1. Media convergence: paths and constructs

INTRODUCTION

Media convergence has a relatively long history and is a multi-faceted phenomenon. In this volume, convergence is viewed as a set of inter-related processes, by this stage significantly well understood by academics to have associated with it a recognisable, if relatively small, body of literature. At the same time, the processes of media convergence and, most particularly, its governance, continue to present many challenging and as yet unanswered policy questions. This opening chapter of the volume has two purposes. First, it maps out the main features of the journey towards media convergence as they have unfolded historically. Second, it explores a range of attempts in the academic literature to characterise media convergence and to understand its governance. The chapter argues that, despite assumptions about the inexorability and inevitability of media convergence as a series of technological and service-based developments, made over a number of decades, the process of media convergence has instead highlighted its fractious, fragmented and protracted character. The chapter argues that this is most clearly evidenced in issues related to the (potential) governance of converging media environments, where key decisions about the allocation of media resources of various kinds are made. A focus on the nature and processes of media convergence governance allows an explanation to be provided for the problematic and incomplete character of media convergence. Furthermore, knowledge of the institutional landscape and communication policy processes in which media convergence issues are considered and (often incompletely) resolved is essential to an understanding of how and why media convergence has developed to date, as well as its future prospects.

A core contention of the volume is that neo-liberal policy agendas, developed and deployed in the communications sector over recent decades, have gone hand in hand with media convergence in many respects. The need to stimulate developments in technology and the new goods and services stemming from them are considered of paramount

importance. This, it is argued by its advocates, should be achieved through market-based changes to create competition, alongside developments in governance arrangements to secure reformed market structures promoting competition. Media convergence and neo-liberalism share the common feature of having been propounded as inevitable, inexorable and irresistible. The message that technological changes create new enhanced services in an environment of unparalleled consumer choice has led to arguments that governance structures and media policy arrangements need to change to accommodate and bring to fruition the benefits of convergence that are fundamentally neo-liberal in character. As a corollary, an understanding of the role of neo-liberalism in electronic media environments can explain much of the changes that have occurred within them.

This chapter commences with a brief consideration of key developments in information and communication technologies and services that brought to prominence the idea of a gradual coming together of disparate parts of the communications landscape. It then moves to consider approaches developed in academic work which have understood convergence as an often loosely connected array of commercial and social – including cultural – constructs. From this, the chapter makes the argument that convergence is, thus, a phenomenon in search of an appropriate governance framework and, in so doing, it considers the features of the key path-based approaches to the governance of media convergence that have developed historically. This is illustrated briefly by reference to the EU which has grappled with the challenge of governing media convergence at the international level. The EU's experience exemplifies very well fractious and limited policy efforts to resolve the idiosyncrasies and peculiarities of convergence. These have been generated by the constituent industrial, societal and public policy actors and associated interests that have, in their different ways, advocated the kind of media convergence we witness today.

This opening chapter of the volume thus provides the context within which the salient contemporary issues of governing media convergence selected and explored in the volume – the deployment of upgraded high-speed electronic communications networks, spectrum allocation, Internet neutrality, copyright, media concentration, public subsidies and public service content – can be taken forward.

EVOLVING INFORMATION AND COMMUNICATION TECHNOLOGIES AND MEDIA CONVERGENCE

Historically, the antecedents of what we now recognise as the main technological constituents of media convergence led largely separate lives. The technologies bound up in the main equipment and infrastructure of Information Technology hardware and software, telecommunications, newspaper print and other publishing, and broadcasting displayed little cross-over or common usage.[1] However, a number of key technological and service-level developments enabled convergence. The first and most widely heralded of these was digitisation or, more plainly, the application of computer-based communication technologies to other parts of communication, in the first instance, telecommunications. The much-heralded realisation of telematics in the 1970s took place within, and reinforced, the conceptualisation of a grand process that would lead, for its advocates, to the computerisation of society (Nora and Minc 1980). The convergence of computing and telecommunications was certainly of huge significance for the latter. Advances in electronic (digitalised) switching led to major practical efficiencies but also increased costs in terms of research and development. Through the assistance of modem technology, the ability to connect computer equipment across a communications network expanded the service possibilities open to providers and users. From this point, at least techno-functionally, combinations of voice, data, text and video could be created and delivered across 'standard' telecommunication infrastructure. The extra transmission capacity that this would require, allied to – an albeit putatively perceived – growth in demand for communications services, would be catered for by the development of fibre optic cable technology heralded, even as early as the 1970s, as providing a context for high-speed, content-laden, and interactive networked-based communication. Some 40 plus years later, the complete deployment of fibre optic broadband networks is, of course, a policy aspiration more than an achievement (see Chapter 2). Around the same time, the use of the airwaves for personal, at that stage only voice-based, communication, was vaunted as a possibility and soon became a reality in the shape of an embryonic, by present standards, mobile communications sector (Linge and Sutton 2015). The digitisation of the airwaves soon followed as a convergence-based, partial solution to capacity problems of microwave communication. As significant, it hinted at the possible future use of the airwaves to send more than simply voice signals between two mobile communication handsets (see Chapter 3).

The above developments and their ramifications were felt most resoundingly in an, until then, somnolent telecommunications sector, illustrating both concrete developments in technology and services but, as important, future promises of convergence. However, as telecommunications was changing through technological enablement, so too was traditional broadcasting. The broadening of telecommunications into the so-called enhanced services realm inevitably raised the possibility of (widening the) transmission of audiovisual content through copper and, beyond that, fibre optic broadband networks. The nature of broadcast communication in respect of the content of services with a strongly developed public service purpose, meant, however, that convergence between telecommunication services and broadcasting, whilst technologically feasible, would be the subject of sustained and often controversial debate. This process is, in fact, still ongoing and – as this volume will attest to – provides much of the territory in which policy debates on convergence are taking place.

Nonetheless, technological changes co-terminus with convergence continued apace. In the 1980s, reminiscent of the incorporation of existing microwave technology in a new commercially driven telecommunications service context, the fairly well-established technology of satellite communication, deployed mostly to that point in international communication, was developed and applied to provide domestic television services resulting in an unprecedented increase in network capacity (Collins 1994). Subsequent to this, and arguably much more significant, the digitisation of broadcast communication networks soon gathered pace through the 1990s. The first and most immediate impacts were a 'turbo charging' of the trend towards network capacity expansion (Humphreys and Simpson 2005). Digitalisation in broadcasting affected cable, satellite and terrestrial networks alike. In a remarkably short space of time, a sector noted for its historical capacity limitations now exhibited capacity abundance.

THE EMERGENCE OF THE INTERNET

The above very important developments in new – and adaptions of existing – communications technologies occurred separately from what is now regarded as probably the biggest technological enabler of convergence: the Internet. Emerging from the shadows of network-based communication, by the mid-1990s the Internet was illustrating its power to become the most significant development in mass communication since television technology. With its underpinning objective of enabling

communication between users attached to a variety of communication networks and utilising a variety of communication devices, the Internet's communication protocols (TCP/IP) are the essence of technology-enabled media convergence (Ceruzzi 2003). The Internet is interesting in that, although it was developed through the creation of bespoke communication architecture to some extent, for it to realise its full significance, Internet traffic needed to utilise longer established telecommunication infrastructure. Internet communication protocols, assisted by a raft of technical innovations which enabled user-friendly 'point and click' environments, provided both the oil and the glue of media convergence (Simpson 2004).

The Internet's end-to-end principle of communication meant, in its initial years of popularisation, that the power to add new applications and services to its environment lay in the hands of users, commercial and private alike. Those with operational control of network transmission merely provided common carriage services for the growing, increasingly content rich and diverse volume of traffic that Internet communication was giving rise to. As a consequence, the online environment became characterised by the potential to collapse, in a way never before witnessed, the distinction between telecommunication, radio and televisual broadcasting, and journalism and book publishing (Dwyer 2010). In terms of content available, applications through which it might be created and consumed, and services provided in and around its delivery, the Internet provided a convergence landscape in which new and innovated forms of communication have developed, in some cases with exponential growth rates. One of the most significant features of the Internet in the last 10 years has been its development as a site for social networking platforms, most famously Facebook and Twitter. The emergence of so-called social media has a fleeting resonance only with the early ideas of communitarian-based communication. Whilst these are venues within which an enormous mass of information is exchanged between human beings, the environment is heavily underpinned by commerciality. The world of online convergent communication for the vast majority of those taking part in it is the target for experts in marketing and consumer behaviour (Fuchs 2014). The Internet, like no previous communications environment, makes the monitoring of human communicative behaviour and the tailoring of communication services a phenomenon subject to mathematical calculation and algorithmic representation. The Internet is in short, the largest, most dense, and most convergent communications environment in human history.

The emergence of the Internet has created a new focal point for the consideration of internationality in media. Its infrastructural growth

(heavily reliant on existing and innovated communications infrastructures), global communicative logic, and increased user friendliness has fuelled expectations of a new, richer, faster, more interactive 24-hour communications environment. The global Internet is often seen as the epitome of media convergence and much, if not all, of the coverage of this volume will relate at least in some part, to its emergence and functioning.

The Internet, at least in its early decades of development, was something of a communications outlier, given that it later became the blazon media convergence (European Commission 1997a). Techno-infrastructurally a product of US research and development money, used in its early years by computer specialists and the academic community, the Internet lay at the margins. However, its end-to-end technical infrastructure pointed towards a decentralisation and democratisation of communicative power to the user; the ability of its communication protocols (TCP/IP) to bring together formerly incompatible communications networks chimed, at least philosophically, with the idea of a convergence in communications of some kind. Those aspects of the Internet that did exhibit features of centralised control (and thus communicative power), most notably its essential Internet Protocol and domain name and addressing system, lay in the hands of the technical community, and were run on a voluntary basis along relatively egalitarian lines. All of this changed with the explosive popular growth of the Internet due to a series of innovations which delivered it as a user-friendly communications environment. Communitarianism, decentredness, and counter-culture soon clashed with proprietisation, centralisation of various kinds perpetrated in commercial and governmental circles, and 'mainstreamism' and increasingly became dwarfed by them whilst not retreating entirely from the Internet's landscapes. As these trends developed, the Internet grew inexorably larger, louder, more colourful and more characteristic of media convergence. A 24-hour, global, interactive multimedia environment where written word and audiovisual content pervade has come to characterise the Internet of the early twenty-first century. The Internet has developed a centrality of social, economic, commercial, cultural and political importance. It is a communications environment of unparalleled variety and, arguably, a communication asset of unprecedented significance. The Internet is now the epitome of media convergence: bold, colourful, interactive, round-the-clock. Yet, like media convergence it is also replete with contradiction, contestation and struggle. These take place in commercial, economic, cultural, political and social environments. Given this kind of importance, the topic of how key aspects of what takes place through the Internet should function and

should be governed lies at the heart of any investigation of media convergence.

However, what kind of governance models for the Internet have emerged to date and in what ways might they be deployed to help us understand better the process of media convergence and its governance? As might be expected, the Internet has exhibited a range of governance practices, much of which relates to other quarters of the communications sector and little of which might be characterised as truly revolutionary. Its early origins, as noted above, exhibited a voluntarism and communitarianism in governance. Here, the direct presence of the state was distinctly conspicuous by its absence. However, as the Internet's strategic importance emerged alongside its growth as an international communications asset, strong evidence of the direct and indirect involvement of the state became manifest in debates on Internet governance, particularly in respect of its naming and addressing system and associated assets (see Mueller 2010). The Internet, however, has also displayed hybridity in governance forms between public and private governance, self-governance and what has been described as co-regulation. These forms of governance are not new in themselves. Self-regulation has been a characteristic feature of (particularly broadcast) media governance for many decades. Private interests have also taken a major role in the governance of key aspects of communications media. However, Internet governance has displayed an interesting – and at times novel – variety within these categories.

CONVERGENCE AS AN HISTORICAL SOCIAL CONSTRUCT

Given the broad social significance of convergence, it is no surprise that a debate has arisen around perspectives developed in industrial, governmental, civil society and academic quarters to try to understand and shape its evolution. These perspectives are used to interpret a series of important events that have taken place in the evolution of communication media more broadly. Often, such a process amounts to an *ex post* rationalisation fraught with difficulties. The biggest and most obvious problem though often under-acknowledged in the plethora of confident assertions about convergence emanating from industrial circles, in particular, is the only partially complete, contested and precarious nature of convergence. Such characteristics lead to an uneven and contradictory pattern of development of media convergence. It is important to

understand that the coming together of different forms of media, often into a common space, does not automatically lead to their integration.

The historical debate on convergence is particularly salient for media policy makers since conclusions on it can provide the ground for setting a course of action for the future. For media policy academics, an important perennial task is to contextualise – and as a consequence deflate – the hyperbole which often surrounds convergence (see Mansell 2016). The ability to do this effectively and to translate it into clear messages which might be listened to – if not adopted – by national and international policy making communities points towards many of the challenges facing academic research on media. Such an undertaking crystallises much of the debate on the role of media policy and its researchers, whose foundation the administrative and, by contrast, the critical research traditions (Just and Puppis 2012) epitomise.

Differing perspectives on convergence hold serious potential ramifications across a range of cultural, economic, political and social processes. Most often witnessed has been a fairly intellectually blunt, revenue-seeking perspective on convergence with two inter-related elements. The first of these concerns convergence as an inevitable process shaped by technological innovations and commercial development. This view, most vocally articulated in industry circles, can be broadly categorised as a techno-economic determinist perspective on convergence. However, such a perspective has also been evident in the thinking and associated rhetoric of policy makers (European Commission 1994a). The second is a cheerfully optimistic-though-naïve take on media convergence. Here, a range of benefits are seen to be derived from the new array of products and services which convergence provides. These benefits are seen to fall across a wide range of issue areas and to be accruable by all. Most obviously, there is the notion that convergence drives economic development. New networks, hardware, applications and services and content are generators of economic value. They create and grow new markets. They exercise a multiplier effect on local, national and international economic life, in ways such as employment generation. They contribute to individual, corporate, national and international economic welfare.

The inexorable drive of economic growth fuelled by convergence is, however, far from unchallenged. A key issue is the extent to which the benefits of convergence fall (relatively) evenly (Mansell 2017). This has intra-national and as well as international ramifications. A key policy concern is the extent to which the outcomes of the convergence process might be shaped to afford and spread the greatest economic opportunity. This fundamental concern sits at the heart of most of the substance of

this volume. At the level of the individual, much thinking on media convergence is underpinned by the notion of the citizen as a consumer. Here, it is argued that a new array of information and communication products and services can be purchased that are discernibly quality of life enhancing. So, new access devices, such as Internet-enabled mobile phones, laptops and tablets provide a high-tech, often colourful entry point to a panoramic array of applications and services which enrich user experience, for those who have the ability to pay. Alongside this is the idea that convergence is enabling. Individuals can communicate with each other more effectively than at any other time in history (Jenkins 2008). Such ideas of convergence enablement are further developed in specific contexts. Social communication has become a richer, more complex process through the use of social media sites (Castells 2013). It is now faster, is 24-hour in nature, and can be achieved orally and aurally, visually and through the written word, all at the same time. For some, convergence-based communication now provides new global reach yet, at the same time, the individual's personal communication environment has never been more immediate. Others, by contrast, point with concern to the mass personalisation of communications services in a context of information farming with packaged personal superficiality (Lovink 2011).

As noted already, media convergence has in technological terms a relatively lengthy history. Viewed in one light, convergence finally delivers the promise of 1970s and 1980s techno-optimists like Toffler (1980) for new flexible working patterns which not only create free space but accommodate the working preferences and lifestyles of busy people with diverse interests. For others, the technologies and services of media convergence have created flexibility whose 'reward' is longer working hours and less fulfilling conditions of employment (Lovink 2011). In particular, there is strong evidence that the distinction between work and non-work activity has blurred to the point of collapse in a converging media environment. Interestingly, this has shed light on the desirability or otherwise of maintaining such distinctions, and how it might be achieved. Concerns of this kind have arisen as a consequence of an 'always on' communication culture where the individual is increasingly assumed to be available constantly in both work and non-work communicative contexts.

Viewed sympathetically, convergence satisfies consumption preferences, empowers in terms of giving new opportunities to express these and other non-consumption-based preferences, and, in the process, liberates individuals and groups. The latter is manifest in new online educational and employment opportunities. In delivering in this way,

media convergence saves individuals and groups time, however they might be organised and for whatever purpose. Attendant to this positive view is the environmentally friendly aspect of media convergence – new high-speed, distance-defying ways of communicating negate, or at least reduce significantly – the need for local and long distance international travel. Yet by contrast, the huge infrastructure of cables, wires and hardware in its myriad forms which are the physical manifestation of media convergence place huge question marks over both their recyclability and biodegradability. Added to this, the innate consumer culture of 'upgrading' bound in with 'social status' adds to concerns over sustainability. Furthermore, the development and deliberate release with strategic periodicity of new products and services fuelling the core computing staples of increased capacity and functionality mean a speedy obsolescence rate of equipment, adding further environmental concern to the mix.

In an even broader and equally controversial social context, for its advocates the convergence environment is establishing a new highly pluralistic media space in which access to a panoramically diverse range of information sources with which to assist the conduct and development of our social relations, broadly defined, is manifest. In this interactive environment where a thousand flowers happily bloom, participatory opportunities in terms of opinion giving, deliberation, and argumentation have arisen as never before (Castells 2013). Media convergence is thus, in this view, in the process of delivering a new vibrant information environment, one of whose features is that distinctions between information provider and consumer are often blurred in the context of so-called 'pro-sumerism'. This rich, diverse landscape is a huge enabler of the democratic process domestically and internationally and provides a catalytic context for 'everyday' political change. It also, it is argued, possesses the potential to stimulate radical moments of political development in the direction of democracy in keeping with the principles of the libertarian, liberating convergence communications landscape which is unfolding (Castells 2013). By contrast, a less sanguine view of the communications landscape characterised by convergence posits a somewhat narrower political space, access to which depends on the possession of the requisite educational, technical and economic resources. It is also an environment where political conviction to seek out alternative information (as well as skill in information seeking) is a necessary prerequisite to participation. However, the latter, if not underpinned by an opinion seeking and deliberative open mindedness, can lead to online communicative strait-jacketing.

All this aside, for the majority without such strong political conviction, there is a concern that the Internet's bulk content is only superficially massaged to portray variety, that political content both interfered with to the point of untrustworthiness, and is crowded out in the mainstream by that of an overwhelmingly commercial and populist bent, and that public service information, where available, does not receive the kind of prominence which its importance is arguably due (McChesney 2013). Others point to an Internet-based convergence environment where the communicative behaviour and choices exercised by human beings can be monitored, assessed and categorised for marketing purposes as never before (Heyman and Pierson 2013). Such analyses contrast the façade of superficially welcoming personalisation of online information services on offer with a relentless, high-tech information gathering and processing apparatus taking surveillance of various kinds to a new level, where privacy is either unwittingly compromised or voluntarily surrendered in the interests of security and participation (Humphreys 2013).

Another related feature of the convergence environment has been the growth of user-generated content. In line with ideas of providing communication empowerment for the individual, users can now create their own audiovisual content and post it to online environments. This is most famously illustrated in online audiovisual environments like YouTube. Such content has often generated quite remarkable viewing interest. The increased functionality of mobile phones, many of which now allow high quality picture and video to be shot, has also resulted in users playing a part in the breaking of news stories. Such activity has been bound up in the idea of citizen journalism (Allan and Thorsen 2009), whose development has also gone hand in hand with the growth of online blogging. The emergence to prominence of the microblogging social network site, Twitter, has added a further dimension to this. News is often broken by non-information professionals, through short (originally) 140-character maximum messages. The corollary of this is that Twitter has become a 'go to' site for professional journalists for whom the drive to provide breaking news has been, if anything, intensified in the online environment. The interactive dimension of the online world has thus allowed users to disrupt the linearity of old media in ways never before witnessed. Interactivity is, of course, not a new phenomenon in media: radio and television broadcasters, as well as newspapers, have sought it for many decades. However, the online environment has undoubtedly brought it to new dimensions. Engagement with media content and service providers is now a de rigueur feature of all online platforms, particularly those providing news and audiovisual services.

Underpinning most, if not all, of the development in communication networks, content and services in the direction of convergence has been what might be described as a 'culture of speed'. In infrastructural terms, there appears an ever pressing need to increase the download and upload speeds of information, something also bound in with the pursuit of increased network capaciousness. However, the culture of speed runs much more deeply than this. It has been argued that users have developed expectations about communication around a culture of instant gratification (McQuire 2008). Relatedly, a culture of constant updating of information has developed with significant time resource implications. This is no more evident than in social network site environments, such as Facebook, where updating of personal profiles is part of the fabric of communication. In professional environments too, the need to update very regularly is seen as a mark of professionalism, to the extent that Twitter feeds, with the expectation that they be constantly attended to, are increasingly embedded in organisational (including individual professional) profiles.

Another key feature of the environment of convergence is mobility. More than ever before, individuals communicate on the move for both social and work purposes. Expectations raised among users of the normalcy of moving around whilst conducting complex communicative tasks has presented two main challenges. The first concerns the nature and functioning of the device used to undertake communication. Here, key developments in IT and telecommunications have combined to produce end users devices – terminal equipment in telecommunication parlance – which are increasingly powerful, multi-functional and portable. The development of mobility has changed expectations within organisations about the nature of work and how, where and when it can be undertaken. The work/non-work rigidities of the Fordist era have given way to more flexible articulations of work practices, undertaken remotely from the organisation's premises and, frequently, on the move. The second challenge in the rise to prominence of mobility in the media convergence environment relates to network capacity and is a telecommunications and, lately, a broadcasting policy matter. As users' demand for wireless communication has grown, so too has the demand for spectrum. As Chapter 3 of this volume illustrates, sophisticated mobile broadband communication has called forth serious policy considerations of a reallocation of spectrum from digital terrestrial broadcasting to the mobile communication sector. The idea of spectrum as a public good and how it might best be used in an increasingly commercial and converging communication environment sits at the core of the debate on this topic.

The environment of media convergence has also created seismic change in the culture and practices of searching for information. The volume of available written and audiovisual information has grown hugely in the last 20 years. This has provided major opportunities for knowledge acquisition and sharing but has many challenges entailed in taking advantage of it. The relatively new phenomenon of so-called 'big data' has emerged where efforts to discern key patterns in huge volumes of complex information and communication generated electronically has become both an industry in its own right and a topic of study for academics (Mayer Schoberger and Cukier 2013). More mundanely, for the average user, the online environment now contains an often-bewildering panorama of written and audiovisual content. The ability to search and scan effectively has become an essential skill in early twenty-first century social and professional communication environ-ments, in ways – and to an extent – never before witnessed. A culture of scanning, however, raises concerns about pursuit of depth of information and, ultimately, knowledge acquisition. Allied to the possible multiple re-use and re-purposing of the same source information based on both the operational constraints of the information provider and content creator, as well as the need to fill increasingly capacious information environments, a key concern is a move in the direction of what might be considered 'information superficiality' in the convergence environment. This points to the need for prominent and well-resourced public and private infor-mation creators and providers (see Chapter 7).

A related issue concerns the feeling of insecurity and uncertainty that the paths to convergence in electronic communication have led to for many users. The mass of information available online makes the assur-ance of trust in the provision of certain types of media content more important than ever. Whilst a culture of acceptance of inaccuracy – or more specifically the risk of it – has grown in the consumption of online information, the need for reliable sources, well developed in traditional news print and broadcasting – has established itself too in convergent online environments. Alarm at the growth of so-called 'fake news' in online information environments attests to this. More dramatically, asser-tions of the dawn of a 'post truth era', whilst temptingly headline grabbing, are an unhelpful characterisation of (albeit often problematic) democratic life. They are reflections on the perceived problems of networked media which provide an example of the exaggerated quality of reflections on media convergence environments.

Alongside this, matters of privacy have become prominent in the online environment, in particular. Whilst there is by this stage general acceptance that participation in online communication, particularly that

of a commercial character, inevitably involves the relinquishment of some degree of privacy, concerns about secure storage, and use and resale of customer data are some of the most prominent features of the online era. The often (unwittingly) very open communication environments of social network sites, such as Facebook, and concerns about privacy protection attendant to them, stand in contrast to evidence of a growing preference among younger users for the more closed user group social network environments provided by sites such as WhatsApp and Snapchat. Whilst the products of media convergence have enabled an environment in which a mass of information, often homogeneous and bland in character, is freely available, evidence suggests that users are prepared to pay to secure privacy, which has now become, at least in part, commodified. It is less clear, at this stage, about the degree to which users are willing to pay for online information services that transcend the homogenous, the bland and the superficial.

In this regard, the public service and public interest aspects of the communications sector have been well developed historically in broadcasting, publishing and telecommunication. These are manifest in direct public funding of network infrastructure development, for example. In terms of content creation and production, direct funding of public service broadcasting has been a key feature of media systems in western Europe and beyond for many years. The business of the journalism industry, whether publicly or privately resourced, has held the provision of news, which is considered to be in the public interest, as a prominent goal in its activities. These developmental paths have provided an important set of communications traditions which have now come into a common – though far from integrated – space in the convergent environment of online media (see Chapter 7). Yet, far from dominating this scene, they find themselves dwarfed by the volume of communication services and content with an overwhelmingly commercial purpose in concentrated market environments (see Chapter 6). Whilst this might be viewed as a cause for concern, it could also be considered an opportunity. For information-inundated users online, with often time constrained communication capacity, the need for information which is prominent and sense-making is abundantly clear. This could be balanced and challenging, structured to enable experimental discovery and broadening, and designed and delivered in the public interest.

The paths to convergence trodden by broadcasting, IT, publishing and telecommunication have been characterised by innovation in technology, content creation and service delivery. These paths of continuity de-bunk the hyperbolic myths of discontinuity often promulgated about convergence by commercial players whose interests lie in asserting the

path-breaking novelty of convergence content and services. The reality is, happily, less radical, though no less important for human development. A key issue, however, concerns the extent to which, and how, well-established patterns of public provision in electronic and print media can be developed for the convergence environment. What would the main constituent features of such a system look like? What is the likelihood of them being realised and over what timeframe might this reasonably occur? The paths to convergence having been by now for the most part well-trodden; the task is to fashion the convergence environment in the most economically robust and societally valuable way possible. This volume argues that such a task has only begun.

THE EMERGENCE OF MEDIA CONVERGENCE AS A GOVERNANCE CONSTRUCT

The historical approach to the governance of media convergence has been contingent on the traditions and features of its composite parts and, in particular, the propensity for change within them. Perhaps unlike any other sector of the economy, communications displayed historically the greatest degree of structural and operational variety, reinforced by sub-sectoral stability for many years. An important starting point in the mapping of the evolution of media governance in the direction of convergence is a consideration of the role of the state. Given the strategic nature of practically all of the communications sector, this has been unsurprisingly, very significant, though more complicated than a straightforward dichotomy between intervention and laissez faire. The state has in fact manifested itself in three broad ways, some or all of which have been present at any particular time depending on the part of the communications sector under scrutiny: direct ownership of communications assets; operational control of communications markets; and sanctioning of the conditions of governance in the communications sector.

In respect of the first of these, the state's direct presence has been particularly strong in telecommunications in most places apart from the notable exception of the US. In Europe, for example, until the 1980s, the ownership of telecommunications service provision lay in state hands. In the USA by contrast, a private monopoly – AT&T – owned the network and provided telecommunication services. Elsewhere, there have been notable examples of direct state control of broadcasting and newspaper and print publishing. In telecommunications, where the functions of sectoral governance and operation were essentially rolled into one, the

state thus had effective operational control of the market. However, by far the most significant development in the role of the state in communications over the last 20–30 years lies in respect of its sanctioning the conditions of governance. This has gone hand in hand with developments in media convergence and is an aspect of the role of the state in the communications that is ongoing, unresolved and thus evolving. It forms a key part of this volume's exploration of the phenomenon of media convergence governance. Yet, the state has been significant in this respect prior to the growth of media convergence. Indirectly, through the passage of laws, it has set the conditions for the structure of the communication sector and its functioning. Thus, laws in libel in publishing, various acts of law related to industry structure, and the creation of regulatory governance bodies for communication all have their roots in state action.

The issue of regulatory governance, in particular, is germane to an understanding of the evolution of communications governance in respect of convergence. Regulation has been an important part of broadcasting for many years. Here, regulatory bodies set in place and policed decisions taken by the state about the structure and functioning of this part of the communications sector. Regulations prescribe and, if necessary, set the conditions for behaviour modification, in broadcasting, where employed. Thus, in the UK, for example, commercial TV broadcasting has been governed by a regulatory body since its inception in 1955. In most of Europe, public service broadcasters were subject to a self-regulatory system to ensure independence from direct state intervention, as was the newspaper press, though the specifics of form and functioning differed markedly in both cases.

However, the most important development in regulatory governance in communications has been underpinned by the broad political–economic project of neo-liberalism. This has been by far the most significant in its quantity and effects in telecommunication, though it has also had profound consequences for broadcasting. Most important of all from the perspective of this volume, the neo-liberal project has been the context for the evolution of a considerable part of the governance of media convergence. In the first instance, this required unprecedented state action to alter the structure and functioning of a large part of the communication sector. In Europe, regulatory governance in telecommunications emerged as an issue of importance gradually from the 1980s onwards. However, like in most parts of the world, it soon became an issue of central importance. Through a process of radical change, private or partially-private ownership replaced traditional state ownership, new differentiated markets were created within the sector and ordered (often not very) competitively. A series of new independent regulatory bodies (National

Regulatory Authorities) policed this unprecedented marketization (Goodman 2006).

In broadcasting too, neo-liberalisation has had a particularly important set of consequences. Network capacity expansion, assisted by a series of techno-organisational changes, set the enabling ground for increased competition to take place between channels. In particular, the use of satellite technology, capacious fibre optic cables and an across-the-board digitalisation of terrestrial, cable and satellite infrastructures created space for new competition to be sanctioned and to take effect. Over the course of at least 25 years, in places where provision was mostly publicly funded, the character of broadcasting systems nationally has taken on a commercial hue. Even where public service broadcasting remains well funded and prominently positioned, the behaviour of public service broadcasters (PSBs) has been recognised as more commercial in orientation (Freedman 2008). Broadcasting systems are now larger in terms of the content available in a multi-channel environment. The huge volume of content has created competition for presence and prominence. Commercial competition for revenues garnered from selling advertising and sponsorship space is fierce. Selectivity has been introduced in a once free-to-air environment through subscription and pay-per-view commercial models. Elite content – manifest in sport of various kinds and film – is more valuable than ever before. Revenue squeezes mean that expensive televisual content is under the inevitable pressure to succeed, even before decisions on its creation have been taken. As a corollary, filling the now spectrum abundant broadcasting landscapes has led to efforts to create a plethora of inexpensive content characterised by homogeneity and blandness, as well as use of repeated content. Interactivity in broadcasting, historically an attractive and important aspect of the medium, has become much more realisable, yet has held within it concerns over fairness and probity, as witnessed in the UK's TV phone-in scandal of the 2006–2008 period (Simpson 2010). All of these changes have occurred as convergence has proceeded and they can be considered part of process, holding within them important policy lessons for the future in governance terms.

At the international level, the pursuit of a governance framework for media convergence has been a subject of interest to the EU for a number of decades. For a complex institution with opportunistic and expansionist policy leanings, media convergence offers considerable scope for action. Convergence presented the promise of a new, open policy agenda, in which the historically well embedded, if not intransigent, traditions of communications could be challenged. Convergence, with the Internet as its forefront, also exudes international potential. This presented scope for the creation of a new policy agenda in which the EU's stake, even as a

relatively new actor on the communication policy scene, could have become potentially as important as many, if not most, national governments. Certainly, from an intra-EU perspective, the EU, was a recognisably prominent actor from the mid to late 1980s onwards. As it developed its policy portfolio in telecommunication, a sector hitherto firmly established at the national level, the EU through the European Commission, referred pointedly and repeatedly, to the convergence of computing and telecommunication usually to reinforce the goal of market liberalisation. In the 1990s, as network development proceeded apace and the debate on the utility of continued separate regulatory treatment of broadcasting and telecommunication emerged in the context of convergence, the EU made a controversial policy intervention in the shape of a Commission Green Paper on Convergence. Tactically, the aim at this juncture was to put forward a range of policy options that would down the line emerge as a raft of policy proposals moving the consideration of media convergence to a new international regulatory context. However, the initiative merely illustrated the depth of feeling and controversy around any move to regulate media convergently and at the European level. Strong arguments, emanating nationally, in favour of the separate regulatory treatment of broadcasting content, as well as a decision to exempt 'information society' or online, services from any new regulatory framework resulted in a rather modest convergence regulatory framework being agreed by EU Member States in 2002. Here, the EU Framework for Electronic Communications (EUFREC) agreed was convergent only to the extent that it dealt commonly with all network infrastructures and associated services across which telecommunications content was transmitted. In retrospect, this policy landmark was probably more significant for what it omitted than what it included. However, at the very least, it put in place the idea of regulating electronic communications networks – as opposed to merely telecommunications networks – at the EU level. As network upgrading progressed from this point and policy conversations mutated into a debate on the creation and functioning of new Next Generation Networks (see Chapter 2), the presence of the EUFREC can be viewed as significant.

In a different way, the subsequent policy review of the EUFREC conducted by the EU from 2006, whilst primarily concerned with what is in effect the telecommunications regulatory package, also took on something of a convergence hue in respect of its treatment of Internet services. As noted above, deliberately excluded from the 2002 EUFREC, nevertheless, the inexorable growth in significance of the Internet meant that, by 2006, issues of Internet access and access services were becoming an increasingly important public policy issue. Here, the debate

emerged in the context of the review of the EUFREC revisions as a consumer rights matter and developed further policy legs within the burgeoning topic of Internet Neutrality (see Chapter 4). At one point, with the European Parliament as a key political protagonist on the matter, progress on the passage of a revised regulatory hinged on addition of a number of policy measures related to the Internet and consumer rights within it. By this juncture, therefore, policy matters of direct relevance to media convergence were emerging in several distinct quarters of an increasingly inter-related EU policy package for the communications sector. The eventually agreed revised EUFREC contained a number of measures related to standards of Internet access services, though the scope and efficacy of these measures is a subject of debate.

The EU Commission's ongoing concern with convergence policy matters was further manifest in a Green Paper in 2013. Its coverage gave a strong flavour of how the debate on convergence had by that stage shifted to a consideration of the relationship between the traditional and evolving broadcast environment and the online world. The Commission addressed, in particular, the legal implications of continuing media convergence, with particular focus on its Audiovisual Media Services Directive (European Parliament and Council 2010), but also the EU's E-Commerce Directive (European Parliament and Council 2000) and the EUFREC. The Commission argued that, for the benefits of convergence to be accrued, the EU needed to take necessary action to create 'a big enough market to grow, a competitive environment, a willingness to change business models, interoperability and an adequate infrastructure'. Important in this development would be to overcome key barriers, such as the limiting of choice and access, often along national geographic lines. A key issue was a consideration of the need in future to impose *ex ante* regulatory obligations in order to stimulate competition. The Commission also made reference to the continued financing of public service broadcasters, noting its 2009 Communication on State Aid requirement for Member States to conduct *ex ante* tests of the effects of such aid. Rather differently, the ability of manufacturers to thwart application access was noted in respect of the debate on standards in a convergence context. This is an old debate that is arguably more alive now than at any point in the development of ICT and broadcasting. An interesting comment, which pointed to the future, concerned the possible coming together in the shape of hybrid models of on-demand and linear broadcasting, achieved through broadband networks (European Commission 2013a: 11). Yet again, given the complex viewing environment facing consumers, the Commission highlighted the importance of media literacy, which it defined as 'the ability

to access the media, to understand and to critically evaluate different aspects of the media and media contents and to create communications in a variety of contexts' (European Commission 2013a: 12). The Commission also raised to be fundamental in the future the media policy staples of the editorial role of service providers, parameters of access and prominence in online environments, variety and the ability to move between platforms to exercise choice.

NEO-LIBERALISM AND THE GOVERNANCE OF MEDIA CONVERGENCE

As noted above, the idea of regulated competition was not new in media. However, it is its renewed force of presence under the neo-liberal ideological and policy drive which has been remarkable. Such developments led to the assertion that a new 'regulatory state' (Moran 2003) had developed of which sectors like communications are exemplary. This was even asserted to have cross-national dimensions in certain parts of the world – the arrival of the European regulatory state was heralded in a burgeoning time of regulatory capitalism (see Majone 1996). Underpinning these developments was the philosophical assumption of the superiority of the market as an organisational form and attendant series of social relations. A key policy assumption was that where competition did not exist, it should be introduced and in places where it was only weakly evident, it should be intensified. Competition, as the policy adage produced by successive UK governments would have it, realised better quality of products and services, would speed innovative breakthroughs in technology and would result in price reductions and, more generally, an environment in which prices would approximate as closely as possible to actual costs of production. This alluring neo-liberal political roster had one further attraction: implementation flexibility and adaptability. As long as the pursuit of competition as the prime form of social relations was in evidence, neo-liberal capitalism could flourish in many operational varieties. This flexibility has contributed to its remarkable powers of durability – that the neo-liberal model has survived (despite having been central to) the near collapse of the global financial system in 2008 is surely its greatest testament in this respect. In communications, the neo-liberal blueprint was thus evident at least to some extent in all continents of the world. It has set the context for the evolution of the communications sector over the last 20 years. It has also provided the ground for its intellectual exposition and critical examination by the

academic community, as well as support and opposition by advocates and detractors, respectively.

A key element of the agenda of neo-liberal marketization has been its internationality. Going hand in hand with ideas of developing economic globalisation, neo-liberalisation has prompted strong efforts at global trade liberalisation. This has been in evidence across communications, in telecommunications especially but also in respect of the audiovisual sector in a more limited way. However, the international agenda has been developed much more deeply than this in the media sector, stretching to the cultural, political and social realm. This is in key respects not a new phenomenon. In the 1970s, the New World Information and Communications Order addressed the consequences of the international spread of audiovisual products. For many decades, the need to facilitate international telecommunication resulted in a series of traffic management agreements between national carriers, negotiated in the International Telecommunication Union. Debates on the economic, cultural and social consequences of internationalising media are thus nothing new.

Freedman defines media governance as 'the sum total of mechanisms, both formal and informal, national and supranational, centralised and dispersed, that aim to organise media systems according to the resolution of media policy debates' where the latter are sites of contested and continual 'development of goals and norms leading to the creation of instruments that are designed to shape the structure and behaviour of media systems' (Freedman 2008: 14). Here, in a neo-liberal era, legally founded regulation of various kinds has played an increasingly important role. Policy debates on media convergence and the governance arrangements that have emerged as a consequence of them reflect much of the neo-liberal thinking that has dominated international political and economic life over the last 40 years, as well as challenges to it.

Neo-liberal policy agendas in the communications sector through time have gone hand in hand with media convergence, in many respects. The need to stimulate developments in technology and the new goods and services stemming from them, as this chapter has argued, is considered of paramount importance. The message that technological changes create new enhanced services in an environment of unprecedented consumer choice has led to arguments that governance structures and regulatory measures need to reform to accommodate and bring to fruition the benefits of a media convergence. From this underpinning perspective, an analysis of neo-liberalism can explain many of the changes that have occurred within the constituent parts of the communications sector. Telecommunication has been transformed radically along neo-liberal

lines. Already characterised by modest regulatory governance and commercialism in part, broadcasting has become a radically commercialised sector. The Internet too, from its communitarian and social libertarian origins has developed into a deeply commercialised landscape. A discourse of imminent media convergence has been a core aspect of the evolution of each of these parts of the communications sector, which have nevertheless developed along separate evolutionary paths, mostly incremental, occasionally radical, in character.

Yet, as this volume will argue, a study and understanding of neo-liberalism also reveals the contradictions of – and limitations to – media convergence. These are most luminescent in the realm of media policy and governance, since this activity refers to control over the levers of a considerable part of the productive power in media systems. Specifically, the impediments that this volume will highlight in respect of the movement towards what might be described as a deeply embedded, integrative form of media convergence can be explained by the inability of neo-liberalism to accommodate non-market-based solutions into a new media convergence paradigm. Instead, conflicts and struggles have ensued which have resulted in only shallow, partial and paradoxically segmented media convergence to this point. Despite the elsewhere recognised flexibility of neo-liberalism – for example in the varieties of capitalism literature – this innate neo-liberal myopia in the media convergence governance context exhibits an intransigence that is inhibiting the development of enriched cultural and social understandings of convergence that might be both facilitated and architected through new governance structures and media policies. The character of shallow media convergence is evident in the remaining chapters of the book.

THE STRUCTURE OF THE BOOK

Following from this opening chapter, Part II of the volume contains three chapters which explore key aspects of the broad governance of communications infrastructures in an environment of converging media. A key contention of this volume is that to understand better the topic of media convergence, it is essential to explore in depth governance and policy issues of communications infrastructures, as well as the content and services delivered through them. The chapters in this section have a number of recurring themes. They show how media convergence is a far from complete process. They illustrate how it has been characterised by multiple and persistent sites of contestation. Ultimately, they provide evidence of the need to give consideration to the role and position of

public service issues amidst an environment of media convergence dominated by issues of commercial priority. Chapter 2 explores policy efforts to create high-speed broadband network environments, or so-called Next Generation Networks (NGN). In analysing recent developments in network evolution in a range of national contexts, as well as the international environment of the EU, a key theme of the chapter concerns the role of public sector involvement in network refurbishment and upgrading. The chapter shows how, since the financial crash and global economic recession of 2008, states have exercised what might be termed developmental governance activity through major investments in electronic communications network upgrade. The underlying assumption here is that investment in NGN can provide economic growth and renewal through creating the infrastructural context necessary for the content creation and service delivery synonymous with positive visions of media convergence. The chapter argues that the range and extent of such public intervention should, however, be contextualised. The scale of the task at hand has meant that the neo-liberal model which has characterised electronic communications infrastructural development since the late 1980s still predominates.

Chapter 3 of the volume turns its attention to the changing governance of airwave spectrum in a context of media convergence. Spectrum has historically been viewed as an invaluable, scarce communications resource governed with strong public interest principles in mind. The digitalisation of the airwaves provided capacity-saving benefits, as well as an enabling infrastructure for content-rich media services, a classic feature of media convergence environments, to be sent and received wirelessly. However, ironically, this so-called digital dividend has whetted the appetite of commercial players from the mobile broadband sector to secure increased spectrum to intensify their service provision at the expense of incumbent terrestrial TV broadcast players. The chapter illustrates how what is effectively a turf war over spectrum exemplifies much of the tensions between media with a public service function and sensibilities and those which are out and out commercial in nature. It provides further illustration that processes of technology-enabled media convergence are merely partial in character since they provoke deeply contested, messy and unresolved debates on the future governance of communications.

Chapter 4 of the volume explores the controversial issue of Internet Neutrality in a media convergence context. In one respect, Net Neutrality is about the conditions according to which users are afforded access to infrastructures of information and communication. However, the Net Neutrality debate is also about how users are treated in their use of the

infrastructure. Thus, in this way, the chapter shows how the Net Neutrality topic connects issues of infrastructure with service delivery and user experience. If articulated beyond its historically narrow techno-economic rationality, Net Neutrality can lead to an exploration of communications rights and public interests in an environment of converging media on the Internet. The chapter undertakes a critical exploration of the incompletely understood idea of neutrality. In so doing, it shows the reality of long-standing and persistent intervention in Internet traffic flows. However, careful consideration and development of the idea of intervention can allow expansive and progressive understandings of the capacities for – but also the necessary limitations of – non-neutral intervention in the converging communications environments of the Internet to be developed.

The chapters in Part III of the book concern governance issues bearing on media content and journalism in the converging media environment and Internet era; these being copyright, media concentration, and media subsidies. The three chapters all have themes that interconnect. All three point to the scale of the challenge posed to effective regulation along traditional lines by the new media, whilst at the same time arguing the continuing need for regulation in the converging, new media environment. Another interconnecting thread of the chapters is discussion of how the challenge can be met by adapting existing policy approaches, but changing the main thrust of policy away from negative regulation, namely restrictions and prohibitions that are hard to implement, towards positive regulation, concentrating on subsidizing quality, professional media content and what might be termed 'public service journalism' in the digital and online environment. Relatedly, all three chapters raise the question whether new Internet intermediaries (ISPs, Google, YouTube and so on) should be considered as simple conduits, deserving of regulatory exemption from much responsibility for content, or whether they should be subjected to greater responsibility for the content they distribute (or if it is preferred, 'host') online through stricter external supervision and the imposition of a levy in order to cross-subsidize those media that produce the content that supports their businesses. Above all, all three chapters depart from the neo-liberal perspective that market-led solutions can be relied upon and that state intervention generally impedes desired outcomes by distorting the market. As far as the issue of the future of quality media content and journalism is concerned, active intervention is required, otherwise convergence will lead to a hyper-commercial and self-cannibalising media environment in which quality media is produced in diminishing quantity.

Chapter 5 explores the challenge presented to copyright by digital convergence and the Internet. It takes issue with scholars who, by an arguably one-sided over-emphasis on the alleged exploitation of copyright law by powerful corporate copyright holders to maximise their control of the media industries and their profits, rather play down the issues of copyright 'piracy' (illegal) and 'free-riding' (legal, see Levine 2011) on a scale that threatens to undermine the business models that underpin the creative industries, from the recorded music business through to traditional newspapers. By exploring how copyright reform has been debated, and to some extent positive change introduced, in the United States and in Europe, it reveals a marked hesitancy on the part of government to legislate and a reliance on a mix of legal process and inter-industry agreements in the US in comparison with a somewhat more active policy making and legislative approach in Europe. Here, policy makers at EU level and in certain European countries appear more minded to defend their culture industries by making technology companies much more responsible for what their users upload. However, as of yet, in Europe as in the United States, neo-liberal thinking and inhibitions about the need to promote new technologies (and defer to the new technology companies) has seen a concern for 'the free market' generally prevail over cultural and culture–industry interests, though this is far from being the whole story.

Chapter 6 considers the issue of media concentration, arguing that it continues to be a major policy issue even in the Internet environment. First, it considers why media concentration per se is a serious content issue not least because of the importance of ensuring a multiplicity of voices in the media for underpinning democracy. The chapter explains why the media are particularly prone to economic pressures towards concentration. Then, it explores trends in media concentration and its regulation, first by exploring the US case, then the European. The chapter shows how the universal trend has been the progressive de-regulation of sector-specific structural rules designed to limit media concentration, the ideological force for which has been a neo-liberal policy turn from the 1980s on and the principle argument against them being that they are no longer appropriate in a converging new media environment where markets are fluid, where it is difficult to determine the 'relevant market' for determining concentration, and where essentially the same media output can be distributed over a number of media vectors or platforms. Next, the chapter turns to the debate between Internet celebrants and sceptics about the pluralising impact of the Internet, showing that, in the converging media and Internet environment, concentration still needs addressing through policy and regulation. The chapter concludes by

suggesting pointers towards policies that might be adopted, which are further discussed in the book's conclusion. One of the chapter's conclusions is that, given the decreasing purchase of sector-specific anti-concentration regulation, an important policy for promoting media pluralism in the new media and Internet era should be a new approach to subsidy, a theme that is taken up in the next chapter.

Chapter 7 explains how new media, lifestyle changes and generational change have combined to present a powerful challenge to traditional quality journalism and news media. First, the chapter examines the challenge to journalism and traditional media organisations represented by the changing technological and market environment they function in. Then, the chapter explores the theme of subsidy, first as a policy mooted to confront what has been seen as a crisis of journalism in the United States, then as a tried and tested policy in Europe with respect both to supporting the press and especially broadcasting. The chapter shows how the UK has always been a generous subsidiser of public service broadcasting and how the policy debate continues to produce highly interesting ideas for innovation. Its main argument is the need to rethink policy for the public subsidy of journalism in the Internet era, where old technology-specific approaches having been rendered increasingly anomalous by digital convergence of the media and the Internet. The chapter explores how public policy might instead support in a technology neutral manner media, public or private, which provide 'public service journalism'. Echoing a conclusion of Chapter 6, it argues that public service broadcasters (PSBs) should continue to be generously supported, not least to allow them to become public service media (PSM). However, it also suggests that there is a case for a new institution to be developed tasked and funded specifically to support public service content in the digital, online environment, along the lines of the 'public service publisher' concept mooted by UK regulator Ofcom as a policy to support plurality of public service broadcasting in the digital era, but doomed by a combination of corporate vested interests and a neo-liberal concern on the part of policy makers about the market distortion that such an innovation implied. The chapter suggests how this could be funded through a number of different possibilities for industry levies, so as not to damage established PSB/PSM institutions.

In the fourth part of the volume, we present our conclusions to the analysis of the governance of media convergence presented in the volume. Whilst the preceding chapters of the volume highlight a problematic and challenging picture in considerable part, this notwithstanding, a central argument of Chapter 8 is that convergence, due to its incomplete nature, presents considerable opportunities. The chapter

argues that media governance and policy can set the context for a more inclusive and progressive process of convergence to unfold. A series of potential media policy solutions to the current impediments to convergence are presented in the core areas of coverage of the volume's preceding chapters. The chapter puts forward an agenda for future work that can lead to a richer understanding of the significance and capacity of digital convergence.

Overall, the convergence in media that we witness and experience at the time of writing is a product of different traditions, practices and cultures. This has the unsettling consequence that the picture of convergence is still complex and contradictory – and thus indistinct and incomplete – in much of its character. To understand better why and how this is the case requires a detailed exploration of the core aspects of media convergence and its governance. It is to this task that the remainder of this volume addresses itself.

NOTE

1. There were some exceptions to this pattern. For example, copper cable was used extensively in telecommunication and less frequently in cable broadcasting, particularly where terrestrial broadcast technologies were impractical because of topography.