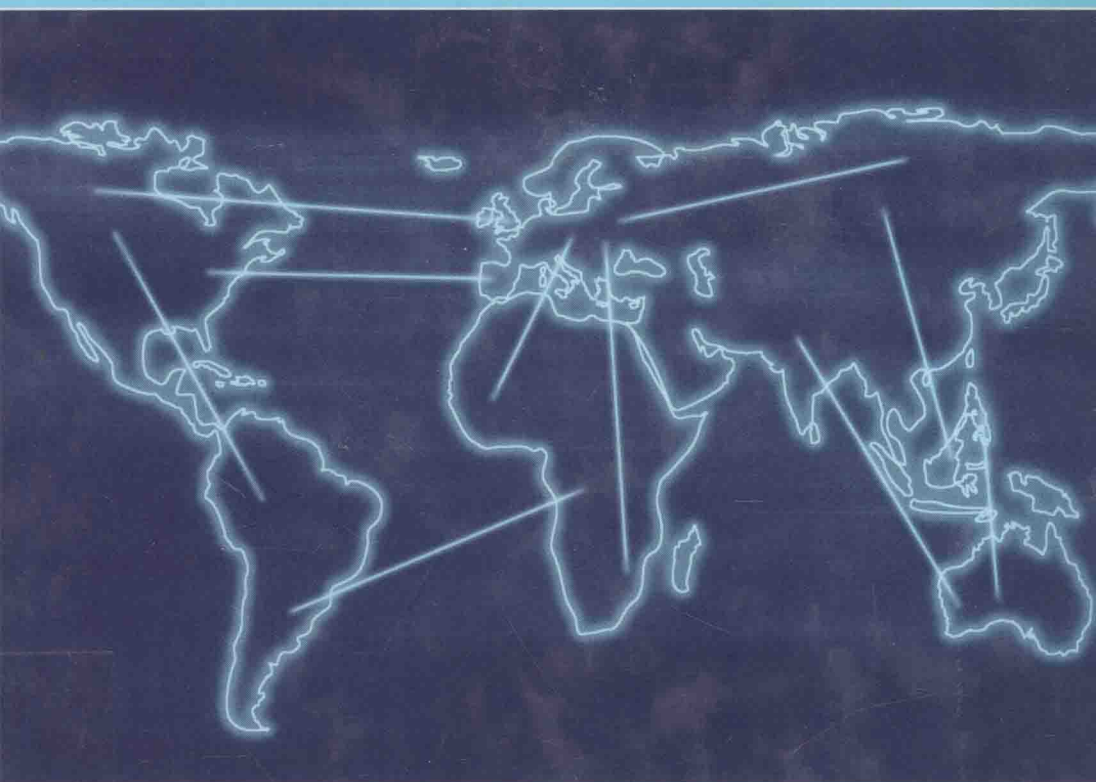


# Digital Broadcasting

## Policy and Practice in the Americas, Europe and Japan



Edited by Martin Cave • Kiyoshi Nakamura

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and Japan

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## Foreword

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This volume originated in a conference at Waseda University in Tokyo, chaired by one of us (Nakamura) which heard presentations on the development of digital television from authors from Asia, Europe and the United States. We have since extended the material by adding additional perspectives from a greater number of European countries and from Latin America. A number of thematic issues, particularly relating to platform competition and digital rights, have also been addressed. We believe the volume provides an account of the state of play in a number of major countries, forgotten with analyses of where digital broadcasting is likely to go, and to take the communications sector more widely. We are grateful to Gill Allen for help in preparing the manuscript and to Alice Cave for editorial assistance.

Martin Cave  
Kiyoshi Nakamura

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# Contents

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<i>List of contributors</i>	vii
<i>Foreword</i>	viii
<i>Acknowledgements</i>	ix
1. Digital television: an introduction <i>Martin Cave and Kiyoshi Nakamura</i>	I
PART I THE DEVELOPMENT OF DIGITAL BROADCASTING	
2. The DTV transition in the US <i>Evan Kwerel and Jonathan Levy</i>	25
3. Digital broadcasting in the developing world: a Latin American perspective <i>Hernan Galperin</i>	39
4. DTT and digital convergence: a European policy perspective <i>Gilles Fontaine and Gerard Pogorel</i>	54
5. The development of digital broadcasting in Italy <i>Alfredo Del Monte</i>	79
6. The development of digital television in the UK <i>Martin Cave</i>	105
7. A perspective on digital terrestrial broadcasting in Japan <i>Kiyoshi Nakamura and Nobuyuki Tajiri</i>	120
PART II CONTENT RIGHTS AND DIGITAL BROADCASTING	
8. Legal and economic issues of digital terrestrial television (DTTV) from an industrial perspective <i>Koichiro Hayashi</i>	139
9. The management of digital rights in pay TV <i>Campbell Cowie and Sandeep Kapur</i>	162
10. Copy control of digital broadcasting content: an economic perspective <i>Koji Domon and Eulmoon Joo</i>	187

PART III DIGITAL BROADCASTING AND PLATFORM  
COMPETITION

11. Regulation of digital TV in the EU: divine coherence or human inconsistency? <i>Luca Di Mauro</i>	203
12. Platforms for the development of digital television broadcasting and the Internet <i>Hajime Oniki</i>	230
13. Economies of scale, scope and vertical integration in the provision of digital broadcasting in Japan <i>Hitoshi Mitomo and Yasutaka Ueda</i>	253
14. Comparative analysis of the market structure of broadcasting and telecommunications in Japan <i>Sumiko Asai</i>	272
<i>Index</i>	285



# 1. Digital television: an introduction

**Martin Cave and Kiyoshi Nakamura**

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The purpose of this chapter is to set in context the contributions which follow describing the development of digital television in a range of American, Asian and European countries, and also discussing certain general issues in the development of broadcasting in the digital era, including the provision of spectrum, protection of property rights and containment of market power.

The first section outlines the development of digital television broadcasting globally. The second section describes the value chain in digital broadcasting, identifies where market power might be exercised, and discusses possible remedies. The third section discusses some of the issues associated with providing spectrum for digital broadcasting, and the implications of digital switch-over. The final section provides a brief review of the chapters which follow.

## WHAT IS DIGITAL TELEVISION AND WHO GETS IT AND HOW?

Hernan Galperin's book on digital television in the UK and the USA eloquently explains in its first paragraph what digital television does:

the transition from a world of spectrum scarcity, dumb terminals, and one-way services, to a world of on-demand programming, intelligent terminals, and abundant channels – namely, a transition from analogue to digital TV. Heralded as the most important innovation in the history of the industry, digital TV involves the reconfiguration of a sector that, beyond its economic significance, is central to the mechanisms of democratic politics and the evolution of popular culture. This is certainly not the first time that the television industry faces reorganization on a massive scale. But for the most part past technological innovations have spurred evolutionary, not revolutionary change. An old black-and-white TV set would probably be able to pick up several colour TV signals. Analogue cable branded packages of programming called channels. The transition to digital TV is different. It requires a complete retooling of the existing video production and distribution infrastructure, from studio cameras

to transmission towers. It requires new mechanisms to compensate content creators and is distributed in a world where conventional ads can be skipped and perfect copies made and distributed with the click of a button. And it requires new tools for viewers to navigate the maze of programming and new services available, much like Internet browsers help us find our way through the World Wide Web (Galperin 2004, p. 3).

The world may be going down this road, but it is doing so in different proportions and at different speeds in different countries. What we observe is the progressive addition of new services which offer viewers first more channels, made possible by the much greater compression attainable under digital rather than analogue technology;<sup>1</sup> then some interactivity, which can involve an enhanced electronic programme guide (EPG), for example with a search engine, content on demand, opportunities to modify a programme via display of additional information or choice of camera angle, interactive advertising, and use of the television to play games or place bets (Jensen 2005); then, in the more distant future, a more comprehensive change in the economic and social relations linking consumers, content providers, and all the intermediate steps in the processes linking providers and consumers of content.

We will begin with platforms, because these are the most visible aspect of the new digital production processes. Initially we had analogue terrestrial transmission, then (in some countries) low capacity analogue cable, then analogue satellite, offering many channels over a significant 'footprint' served by a transmitter in geo-stationary orbit. Compared with analogue terrestrial, cable and satellite broadcasting was already beginning to chip away at the limitation on access to content supported by barriers to entry arising from limited spectrum availability – or the reluctance to release what there was or the part of governments which were often in thrall to politically influential incumbents.

Transition to digital platforms both expands the capacity of each and breaks down divisions among different types of communication, such as television, voice communication or access to the internet (a process often known as convergence). Table 1.1, adapted from Chapter 6, exposes the range of possibilities – either available or in prospect.

The take up of digital TV is variable throughout the world. Table 1.2 shows take up rates in 2005 in a range of countries. The UK had reached the highest level – nearly 70 per cent. Other countries, such as the Netherlands with nearly 100 per cent cable penetration, had barely made a start. The take up rate of DTT in the United States remained very low – see Kwerel and Levy (Chapter 2) below – although satellite services were completely digital, cable increasingly so and DTT was widely avail-

Table 1.1 Characteristics of digital platforms

Platform	Services	Approximate capacity to home	Interactivity	Strengths	Weaknesses
Digital cable	TV, radio, PPV, interactive services	Equivalent to about 800 TV channels	Good scope – integrated return path	Large bandwidth Integrated return path	Limited return path capacity Fragmented networks add to costs
Digital terrestrial transmission	TV, radio, interactive services	4–6 times analogue capacity (say 40–80 channels)	Limited scope and no return path	Large bandwidth Mobile and portable indoor use (theoretically) Local differentiation possible	No integrated return path Expensive way to achieve universal coverage
Digital satellite	TV, radio, PPV, interactive services	Equivalent to 600–1000 TV channels	Good scope but lacks integrated return path	Large bandwidth National coverage from one satellite Fast roll-out of innovations is possible, for example, personal video recorders and high definition TV	No indoor reception No integrated return path Long transit time doesn't suit all interactive services
DSL based on telephone network	TV, radio, VOD, interactive services, Internet	Unlimited (video on demand)	Excellent – integrated high-speed return path	Large bandwidth Near universal coverage	Bandwidth available drops with distance from the exchange

Table 1.1 (continued)

Platform	Services	Approximate capacity to home	Interactivity	Strengths	Weaknesses
Powerline, based on electricity network	Internet	(as for DSL)	Excellent – integrated high-speed return path	Ubiquitous access extends throughout houses	Not yet rolled out Interference problems still to be resolved
Wide area wireless broadband	Internet	Up to 1 Mbps at present	Good	Extends the reach of fixed broadband platforms	Coverage varies within home
Mobile broadcasting DVB-H	TV, radio, interactive services	30–80 channels per multiplex	Good – uses 2G/3G return path	Suited to mobile TV and other multimedia services Backed by major handset vendors	Not mature yet Needs spectrum opportunities
3G mobile	Voice, Messaging, Audiovisual stream/download, interactive services,	No live TV at present Typically ~384 kbps	Good	Good for Internet access Fast roll-out within covered areas	Coverage variability

Note: DSL = digital subscriber line; PPV = pay per view; VOD = video on demand.

Table 1.2 Digital TV penetration rates (per cent) end 2005

	Total	Cable	Satellite	DTT	IPTV*
UK	68.9	10.5	32.0	25.2	0.2
France	34.7	4.3	21.6	6.9	1.9
Germany	28.9	6.7	17.8	4.2	0.1
Italy	36.0	0.0	20.2	14.9	0.9
Netherlands	11.4	5.3	3.1	2.3	0.6
Poland	17.9	0.4	17.5	0.0	0.0
Spain	27.6	5.6	15.4	5.2	1.5
Sweden	44.5	9.6	20.6	13.3	1.0
USA	50.3	25.3	24.2	0.5	0.3
Japan	59.1	7.2	33.1	17.9	0.9

Note: \*Delivered by DSL or equivalent technology.

Source: Screen Digest.

able. In Japan, analogue terrestrial is firmly targeted for switch-off in 2011.

## THE DIGITAL VALUE CHAIN AND MARKET POWER

As shown above, digital television can be delivered on many platforms, although at present cable, satellite, and to a lesser extent DTT, predominate. Moreover, the platform is a single element in a complex value chain which goes from the initial creation of broadcast content by actors, sportspeople, cinematographers, and so on and ends up with the reception equipment in a home or (in the future) on a mobile terminal. Some firms provide nearly all the services involved in the value chain; others participate in only one (for example, programme making or satellite distribution). The outcome for viewers in terms of choice, price and quality depends upon what happens in the chain as a whole.

From the consumer's viewpoint, a key determinant of outcomes is the exercise of market power. The owner of a bottleneck at any point in the value chain will try to appropriate the monopoly rents available throughout.

Table 1.3 Digital value chain

Platform	Content creation	Programme making, filming sports etc
	Wholesaling of programmes	Complete channel or pay per view
	Retailing	Often as 'bouquets' of channels
	Transmission	Cable, satellite, DTT, ADSL
	Conditional access, and so on	Not relevant for 'closed channels' such as cable
	Customer provides equipment	Including STB's – often subsidised.

For this reason competition authorities and regulations have taken a keen interest in the exercise of market power in broadcasting.

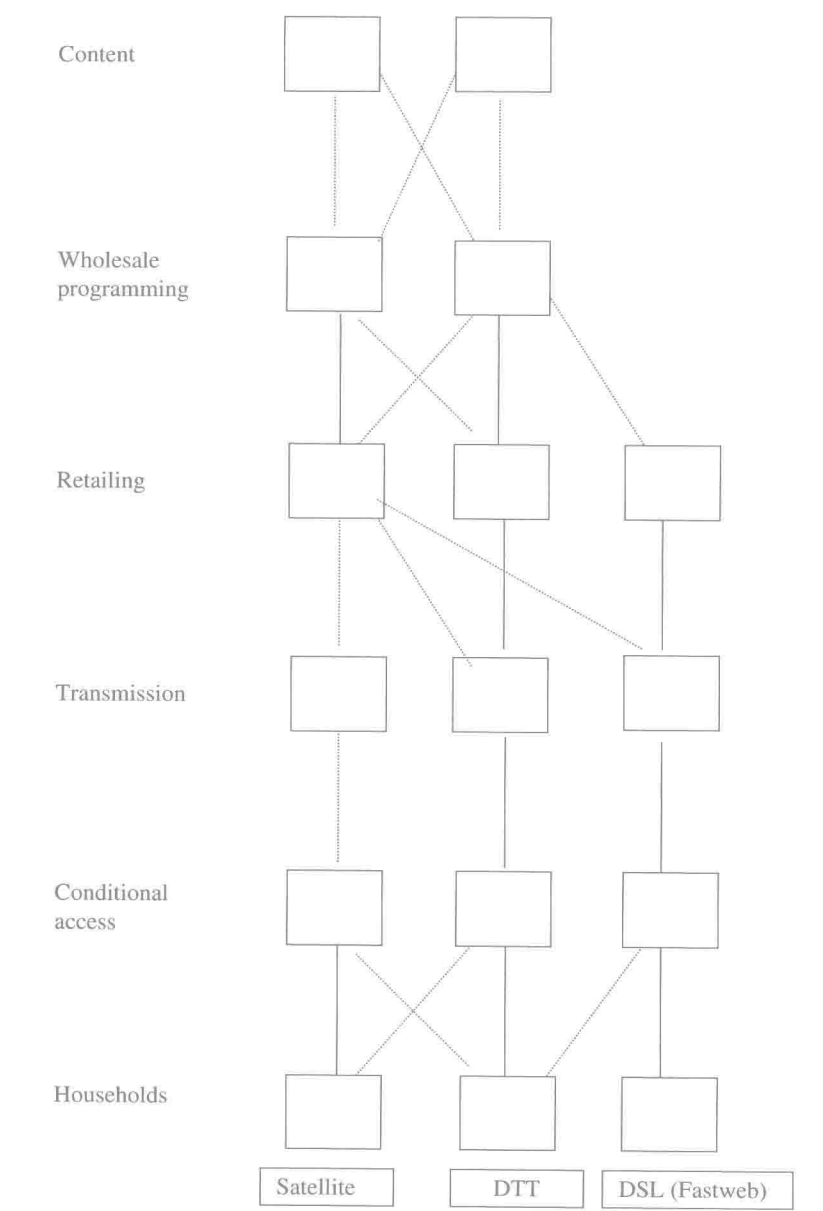
We illustrate this in terms of a simplified value chain shown in Table 1.3 (see Cave 1997). Under advertiser-supported broadcasting, instead of programmes being retailed to audiences, the audiences themselves are sold to advertisers. This activity replaces revenue capture via conditional access. Traditional analogue terrestrial broadcasting in Europe, undertaken by monolithic firms, often in public ownership, shows a high degree of vertical integration of these activities.

Throughout the value chain, competition takes place within the framework of standards adopted *de jure* or *de facto* in particular regions. An example is provided by the various versions of the digital video broadcasting (DVB) standard adopted in Europe. There has been much debate about the appropriate role of standards and the consequence of the existing multiplicity of standards across the world (Galperin 2004, Levy 1999). Most of the chapters which follow take existing standardisation arrangements as a given in their discussion, as that phase of activity has passed. But the past (and future) role of standards should not be underestimated.

A more realistic example, loosely based on the state of pay TV in Italy, is shown in Figure 1.1 (see also Chapters 5 and 11 by Del Monte and Di Mauro). This involves separation of ownership (illustrated by dotted lines) and interchange among stages.

In this representation:

- (a) content providers sell exclusively or non-exclusively to wholesalers;
- (b) the latter make their material available to multiple retailers;
- (c) one platform buys all its content at wholesale;



Notes: Dotted lines represent transaction boundaries.

Figure 1.1 Competition in the value chain: an example

*Table 1.4 Broadcasting activities and likely problems*

Activity	Competition problem
Content	Monopolisation
Wholesale programme market	Bundling, price squeeze, excessive pricing
Retailing of pay programmes	Bundling, price squeeze, excessive pricing
Transmission	Abuse of dominance, denial of access
Conditional access, EPG and so on	Refusal to supply, discrimination, excessive pricing

- (d) a retailer can get on to multiple platforms;
- (e) using the same or a different delivery mode (satellite, DTT, and so on), any two activities, such as transmission and conditional access, can be vertically integrated or separated; and
- (f) households can take programmes from more than one platform.

This complex structure generates an almost limitless array of opportunities for the exercise of market power. Table 1.4 contains some of the more prominent ones encountered in practice.

By way of illustration of the competition problems which have been identified:

- The issue has arisen in the United States as to whether cable operators can foreclose entry in platform markets by denying their platform rivals access to programming (Hazlett 2005).
- In Europe, the collective selling of live football rights to a single programme wholesaler has attracted intervention by competition authorities; the practice has been impugned as a joint exercise of market power which also leads to reduced competition in downstream retail markets.
- In Italy, it was made a condition for a merger between two pay-TV operators that the combined entity would give rivals access to its platform.
- In the UK the leading pay broadcaster was investigated for (and cleared of) conducting a margin squeeze by preventing purchasers of its wholesale programmes from being able to make a profit in retail markets.

The chapters which follow pick up these competition issues in various ways. They also address questions of how legitimate protection of intellectual property can be achieved. In this context a particularly interesting



development is the growth of digital rights management (DRM). Copyright on content can be justified by the need to provide incentives for its creation (Scotchmer 2004). In a digital world, making perfect copies is easy and cheap. Content owners thus have a strong incentive to protect their intellectual property and have a range of new technical options available. As Cowie and Kapur show in Chapter 9, some of these supersede functions now carried out by platform providers, thus altering the balance of market power in the value chain. In Japan the issue of improving a defective copyright regime has become increasingly important, as Chapters 10 and 12 by Domon and Joo and Oniki show.

## SPECTRUM POLICY AND THE DIGITAL SWITCHOVER

Public policy in the field of spectrum allocation also exercises a powerful influence on digital TV. Traditionally, governments used their power to assign spectrum as an auxiliary instrument for controlling the number and identity of broadcasters. Traditional spectrum management techniques suited this purpose very well.

These techniques are known as 'command and control' and have operated in essentially the same way since the first global convention for co-ordinating spectrum use in 1906. Under the system, spectrum blocks are allocated, through international agreement, to broadly defined services. National regulatory authorities then assign licences for use of specific frequencies within these allocations within their jurisdictions (Cave 2002, 55).

This regulatory task involved an inherently complex balancing act in a range of dimensions, in each of which there are many conflicting considerations. Key factors include:

- *Interference* Transmissions interfere unless sufficiently separated in terms of frequency, geography and time. Regulators must strike a balance between reducing the extent of harmful interference, through careful planning, and enabling potentially valuable new services to enter the market.
- *International co-ordination* The effective use of radio spectrum in one country will typically require careful co-ordination with neighbouring countries, to mitigate the extent of harmful interference.
- *Investment in equipment* Most radio equipment can operate over only a limited range of frequencies, and so relies on predictable access over time to defined frequency bands. Stability in spectrum assignments to encourage investment in equipment can slow the pace of