

Innovating free-to-air broadcasting

Social value, broadcast content, and personal mobile communications

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ABSTRACT

This chapter analyses recent evidence of efforts by broadcast players to move into personal mobile communications through the delivery of broadcast content to smartphones. It explores innovation strategies related to the broadcast distribution channel, rather than content, and illustrates what can be described as defensive and progressive elements in the activities of European digital terrestrial television (DTT) service providers. The chapter points to the enduring resilience and social value of public service broadcasting in increasingly online, predominantly alinear, electronic communications. We outline the case for this in terms of the social value added which these providers bring to two linked and complementary core elements: technological research into 5G broadcast delivery and strategies to protect existing control of scarce ultra high frequency (UHF) infrastructural spectral resources. We argue that both elements contribute to the public purposes of providing access to – and securing universality of – media services.

KEYWORDS: broadcasting to smartphones, technical standards, public service media, 5G, mobile communications

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Introduction

This chapter analyses recent evidence of efforts by digital terrestrial television (DTT) broadcasters to move into personal mobile communications through the delivery of broadcast content to mobile smartphones. In so doing, it adds to the broader debate on future distribution strategies of free-to-air broadcasters, many with a public service underpinning, on which there has been little research to date. Over the last decade or more, considerable academic attention has been given to the role of public service media (PSM) and their providers in general online environments, though, within this, there is an understandable gap in knowledge on the prospects for free-at-the-point-of-consumption PSM content delivery in personal wireless broadband communication environments, such as those being developed through 5G technology. That (on the surface, counterintuitive) action of this kind by broadcasters could manifest itself gives rise to the core line of enquiry and research questions of this chapter:

- RQ1. Why would traditional terrestrial broadcasters wish to move into personal mobile communications?
- RQ2. What is the nature of the action taken by digital terrestrial television providers, and what does it tell us about their perspective on the future of terrestrial broadcasting?

Personal mobile communications – an adjacent sector to broadcasting – has been established since the 1980s and is structured and functions according to wholly commercial values and practices. It is already inhabited by highly powerful and often globally branded equipment manufacturers and service providers hailing from the telecommunications sector. This chapter provides recent evidence to account for DTT provider activity aimed at delivering 5G mobile broadcasting services to audiences. We undertake two core tasks in pursuit of our research questions. First, we seek evidence of the continuing role of DTT sector players, and PSM providers in particular, in technological research, in this case to enable wireless and mobile consumption of broadcast content. As such, we explore innovation strategies related to the broadcast distribution channel, rather than content. According to Donders (2019: 1021):

[There is] little evidence that much reflection has taken place on the important matter of how the connection with the audience can be restored or improved in an environment where [...] all the means of distribution are (in one way or another) controlled by companies that are not PSM institutions.

In this chapter, we unearth evidence that such organisations are indeed undertaking such reflection, as well as strategic action in service of its realisation. Our focus on innovation resonates with the analysis of Künzler and colleagues (see Chapter 12 in this volume).

Second, we illustrate the keen interest of PSM broadcasters and DTT network operators in translating the fruits of their research to continue to provide socially progressive and innovative delivery methods for their services. In this way, these organisations continue to present themselves as trusted custodians of scarce public communication resources through providing the extra dimension of wireless and mobile consumption. Yet, in a different way, this chapter demonstrates how this activity also exhibits a strategic, defensive purpose, where broadcasters have shown evidence of their ability to formulate arguments and develop sophisticated proactive strategies in order to mount a strong defence of the territory they hold – in this case, the 470–694 MHz (megahertz) band, which they argue can be used to deliver new broadcast to mobile services alongside traditional television services. This issue is particularly important, since the spectrum in question is also of interest to mobile broadband players wishing to expand their online electronic service portfolio and has emerged as something of a ground of resource contestation. Ultimately, this chapter highlights strategic action taken by terrestrial broadcasters to assert the enduring resilience and social value of broadcasting with a public service character in increasingly online, predominantly alinear, electronic communications. These relate directly to providing access to – and securing universality of – media services.

The next section presents insights from the academic debate on the ability of broadcast service providers to deliver social gain from their activities (in their original incarnation) and now expanded to include online (broadcast) consumption environments likely to develop even more widely in the coming decade. We articulate the main contributions of public service provision over what has become a rival alternative, counterpart system of commercially underpinned personal communication services provision which, with some justification, is able to claim the delivery of its version of “public utility” to a public mass of consumers.

In the subsequent section, we first show how prominent terrestrial broadcasters have devoted research and development resources to explore the technical feasibility of delivering high capacity, large-scale, broadband (broadcast capacity) content services within wireless 5G environments. We then explore the recent and ongoing international debate on current and potential future use of the part of the ultra high frequency (UHF) spectrum occupied by DTT players, which has brought into often fractious focus the role of broadcast and mobile broadband providers in the future development of electronic communications. We link the two issues by providing evidence of a highly proactive-defensive stance by broadcast players to argue the case for the continuation of their assigned exclusive primary rights to operate in the 497–694 MHz UHF spectrum bands, a newly introduced element of which is the declared intention to offer 5G broadcast services, enabled by recently concluded technological research. This might be seen as a bold

counter-manoeuvre into the territory of mobile broadband personal mobile communications providers. To conclude, we reflect on the continual and future social value of broadcasting with a public purpose by focusing on the distinction between the concepts of public service-realised social utility and commercial market-realised mass public consumer utility in online wireless broadcast network environments. Methodologically, we employ a critique of literature on the public and social value of broadcast media, analysis of interview evidence on multistakeholder participation in technical standards-making for online services, and documentary analysis of publicly available recorded video footage of two sessions involving DTT and mobile broadband representatives on the future of the 497–694 MHz band.

Thinking about social value and public service media

PSM's role in society has been an ongoing concern of media scholars for at least the last 20 years, despite – or maybe because of – the growing and seemingly inexorable commercialisation of the (increasingly online) media system. The defence of traditional television provision in the Internet era has been strong, with Bailey (2019: 153) having argued that the former “remains a common source of information and entertainment and is characterised by meaningful continuities”. In thinking about future approaches to public service broadcasting, Jakubowicz (2010: 14, 17) asserted that “tasks subsumed under the general rubric of ‘socially valuable content’ need to be modernised and adjusted to new circumstances [... where ...] almost everything in the way that it performs its mission should change”. After a decade and a half of online social media, Bourdon and colleagues (2019: 1) argued that “the idea of an independent media providing quality material, trying to give universal access to relevant content which addresses audience needs and wants without manipulating them or selling their data, actually feels more urgent than outdated”. Belair-Gagnon (2012: 62) earlier raised a concern about the “diffuseness and absence of a communicational centre” in social media, something which sits in contrast to – and challenges – traditional understandings of the value of public service broadcasting (PSB). It has recently been argued that the scale advantages accrued by public service broadcasters can even allow them to act as an important counterpoint to social network platform power (Sundet & Syvertsen, 2021), where the idea of the PSM provider as a prominent and trusted brand could be significant.

The adoption of new communications technologies by service providers could lead to a consideration of “complex behaviours, practices and attitudes that influence changes in professional identities and practices” (Belair-Gagnon, 2012: 62). Here, authors such as Bennett and Strange (2008: 108) have focused on “the shifting parameters of television’s technological, cultural and textual form and the place and purpose of PSB within these”, with a

particular focus on content creation. Their relatively early analysis of some British (BBC-run) projects led to an assertion of the future importance of the PSM provider as a manager of “user flows [...] through the creation of public partnerships that often involved users moving out into public spaces as part of a *mobile citizenry* [emphasis added]” (Bennett & Strange, 2008: 116). Goodwin (1997) noted that in the UK, as far back as 1984, the BBC was asserting its resolve to lead on the development of new technologies with its public service remit in mind. Brevini (2010) charted the BBC’s engagement with online provision, noting how expenditure on the BBC Online service nearly tripled between 1998 and 2001, a service licence which required content to comply with at least one of the core PSB constituents of being high quality, challenging, original, innovative, and engaging. She argued that PSB activities online should transpose and take forward the core staples of “citizenship, universality, quality and trust” (Brevini, 2010: 360), thus validating the legitimacy of broadcasting with a public purpose (see Fehlmann, Chapter 2 in this volume). Debrett (2010: 187), too, has argued that universality “is generally considered the most important of the PSB principles because of the social value of mass audience reach” and that online “on-demand, cross-platform access is the new universality [... which ...] needs to be addressed across the full range of media platforms in order to aggregate sufficient fragments to reach a general public”. From this, other core staples of public service in media delivery have the opportunity to be pursued and realised. Such a perspective tends to consider both content creation and delivery as essential parts of the social value of online PSM.

Despite these assertions, in an increasingly commercial media landscape, it is inevitably the case that scrutiny would focus on the extent to which the activities of PSB and PSM providers might be anti-competitive in character or – in a more long-term perspective – might crowd out investment from private sector players. As broadband fibre rollout has proceeded, and television consumption through the Internet has become possible, the UHF spectrum occupied by DTT providers has been eyed enviously by mobile broadband providers, increasingly scrutinous of (and sceptical about) television providers’ use of this scarce, and thus valuable, resource. Regarding the activities of public service broadcasters in online environments, criticism has tended to focus on an aversion to the idea of these providers acting for commercial purposes. Raats (see Chapter 6 in this volume) explores the potential tensions between economic and public impacts of PSB, yet, as D’Arma (2018: 433) has pointed out, “many of these organisations have long supplemented the funding they receive from the state with income derived from either selling advertising or engaging in various ancillary commercial activities”. Similarly, Donders and Van den Bulck (2016) reminded us of the significance of BBC Worldwide, a far from uncontroversial commercial endeavour with an avowed public service underpinning. Criticism from commercial competitors

has followed the BBC, in particular, since its move into the online world, and it has been argued that the corporation has in response in fact cultivated something of the commercialisation-competition agenda from whose quarters such criticism has emanated with the “internalisation of a pro-market and pro-competition ideology at the BBC’s top management level” (D’Arma, 2018: 443) and even evolution into a “neoliberal bureaucracy” (Mills, 2016). Yet, more broadly, in her recent study of the content and distribution strategies of a selection of public service broadcasters, Donders (2019: 1013) has found that they “have so far failed to develop distribution strategies that match the theories relating to PSM”.

Academic analysis, too, illustrates fraction in the debate on the future role and position of PSB. From an economic perspective, Sieg and Stuhmeier (2015: 443) have argued that “digitalization of content, subscription models, and changing viewer behaviour erode the grounds of public intervention in broadcasting markets” to an extent that it should only occur in key areas like “news and cultural content if it is desired from a social perspective, but too costly to produce in the private market”. Yet, Michalis (2012: 945), in a study of the BBC’s withdrawal of its online BBC Digital Curriculum, found evidence challenging “the suggestion that the entry of PSBs into a market necessarily displaces commercial activities since, following the BBC’s retreat, there has been no flourishing of private investment in the markets the Corporation intended to serve”.

Goodwin (1997) set out three core arguments as to why PSM should not be limited to activity beyond what the market is able and willing to deliver: the danger of PSM being marginalised in society; the fact that PSM has raised across-the-board quality standards in media; and the empirical difficulty of establishing what the market would and would not wish to provide. Goodwin took these arguments – historically generated in respect of media content – further, by asserting that “if they apply to public service as traditionally delivered, surely they apply to *public service use of new distribution channels* [emphasis added]” (Goodwin, 1997: 72). Harker (2011) reminded us that whilst customer segregation and exclusion through pricing may now be technically possible in broadcasting, the idea of the undesirability of exclusion on welfare maximisation grounds – and thus a persistent public good character – in broadcasting remains. This opens up the possibility of recognition of the cultural and societal value of broadcasting, where “PSB should, therefore, be seen to have a wider role than simply filling the ‘gaps left by the market’: it may play an important role in shaping preferences prior to the market” (Harker, 2011: 558).

Recent evidence from the UK suggests the endurance of considerable support for public service television, where the Puttnam Inquiry asserted “a comprehensive and lucid defence of television’s social purpose” (Bailey, 2019: 163). One particular view emanating from some government circles which

it challenged was the criticism that the BBC had forsaken the pursuit of so-called distinctiveness in its programming in a move to be something of a ratings chaser, the policy implication being that the BBC might be effectively reined in to focus on less generalist content and its audiences. The “distinctiveness debate” and its threat to the idea of progressive PSB (Tracey, 1998) has recently received considerable academic attention. It has been asserted that “offering high quality and being distinctive is not the same as being a niche player” (Donders & Van den Bulck, 2016: 301). Goddard (2017: 1093) argued that the idea of distinctiveness has developed “a rather elastic and sometimes contradictory” character. An undesirable outcome of the recent distinctiveness debate in the UK has been the BBC’s positioning of itself as an organisation which Braman (2016) characterised as a bifurcation between creating expensive content to take on newer global media players like Amazon and Netflix, on the one hand, and seeking to provide content which the market chooses not to, on the other.

The debate on the continuing relevance of live free-to-air television has been bolstered by trends in media convergence where users are increasingly viewing media content alinearly and on the move. The growth of mobile broadband communication has led to a view that the twenty-first-century electronic communication needs of consumers can be delivered to a significant extent by mobile broadband providers. For several years now, they have presented the argument that to do so, they require a reallocation to them of UHF spectrum used by DTT broadcasters. The capacity efficiencies from digitalisation of the airwaves created the well-written-about “digital dividend” to allow this to occur; and the growth of television consumption through the Internet added further weight to their case. In policy and practical terms, such arguments have gained considerable traction with the clearance of, first, the 800 MHz and then the 700 MHz bands by DTT providers and their allocation to mobile broadband providers (Rashid & Simpson, 2019) with current focus on the sub-700 MHz band (470–694 MHz). In contrast to the arguments which have sustained the development of public service provision in broadcasting historically, and, as noted above, are utilised for its proposed extension in the online world, the mobile broadband sector has asserted the rationale for its own expansion in terms of commercial market-realised mass public consumer utility in online wireless broadcast network environments. Evidence suggests some development of these ideas even into the realm of the so-called digital divide (see below).

Thus, there are two markedly different ideological viewpoints on the future of public value in media which continue to shape the debate on the development of online media consumption. The remainder of the chapter shows how DTT providers have been active in asserting their position in what has become a notable arena of media policy contestation.

Social value and terrestrial television with a public purpose

Technological research

New technologies offer PSB a chance to perform its role better and to serve the audience in more varied ways than before (Jakubowicz, 2010). Evidence from the UK suggests that the 2020s may mark a pivotal moment of transition in the history of broadcasting. On the one hand, in February 2020, Enders Analysis released a report highlighting the “surprising endurance of UK broadcasting media”, and concluded that, with some 13 per cent of adults still not using the Internet, the prospects of witnessing an online-only (broadcast) media environment in the UK were not realistic in the near future. Yet, on the other hand, mobile traffic rates and mobile data consumption are increasing, where video content has been one of the main drivers of data demand, accounting for over 60 per cent of all data traffic on mobile networks (Miller et al., 2021). Online video consumption time has increased by 85 per cent since 2016, reaching almost eight hours in 2020 (Miller et al., 2021).

In order to respond to audience trends, the European broadcasting industry has devoted research and development resources to explore the technical feasibility of delivering high capacity, large-scale, broadband (broadcast capacity) content services within mobile 5G environments. A working group – 5G in Content Production (5GCP) – involving European Broadcasting Union (EBU) members, suppliers, and other interested parties was established in May 2018 (Waglin, 2019). The driving force behind the work of the group, as explained by the chair, Ian Waglin (BBC), is the already well-known problematic for the broadcasting community of “the potential of the technology [combined] with the threat of spectrum currently in use by broadcasters and production teams being eaten up by future 5G” (Waglin, 2019: para. 6).

Further, in terms of collaborative efforts, broadcasters within the EBU have called for active participation in developing new mobile standards within the European mobile standards body, 3GPP, as well as the European standardisation authority, the European Telecommunications Standards Institute. Elements have been added to the current 5G standard to enable content delivery to mobile devices, utilising the available spectrum to broadcasters in the UHF band. The broadcast-specific downlink-only addition – called 5G Broadcast – allows for “free-to-air content to mobile phone users without the need for additional receivers to be built into handsets and for the user to get a subscription” (EBU, 2021a: para. 2). The DTT broadcasters are keen to highlight that the new technology conforms with the International Telecommunication Union GE06 Agreement and current World Radiocommunication Conference (WRC) regulations (Puigrefagut, 2021, 2022), which means that no allocation of further new spectrum to deliver 5G services is immediately required. The 5G Broadcast standard is also being developed to ensure coexistence with

DTT and programme-making and special events services in the same spectrum band. Therefore, this technology is the preferred system for broadcasters for serving PSM users, as it can complement the services offered by DTT since it neither replaces it nor competes with it for the same spectrum. Granting further spectrum in the sub-700 Mhz UHF band (see discussion in the next subsection) to mobile broadband operators – whose technical capability to deliver the same content to a mass audience as efficiently as DTT or satellite broadcasting has been questioned (Lombardo, 2019) – is a fiercely opposed alternative by broadcasters, as coexistence between DTT and mobile services is considered problematic (Faisan, 2021) from a technical perspective. Another prominent argument made by the broadcasting constituency is that the technology may allow additional flexibility due to its complementarity with DTT. Here, in countries where DTT take-up is low, the digital terrestrial broadcasting system can be replaced with 5G Broadcast, while in countries with higher DTT provision, the digital video broadcasting-based services can continue to operate and serve audiences for as long as they are needed (Hemingway, 2021).

If possible, public service broadcasters want to benefit from the availability of both downlink (e.g., terrestrial or satellite television, suited for mass, live broadcasting with no return channel) and uplink (mobile broadband) infrastructure, acknowledging that while “most of the population still massively relies on traditional broadcasting to consume live content” (Lombardo, 2019: 29), there is some evidence of growth in consumption of live and on-demand television services on smartphones. The EBU has argued that as “no single solution represents the optimum”, maintaining DTT while at the same time creating technical solutions where 5G can be integrated into existing broadcasting infrastructure (Lombardo, 2019) should be the adopted approach. Two more technical reports published by the EBU have confirmed reliance on this direction: One report (EBU, 2021c) concludes that using available DTT frequencies in the sub-700 MHz band is the most practical way to introduce 5G Broadcast services, and the other (EBU, 2021b) proposes a hybrid technical approach incorporating layers of existing broadcasting infrastructure with mobile-level networks as a possible compromise for delivering 5G content services.

Incorporating 5G broadcasting technologies and building them into the existing DTT solutions is argued to be a realistic approach, considering that “even in the most developed countries, 4G coverage has exceeded 95% household penetration only after 10 years”, with an even lower adoption rate of 42 per cent of total connections (Lombardo, 2019: 31). In addition, although content is shifting to Internet Protocol, the transition is happening slower than anticipated, with more than 80 per cent of viewing and listening served through terrestrial, satellite, and cable platforms (Hemingway, 2021). Therefore, “assuming that these patterns and trends will not change in the

future, we can expect to see a full 5G rollout for developed countries in 2030, and a satisfactory adoption rate in 2035” (Lombardo, 2019: 31). In addition, the feasibility of achieving universal coverage, including for rural areas, seems very low, as the price of covering these areas is as high as “half the entire running cost of the network for the whole country” (Lombardo, 2019: 31).

In the UK, the BBC’s research and development department has been involved in the first 5G broadcasting content trials and an exploration of opportunities around 5G delivery. The BBC, as part of a wider consortium, has begun testing live radio broadcasting over 5G in remote rural locations on the Orkney Islands in Scotland. The 5G RuralFirst consortium, led by Cisco alongside BT, Microsoft, and several higher education institutions, has focused on the Orkney Islands due to their “limited fixed broadband, little or no mobile signal and poor digital radio (DAB) coverage” (Murphy et al., 2019: 4). The private sector companies involved in the consortium are interested in exploring a niche business model, beyond that covered by the major 3G and 4G service providers. For the latter, the cost of providing affordable and reliable coverage to remote rural areas is high, leaving expensively acquired spectrum unused in those areas. Therefore, claims about the public social value of the 5G RuralFirst consortium must be tempered by this realisation.

Nevertheless, in terms of public value of the provision, Murphy and colleagues (2019) reported that the users’ response to the service and its impact was generally positive. Nine out of ten people were satisfied with the trial for Internet services, describing it as faster and more reliable. In addition, the better quality of the Internet signal diversified the content choice for listeners. It has been argued that “while listening habits broadly reflect trialists’ existing service preferences, there is evidence of a broader repertoire of stations being listened to via the trial app” (Murphy et al., 2019: 7). Thus, this innovated provision increased the variety of stations and flexibility to listen on the move, affordances underscoring Lin and Tsai’s argument (see Chapter 7 in this volume) about the need for broadcasting with a public purpose to be receptive and responsive to changing public audience preferences.

5G networks are also expected to play a vital role in the development of virtual and augmented reality. Trials of immersive broadcasting services and so-called 360° visual media on mobile devices have involved, in the UK, collaborations, including the BBC, to test virtual and augmented reality user experiences based on smartphone applications displaying virtual reconstructions of the historically important moments during the era of Roman Baths in Bath, UK (BBC, 2019; Murphy et al., 2019). The project, titled 5G Smart Tourism, “examined how 5G might change the types of media experiences that would be practical on a mobile device and how they might enable the BBC to inform, educate and entertain in new ways” (Murphy et al., 2019: 9). The two projects concluded that although “the trials have demonstrated the opportunities that 5G could enable for distribution and content [...], details

relating to the costs to broadcasters and the associated business models will require further investigation” (Murphy et al., 2019: 12).

Other trials on the performance of 5G broadcast opportunities in Europe have been conducted with the involvement of broadcasters and broadcasting network operators in Germany, Italy, Austria, and Spain (5G Mag, 2021). In Germany, the 5G Media2Go project is exploring the opportunity to distribute media content (linear and alinear) in the integrated “infotainment” systems of cars and public transport vehicles. The project unites broadcast, automotive, and telecommunication industries’ efforts to develop 5G-enabled consumption services, offering innovative pathways to distribute media content and reach audiences on the go. Another trial project – 5G Today – implemented in Munich, has explored the potential of the 5G Broadcast standard to bridge the gap between unicast (one-to-one) and broadcast (one-to-all) modes of content distribution for mobile devices and tablets, reporting promising results for deployment in the near future. In 2020, the ORS Group (Austria’s broadcasting service provider) started trials in Vienna to compare the quality of coverage and signal of the DTT advanced standard DVB-T2 with 5G Broadcast (Phase 1), and to test the new 5G standard as regards the interaction between broadcasting and mobile communications in the provision of hybrid services and the distribution of disaster and crisis information (Phase 2). Most recently, the Italian broadcaster RAI, along with other members of the EBU, showcased 5G Broadcast in Europe, delivering the Eurovision Song Contest live to 5G Broadcast-enabled mobile phones, through the use of existing digital television transmission networks (EBU, 2022).

These and similar trials and tests have informed the work on standardisation and demonstrated, in theory and practice, the opportunity of convergence of fixed, mobile, and terrestrial broadcast networks for integrated media user experiences. Yet, none of the trials have drawn clear conclusions on the costs to broadcasters or offered concrete business model pathways. Further investigations are therefore continuing. In addition, as much as there is cooperation between the broadcasting and mobile communication sectors in adjusting standards (mostly driven by the former), the competition for spectral infrastructure and resources is an ongoing issue.

Use of scarce infrastructural spectral resources

The debate on future use of the sub-700MHz (470–694MHz) bands re-emerged in 2021 in the context of preparations for the International Telecommunication Union World Radiocommunications 2023 conference (WRC-23). The conference agenda required participants “to review the spectrum use and spectrum needs of existing services in the frequency band 470–690 MHz in Region 1 [comprising Europe, the Middle East and North Africa] and consider possible regulatory actions [...] in accordance with Resolution

235 (WRC-15)” (ITU, 2020: §1.5), something which has acted as a catalyst reigniting the debate across Europe. In 2017, in the European Union, after an intense debate post the 2015 WRC conference (WRC-15) and the findings of the Lamy Group on the future of the 700MHz band (Lamy, 2014), the European Council resolved that the sub-700 MHz band would remain available exclusively to DTT and programme-making and special events services at least until 2030, but that the European Commission would report to the Council and the Parliament on the developments in the use of the band by 2025 (European Union, 2017).

Evidence suggests that in the renewed and ongoing debate on the future of the 470–690 MHz band, arguments are centring around the rollout of 5G mobile services, crystallising many of the arguments elaborated on in this chapter. In the process, incumbent interests in the band, principally from DTT service provision, DTT network operation, and the programme-making and special events sector are mounting strong arguments for no change to the status quo to be agreed on at WRC-23. Here, progressive arguments around universality have been presented through technological change–underpinned new service provision, where it is argued that DTT broadcasters in Europe need continued exclusive primary access to the band to allow them to innovate. A related argument is that the provision of DTT and 5G broadcast services possess something of a public service complementarity, with consumption of services by audiences occurring through traditional DTT in the home and through 5G services on the move (Faisan, 2021; Forum Europe, 2021). Underpinning this is the claim of efficient technological management of the band through maximal signal compression. DTT, thus viewed, supports European policies and values in a way other platforms do not. Any move to create a co-primary allocation of the band between broadcasters and mobile broadband providers at WRC-23 would undermine this by creating disruption and uncertainty for broadcasters. More emotively, it has been claimed – based on the experience of the repurposing of the 800MHz and 700MHz bands – that a co-primary reassignment of the band would culminate in the “eviction” of DTT players and, ultimately, “the end of free television for European citizens” (Faisan, 2021).

Puigrefagut (2021) provided an EBU perspective in the debate by arguing for the public and societal value of the UHF band, as well as rehearsing the argument about the benefits to the media production sector through DTT broadcaster investment in content creation, where it was claimed that 89 per cent of television output is domestic or from the European Union, with EUR 19.5 billion per year invested in content creation. Puigrefagut (2021) noted the innovation occurring in technical standards produced by 3GPP and the European Telecommunications Standards Institute such that 5G Broadcast can support a new one-way (downlink) distribution channel for free-to-air services and network configuration flexibility for optimal coverage. The argument for regulatory stability was again asserted since this

activity is still a work in progress. It was further argued that 5G Broadcast is a “broadcast service” that is technically compatible with both DTT and programme-making and special events services, and it can be introduced in the UHF band under the international Geneva GE06 Agreement, which sets out conditions for bilateral and multilateral coordination arrangements for DTT services planning. More defensively, it was argued that any changes to the allocation and use of spectrum between DTT and other services in the band could require potentially complex and time-consuming work to ensure compliance to avoid signal interference problems. Puigrefagut (2021) argued that since DTT broadcasters are evidently innovating without asking for more spectrum, could mobile operators be asked to try to do the same in a status quo situation?

As might be expected, a rather different perspective on the future of the band has emanated from the mobile broadband sector. In their recent analysis on the future of the sub-700MHz (470–694MHz) band, Miller and colleagues (2021) argued overall for co-primary reassignment of the band to occur at WRC-23 between broadcasters and mobile broadband providers. Much of their argument was framed in terms of universality, where the proposed change could realise 5G “ubiquitous coverage”. More critically, it was contended that “while DTT standards are technically efficient, the characteristics of broadcasting networks [...] mean there are parts of the allocated UHF frequencies being left unused at a particular time” (Miller et al., 2021: 39). It was argued that DTT is unevenly deployed across Europe, where “Belgium, Denmark, Estonia, Iceland, Netherlands and Norway have less than five national DTT services each, while others such as Albania, Czech Republic, Finland, France, Italy, Spain, Ukraine and the UK have more than 20” (Miller et al., 2021: 39). It has similarly been argued that future demand for DTT is uncertain, with growing demand for streaming and the increased possibility for consumers to receive television services through the Internet. Notable here is the decision of the Flemish (VRT) and Swiss (SRG) public service broadcasters to close their DTT networks in 2018 and 2019, respectively. Whilst acknowledging the likely continued use of DTT into the next decade in states such as Italy and Spain, and for purposes of ensuring free-to-air access for older people and low-income households, Miller and colleagues (2021: 48) nevertheless argued that “the level of demand is likely to be much reduced in many countries”.

A particularly interesting aspect of this version of the pursuit of universality refers to closing the “digital divide” between rural and urban environments. It has been argued that 5G provided by the mobile broadband sector can positively impact what is termed “economic well-being”, such as providing better access to inputs to improve production processes in businesses; provide better access to finance; better access to the labour market; and improvements in employment. Separately, Rehfuss (2021) has argued that 5G use requires the kind of high-quality bandwidth available in the 470–694 MHz band to

deliver services to rural areas. More broadly, he contended that networks would evolve in the future in a convergent direction, and a co-primary allocation of the band at WRC-23 would allow options to be kept open when the need to build momentum in ecosystems is necessary.

Conclusion

Media systems have a well-established history of developing new means of asserting the value and societal contribution of PSM (Bardoel & Lowe, 2007), and they have provided regular instances where broadcasters with a public purpose find themselves in an existence-justification, defensive position (Sundet & Syvertsen, 2021). This chapter provides evidence of the importance of innovation in the infrastructures to deliver free-to-air broadcast services to audiences in the twenty-first century, something which can be viewed as a part of this kind of exercise. It also reminds us that deploying the airwaves to provide communications services still requires media-policy decision-making on a scarce public resource to develop and sustain its societal contribution.

The multichannel era of broadcasting at one point led to the view that the period of spectrum scarcity that had characterised the evolution of the sector for much of the twentieth century had ended. Convergence of media infrastructures, services, and content – underpinned by a desire for wireless mobility – has dramatically terminated this hiatus of abundance. As a consequence, broadcasting with a public purpose has entered the latest phase of challenge to its territory requiring a (re-)assertion of its purposes and societal contribution. The evidence of this chapter suggests that such a defence is robust and pluri-dimensional. In this chapter, we have placed emphasis on the pursuit of the related goals of technological change and universality. Providing 5G mobile broadcast services sustains into the future the core staple of free-to-air communication service provision. It also considers dynamically and progressively long-held ideas of engaging with audience members to provide them with personal utility and satisfaction, a key societal benefit still relevant in the mobile Internet era. Writ large, this chapter exemplifies the cornerstone ideas of the public broadcasting system to pursue equality of access and, in so doing, the promotion of communications citizenship. These issues comprise the citizen-focused social value and contribution to be derived from free-to-air 5G mobile broadcasting.

Yet, the chapter also provides evidence of the continuing social contribution of broadcasting with a public purpose in the realm of technological research (see Table 9.1). Regarding work to realise 5G broadcast distribution, this involves arguments showing the role of DTT providers as flexible innovators working with existing capacity resources. It illustrates the keen interest of PSM broadcasters and network operators to translate the fruits of research to continue to provide progressive and innovative delivery methods for their services. Here, they continue to present themselves as trusted custodians of scarce public communication resources.

Table 9.1 Approaches to online content delivery through 5G

Public service broadcasters	Mobile broadband providers
Universality: free-to-air	Universality: customer subscription
Universality: audience member engagement	Universality: customer quality of service focus
Universality: promotion of citizenship	Universality: promotion of individual welfare
Universality: provision of equality of access	Universality: provision of service to narrow digital divide
Technology: trusted custodian of scarce resource	Technology: proactive new entrant
Technology: flexible, complementary innovation with existing resources	Technology: ambitious, resource-demanding, system-disrupter

The need to preserve for DTT primary use of the sub-700MHz UHF band is thus justified by broadcasters in the light of growth in on-demand television content provision for smartphones, tablets, and mobile devices in cars. The 5G Broadcast method is seen as a complementary technology which does not require changes to the (sub-700MHz) UHF band and amendment to the International Telecommunication Union’s radio communication regulations in WRC-23. 5G Broadcast, it is argued, will complement existing usage and will not replace DTT and programme-making and special events, as they can fairly coexist in the UHF band, while co-existence between digital terrestrial broadcasting and mobile broadband services is not possible (Forum Europe, 2021). This chapter also provides further evidence of the ability of these organisations to formulate strategic arguments and develop sophisticated proactive strategies in order to mount a strong defence of the territory they hold – in this case, the 470–694 MHz band. According to Broadcast Networks Europe (BNE), the success of 5G Broadcast deployment depends on long term regulatory certainty (Faisan, 2021). This can provide a route to successful innovation, rather than a co-primary allocation of the spectrum as suggested by the mobile broadband community. It has been argued by the BNE that:

There is a history of mobile being given co-primary status with broadcasting in different parts of the UHF band and that leading to either the spectrum being cleared for mobile services or discussions about the spectrum being cleared. It is therefore inevitable that a co-primary allocation to mobile in the 470–694 MHz band would lead to uncertainty regarding the future of DTT’s use of spectrum – and given that this is the only remaining spectrum that DTT uses for transmissions – uncertainty regarding the future of DTT as a television platform. (Aetha Consulting, 2014 cited in Faisan, 2021)

The classic arguments that sustained the public service character and societal contribution of television – free at the point of consumption, openly available, and accessible to viewers – have also been put forward. Beyond this, however, ideas of ongoing engagement with audience members on their terms and, in the process, sustenance of the idea of a connected citizenship are in evidence. Overall, the chapter points to the enduring social relevance and contribution of broadcasting with a public purpose in the online world. Yet, evidence also suggests that broadcasters continue to face challenges in countering arguments about commercial convergence with those of public sector convergence (Humphreys & Simpson, 2018; Jakubowicz, 2010). As shown in the chapter and summarised in Table 9.1, mobile broadband personal mobile communications players have presented themselves as high technology, proactive new entrants with an ambitious, resource-demanding, even system-disrupter character. They assert the pursuit of universality through the market mechanism – customer subscription delivered with a consumer quality of service focus. Here, the promotion of individual (primarily economic) welfare has been emphasised, which, when realised at scale, can tackle the digital divide, particularly between rural and urban environments.

From the perspective of some broadcasters, the required approach is to involve mobile counterparts in a cooperative manner and may ultimately present a way forward in the debate. Here, stress is placed on both “cooperative network” and “cooperative content” (Arcidiacono, 2019: 2). In terms of network development, the idea is to combine the broadcasters’ capacity to serve a mass of users simultaneously with the speed and capacity of 5G networks to provide interactive and personalised services to individual users (Arcidiacono, 2019). In terms of content cooperation, the idea is to combine 5G one-to-one and one-to-many (broadcast) technologies to enable the provision of both linear (live) and alinear (on-demand) content at the same time (Arcidiacono, 2019).

In the lead-up to WRC-23, much will depend on the view taken on these respective arguments by policy-makers at the national and international level, and these will hold important consequences for the future shape of the social value and societal contribution of broadcasting.

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