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Broadcasting as a Means of Signal Transmission in Germany



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Abstract: The paper at hand provides a brief overview of the development of broadcasting as a means of signal transmission in Germany during its emergence (1920-1945), nationwide extension (1946-1980), expansion of satellite and cable broadcasting (1981-1995) and the still ongoing process of digitalisation (up from 1996). With regard to the general subject of the project the paper is embedded in, it also briefly discusses the most obvious and relevant consequences of the altering forms of signal transmission for broadcasting as a logistic and technological system to transmit information, and the consequences for broadcasting as an institution that provides information to the public – and thus has societal, political, cultural and economic implications.

1 Introduction

The term “broadcasting” has different meanings. Traditionally it refers to transmission technology and means the (linear) transmission of information by electromagnetic waves. More generally, it refers to communication theory and means the transmission from one sender to many receivers (which may be linear or non-linear push and pull services). And in a third sense the term refers to social (system) theory and stands for organisations or institutions which provide information to the public.

¹ The paper at hand came into existence as a part of European-wide project under the coordination of the University of Tampere, Finland (see the project website: http://www.uta.fi/cmt/post-broadcast/focus_a.html). It describes the specific development path of the German means of broadcasting. Papers with results from other countries as well as an updated version of the paper at hand will be published in a collective volume soon. The authors thank Kathleen H.B. Cowe for careful editing.

In this historical overview, we will focus on broadcasting as a means of signal transmission. However, with regard to the projects' general subject, we will also look at the most obvious and relevant consequences, which the altering forms of signal transmission have for broadcasting as a logistic and technological system to transmit information, and at the consequences for broadcasting as an institution that provides information to the public and thus has societal, political, cultural and economic implications.

As a means of signal transmission, the technical development of broadcasting in Germany can be subdivided into four periods:

1. the early analogue age with radio as the main (propaganda) instrument of public communication (1920 - 1945),
2. the construction phase of the nationwide analogue radio and TV broadcasting during the public service broadcasting oligopoly (1946 - 1980),
3. the period of expanding satellite and cable broadcasting during the settlement of the dual media system (1981 - 1995), and
4. the period of digitalising transition in the course of expanding mobile and DSL networks (1996 - today).

2 The Early Analogue Age with Radio as the Main (Propaganda) Instrument of Public Communication (1920 - 1945)

In Germany, the state played a leading role in the development of broadcasting, right from its inception in **1923**. Before World War II, in the Weimar Republic, regional radio stations were established under the substantial technical and economic control of the ministries of Post and Interior Affairs,² as the Post administration itself did not possess the technical capacities for a nationwide transmission with a central transmitter in Berlin. In **1925/1926**, the regional commercial stations were forced under the umbrella of the "Reichs-Rundfunk-Gesellschaft", which was controlled by the Post (51 % of shares). Compliance with political neutrality was the official aim of the new holding structure, but another reason was that the regional broadcasters could thus be obliged to transmit political news of the "Dradag AG", which was controlled by the Ministry of the Interior.³ Gradually, the Post extended the long and short wave transmission capacities,⁴ and central control was intensified: In **1926** the long wave educational programme "Deutsche Welle" was founded, and in **1929** a world radio broadcaster was established on short wave.⁵

² Kapust 1981, pp. 34 - 35; see also Humphreys 1994, pp. 124 - 126

³ Schätzlein 2012, p. 67 - 68; see also Khabyuk 2010, p. 23 - 25

⁴ ARD 2002

⁵ Schätzlein 2012, p. 67

State influence even intensified after the broadcasting reform of **1932**, which squeezed out private investors from the “Imperial Broadcasting Company”. This also prepared the way for the “Gleichschaltung” of broadcasting (i.e. the enforcement of political conformity) by the Nazi regime in **1933**.⁶ Broadcasting became the most important propaganda instrument for the regime, also due to the “Volksempfänger” (in translation: a radio tuner for the nation), which entered the German households rapidly as from **1933**.^{7,8} Its receiving capabilities were strong enough to listen to propaganda speeches of German politicians, but too weak to pick up the voices of foreign enemy stations (which was forbidden anyway).⁹ In **1933** there were 4 million radio listeners, in **1943** even 16 million.¹⁰

In **1935**, a regular television service started, and in **1936** this new media became popular in Germany, when the Olympic Games in Berlin and Garmisch-Partenkirchen were broadcast on TV.¹¹ In **1938** the Post Ministry started to lay a TV cable from Berlin to Hamburg, but due to high costs, the impossibility of transmitting more than one channel, and the increasing war expenditures, the cable expansion was gradually terminated.¹² By the end of WWII many of the existing transmission facilities were blown up on the command of Hitler.¹³

⁶ Kapust 1981, pp. 35 - 36; see also Humphreys 1994, pp. 124 - 126

⁷ Institut für Rundfunktechnik 2016

⁸ Schätzlein 2012, p. 68

⁹ Kleinsteuber 2012, p. 89

¹⁰ Schätzlein 2012, p. 68

¹¹ Institut für Rundfunktechnik 2016

¹² Schwanebeck 1982, p. 3

¹³ Schätzlein 2012, p. 68

3 The Construction Phase of the Nationwide Analogue Radio and TV Broadcasting During the Public Service Broadcasting Oligopoly (1946 - 1980)

After World War II, the allied forces in West Germany sought to decentralise the structures of the public sector in general and broadcasting in particular. Their efforts henceforth were directed at establishing broadcasting in a federal organisation, free of any central level, and not dominated by any governmental, political, economic, religious or other power.¹⁴

Generally (but not exactly) in line with the territorial borders of the federal states (“Länder”), six broadcasting stations were established: “Nordwestdeutscher Rundfunk” (NWDR) for the British sector, “Südwestfunk” (SWF) for the French sector, and four stations located in the former American sector: “Bayerischer Rundfunk” (BR), “Süddeutscher Rundfunk” (SDR), “Hessischer Rundfunk” (HR) and “Radio Bremen” (RB). Comparable to the BBC in Great Britain, they were established as non-governmental and non-commercial organisations, and thus in German were called “Anstalten des öffentlichen Rechts” (“Institutions under Public Law”). Its directorates (“Intendanten”) were responsible for the current journalistic activities, and two councils, consisting of delegates from civil society (from “socially relevant groups”) and the state sector,¹⁵ were responsible for the stations’ fundamental alignments: a “Rundfunkrat” (Broadcasting Council), responsible for the journalistic policy, and a “Verwaltungsrat” (Administration Council), responsible for finance, management and infrastructure. These principles in general still hold today, although they have been further consolidated and partly modified over time by the Federal Constitutional Court (“Bundesverfassungsgericht”), by the broadcasting laws of the federal states (the “Länder”), which are responsible for broadcasting as a cultural matter (see below), and by interstate treaties between the federal states.

¹⁴ Dussel 2010, pp. 179 et seqq. In contrast, in the Soviet sector broadcasting was re-established as a central and quasi-governmental organisation (ibid, pp. 123 et seqq.; Schätzlein 2012, pp. 70 - 71; see also Khabyuk 2010, p. 23 - 25). For the history of broadcasting in the Soviet sector and in the later founded German Democratic Republic (DDR), which is not covered in our article, also see Otto 2015, pp. 31 et seqq.

¹⁵ In its decision from 2013, the Federal Constitutional Court limited the portion of the latter delegates to 30 % (see Dörr 2016).

As the main source of funding, a license fee (“Rundfunkgebühr”) was introduced; revenues from advertising and other forms of commercial communication only came into existence later and never exceeded 10 % of the overall revenues for German PSB.¹⁶ This fee had to be paid by every household with a broadcasting receiving set.¹⁷ As over the first two, even three decades of Post-War Germany the number of these receiving sets grew much faster than the GNP (and all other macroeconomic variables), the revenues from the license fee exploded, even though the actual amount to be paid by each household was not (or only moderately) increased for many years.

This may explain why the federal governments did not recognise the strong increase of German public service broadcasters as a systematic contravention against the principle of balanced revenue sharing between all public entities,¹⁸ and why German public service broadcasters, in comparison both with other German media and with public service broadcasters in other countries,¹⁹ became affluent, even abundant. This was not a deliberate decision of German media policy, but a rather unintended and accidental consequence of the assignment of an (over)yielding revenue source, which was neither detected nor corrected by the broadcasting councils (as the stakeholders of the license fee payers) or by the governments (as the stakeholders of the general public).²⁰

If on the other hand one believes that neo-liberal economists and politicians tend to underestimate the potentials of a non-market-provision of goods in general and of the provision of media in particular, the high revenues from the German license fee can be considered a fortunate coincidence, as it yielded the reserve revenues public service broadcasters needed later when the market for receiving sets saturated, the number of households stagnated for demographic reasons and the willingness to pay the license fee eroded (see below).

¹⁶ See Media Perspektiven: Daten zur Mediensituation in Deutschland, different years; for 2007 - 2015 consolidated in http://www.ard.de/home/intern/fakten/ard-mediendaten/Werbefernsehumsaetze_von_ARD_und_ZDF/408628/index.html.

¹⁷ Each public service broadcaster of the ARD receives the license revenues paid by the households located within its broadcasting areas. For this reason, large broadcasters (with many license fee payers), like the NDR, WDR, and BR, have much higher revenues than small broadcasters (like RB and SR). The differences are reduced (only slightly) by an internal fiscal equalisation system (“ARD-Finanzausgleich”).

¹⁸ Another explanation would be that the responsible politicians realised this defect, but waived the correction because of possible disadvantages for their political career or accusations of violating the broadcasters’ journalistic independence.

¹⁹ For international comparative data about the revenues of public service broadcasters see Kops 2007, pp. 47 et seq., Nordicity 2016.

²⁰ In the run-up to the license fee reform of 2012, it was suggested to switch over to a tax funding model. This plan did not prevail, mainly because of its missing arm-length; instead a receiving-set independent household fee was introduced (see *ibid*). However, if one considers that the risks of imbalanced revenue sharing is lower, if all public entities, including public service broadcasters, are funded from one (tax) budget, the tax funding model becomes more attractive.

Based on the described organisational and financial jurisdiction, the six newly founded public service broadcasters in West Germany from **1949** onwards gradually started to produce and transmit one or two radio programmes.²¹ As an essential technical restriction they had to consider that the Copenhagen Frequency Plan, already decided in **1948** and set in force in 1950, had withdrawn almost all German radio frequencies on the medium wave and long wave and reassigned them to other countries;²² so radio stations in West Germany had therefore to enter the metric wave frequencies (FM).²³ As a result, Europe's first FM radio station in **1949** started in Freimann, West Germany.²⁴

The proportion of households possessing a radio receiver grew fast and steadily. As early as **1952**, there were already 10 million radio households, and at the end of 1950s most households possessed a radio receiving set. In Germany, radio then was the main media channel.²⁵

Already in the early years of their existence, the public service broadcasters realised joint problems and the need for a formal co-operation, especially as there was no central administrative level. Thus already in June **1950** they founded an association under public law ("Arbeitsgemeinschaft öffentlich-rechtlicher Rundfunkanstalten", ARD), in order to co-operate even closer and to manage common tasks efficiently by only one (rotating) broadcaster.²⁶

As a more efficient association, these stations in **1952** also started a nationwide conjoint TV channel under the ARD brand. Every member station had to contribute programmes: at the beginning according to its different capabilities, and later determined by fixed proportions. All members were free, however, to complement or even substitute the ARD transmissions with their own programmes. To transmit the programmes to all households, the development of the transmission VHF frequency network was pushed and finished by the **end of the 1960s**.²⁷

²¹ Abele 2003

²² Hans-Bredow-Institut 2006, p. 297

²³ Hans-Bredow-Institut 2006, p. 297

²⁴ Institut für Rundfunktechnik 2016

²⁵ Schätzlein 2012, pp. 65, 71 - 73

²⁶ Humphreys 1994, pp. 128 - 129

²⁷ ARD 2002

In **1960** the central government (“Bundesregierung”) attempted to establish a second television channel under the legal form of a commercial company.²⁸ The federal governments (“Landesregierungen”) considered this as a violation of the German basic law, which had assigned the competences for the media as a cultural matter to them, and they filed a complaint with the Federal Constitutional Court. In a “first broadcasting ruling” in 1961, the Court authorised the federal states to be responsible for broadcasting policy exclusively. On the other hand, the Court confirmed the central government to be exclusively responsible for the administration of telecommunication (frequencies assignment) and the postal services.²⁹

Encouraged by this ruling, in **1963** the federal states established a nationwide TV station, called “Zweites Deutsches Fernsehen” (“Second German Television”, ZDF). In contrast to the decentralised structure of the ARD, the ZDF was organised centrally; and it was restricted to broadcast only one nationwide television programme. In return, the ARD-broadcasters were allowed to establish regional channels, called “Dritte” (“Third”) programmes.³⁰ According to the ruling mentioned above, the analogue broadcasting transmitters remained the property of the ARD.³¹

At the end of the 1950s, the construction of the technical broadcasting facilities for the ZDF and for the Third TV programmes started on the UHF frequency. The new transmitters were controlled by the “Deutsche Bundespost”, which at that time was owned by the Federal government.³² The terrestrial distribution networks for the two nationwide programmes of ARD and ZDF and the six “Third” TV channel programmes³³ were enhanced during the **1960s and 1970s**; blind spots were completed.³⁴ In **1967** colour television in Germany was launched.³⁵ In **1958** the first mobile network of the class “A” was started by the “Deutsche Bundespost”; in **1972** the class “B” mobile network was founded.³⁶ In **1980** ARD and ZDF started a common teletext service.³⁷

²⁸ Potschka 2012, pp. 158 - 171

²⁹ *ibid.* Such a division of competences still exists today; this explains why internet and mobile networks (which are regulated by the central government) are treated differently from broadcasting networks (which are regulated by the federal state governments).

³⁰ Kapust 1981, pp. 42 - 45; Humphreys 1994, pp. 157 - 162, 168 - 169; see also Khabyuk 2010, p. 23 - 25

³¹ Krieger 2016. This still is the case today, even after the transformation to DVB-T2. See below, chapter 5.

³² Today it is owned by “Media Broadcast”, a commercial firm which in **2008** demerged from the “Deutsche Telekom” (which emerged from the “Deutsche Bundespost” in **1995**). See below.

³³ Due to several mergers and reorganisations of the German federal state territories and the territories of the regional broadcasters and the basic reorganisations caused by the reunification of Germany in **1989/1990**, the number of regional broadcasters that cooperate in the ARD varied over time. Whereas there were six stations in the beginning, now there are nine stations, as new stations were founded for East Germany after the re-unification, but also some of the original stations in West Germany were merged or modified in the course of time.

³⁴ ARD 2002

³⁵ Institut für Rundfunktechnik 2016

³⁶ Nocker 2005, p. 163

³⁷ ARD 2017

All in all, this period was a success story for radio and television, which improved their technical qualities and capabilities, their coverage and their societal and political influence with surprising speed. It was also a success story for public service broadcasting as a new organisational form of public entity that was run “for the public and by the public”, i.e. by civil society forces organised in the public service broadcasters’ councils, and at arm’s length both from the state and from the market.

The transmission of broadcasting signals was purely analogue and purely linear, directed “from one to many”. This technical infrastructure somehow reflected and matched the societal and political philosophy of broadcasting of this time. Public service broadcasters perceived their programmes as a service, meant for and restricted to their license fee payers, rather than as a common service for all citizens. This was consistent from a historical point of view, as the license fee payers in the initial phase of public service broadcasting were only a fraction of the population;³⁸ but it also was misleading as it ignored the public value of public service broadcasting for all citizens, which distinguishes itself from commercial broadcasting (an argument which should become important for its justification and legitimisation in the upcoming dual media order, see below).

In addition, public service broadcasters of that time did not consider their fee payers as customers who had deliberately chosen their services and could choose another service if they were discontent, but rather as tax payers who were obliged to pay for the programmes in any case. Or as Hirschman 1970 points out: neither “exit nor voice” were considered as options for dissatisfied or reluctant fee payers. This view also was understandable with regard to the public service broadcasters’ comfortable oligopolistic position at that time, but in retrospect it also contributed to the diminishing public appreciation and support of public service broadcasting which occurred after commercial broadcasting expanded.

³⁸ Hansmeyer 1995 therefore speaks of the transformation of broadcasting “from a group specific to a common good”.

4 The Period of Expanding Satellite and Cable Broadcasting during the Settlement of the Dual Media System (1981 - 1995)

Unlike other countries such as the USA, where commercial broadcasting had already been common and vital since the 1940s, there were no private broadcasters in Germany until the 1980's. However, even back in the **1970's** there were demands - especially from the Berlin Press but also from some academics and from some politicians - to permit commercial broadcasters in Germany as well.³⁹ They were based on the argument that the Federal Constitutional Courts' original justifications for the public service oligopoly, spectrum scarcity and not privately refundable high investments ("Sondersituation" of broadcasting), would no longer hold. In **1981** the Constitutional Court itself paved the way for the approval of private broadcasters with its "third broadcasting ruling".⁴⁰ It described the technical, economical and organisational preconditions under which broadcasting, similar to the press, would become capable of developing an "external plurality" and private broadcasters (like the "FRAG" company which had initiated the Courts' ruling) could be licensed in Germany.⁴¹

At that time, cable networks and later also satellites had come up with new technical facilities for the transmission of (then still analogous) broadcasting signals. In these cable networks about 30 TV channels could be transmitted: a lot compared to terrestrial broadcasting, which only could transmit three to five channels.⁴² From **1982** several cable television projects were launched, first in Ludwigshafen, later in Berlin, Munich and Dortmund;⁴³ until the year **2000** cable networks successively increased their reach to about 70 % of all TV households.⁴⁴ In **1986**, the year the mobile network of class "C" (1G) was launched in Germany, private TV and radio broadcasters entered the market.⁴⁵ In **1988**, the "Astra" satellite with a capacity of 16 TV channels was injected into orbit, followed by other satellites.⁴⁶ In **1989** all main commercial broadcasters, and in **1993** also the public broadcasters, became present on "Astra". After the German reunification in **1990/1991**, satellite transmission became even more important, as there were not many cable nets in Eastern Germany and the satellite dishes were the easiest and fastest way to receive programmes from ARD and ZDF.⁴⁷ During the transmission period, the technical responsibility for Eastern German terrestrial networks was taken over by the "Deutsche Bundespost" (today: "Media Broadcast", see above).⁴⁸

³⁹ Potschka 2012, p. 172

⁴⁰ BVerfGE 57, 295 et seq.

⁴¹ Kleinsteuber 2012, p. 84, remarks that after the market liberalization in the 1980s the number of radio stations increased significantly. However, the technical conditions remained almost the same. The author concludes then that these conditions were more of a political, than technical origin.

⁴² Götz 2006, p. 434

⁴³ Potschka 2012, p. 181.

⁴⁴ Kempf 2007, p. 156

⁴⁵ Potschka 2012, pp. 158 - 171

⁴⁶ Götz 2006, p. 443

⁴⁷ Reimers 2006, p. 59

⁴⁸ ARD 2002

The commercial broadcasters benefited from all these developments after they went on air in 1984 and 1985. Especially for the first commercial TV programmes, “Sat.1” and “RTL”, both financed by advertising,⁴⁹ the increasing popularity of cable and satellite distribution played an important role. Another reason for this success was the large backlog demand for new entertaining content and formats, which was recognised and implemented. The first commercial radio stations also started in 1984.⁵⁰ The first special interest channels emerged in the early 1990s,⁵¹ and the first pay TV channel “Premiere” (later “Sky”) started in 1991. Within one decade, the commercial TV stations increased their market shares continuously to 55.2 %, and the market share of public service broadcasting decreased to 44.8 % (see illustration 1). Since then it has stabilised and slightly recovered. In 2016 the market share of public service broadcasting (ARD, ZDF and several smaller stations) was 45.2 %, and the market share of all commercial stations was 54.8 % (23.2 % for the RTL group, 18.9 % for the ProSieben.Sat1. group and 12.7 % for other commercial broadcasters).⁵²

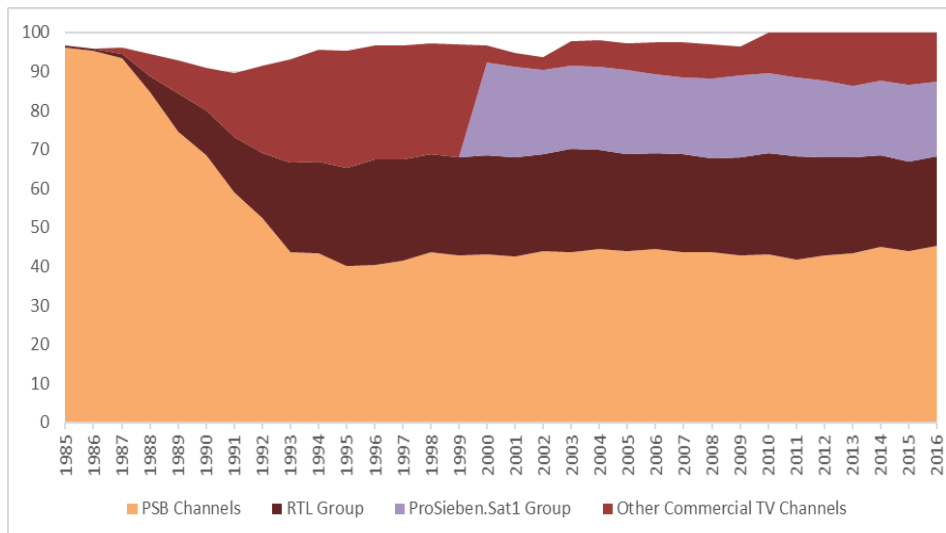


Illustration 1: TV shares 1985 - 2016, in %

Sources: Own computations, based on KEK 2010, pp. 324 - 325; KEK 2016, pp. 84 - 85, KEK 2017

⁴⁹ Beyer 2016, pp. 204 - 205

⁵⁰ Seidemann 2016, pp. 188 - 189

⁵¹ *ibid.*, pp. 206 - 208

⁵² Own computations, based on KEK 2010, pp. 324 - 325, KEK 2016, pp. 84 - 85, KEK 2017. The sum of TV shares is not always 100 %, supposedly because of statistical difficulties to determine the share of small channels. The ProSieben.Sat1-Group was founded in 2000, but most channels existed before.

Hence within a rather short period of about one decade, the public service broadcasting monopoly had been substituted by a dual order, in which public service broadcasters and commercial broadcasters were almost equally important with regard to the size of their audiences and market shares and financial resources. This dual order has proved to be rather stable even today.⁵³

This competition offered chances for the viewers and listeners both to exit (switch to the programmes of another broadcaster)⁵⁴ and to voice (by expressing preferences by means of the remote control, but also for instance by articulating criticism and programme wishes). For the commercial broadcasters, it was advantageous to receive and consider such reactions in order to expand their market shares. The public service broadcasters also became more consumer-oriented, as many media politicians, maybe even the public service broadcasters' managements themselves (falsely) understood market shares as indicators of the success and justification of public service broadcasting. The installation of the dual system thus not only introduced a new, more commercial type of broadcasters but also motivated public service broadcasters to become more commercial in the sense of being more consumer oriented.⁵⁵ At first sight, one would appreciate this, but if one realises that the remit of public service broadcasters was not to maximise the viewers' and listeners' private value but the public value for the citizens, it proved a problematic strategy shift, with negative consequences for the perception and appreciation of public service broadcasting in its even harder times to come.

5 The Digitalisation of TV Distribution in the Course of Mobile and DSL Network Expansion (1996 - today)

In Germany, already in the late 1980s and early 1990s the first provisions were made for digitalising the technical distribution, such as:

- the introduction of the digital telephone network standard ISDN in **1989**,⁵⁶
- the introduction of the first digital mobile networks in **1992** (class "D"/2G) and in **1994** (class "E"/2G),⁵⁷
- the announcement of CERN to open the web for public use in **1993**,
- the start of the digital radio broadcasting (DAB) pilot project in **1995**,
- the launch of Astra Digital Satellite Radio in **1995** and⁵⁸
- the transmission of the first digital signals in cable networks (according to the standard "DVB-C"), also in **1995**.⁵⁹

⁵³ Kops 2011

⁵⁴ However, a radical exit from public service broadcasting is still not possible, as the license fee still has to be paid for the possession of receiving sets, even if they only are used for the reception of commercial programs.

⁵⁵ Kops 2014

⁵⁶ Nocker 2005, p. 167

⁵⁷ Nocker 2005, p. 168

⁵⁸ Institut für Rundfunktechnik 2016

Compared to other distribution outlets, the satellite distribution started rather late, only in **1988** (see above, chapter 4). In **1996** the main commercial and public service TV broadcasters offered their channels on digital satellite frequencies on “Astra”; since **1997** all public service channels (and since **2005** also all radio ARD channels) have been transmitted in DVB-S.⁶⁰ In **2012**, simultaneously the analogue broadcasting signals were turned off and digital broadcasting in HDTV quality started.⁶¹ As shown in illustration 2, satellite distribution still plays a major role in the portfolio of technical TV outlets (2016: 46,5 % of TV households). Astra 1-2 and Hotbird 1-6 are the most important satellites for German TV households.

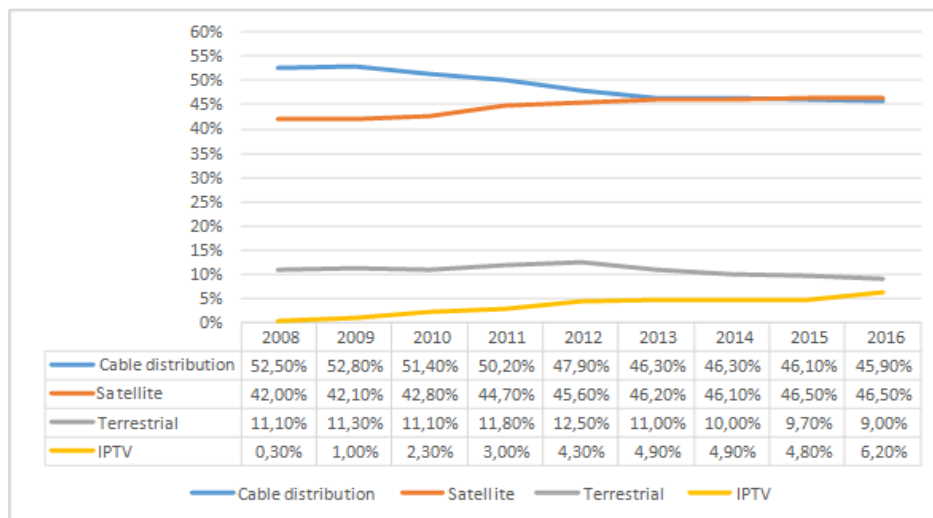


Illustration 2: Demand for Technical Distribution Outlets of TV Channels in Germany

Source: Die Medienanstalten 2016, p. 15

⁵⁹ Fischer 2016, p. 377

⁶⁰ Institut für Rundfunktechnik 2016

⁶¹ Fischer 2016, pp. 1, 321

The extension of the **cable networks** in the early stage was strongly pushed by the state-owned “Bundespost”. It was privatised to “Deutsche Telekom” in 1995, and its early monopoly position soon was abolished by the “Postal reform III” of **1996** (partly in response to the Green Book of the European Commission on the Single Market for Telecommunication from **1987** and later EU regulations).⁶² The cable networks were included in the privatisation package. The execution of the decision initiated in **2000**⁶³ was complicated by antitrust procedures and financial difficulties of investors and therefore was only finished in **2003**. Within this period, the “Deutsche Telekom” as owner deferred investments into the cable development, but extended its DSL internet network.⁶⁴

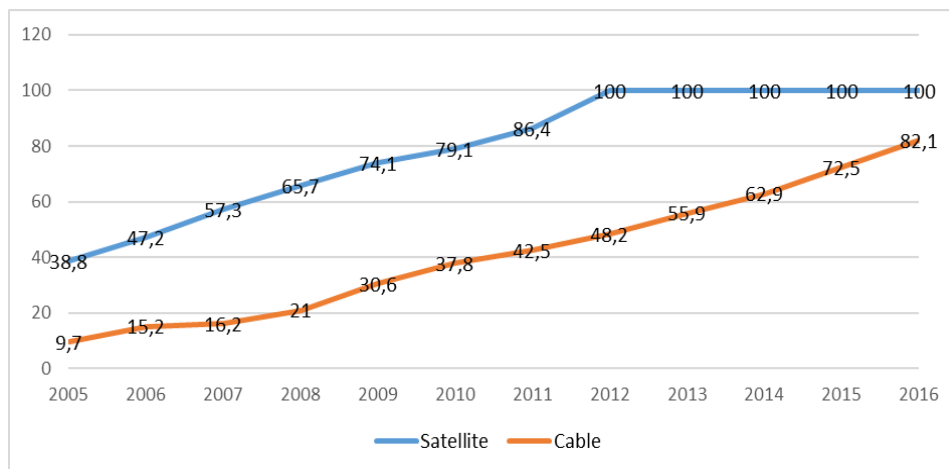


Illustration 3: Digitalisation of cable and satellite distribution (in % of TV households)

Source: Die Medienanstalten 2016, p. 18

The historical division of the cable into

- cable network **level 2 and 3** (all the cables on the street, property of the cable network, can be digitalised by the operator centrally) and
- cable network **level 4** (inside the house, property of the house owner can be digitalised only with his/her approval),

created stumbling blocks for the further process of digitalisation. Until today, digitalisation is still not complete for the cable networks (see illustration 3). This weakens the position of cable operators in their competition with other means of distribution.

⁶² Der Präsident des Bundesrechnungshofes 2009, pp. 13 - 19

⁶³ Götz 2006, p. 434

⁶⁴ Woldt 2004, p. 262

The cable networks today belong to two big companies: “Vodafone”⁶⁵ (active in 13 of the 16 federal states) and “Unitymedia”⁶⁶ (active in 3 federal states); in addition, there are smaller supra-regional network operators.⁶⁷ To force its clients to digitalise their NL 4 network sections, “Unitymedia” started shutting off its analogue signals from June 30th, 2017. Other operators are discussing similar deadlines for the end of 2017 or for 2018.⁶⁸

The situation of the **DSL internet** will not be dealt with in detail here. We will only provide a short overview, as DSL is a competitor to other distribution outlets and a platform for the increasing distribution of TV signals (IPTV).⁶⁹ The market share of IPTV is gradually approaching the market share of terrestrial TV (6.2 % for IPTV vs. 9.0 % for DTTV in 2016; see illustration 2). The technical infrastructure is still provided by the “Deutsche Telekom”, but other providers can use it to sell in their own name. The “Deutsche Telekom” intends to speed up its existing lines by introducing the vectoring technology. As this would squeeze out other competitors using the Telekom infrastructure (especially the blue coloured competitors in illustration 4), the “Bundesnetzagentur” as regulator has not yet decided to agree or to prohibit these vectoring plans.⁷⁰ In this context one also should realise that the improvement of broadband networks, especially in rural areas, in Germany is still a topic in current election campaigns.⁷¹

Signals distributed on the Internet have played an increasing role for broadcasting since 2009, when the HbbTV standard for Smart TVs was established as a pan-European initiative.⁷² HbbTV allows downloading from the web and presenting additional information on TV programmes (functionality of the electronic programme guide/EPG) and TV spots (functionality of the “red button”). This has become relevant as meanwhile a considerable portion of all German TV households (2016: 17.6 %) own an internet-connected (and usually HbbTV-ready) Smart TV⁷³ and a large number of on-demand video apps are available at app stores of different Smart TVs, with content streamed from the internet. These and other video offerings are gradually replacing TV channels, and they are expanding rapidly.⁷⁴ “Netflix” and “Amazon Video” can be mentioned as the most successful examples of these OTT-providers, even if their market shares in Germany are still lower than in other countries.⁷⁵

⁶⁵ Vodafone belongs to the Vodafone Group PLC (Vodafone Deutschland 2017). 17.3 % of shares of the group entity are held by institutional investors (Financial Times 2017a).

⁶⁶ Unitymedia belongs to Liberty Global plc (Unitymedia 2017) and is held to 43.37 % by institutional investors (Financial Times 2017b).

⁶⁷ W.a. 2016

⁶⁸ Wenzel 2016

⁶⁹ A consumer-oriented overview over the IPTV market is provided by IPTV-Anbieter.info 2017.

⁷⁰ Briegleb 2016

⁷¹ W.a. 2017a

⁷² Institut für Rundfunktechnik 2016

⁷³ Die Medienanstalten 2016, p. 53

⁷⁴ Compared to classical TV (71,2 %), VOD still (2016) is in second place (15,8 %) in TV and video usage (Die Medienanstalten 2016, p. 87). However, this varies between household groups, and it differs especially for young people (ibid, p. 95).

⁷⁵ ibid, p. 130

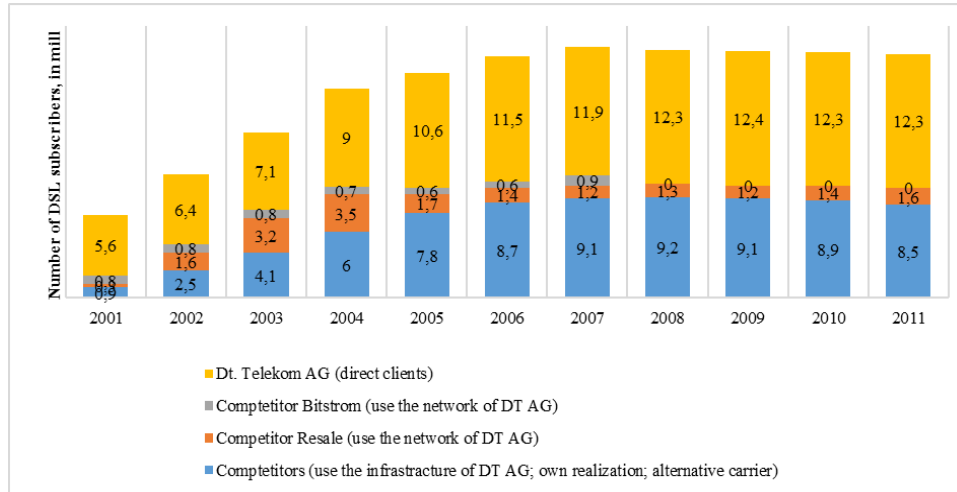


Illustration 4: Number of DSL subscribers, in mill., 2001 - 2011

Source: Bundesnetzagentur 2015b, p. 74

In principle, the **mobile networks** have been offering a digital infrastructure since its implementation in Germany in 1992. Since then, the demand for mobile services has developed rapidly (see illustration 5). However, the bandwidth for many years was not sufficient to distribute audiovisual content, but had to be improved gradually: In **2000** the duplex frequencies (0.8, 1.8, 2 and 2.6 GHz) for UTMS purposes were auctioned,⁷⁶ and in **2004** the first UTMS network started (3G). In **2005** the standards DVB-H (DVB for handhelds) and DMB (digital multimedia broadcast) were introduced as transmission systems for mobile TV.⁷⁷

⁷⁶ Bundesnetzagentur 2016b

⁷⁷ Institut für Rundfunktechnik 2016

Compared to the enormous investments in UMTS, the mobile operators' willingness to pay for DVB was much lower. In addition, for radio listening an FM receiver was offered in mobile phones but was not adopted by the consumers.⁷⁸ A second spectrum auction took place in **2010** ("Digital Dividend I"), which sold former military frequencies and UMTS frequencies that had been given back from the previous auction. These frequencies could be used for LTE transmission (3.9G), which was implemented the same year. In **2014** the LTE Advanced network (4G) was launched; and a first transmission of TV signals via the LTE broadcast (eMBMS standard) in a single-frequency mode took place.⁷⁹ In **2015** the frequencies to be reallocated after the introduction of DVB-T2 (see below) as well as some expired mobile frequencies ("Digital Dividend II") were sold in another auction (0.7, 0.9, 1.5, 1.8 GHz).⁸⁰ The reassignment of the DVB-frequencies in Germany entered into force since the beginning of **2017**.⁸¹

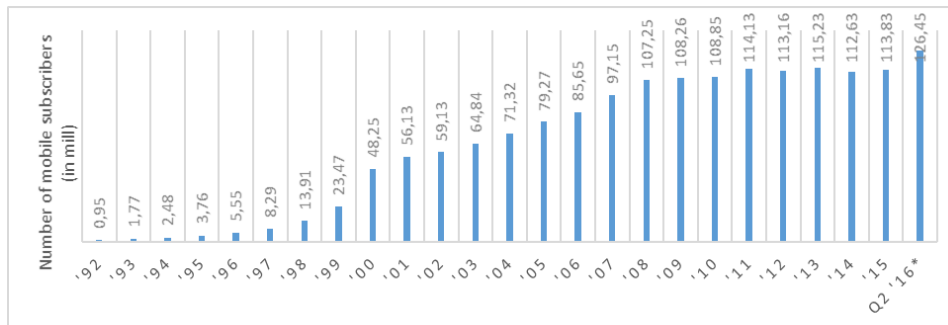


Illustration 5: Number of mobile subscribers, 1992 - 2016

Source: BUNDESNETZAGENTUR 2016a

Digitalisation of **terrestrial TV broadcasting** started in **2002/2003** with the launch of DVB-T at the Berlin IFA. At that time, the analogue terrestrial TV distribution was used by 7 % of all TV households. The digitalisation efforts in terrestrial TV broadcasting ended in **2008**, two years earlier than planned,⁸² when 600 analogue TV transmitters and 8.700 supplementary transmitters were deactivated and the transmission was switched over to the terrestrial TV network of the ARD, based on 562 DVB-T transmitters.⁸³ Since 2005, the digital terrestrial distribution increased steadily to 12.5 % by **2012**; but since 2013 it has been decreasing (to 9 % in 2016, see illustration 6).

⁷⁸ Reimers 2006, p. 62

⁷⁹ Institut für Rundfunktechnik 2016

⁸⁰ Bundesnetzagentur 2016b

⁸¹ Bundesnetzagentur 2015a

⁸² Task Force DVB-T Deutschland von ARD und ZDF 2008, p. 3

⁸³ ARD 2002

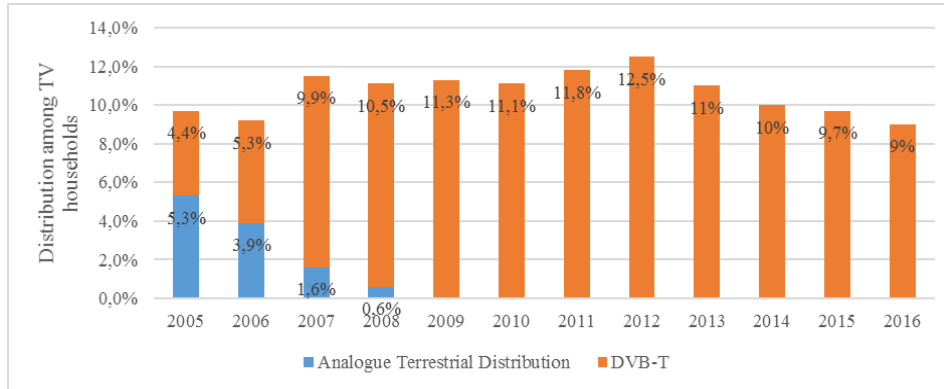


Illustration 6: Distribution of analogue and digital terrestrial broadcasting in Germany, in % of TV households, 2005 - 2016

Sources: Ecke/Deck 2009, p. 11, Die Medienanstalten 2016, p. 15

Although DVB-T can be received free-to-air and mobile, even without special establishing measures, it is not as popular as the competing distribution outlets, as it has several disadvantages: firstly, the number of available TV programmes is restricted to about 30; secondly, in some areas no commercial channels are broadcast; and thirdly, programmes in HD quality cannot be transmitted at all.⁸⁴ On the one hand, DVB-T was dismissed by politicians: In 2004, as the federal states refused the increase of the license fee.⁸⁵ Thus it was no surprise that in **2013** the biggest commercial broadcaster, RTL, considered switching off its DVB-T transmission because of poor commercial prospects.⁸⁶ This would have diminished the attractiveness of DVB-T as a distribution outlet in general. However, RTL later dropped these plans, presumably because of the then pending introduction of DVB-T2, which promises to settle the disadvantages of DVB-T, as it can reach an 80 % coverage of the population for commercial programmes,⁸⁷ can distribute a higher number of channels (about 40), and allows the introduction of pay walls.

⁸⁴ Schinzel 2015, p. 3

⁸⁵ BVerfG, BvR 2270/05, Rn. 1-213

⁸⁶ Schwegler 2013

⁸⁷ Schinzel 2015, p. 7, FreetnetTV2017

In **2015** the decision was made to partly reassign the DVB-T frequencies to the mobile providers and to introduce DVB-T2 (Digital Dividend II).⁸⁸ The auction took place in **2015** und came into force in **2017** (see above). Also in **2015**, “Media Broadcast” was authorised as platform provider for DVB-T2.^{89,90,91} In **2016** a pilot phase of DVB-T2 was launched,⁹² and since March 29th **2017** DVB-T2 has been introduced in major urban areas.⁹³ By November **2017** most of the densely populated areas in Germany will be covered, either by both commercial and public service broadcasters (the dark shadowed areas in Illustration 7), or only by the latter (the lighter shadowed areas). Additional expansions will take place by **2019**, and then about 80 % of the population will be able to access DVB-T2.⁹⁴

⁸⁸ Krempf 2015

⁸⁹ W.a. 2015, Krieger 2016. As already mentioned this company emerged from the “Deutsche Bundespost”, which after its privatization became part of the “Deutsche Telekom” (**1995**) and later part of its subsidiaries “T-Systems International” (**2002**), “T-Systems Business Services” (**2005**), “T-Systems Media & Broadcast” (**2007**). In **2008** it was sold to the French “TDF-Group” and has operated since then under the name of “Media Broadcast”. In **2016** the company (except the satellite assets) was acquired by “mobil-com-debitel” (a subsidiary of the “freenet Group”, which is a publicly listed company with 47,91% shares in public float (31.05.2017; Freenet Group 2017)).

⁹⁰ Media Broadcast 2017a

⁹¹ Freenet AG 2016.

⁹² Institut für Rundfunktechnik 2016

⁹³ W.a. 2017c

⁹⁴ Schinzel 2015, p. 7



Illustration 7: Distribution of the DVB-T2 in Germany, November 2017

Source: W.a. 2017e

From its beginning, DVB-T2 headed for a commercial scenario, where only the public service broadcasters' programmes can be received without any fee. The commercial advertising-financed channels cost 69 €/year after a free testing period (for the first clients, the testing period ended in **June 2017**).⁹⁵ To receive the commercial channels, a decryption card with an appropriate set-top-box is necessary.⁹⁶ Some of the approximately 40 channels are not yet available in all areas of distribution.⁹⁷

According to a representative poll among 2000 respondents from **June 2017**, about 14 % of DVB-T users will convert: 7.8 % to cable, 3.9 % to satellite and 2.6 % to IPTV. 35.1 % have not decided yet. About half of the DVB-T users are planning to stay with DVB(-T2). On the other hand, cable, satellite and IPTV clients are planning to switch to DVB-T2; 19 % have not decided yet.⁹⁸ The switching period was also used by competing providers, like the cable provider Vodafone⁹⁹ and the internet-based TV platform Zattoo,¹⁰⁰ to carry out (partially misleading) advertising. Media Broadcast announced already at the end of **June 2017** that they had acquired 500,000 new clients.^{101,102} Since the platform is developing it will need some time to find its place among the competitors described above.

⁹⁵ W.a. 2017d, p. 2.

⁹⁶ W.a. 2017d, p. 2

⁹⁷ W.a. 2017b

⁹⁸ W.a. 2017b

⁹⁹ Kremp/Böhm 2017

¹⁰⁰ Zattoo 2017

¹⁰¹ Media Broadcast 2017b

¹⁰² The success of the new DVB-T2 platform depends on several factors: Of strategic importance is the convenience factor; at present, there are restrictions to record commercial programmes and to fast-forward them (which reminds some users of the early static television of the 1980s) (see Sagatz 2017).

For **radio**, the digitalisation efforts have not yet progressed very far in Germany. 20 years ago, in **1997**, the digital audio broadcasting (DAB) started.¹⁰³ In **2003**, the digital middle wave standard “Digital Radio Mondiale” was introduced. In **2009** the renewed DAB+ standard was introduced.¹⁰⁴ In **2011** 14 DAB+ channels with national-wide distribution went on air.¹⁰⁵ According to recent data (2016), only 13 % of all households own a DAB+ radio receiver; and almost 8.6 % own an IP-based radio receiver.¹⁰⁶ There are many reasons for the failure to introduce DAB/DAB+. One reason might be the fear of technically enabled additional competitors and the attempts to avoid any changes in the controversial audience measurement method of “ma Radio”.¹⁰⁷ Here again, competitors from other industries could intensify the competition, like “Spotify”/“Apple Radio” (on-demand music), web radio stations as well as new platforms like the “radio.de” mobile app¹⁰⁸ or “Amazon Echo/Alexa”, which stream radio stations audio signals from all over the world.¹⁰⁹ Presumably, these reasons pushed “Media Broadcast” to start selling its FM networks in 2017 and this is still ongoing.¹¹⁰

Due to the digitalisation of signal transmission, the internet connectivity of more and more households, and the dissemination of new and less expensive facilities to pull and push content to be consumed anywhere and anytime, the demand for non-linear transmission and non-linear formats has increased. On the other hand, the higher demand has increased the supply of more non-linear content, which is both more attractive and more profitable. Thus, the one-to-many communication of linear broadcasting has been subsequently supplemented and partly substituted by many-to-many communication, e.g. in the social networks, at least for the digital generation.¹¹¹

¹⁰³ Reimers 2006, p. 57

¹⁰⁴ Kleinsteuber 2012, p. 96

¹⁰⁵ Kleinsteuber 2012, p. 97

¹⁰⁶ Die Medienanstalten 2016, p. 165-166

¹⁰⁷ For the methodology, see Arbeitsgemeinschaft Media-Analyse e.V. w.d., for its weaknesses see Hein 2015.

¹⁰⁸ Radio.de w.d.

¹⁰⁹ Rautemusik w.d.

¹¹⁰ Lipinski 2017

¹¹¹ A long-term data on online media usage (1997-2016) is available from the ARD/ZDF online study (see <http://www.ard-zdf-onlinestudie.de>).

Public service broadcasters in Germany have “missed the boat”, both with regard to the necessity to offer more non-linear and interactive formats and the necessity to provide it on user friendly and traceable platforms. This can partly be explained by legal restrictions. Until 2008 public service broadcasters were not allowed to spend more than 0.75 % of their budgets on online services, and only in 2009 were these services (in Germany called „Telemedien“) approved as an element of the public service programme remit.¹¹² On the other hand, it can also be explained by the ARD’s de-centralised organisation and the complicated co-ordination between ARD and ZDF (and Deutschlandradio and Deutsche Welle as the smaller public service broadcasters).

The main reason, however, is, that ARD and ZDF focused too long on the linear push-model and neglected the pull-model which has become possible and attractive with interconnectivity, the rise of mobile broadband and the expansion of new pull- and push-devices.¹¹³ As linearity was and still is preferred by its senior viewing audiences, this focus on linear formats and linear transmission may have been justified. However, it has accelerated the “generation demolition”: Today the average age is 61 and 62 for the TV-viewers of ARD and ZDF.¹¹⁴

After the problem had been discussed for years by the broadcasters’ managements and boards,¹¹⁵ in 2014 the decision was made to establish a linear special interest channel for young people. It took another two years before this decision, modified by media policy, was put into practice. Only in October 2016 was the online youth channel “FUNK” – which is meant for the generation from 14 - 29 – launched. There, about 40 formats can be accessed from an independent player or on the platforms of YouTube, Facebook, Instagram and other social media. €40 millions per annum are available for this channel (which is 0.6 % of the overall budget of ARD and ZDF).

6 Drafting the Consequences for Broadcasters

To sum up, in this period of digitalisation, again with the focus on broadcasting as a means of signal transmission, the broadcasting sector went through a series of improvements: It raised the quality of audiovisual content by eliminating the susceptibility of analogous transmission and by allowing a much higher density of video content transmission. It also created several “digital dividends”, as digital transmission uses the limited spectrum more efficiently and thus can provide more linear stations and more linear programmes – an important technical prerequisite for the necessary polyopolistic competition, and for the marketability of commercial broadcasting.

¹¹² However, this agreement which settled the state aid dispute with the European commission, was combined with several restrictions: a list of online services which were not allowed to public service broadcasters (“negative list”), duties to de-publish certain existing as well as close catch-up periods for certain online content (see Kops/Sokoll/Bensinger 2009).

¹¹³ In a recent study prepared for the ZDF Dörr/Holznel/Picot 2016 have identified these omissions and have suggested ways to strengthen public service broadcasters’ online presence.

¹¹⁴ Mantel 2017

¹¹⁵ For instance, by Giersch 2008

On the other hand, digitalisation has also raised new demands for the usage of spectrum, mainly for mobile broadband. This is a threat for (both public service and private) broadcasters, as the frequencies presently used by linear radio and TV stations in the longer run may be allocated to other services. The present discussions about switching off linear terrestrial broadcasting in several countries illustrate this risk. It may be even greater if one considers that it also would affect broadcasting as an institution.¹¹⁶

Another consequence is that the bidirectional and centralised “one to many” communication of analogous linear broadcasting slowly but gradually has been replaced (and will continue to be replaced) by the multidirectional and more democratic “many to many” communication of digital non-linear broadcasting (or “broadbanding”). Digitalisation has created new ways to transmit and to receive audiovisual content, anywhere and any-time, at home and mobile, on different devices, from anybody to anybody. This has also affected the formats of audiovisual content, and it has affected the ways audiovisual content is consumed: content is delivered and consumed less linearly and in smaller pieces (fragmented), and it is provided and consumed according to the consumers’ personal preferences (“personalised”). All these changes have increased the power of the recipients (or “consumers”) and have diminished the power of the providers (suppliers).¹¹⁷

For broadcasters this has complicated the inseparable bundling of private value content with public value content, a strategy which is essential particularly for public service broadcasters that have to both cover socially relevant topics and - in order to fulfill their programme remit - have to reach large audiences.¹¹⁸ Taking this into account, public service broadcasting in the course of de-linearisation is becoming more fragmented and the same time more expensive and less successful.¹¹⁹ This is a severe challenge for public service broadcasting. As an institution it will only survive if the citizens and the politicians recognise and appreciate its important value – and if there is the political will to fund it. This would be a good investment in public service broadcasting, especially at a time when integration and democratic decision making need to be provided and promoted by the media, and the entertainment-oriented commercial media are retreating from public value oriented journalism more and more.

¹¹⁶ This is one more example of the fact mentioned above, that broadcasting as a means of signal transmission (here its digitalization) has had (and will have) important implications for the societal and political role of broadcasting.

¹¹⁷ Kops/Ala-Fossi 2017

¹¹⁸ *ibid*

¹¹⁹ *ibid*

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