <[Http //www partnership bt com/](http://www.partnership.bt.com/)> Visited 18/12/00

Pursiainen, Harri (1999) 'Policies and Priorities For Telecommunications In Europe' *Intermedia* Volume 27, Number 4

Q-R

- Raboy, Marc (1998) 'Public Broadcasting and the Global Framework of Media Democratization' *Gazette* Volume 60, Number 2, pp 167-181
- Raboy, Marc (1994) 'The Role of the Public in Broadcasting Policy-Making and Regulation Lesson for Europe From Canada' *European Journal of Communication* Volume 9, pp 5-23
- Rapp, Lucien (1996) 'Public Service or Universal Service' *Telecommunications Policy* Volume 20, Number 6, July, pp 391-46
- Radio Telefis Eireann (1998) 'The Future Delivery Of Television Services In Ireland' *Radio Telefis Éireann* Dublin Radio Telefis Eireann
- Radio Telefis Eireann (1996) 'The Impact of Digital technology on the Transmission of the Television Services' *Radio Telefis Eireann* Dublin Radio Telefis Eireann
- Raeder, Linda (1998) 'Hayek Liberalism and the Common Good A Hayekian Perspective On Communitarianism' *Independent Review* Volume 2, Number 4, Spring, pp 519-535
- Radiocommunications Agency (1999) 'Spectrum Pricing Implementing the Third Stage and Beyond' *Radiocommunications Agency* At URL [<Http //www radio gov uk/>](http://www.radio.gov.uk/) Visited 18/12/00
- Unmetered Telecommunications Group (1999) 'Campaign For Unmetered Telecommunications' *Unmetered Telecommunications Group* At URL [<Http //www unmetered org uk/>](http://www.unmetered.org.uk/) Visited 18/12/00
- Radiocommunications Agency (2000) 'Spectrum Auction' *Radiocommunications Agency* At URL [<Http //www spectrumauctions gov uk/>](http://www.spectrumauctions.gov.uk/) Visited 18/12/00
- Rasmussen, Terje (1999) 'New Media Change' In Jensen, Jens and Cathy Toscan (Ed) (1999) *Interactive Television TV of the Future or the Future of TV* Aalborg University Press Aalborg, pp 119-148

Renaus, Jean-Luc (2000) 'HDTV Europe the Saga Continues' *Cable and Satellite Europe* April, pp 32-44

Regourd, Serge (1998) 'Convergence, European Style' *Le Monde Diplomatique* At URL <[Http //monde-diplomatique fr/en/1998/03/?c=15telereg](http://monde-diplomatique.fr/en/1998/03/?c=15telereg)> Visited 16/06/00

Reuters (2000) 'EU Set To Move Telecoms Monopolies' *Irish Times* July 10th, p16

Roberts, Dan (1999) 'Wireless Internet, Next Year' *Daily Telegraph* At URL <[Http //www telegraph co uk 80/et?ac=001723865129962&rtmo=3qwYrAqM&atmo=6666qa5J&pg=/et/99/7/6/cnmt06.html](http://www.telegraph.co.uk/80/et?ac=001723865129962&rtmo=3qwYrAqM&atmo=6666qa5J&pg=/et/99/7/6/cnmt06.html)> Visited 06/07/99

Roberts, Dan (1999) 'Orange launches Internet By Phone' *Daily Telegraph* At URL <[Http //www telegraph co uk 80/et?ac=001723865129962&rtmo=awNX8JpL&atmo=666666BJ&pg=/et/99/7/2/cnorg02.html](http://www.telegraph.co.uk/80/et?ac=001723865129962&rtmo=awNX8JpL&atmo=666666BJ&pg=/et/99/7/2/cnorg02.html)> Visited 02/02/99

S

Savage, Robert J (1966) '*Irish Television The Political and Social Origins*' Cork Cork University Press

Salmon, Peter (2000) 'A Gambler – and Proud of It' *Guardian* At URL <[Http //www newsunlimited co uk/media/story/0,3605,143775,00.html](http://www.newsunlimited.co.uk/media/story/0,3605,143775,00.html)> Visited 05/12/00

Sawhney, Harmeet (1994) 'Universal Service Prosaic Motives and Great Ideals' *Journal Of Broadcasting and Electronic Media* Volume 38, Number 4, pp 375-396

Scalise, Fabio (2000) 'Wireless Terrestrial Return Channel' *TVBEurope* At URL <[Http //www tvbeurope com/current_issue/dtv5.html](http://www.tvbeurope.com/current_issue/dtv5.html)> Visited 31/0/2000

Scannell, Paddy (1990) 'Public Service Broadcasting The History Of A Concept' In Goodwin, Andrew and Gary Whannel (ed) *Understanding Television* London Routledge, pp 11-30

Schudson, Michael (1992) 'Was There Ever A Public Sphere' In Golding, Peter and Graham Murdock (1997) *The Political Economy of the Media* Volume 3 Cheltenham and Vermont Edward Elgar Publications, pp 192-214

Schiller, Dan (1997) 'O, What A Tangled Web We Weave' *Index on Censorship* Volume 26, Number 3, Issue 176

Schreiber, Dominic (1999) 'Cable Realises Digital Potential' *Cable and Satellite* January, Number 181

Schrage, Klaus and Josef Trapp el (1998) 'Public Service Broadcasting Its Strategic Importance in the Transition From Analogue To Digital' *Bulletin* At URL <http://www.eim.de/dec-98-2.htm> Visited 29/06/00

Schoof, Hans Ans Adam Watson Brown (1995) 'Information Highways and Media Policies in the European Union' *Telecommunications Policy* Volume 19, Number 4, pp 325-338

Scannell, Paddy (1989) 'Public Service Broadcasting and Modern Public Life' *Media, Culture and Society* Volume 11, pp 135-166

Schafer Gross, Lynne (1986) *Telecommunications An Introduction To Radio, Television and Other Electronic Media* Iowa Brown Publishers

Screen Digest (2000) 'Second Box Supplier for UK Cable Group' February, p43

Screen Digest (2000) 'ATSC U-Turns On US DTT Standard' July, p196

Screen Digest (2000) 'US Networks Join DTT Standards Criticism' July, p196

- Screen Digest. (2000). 'NTL and Mircosoft Tie for UK Interactive DTT'. January, p1.
- Screen Digest. (2000). 'iDTV Get Concerted Push in UK'. June, p164.
- Screen Digest. (2000). 'Interactive Cable TV for Germany and Ireland'. June, p173.
- Screen Digest. (2000). 'The European Broadband Internet Market'. February, P60.
- Seaton, Jean (1998). Introduction: Politics and The Media. *Political Quarterly*. Oxford: The Political Quarterly Publishing Company, pp 1-7.
- Shurmer, Mark. (1997). 'Future Demand for Pay-TV in the UK'. *Telecommunications Policy*. Volume 21, Number 7, pp 611-618.
- Siune, Karen and Woflgang Truetzschler. (1992). *Dynamics Of Media Politics: Broadcast and Electronic Media In Western Europe*. London: Sage Publications.
- Silverstone, Roger. (1996). 'Future Imperfect: Information and Communication Technologies In Everyday Life'. In Dutton, William, H (ed.) (1996). *Information and Communication Technologies: Visions and Realities*. Oxford: University Press, pp 217-231.
- Sheldon, Nigel. (1997). 'The Digital Dawn', *Admap*, December, Number 380.
- Smith, Anthony (1993). 'Licences and Liberty'. *Books To Bytes*. London: British Film Institute, pp 154-167.
- Squires, Neil and Ben Summerskill (1999). 'BBC In Move To Pay View TV'. *Daily Express*. At URL: <[Http://www.lineone.net/express/99/07/07/news/n0100splash-d.html](http://www.lineone.net/express/99/07/07/news/n0100splash-d.html)>. Visited 07/07/00.
- Statutory Instrument Number 73 (1999). 'Wireless Telegraphy (Programme Services Distribution) Regulations'. *Department of Public Enterprise*. Dublin: Department of Public Enterprise.

Statutory Instrument Number 262 (1998) European Communities (Use of Standards for the Transmission of Television Signals) Regulations *Department for Public Enterprise* At URL <

[Http://www.irlgov.ie/tec/communications/comlegislation/262s198.htm](http://www.irlgov.ie/tec/communications/comlegislation/262s198.htm)> Visited 17/02/00

Statutory Instrument Number 39 (1989) 'Wireless Telegraphy (Television Programme Retransmission) Regulations' *Department of Public Enterprise* Dublin Department of Public Enterprise

Statutory Instrument Number 67 (1974) 'Wireless Telegraphy (Wired Broadcast Relay Licence) Regulations' *Department of Public Enterprise* Dublin Department of Public Enterprise

Stemers, Jeannette (1998) 'Broadcasting Is Dead Long Live Digital Choice' *Convergence The Journal of Research into New Media Technologies* Spring, Volume 3, Number 1

Stemers, Jeannette (1998) 'Top Dogs Or New Dogs Who Will Control Multi-Channel Digital Television In Europe' *Convergence The Journal of Research into New Media Technologies* Spring, Volume 4, Number 1

Steel, Peter B, and August E Grant (1997) *Broadcast Technology Update* MA Focal Press /Video Production Technologies

Stewart, James 'Interactive Television At Home' In Jensen, Jens and Cathy Toscan (Ed) (1999) *Interactive Television TV of the Future or the Future of TV* Aalborg University Press Aalborg, pp 119-148, p 261

Stevenson, Nick (1995) '*Understanding Media Cultures Social Theory and Mass Communication*' Sage London, P140

Shapiro, Mitch (2000) 'HDTV in the US' *Cable and Satellite Europe* April, p38

- Smith, Patrick (2000) 'EU Liberalising Telecommunications' *Irish Times* At URL <[Http //www ireland com/newspaper/finance/2000/0713/fin7 htm](http://www.ireland.com/newspaper/finance/2000/0713/fin7.htm)> Visited 13/07/00
- Smyth, Jamie (2001) 'Reorganisation, 200 job loses in Multimedia' *Irish Times* April 10th, 2001, p 16
- Smyth, Jamie (2000) 'Major Telecoms Operators Should Co-Operate – EU' *Irish Times* At URL <[Http //www ireland com/newspaper/finance/2000/0427/fin7 htm](http://www.ireland.com/newspaper/finance/2000/0427/fin7.htm)> Visited 27/04/00
- Smith, Paul (1999) 'The Politics of UK Television Policy the Introduction of Digital Television' *International Journal of Communications Law and Policy* Issue 3, Summer 1999, pp 1-20
- Stanton, Helen (1999) 'Eircom Response To the EU 1999 Communications Review' *Eircom* At URL <[Http //www ispo cec be/infosoc/telecompolicy/review99/comments/eircom15b htm](http://www.ispo.cec.be/infosoc/telecompolicy/review99/comments/eircom15b.htm)> Visited 20/07/00
- Straw, James '*Telecommunications and Deregulation*' Artech House Boston/London, p134
- Stylhadou, Melpomeni (1997) 'Applying EC Competition Law to Alliances in the Telecommunications Sector' *Telecommunications Policy* Volume 21, Number 1, pp 47-58
- Sweeney, Conor (2000) 'EU Will Force Eircom to Give Up Monopoly on the Line Rental' *Irish Independent* At URL <[Http //www independent ie/2000/194/d04a.shtml](http://www.independent.ie/2000/194/d04a.shtml)> Visited 13/07/00
- Sussman, Gerald (1997) *Communication, Technology and Politics In The Information Age* California Sage Publications

T

Tarjanne, Pekka (1999) 'Telecommunications and The ITU' *InterMedia* Volume 27, Number 1, pp 9-12

Taylor, Cliff (1999) 'RTE Surplus Remains Steady But Broadcasting Losses Rise By £2m' *Irish Times* September, 11, pp 21

Taddia, Marialuisa and Paul Davies 'Vivendi Universal Gets Leverage Against Murdock' *New Media Markets* Volume 18, Number 23, p5

Tadayoni, Reza and Knud Erik Skouby (1999) 'Terrestrial Digital Broadcasting, Convergence and Its Regulatory Implications' *Telecommunications Policy* March, Volume 23, Number 2, p18

Tambini, Damien and Roza Tsagarousianou and Cathy Byran (Eds) (1998) *Cyberdemocracy Technology, Cities and Civic Networks* Routledge London

Thesing, Gabi (2000) 'Battle for the Box' *Business and Finance* At URL
<[Http //www businessandfinance ie/bandf/pages/cover1 html](http://www.businessandfinance.ie/bandf/pages/cover1.html)> Visited 03 07/00

Thesing, Gabi (2000) 'Irish Multichannel To Bundle Services' *Business and Finance* Volume 36, Number 29, p3

Thesing, Gabi (1999) 'Phoney War (Again)' *Business and Finance* December 2nd

Thesing, Gabi, (1998) 'Cablelink to be Sold Off' *Business and Finance* Volume 34, Number 10, January 15th

Thesing, Gabi (1998) 'Cable's Ownership' *Business and Finance* Volume 134 Number 10 January 15th

- Thornton, Alinta (1997) 'Does Internet Create Democracy?' *University of Technology, Sydney* At URL <[Http //www wr com au/democracy/thesis1 htm](http://www.wr.com.au/democracy/thesis1.htm)> Visited 18/12/00
- Tittel, Ed, James, Steve (1996) *ISDN Networking Essential* London Academic Press
- Tonge, Gary (1998) 'Digital TV - Now and Next' *Journal Of The Royal TV Society* Volume 35, Number 9, January/February, 1998
- Tongue, Carole (1999) 'Euro Vision' *Stage, Screen and Radio* May, pp 16-7
- Tongue, Carole (1996) 'The Future Of Public Service Television in a Multi-Channel Digital Age' *Cinema and Audiovisual Intergroup of the European Parliament* At URL <[Http //www poptel org uk/carole-tongue/index2 html](http://www.poptel.org.uk/carole-tongue/index2.html)> Visited 18/12/00
- Tongue, Carole (1998) 'Submission on the Green Paper on the Convergence of the Telecommunications, Media and Information Technology Sectors and the Implications for Regulation' *Cinema and Audiovisual Intergroup of the European Parliament* At URL <[Http //www poptel org uk/carole-tongue/index2 html](http://www.poptel.org.uk/carole-tongue/index2.html)> Visited 18/12/00
- Tracy, Micheal (1998) '*The Decline and Fall Of Public Service Broadcasting*' Oxford Oxford University Press
- Tracy, Micheal (1996) 'Beyond Governance The Triumph Of Populism and Parochialism in the 21st Century' *Javnost/The Public* Volume 3, Number 2, pp 23-34
- Travers, John (1999) ForFas 'Case Study Dublin, Ireland The Role of Information Technology in Attracting foreign Investment, Creating Industrial Zones and Developing Human Resources' *ForFás* World Bank Washington D C , p16

Trench, Brian and Susan O'Donnell. (1997). 'The Internet and the Expansion of Democratic Practices in Ireland'. *Dublin City University*. Dublin: Dublin City University.

Truetzschler, Wolfgang and Mary Kelly. (1992). 'Ireland'. In Ostergaard, Bernt Stubbe (ed), (1992). *The Media in Western Europe: The Euromedia Handbook*. London: Sage, pp 108-123.

Tsagarousianou, Roza. (1998). 'Back To the Future of Democracy?: New Technologies, Civil Networks and Direct Democracy in Greece', p15. In Tsagarousianou, Roza, and Damien Tambini and Cathy Byran (Eds.). (1998). *Cyberdemocracy: Technology, Cities and Civic Networks*. Routledge: London.

Turner, Colin. (1997). *Trans-European Telecommunication Networks: The Challenges for Industrial Policy*. London: Routledge.

U-V

Ungerer, Herbert. (1995). 'EU Competition Law in the Telecommunications, Media and Information Technology Sectors'. *Fordham Corporate Law Institute*. At URL: <[Http://europa.eu.int/comm/competition/speeches/text/sp1995_041_en.pdf](http://europa.eu.int/comm/competition/speeches/text/sp1995_041_en.pdf)>. Visited 18/12/00.

Ungerer, Robert. (1999?). 'Ensuring Efficient Access to Bottleneck Facilities. The Case of Telecommunications in the European Union'. *Commission of the European Communities*. At URL: <[Http://europa.eu.int/comm/competition/speeches/text/sp1998_056_en.pdf](http://europa.eu.int/comm/competition/speeches/text/sp1998_056_en.pdf)>. Visited 18/12/00.

Unmetered Telecommunications Group (1999). 'Campaign For Unmetered Telecommunications'. *Unmetered Telecommunications Group*. At URL: <[Http://www.unmetered.org.uk](http://www.unmetered.org.uk)>. Visited 18/12/00.

- Uhlig, Robert (1999) 'OfTel Plans to End BT's Local Call Monopoly' *Daily Telegraph* At URL <[Http //www telegraph co uk 80/et?ac=001723865129962&rtmo=ISQlFQzt&atmo=YYYYYYYp&pg=/et/99/7/7/oft07.html](http://www.telegraph.co.uk/80/et?ac=001723865129962&rtmo=ISQlFQzt&atmo=YYYYYYYp&pg=/et/99/7/7/oft07.html)> Visited 07/07/00
- Uricchio, William (1999) 'History of New Media' *New Media Developments Trends in Communications* Boom Publishing Amsterdam, pp 103-111,195
- Van Cuilenburg, Jan (1999) 'On Competition, Access and Diversity in Media, Old and New' *New Media and Society* Volume 1, Number 2, pp 183-207
- Van Cuilenburg, Jan and Paul Slaa (1996) 'From Media Policy towards a National Communications Policy Broadening the Scope' *European Journal of Communication* Volume 8, pp 149-176
- Van Miert, Karel (1997), 'Impact of Digital Technologies on the Telecommunications and Television Sectors' *Commission of the European Communities* At URL <[Http //europa eu int/comm/competition/speeches/text/sp1997_032_en.html](http://europa.eu.int/comm/competition/speeches/text/sp1997_032_en.html)> Visited 18/12/00
- Venturelli, Shalini S (1993) 'The Imagined Transnational Public Sphere in the European Community's Broadcast Philosophy Implications for Democracy' *European Journal Of Communication* Volume 8, pp 491-518
- Veljanovski, Cento (ed) (1989) *Freedom In Broadcasting* London Institute of Economic Affairs
- Volta Publishing (1999) 'Q & A With Ms Etan Doyle, Director of Telecommunications Regulation (ODTR)' *Volta Publishing* At URL <[Http //www voltapubhshing com/cgi-bin/qa/index cgi?ref=browse&f=view&id=942655920194106137130&block=>](http://www.voltapublishing.com/cgi-bin/qa/index.cgi?ref=browse&f=view&id=942655920194106137130&block=>)> Visited 15/11/99

W- Z

- Waldman, Simon (1999) 'Why Do We Put Up With Dead PCs?' *Guardian* At URL
<<http://www.newsunlimited.co.uk/media/story/0,3605,56963,00.html>> Visited
10/06/99
- Wallis Joe and Brian Dolley (1999) *Market Failure, Government Failure,
Leadership and Public Policy* Macmillan London, pp 16-17
- Watson, Iarfhlaith (1999) 'Teilifis Na Gaeilge as a Public Sphere' *Irish
Communications Review* At URL
<<http://www.icr.dit.ie/journal/articles/article05.html>> Visited 18/12/00
- Webster, Frank (1995) 'Information Management and Manipulation Jürgen
Habermas and The Decline of the Public Sphere' *Theories Of The Information
Society* London Routledge, pp 101-111
- Webster, Frank (1995) *'Theories of the Information Society'* London Routledge
- West, Don (1998) 'The Dawn of Digital Television' *Cable and Broadcasting*
Volume 128, Number 47, November 16th
- Wilson, Kevin G (1992) 'Deregulating Telecommunications and The Problem Of
Natural Monopoly A Critique Of Economics In Telecommunications Policy' *Media,
Culture and Society* Volume 14, pp 343-368
- Wills, Micheal (1999) 'Micheal Wills Unveils Wireless Revolution' *British
Government* At URL <<http://213.38.88.195/coi/coipress.nsf/>> Visited 18/12/00
- Williams, Raymond (1974) *Television, Technology and Cultural Form* London
Fontana
- Winsbury, Rex (1999) 'Public Space On The Internet An On-Line Search for a PSB
Portal into the Twenty-First Century' *Intermedia* Volume 27, Number 3
- Winston, Brian (1998) *Media, Technology and Society* London Routledge

Winston, Brian (1980) 'The Illusion of Revolution' In Tom Forester (Ed) (1980) '*Computers in the Human Context Information Technology, Productivity and People*' Oxford Blackwell, pp 71-81

Working Group Seven On the Advanced Group On Information and Telecommunications Standards (1999) 'Introduction to Digital Television' *Working Group Seven On the Advanced Group On Information and Telecommunications Standards* At URL <[Http //www teltec dcu ie/agitSWG7](http://www.teltec.dcu.ie/agitSWG7)> Visited 18/12/00

Yeomans, Keith (1999) 'Global Knowledge and Global Poverty' *InterMedia* Volume 27, Number 1, pp 37-39