

The ARD and ZDF

Mediathek portals

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ZDF

Following my interview with Anthony Rose about the BBC iPlayer in the 2008-Q4 edition, I thought it may be useful for readers of EBU Technical Review to learn more about another important Internet TV-related development – the German Mediathek.

Very little is known about Mediathek outside of Germany and, indeed, there is a lot of confusion surrounding it. And yet, it is one of the most vibrant and exciting Internet media developments not only in Europe but worldwide. Not only is the size of the Mediathek audience commensurate with the sheer size of the German consumer electronics market (which is the largest in Europe), it is also the complexity and the variety of different programme services and formats of the Mediathek systems that deserve the attention of the outside observer.

What is most interesting is the optimism of the leading ARD and ZDF technology experts with whom I was able to discuss the future of Internet TV and television when visiting them in Mainz at the beginning of October 2009. They are strong supporters of the future convergence of broadcast and internet platforms, and are actively participating in the HbbTV standardization efforts.

Franc Kozamernik (EBU Technical)

Opening statements

André Berthold (ARD): The ARD Mediathek and ZDF Mediathek are two distinct and unrelated platforms, as they belong to two separate organizations. The fundamental difference is that the ARD Mediathek includes content from a large number of both television and radio organizations that provide regional and national coverage, whereas the ZDF Mediathek involves one centralized national public TV broadcaster with several TV channels. The level of complexity of the ARD Mediathek is slightly larger, as we have more content coming from various sources. It is challenging to organize and structure it in a consistent usable flow and to find the right balance of content.

The sister of the ARD Mediathek, the *DasErste.de* Mediathek offers content of the first German TV channel, produced jointly by the regional broadcasters. In addition to the videos of the first TV channel, the ARD Mediathek covers the audio and video components of the regional TV and radio programmes. Thus we offer audio and video coming from half a dozen TV programmes and more than 60 radio stations at the moment. All content for the ARD Mediathek, including metadata and

URL links, is generated by the regional broadcast organizations and is made available for use by the regional and federal Mediatheks. Legal and copyright matters are entirely controlled by the regional broadcast stations. In practice, some shows cannot be published by the Mediathek due to copyright restrictions. The metadata format is TVAnytime and for podcasts, RSS feeds (iTunes tags) are used.



Figure 1
Home page of ARD Mediathek (from 20 January 2010)

My personal role is project management with a particular focus on technical matters. My project team consists of a group of software developers and designers working at www.ARD.de and www.DasErste.de. Requirements, from an editorial perspective, are contributed and tested by the editorial teams of these two websites. A lot of coordination, technical infrastructure and technical adjustments are required to align the inputs from all these sources. Editing issues are coordinated by the editorial head of ARD.de and the ARD *Onlinekoordination*.

Jochen Schmidt (ZDF): ZDF started experimenting with internet video on the www.zdf.de site as early as 1998 but regular internet video production began around 2002, initially with low-quality video clips and later, from 2005, as a dedicated Mediathek portal. The current ZDF Mediathek portal was originally launched at IFA¹ 2007 as a dedicated on-demand services portal and has recently been redesigned. All ZDF content can now be found centrally in one place, rather than scattered across different locations on the web. From the very beginning, our objective has been to offer the end user the highest possible video and audio quality and to cater for most PC-based platforms. To achieve this goal, a complex technical infrastructure for the content management and video distribution has been built up. This includes the processing of AV files, related metadata, EPG data and associated applications such as teletext, captions, etc.

1. *Internationale Funkausstellung* – taking place every year in Berlin at the end of August / beginning of September.

I am a technical manager responsible for web software and internet infrastructure projects as well as for all future technical developments of the platform. In November 2009, we launched new versions of several Mediathek portals. For a couple of months we have been conducting a comprehensive trial involving many technical improvements and novelties. Additionally, our objective is to get ZDF content effectively onto other platforms: cable, YouTube, Facebook, mobile phones, etc. To this end, our production facilities are now ready to repurpose our content for different platforms. ZDF also provides video streaming production for the 3sat and Phoenix channels which work in cooperation with ARD.

Rainer Kirchknopf (ZDF): I am from the ZDF technical innovation office and am responsible for strategic development of the ZDF Mediathek. One of the objectives is a Mediathek standardization for CE devices in order to avoid multiple formats, as is currently the case in the PC domain. The main issue is how to bring TV and PC together intelligently and to integrate them in a single device.

Basic requirements and objectives

André Berthold (ARD): It should be understood that Germany is a federal country that has a very specific public broadcasting set-up. There are nationwide broadcast services provided by Deutschlandradio for radio, and by ARD and ZDF for television. The ARD association consists of nine regional broadcasters which offer regional radio and TV services. The regional broadcasters, i.e. WDR, SWR, NDR, BR, MDR, HR, RBB, SR and Radio Bremen, have different sizes. They have a joint mandate to produce one nationwide TV channel “DasErste” as well as three TV channels which can only be captured with digital receivers. The tenth member of the ARD association is “Deutsche Welle” – a broadcaster which provides international radio and TV broadcast services.

Together with ZDF, the ARD association produces the two TV channels “KiKa” (children's channel) and “Phoenix” (political documentation channel). The TV channel “3sat” is a joint production of ARD



Figure 2
Home page of DasErste.de Mediathek

and ZDF together with ORF (Austria) and SRG (Switzerland). Finally, ARD and ZDF are associates in the cultural channel “arte”.

The internet portals of the regional and national TV channels, and the regional radio stations, are covered by the ARD Online service located at www.ARD.de. This internet service has been available for more than 10 years now. It includes online counterparts of special TV shows such as sport-schau.de and tagesschau.de, as well as the website of the first TV channel, www.DasErste.de.

The screenshot shows the ARD Mediathek website interface as of 03.02.2010. The top navigation bar includes links for ARD Home, Nachrichten, Sport, Börse, Ratgeber, Wissen, Kultur, Kinder, ARD Intern, Fernsehen, Radio, and ARD Mediathek. The main header features the ARD Mediathek logo, a search bar, and navigation tabs for Übersicht, Fernsehen, and Radio. A prominent section titled 'PODCASTS · RADIO ZUM NACHHÖREN' displays a grid of podcast thumbnails from various senders, including SWR2, with details like episode counts and titles. Below this, there are sections for 'Tipps der Redaktion' and 'Neueste Clips', each showing a grid of audio clips with titles and durations.

Figure 3
Radio page of the ARD Mediathek

The ARD Mediathek started in spring 2008. As a predecessor to our Mediathek, the ARD *Landesrundfunkanstalten* set up extensive podcast services which capitalised on the widespread usage of popular Apple products – the iPod and iTunes. These podcast services began in 2004. We initially offered audio downloads of our radio broadcast events. Video followed soon after but encountered many legal and copyright issues. The content was spread over the various ARD television and radio web sites, and the users had to browse many web sites to find a particular programme. They wanted a one-stop solution, hence the idea of creating a download and podcast portal. The project “ARD Mediathek” was initiated when DasErste.de started to produce more video content for the web in 2006. We decided to offer this content together with the audio and video content from all the regional broadcasters in one place, no matter if it was live, on-demand or downloadable content.

Jochen Schmidt (ZDF): Regarding their operation, both the ARD and ZDF platforms are completely separate. In particular, the editorial policy and content production for the platforms are entirely separate. However, as both platforms use common CE devices and share the same consumer base, we have a certain level of cooperation on technical issues. We have the same strategy concerning the future usage of PCs and standardized hybrid broadcast/broadband devices and, as you know, German broadcasters strongly support the HbbTV project ². We both cooperate closely in this area

with the IRT (*Institut für Rundfunktechnik* in Munich). One particular area of common interest is programme distribution over the Internet. We have several working groups, one of which deals with the harmonization of contracts with the content distribution platforms in terms of commercial issues such as traffic cost, tariffs, etc. Nevertheless, each broadcaster has his own contract with a CDN³ provider of his choosing.

Figure 4
TV page of the ARD Mediathek

André Berthold (ARD): I would like to confirm what Jochen said: ARD and ZDF collaborate quite strongly. I already mentioned the joint TV channels and programmes (*on pages 3/4*). But there are still issues to be resolved: in TV, we have an agreement to cover major sports events together (e.g. the Olympic Games, major football championship matches, etc), and we share the rights for distributing the content. These events are programmed alternately, i.e. they are broadcast on ARD and ZDF TV channels on alternate days. However, a concept that seems to work fine for TV is probably not the best solution for the web because users would have to look for streaming content of the same event in different places.

2. HbbTV (Hybrid Broadcast Broadband TV) is an industry-led project on hybrid broadcast/broadband television. It is supported by many European CE manufacturers and broadcasters and has plans to submit its technical specification to ETSI in early 2010. A Technical Review article on HbbTV is available at http://tech.ebu.ch/docs/techreview/trev_2010-Q1_HbbTV.pdf.
3. CDN = Content Delivery Network. It is a server-based technical platform for achieving high-performance delivery of web content to huge parallel numbers of users. The content can be static HTML pages, on-demand and live video streams. The servers are operated as a “cloud” and are located close to the users within several different network segments.

Platforms

Jochen Schmidt (ZDF): At the moment, the main user platform is the PC. Since 2007, German broadcasters have also considered other devices, including large flat-panel TV displays and media centres for the living room, and mobile screens while on the move. But the PC is, and remains, the main end-user device, and it will probably remain important for a couple of years to come, in spite of HbbTV and other HBB television efforts.

Rainer Kirchknopf (ZDF): Today, Mediathek feeds content to three different platforms: PC, Microsoft Media Centre and 3G mobile phones. Each platform is accessible from a different URL. The Media Centre still uses a PC but it is TV-centred, as a remote control is used and the users have the impression that they are watching TV. The next step is basically to put the power of the PC into the set-top box or TV set, which is happening in various forms throughout Europe with the HBB platform and could provide for interactive services. The market requires interactive services and as long as the required services are delivered at an affordable cost, which technology is actually used, is not important.

André Berthold (ARD): Users often question why the ARD Mediathek, unlike the ZDF Mediathek, does not provide a plug-in for using the Microsoft Media Centre. There are several reasons. Firstly, we need a common standardized solution for repurposing content for the different platforms. Obviously, the same content formats should be used by all contributors to the ARD Mediathek. It is equally important to use standardized production technologies and associated tools for all platforms. Secondly, the Media Centre is a proprietary platform, which means that Mac and Linux computers are excluded. In addition, until now the Media Centre penetration across Germany is not sufficiently large to justify its introduction. We will observe the situation after the introduction of Windows 7, but we are also taking into consideration that there are already better solutions for “TV on demand” in the living room. Most importantly, these rely on open standards instead of proprietary solutions.

Our policy is to focus on generic, horizontal market platforms with a mass-market potential. One such solution which is likely to become of interest is the Hybrid Broadcast/Broadband system called HbbTV. It should be pointed out that before we even consider a new distribution platform, all ARD *Rundfunkanstalten* have to agree that this can be worthwhile and all legal/regulatory matters are resolved beforehand. This takes time.



Figure 5
Prototype of the ARD Mediathek for HbbTV-based devices

Adapting our content to the 3G mobile platforms is a particularly difficult area. Although increasingly popular, these platforms are still in their infancy when you consider audio and video distribution ... if you leave out the iPhone. There is a large variety of different types of 3G mobile devices. They are based on different operating systems, middleware and streaming codecs with different screen resolutions. Consequently, ARD has only just recently started to offer its content to this market segment.

Jochen Schmidt (ZDF): The ZDF Mediathek mobile portal is able to provide content for most of the different mobile phone platforms. We have overcome the problem of repurposing content for different mobile phone platforms by using a content adaptation solution which automatically adapts HTML pages to fit most browsers implemented in different phones. The quality of the video content depends on the 3G access network. If the broadband connection is poor, it will make little sense to watch video. Our mobile Mediathek portal considers different bandwidth connections: to distinguish between the different mobile platforms, we have chosen three different video formats (H.263, H.264 and Real). In total, our portal supports some 14 different video formats and bandwidths. These content versions are available from our mobile Mediathek platform and are suitable for iPhone and HTC as well as many other smartphones and mobile devices like the iPod.

We also provide some content feeds for other platforms that wish to use the ZDF video content. An example is a service provided by a big German ISP, 1&1, which developed an internet-connected set-top box, allowing access to commercial pre-paid video-on-demand services. We deliver our content to this platform, so the user can access our Mediathek content through these boxes which are already used by around 250'000 users. So, in summary, ZDF has a responsibility to deliver content to three internet media platforms and to provide data feeds (such as media RSS) an video to several other platforms.



Figure 6
ZDFmediathek home page for Flash PC users

Quality considerations

André Berthold (ARD): As the content for the ARD Mediathek is not produced centrally, ARD has established an internal standard defining three target quality ranges for the PC in terms of the bitrate used for audio and video. These are applied by all the *Rundfunkanstalten*. First of all, there is a small format called “Web-S” (S stands for small) designed for the former modem and ISDN bitrates (up to 128 kbit/s) but this will not remain in use for much longer. More importantly, we have “Web-M” (medium) and “Web-L” (large) formats using proportionally larger bitrates.

We are in the process of setting up a “Web-XL” format for HD-type content. This format could become operational for selected content from 2010 onwards when ARD will begin distributing HD content over the Astra satellite network. Audio content is distributed as MP3s or Windows Media Audio. Some older video content can still be found as VP6-encoded (in an FLV container). But in summer 2009, the *Landesrundfunkanstalten* changed their production workflows to H.264 because there is more potential for interoperability with other distribution channels. Additionally some video content is available as Windows Media Video.

The Web-M format covers video bitrates of around 500 kbit/s, offering a ¼ PAL resolution and is increasingly used by broadband users with capacities (speeds) of 1 to 3 Mbit/s. Web-L provides a full “PAL-equivalent” resolution with either a 4:3 or 16:9 aspect ratio but, unfortunately, it is available only for selected programmes at the moment, mainly for cost reasons. This will have to be reconsidered in the near future because distribution costs have decreased significantly in the last few months. Currently, we use unicast delivery provided by several commercial Content Delivery Networks (CDNs). To further reduce distribution costs, ARD is contemplating the use of IP multicast once it is available, or even P2P should it prove to be really effective.

Figure 7
ZDFmediathek home page for HTML PC users

As for the CDNs, there are four or five competitors on the German market, most of which come from the USA. In a way, today we have to use the streaming formats they provide as part of their commercial offering. Any German-specific requirements for our services would be too expensive, so we are adopting the existing standards that are well established on the market and – more importantly – are available on the users' devices.

Jochen Schmidt (ZDF): In principle, ZDF has the same or similar requirements for the audio and video delivery quality. However, our goal from the outset has been to address big screen television sets and provide the best possible video and audio quality. In order to resolve the distribution cost problem, ZDF launched a request for proposals and made the necessary tenders to get the best price for internet traffic and selected the most suitable CDN. As a result, the transport of video traffic and playout is no longer the main cost factor and is, in fact, currently much less important than the operating cost associated with the content management and software systems used for production of Mediathek programmes. According to the current business model, we have to pay for the traffic and not for the bandwidth used.

To repeat, our primary objective is to maintain the best possible picture quality. It should be taken into account however that most broadband connections available in the German market are still “DSL 2000” and we are obliged to stick to this limited connection quality. Consequently, we have decided to use 1.5 Mbit/s per stream which is comparable to standard television quality. We offer two other quality ranges: 100 kbit/s and 512 kbit/s for low quality (in case people have “bad” DSL or ISDN connections). So, in total, we currently have 3 different bandwidths in our service portfolio, covering the most likely usage cases.

But this is not enough. We further intended to avoid cascading different codec platforms in the value chain, in order to minimize the need for transcoding from one algorithm to another. We use a professional video source DVCPRO 50 or DVCPRO 25, which is transcoded directly to H.264. Thus, using the same codec throughout the chain and avoiding any further transcoding, we maximize the picture quality. It is interesting to note that ZDF Mediathek produces 12 hours of programmes a day in all 14 above-mentioned video formats and bandwidths.

At IFA 2009 we carried out the first HD test using a stream of around 3 Mbit/s. This bitrate seems to be suitable for the popular “DSL 6000” connection which is expected to be the next broadband

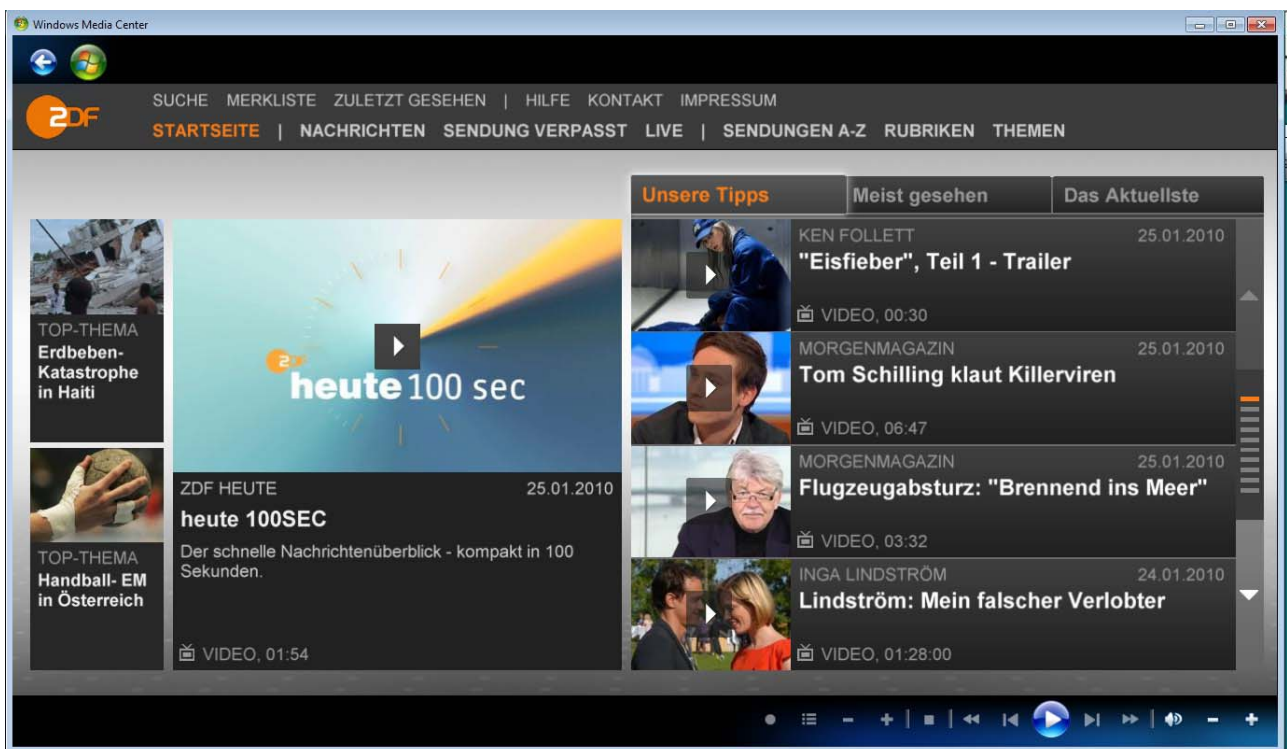


Figure 8
ZDFmediathek home page for Media Centre users

household connection rate that will be used in the German market. In the future, we could use this connection speed to deliver “near-HD” quality services. ZDF is conducting technical tests using different access and home network speeds in order to investigate the video quality and the quality of service (QoS) achievable. We test the peering capacity with different ISPs and are conscious of stabilizing the transport costs. At the moment, it is premature to offer HD-quality services, not only due to high server and traffic costs but also because of the significant production cost. But the future is certainly HDTV.

Concerning the internet video formats, we must satisfy our public and cover most of the existing video formats that are available on the market today. The most important platform from the beginning has been “Windows Media” for PCs. Since 2007, we have been experimenting with H.264 and “QuickTime” containers for Macs and also Linux. H.264 is appropriate because it is already used for HD in cable and satellite. The goal was to test whether H.264 encapsulated in the QT container is convenient for the web. In May 2009, we decided to migrate completely to H.264, as Windows, Linux and Macs all can play H.264 using for example the Adobe Flash player.

At the moment Windows streaming represents about 20% and H.264 streaming about 80% of the traffic. It goes without saying that using H.264 has considerably improved the picture quality. Although we plan to increase the H.264 share still further, we cannot completely discontinue Windows Media. For example, the 1&1 STBs and Windows Media Centre can only play WM, as well as some WM-compatible mobile phones.

The Mediathek market

André Berthold (ARD): Both the ARD and ZDF Mediatheks are portals of the non-commercial German public service broadcasters and are funded by the German television licence-fee payers. Many media events are subject to copyright constraints. For example, some sport events and films are copyrighted only for the German territory, and not allowed for German-speaking viewers in Austria and Switzerland. The German market is big – it counts some 80 million people. Our joint ARD/ZDF study showed that in 2009 more than 67% of the German population was connected to broadband internet services (i.e. was “online”). The online market has been evolving for more than

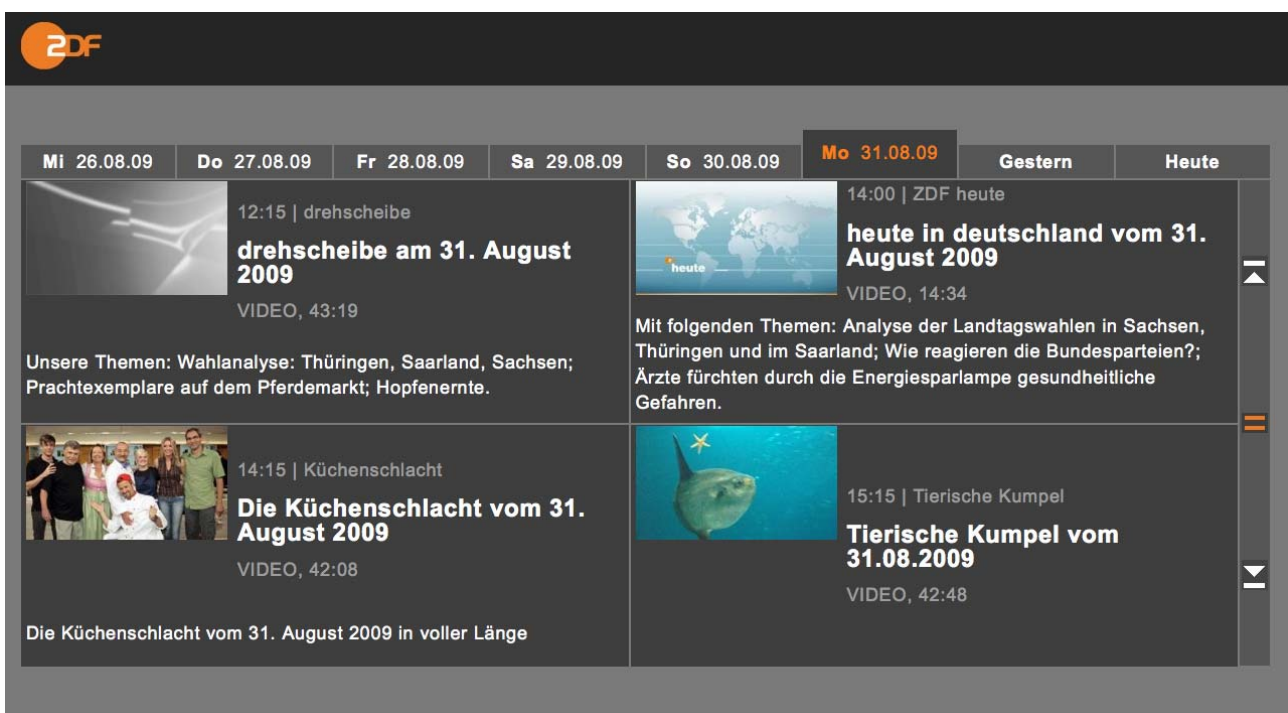


Figure 9
ZDFmediathek prototype for HbbTV boxes and TV sets

10 years now and there is ample evidence that it is beginning to be saturated. There is a lot of competition among service and content providers, including those from abroad. The study “*Massenkommunikation*”⁴ of ARD and ZDF shows that, today, people are exposed to different media including broadcasting, the press, music, cinema, etc for about 10 hours a day, which is 4 hours more than in 1992.

Jochen Schmidt (ZDF): Our media research department (as well as that of commercial broadcasters) is looking into the relationship between TV and internet viewing numbers. We have found that, in principle, the prime time for internet viewers has moved from lunch-time (12:00 to 14:00) to the evening hours. So television prime-time and internet prime-time are now both taking place simultaneously between 8 pm and midnight. For the old version of Mediathek we had between 5 and 10 million viewings per months, where “viewing” may simply mean clicking on the stream and watching it for a short time, without knowing for exactly how long.

Since 2007, these viewing numbers have almost doubled, reaching around 15 million viewings per month for the current Mediathek. We are happy with these numbers – they are quite high, considering the size of the German market. It seems that we have reached some kind of saturation for a PC-based “lean-forward” usage scenario – a large majority of broadband-connected households use their broadband connection and they also use our portal as a source of internet television viewing.

We have noticed that the viewing duration has now gone from a couple of minutes to full-length broadcast programmes of more than 30 minutes. We are convinced that this new medium has been fully accepted by the general public, especially since it is easy to use and is user-friendly, even for the technically non-initiated. But the viewing pattern will change because Mediathek will be used with CE devices increasingly in a “lean-back” scenario. We plan to capitalise on this initial success and are working towards bringing the Mediathek into the living room, using large flat-panel television displays.

Rainer Kirchknopf (ZDF): Research carried out in our department showed that Mediathek viewing has not caused any decrease in television viewing; there is no sign of cannibalisation. Generally, people continue watching linear TV like before and, in addition, they also watch Mediathek catch-up television services. The two media seem complementary, rather than in competition. So the aggregate TV viewing is higher than before. This year, however, we noticed a slight decrease in TV viewing but this may be due to fragmentation of the TV market (i.e. the availability of more TV channels!), rather than internet television.

Jochen Schmidt (ZDF): Let me stress that 95% of Mediathek content is on-demand and time-shifted content, such as TV series which may be broadcast during inconvenient times (e.g. in the afternoon when many people are away, or late at night when people are asleep). Mediathek helps these people to catch up with their viewing, so that they do not miss any important items. Sometimes, with only a few thousand people watching TV in real time, there are many more users on the Mediathek, as they can choose the time which is convenient for them. In a way, Mediathek is a

4. *Massenkommunikation 2005: Images und Funktionen der Massenmedien im Vergleich* by Christa-Maria Ridder and Bernhard Engel. In *media perspektiven* 9/2005.



Figure 10
ZDFmediathek home page for mobile devices

replacement for a PVR but it is much more convenient, since it does not require the purchase, setting up or programming of a PVR.

We also offer some live broadcast streams, either simulcast with regular TV broadcasting or exclusive internet-only streaming. A football match was recently “broadcast” on the Mediathek on an exclusive basis and was not available on conventional TV networks. This was a huge success for the web, with 60'000 concurrent users.

It should be pointed out that we technically do not allow the recording of Mediathek content by the end user, as it is streamed and not downloaded. After having been rendered, the content is removed from the computer without any trace. However, from November 2009 onwards, we planned to introduce a download service for some selected ZDF-produced content which will not be protected or DRMEd. It is subject to a “fair usage” principle which means that users are allowed to download the content for free private usage.

André Berthold (ARD): I can confirm ZDF’s observations on the shift of the main interest in our portals from lunch-time to the evening hours. This shift started with the launch of the Mediathek and has remained stable for several months now. We can thus be sure that usage of internet on-demand content is complementary to the usage of linear TV shows and that the additional offer of Mediathek content is appreciated by our users.

I would like to stress that ARD Mediathek and DasErste.de Mediathek have seen a 300% increase in audience numbers since last year. This three-fold increase is probably a result of several factors. On the one hand, by bundling all ARD audio and video content in one place, we make an offer to our users which is extremely well received and has a lot of potential for the future. We now offer more content and more attractive content than before.

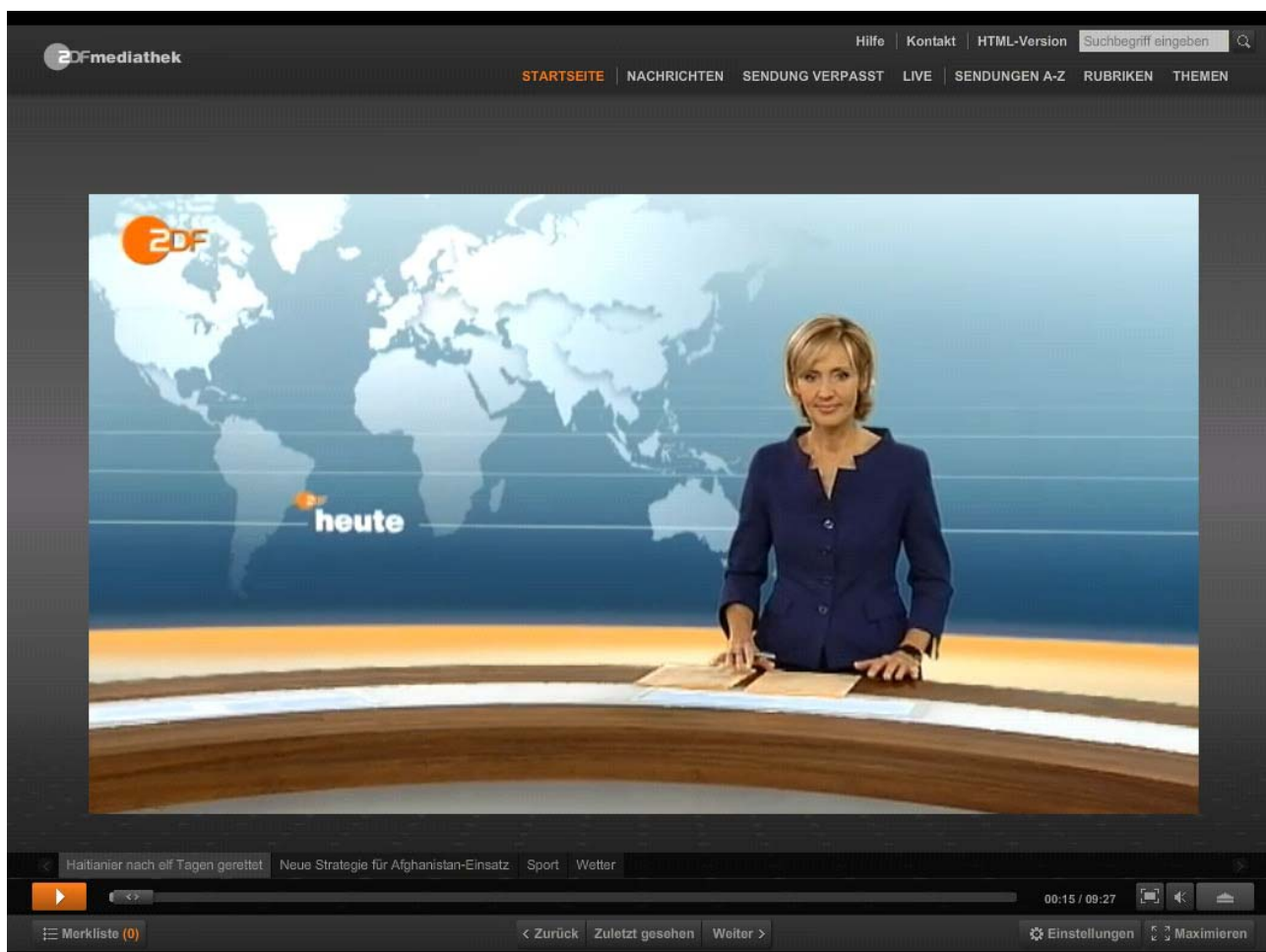


Figure 11
ZDFmediathek screen during video usage

Another reason is that there is more interest among younger audiences: it is interesting to point out that Mediathek demographics are not the same as the demographics for TV. It is known that, for the mainstream TV programmes of ARD, most of the audience is aged over 50 years. For the Mediathek, a study shows that the average age is around thirty years. Younger generations no longer have TV sets and instead use a PC to access TV services.

The recent German elections are a good example of the Mediathek's popularity. Our data show that many people went to the internet at 6 pm for an update on the intermediate results. They commented on the results and on the running TV shows on platforms like StudiVZ (a German social network) or Facebook. A Facebook widget was integrated in the ARD Mediathek live-stream page of the event and received a lot of comments. During a football match that recently took place in the afternoon between Germany and Azerbaijan, many viewers used the Mediathek portal and their internet-connected office PC to watch the match.

Interactive applications

Rainer Kirchknopf (ZDF): Mediathek is not only audio and video content but also a wide range of interactive media applications.

Jochen Schmidt (ZDF): From the technical perspective these applications are mostly Flash modules which provide some explanatory information (e.g. www.geothek.zdf.de). On the occasion of the German elections in September, we offered useful information about on-going voting, related information about broadcasts, different simulations and games. We also offered a Flash module allowing viewers to provide feedback as well as user recommendations for editors, user-generated picture galleries for still pictures, etc.

User-generated content (UGC)

André Berthold (ARD): Initially, there had been some fear that UGC would interfere with the channel's editorial policy and would discredit professional quality. However, UGC is now considered complementary to professional content. Our credo is not to mix UGC alongside professional content in the same place or application. We prefer having dedicated UGC applications. For example, ARD offers a radio drama award called *Premiere im Netz* (Premiere on the web) where an expert team of professional drama producers selects the winning UGC product.

During the *ARD Themenwoche* which takes place for a full week each year, we devote our reporting to one special subject, which can range from "demographic developments" or "the children – our future" to "cancer deaths" (e.g. themenwoche2008.ard.de). We launch an invitation to the general public to contribute their media products such as audio, video and photos, centred on the given theme. Last year, however, we did not accept videos because the processing of the myriad of different video formats proved to be overly time consuming. It is not our business to transcode thousands of videos received from users. We especially do not mix user-generated audio or video content with the regular Mediathek content and there are no plans to do so in the future.

Naturally, we are interested in feedback from our users. Thus the DasErste.de Mediathek now uses a commenting and voting system, and you can also vote for content in the ARD Mediathek. However, not all content allows for voting and commenting, e.g. we do not want people to vote about the news.

Jochen Schmidt (ZDF): The ZDF Mediathek itself does not use UGC at the moment. But we invite user voting, grading and other tools for providing feedback. Within other internet portals, we collect and present pictures etc. from users (e.g. www.ihrebilder.zdf.de).

Electronic Programme Guides (EPGs)

André Berthold (ARD): The current ARD electronic programme guides only provide information about linear content (TV and radio channels). However, the ARD Mediathek plans to provide meta-data for EPGs for the past, current and future content items in order to make them available on-demand in the linear programme guides. In the future, we will no longer distinguish between linear and non-linear services. With HbbTV we will provide such information on a TV set.

Jochen Schmidt (ZDF): One of the key roles of the ZDF Mediathek is the provision of catch-up TV and we store up to seven days of TV programming. In addition, we also provide “long-tail” archive material which has been broadcast up to several months ago.

There is an issue concerning the preservation of the web archive. Web archiving is not the same as a traditional archive in which all files have to be preserved for good. The German rights regulation (*Telemedienkonzept*, which is going to be established in summer 2010) requires that ARD and ZDF remove certain videos from their web portals after a period of time. Depending on the rights situation, some content is removed from the archive after a week, 3 months, a year and in other cases after 5 years. In our CMS systems, we have implemented the necessary mechanisms for automatically removing videos according to a pre-determined schedule.

We will try to provide catch-up TV (*Sendung verpasst*) services to other devices. Multi-platform delivery is the main objective of the Mediathek. We will try to merge it with the EPG service but this is strongly related to the functionalities implemented in the consumer devices. Do they support EPGs, which kind of EPGs, do they have sufficient storage, etc?

We are currently in the process of learning what is possible and which products have been put on the market.

Distribution

André Berthold (ARD): For the video delivery of the various regional ARD Mediathek contents, the ARD *Rundfunkanstalten* have contracts with a number of the “usual CDN suspects”: Akamai, Level3, Nacamar, TV1 and Limelight. These provide satisfactory capacity to cater with the network load for the moment. However as we move from PCs to multiple CE devices, in a few years the number of streams required may increase by several orders of magnitude, and we have no straight answer on how this will be handled.

Abbreviations

AV	Audio-Visual	ISDN	Integrated Services Digital Network
CDN	Content Delivery Network	ISP	Internet Service Provider
CE	Consumer Electronics	MHEG	Multimedia and Hypermedia information coding Expert Group http://www.impala.org/
DRM	Digital Rights Management	MHP	(DVB) Multimedia Home Platform
DSL	Digital Subscriber Line	PAL	Phase Alternation Line
EPG	Electronic Programme Guide	PVR	Personal Video Recorder
ETSI	European Telecommunication Standards Institute http://pda.etsi.org/pda/queryform.asp	QoS	Quality of Service
HBBTV	Hybrid Broadband/Broadcast Television	RSS	Really Simple Syndication
HTML	HyperText Markup Language	STB	Set-Top Box
IFA	<i>Internationale Funkausstellung</i> (Berlin consumer electronics exhibition)	UGC	User-Generated Content
IRT	<i>Institut für Rundfunktechnik GmbH</i> (German broadcast technology research centre) http://www.irt.de/	UMTS	Universal Mobile Telecommunication System http://www.umts-forum.org/
		URL	Uniform Resource Locator
		WM	(Microsoft) Windows Media

On the occasion of the World football Championship 2008 in Germany, the German team was playing in the semi-final which was webcast live by Bayerischer Rundfunk using a 1.5 Mbit/s PAL resolution signal. According to statistics from BR-Online, our signal covered about 70% of the German traffic at that time. Because this event was so popular among internet users, the CDN distribution system used was brought very close to its limit. In other words, our experience is that at the moment the Internet is not suitable for covering hugely popular live events reliably with high-quality video signals. Things should improve in the future, if hybrid solutions bring together the advantages of live broadcast and on-demand internet access.

Jochen Schmidt (ZDF): Unicast on-demand traffic accounts for 95% of all Mediathek traffic. In general, traffic is more or less evenly distributed over time, and large traffic peaks are quite rare. We should also consider that the Internet is “best effort” and does not provide a guaranteed service quality: there is no dedicated QoS. We monitor the traffic bandwidth and network load closely and analyse the statistics every month in order to determine whether we have enough servers and peering capacity. In order to adapt flexibly to the varying market conditions, we only have short-term contracts with ISPs and CDNs. It is important to use more than one service provider to allow for competition.

We estimate that the current networks can cope with peaks of 60 or even 80 Gbit/s, which may occur during the peaks mentioned by André. However, normal on-demand traffic in the evening is currently much lower, around 10 Gbit/s, although this could change should living-room devices become connected to the Internet in large quantities for “lean back” usage. At any rate, the present internet networks are suitable for today’s level of on-demand traffic and there is no need to change the basic network infrastructure. But we do have to track any future developments very closely. From the broadcaster’s perspective, it is important to note that growth can mostly be compensated by lower traffic costs. In the last 10 years the cost has come down by a factor of 10, from 1€ to below 10 cents per Gigabyte, which is significant. Of course, if the CDN provider needs additional network functionalities such as geolocation, content protection, larger peak capacity headroom etc, the price will go up accordingly. Broadcasters can potentially overcome the high operational pricing issue, if they set up their own server platforms or if they buy sufficient peering capacity.

Mediathek organization

Jochen Schmidt (ZDF): Mediathek is part of the regular ZDF internet and TV business. Responsibility for content lies with the new media editorial department and the technical department is responsible for all technical matters. For example, facilities for non-linear TV production are also used for the video transcoding required by the Mediathek. Over the past few years, we have had a new media department which coordinates all ZDF web portal content, including the Mediathek. Mediathek is re-using the infrastructure services also used for other ZDF web services.

No additional organizational structure is required for the Mediathek. In other words, the Mediathek has been smoothly integrated into the existing ZDF structure.

André Berthold (ARD): Like ZDF, regional broadcasters do not generally establish new organizational units. The existing production and technical infrastructure has been modified to meet the challenges of the new media. TV and online editorial teams work closely together. This close cooperation is strategically important, as the two worlds are converging – consider the hybrid broadcast broadband (HBB) developments for connected TV services. Web production is on its way to becoming an integral part of TV and radio broadcast production.

Future of Mediathek

Jochen Schmidt (ZDF): ZDF has plans to move onto new CE hybrid broadcast/broadband platforms (connected TVs). The market reality today is that there are multiple Internet TV platforms

already deployed in Europe (examples: Philips NetTV, Samsung widgets, Panasonic VieraCast, Sony Bravia and AVM). ZDF could use them as appropriate, as of now. However, in the long run, we plan to adopt a “horizontal” solution proposed by the HbbTV project which is based on open standards. Secondly, we plan to focus on mobile and semi-mobile devices (e.g. UMTS-enabled netbooks, the iPhone), since prices are decreasing rapidly for mobile web usage. Thirdly, we plan to promote our ZDF brand on other platforms such as YouTube, Facebook, etc and link to other platforms producing some RSS feeds. We will also continue working to improve the existing user interfaces.

The Mediathek will remain free-to-air and will not be DRMed. As a public service broadcaster, we have to be present on all CE platforms. ZDF needs to continue to play an important role in the German media landscape.

André Berthold (ARD): One cannot predict or even foresee the technological future over the next 10 years. For the next two years, I would predict an increased availability of HBB devices. Standardization and collaboration are an important issue, thus horizontal markets will overcome the proliferation of proprietary standards. Users want to be able to use the same content, independent of place and time, with devices of their choice. This cannot be assured by proprietary media solutions or vertical markets.

What has been the most important innovation for public broadcasters in the past 10 years? Ethernet plug-in TV stations are not that innovative but ... HBBTV is a technology with much potential. It is simple to understand, uses an already established and successful technology and, in my opinion, is



André Berthold studied Computer Science, Computational Linguistics and French at the universities of Leipzig, Strasbourg (France) and Saarbrücken. In 1990, he began working as a software developer in different industries, and started working in 1999 for the Internet *Dachdomain* “ARD.de” at SWR in Stuttgart. He participated in setting up this domain and remains responsible for the technical and technological development of the website. He has also been involved in different technical working groups, coordinating the common online projects of the ARD *Rundfunkanstalten*.

In 2002 André Berthold became head of the “Technology and Software Development” department at ARD.de. Some milestones in the development of ARD.de include the setting up of the Content Management System (CMS), Coremedia, the expansion of the online content syndication of the ARD *Rundfunkanstalten*, the introduction of the ARD Online Radio Programme Guide and the development of, and technical support for, many web applications and ARD theme weeks.

Since 2007, Mr Berthold has been the project head of ARD Mediathek and DasErste.de Mediathek. He was in charge of the IT design, the setting up of the application and the technical supply of metadata from the *Rundfunkanstalten* that deliver content for the Mediatheks. He is responsible for ensuring the further development of the application and its adaptation to the needs of the users and the editorial teams, as well as the technical operation of the Mediathek.

After studying electronics, **Jochen Schmidt** began working for ZDF in 1992, involved with the technical planning of several projects for TV production until 1995. From 1995 to 1997, he defined several projects for Digital TV in Germany together with Telco companies, ARD and other broadcasters. After first studies and proof-of-concepts, the goal was to set up an integrated production and distribution technology platform for digital TV and data broadcasting services within ZDF. Additionally, he defined new-media services together with the editorial departments.

From 1998 to 2005, Mr Schmidt was project manager for setting up the ZDF “Data Broadcast Center” (DBC) which is a new department for operating all data and internet services for ZDF and its partners (3sat, Phoenix etc.). From 2002, he managed several projects on tapeless TV production for internet portals and internet video distribution platforms.

Since 2007, Jochen Schmidt has been the leading project manager in setting up and further developing the ZDF Mediathek and Content Management System (CMS) platforms for ZDF internet portals.



the first real means of convergence between lean-forward and lean-backward scenarios on one device in the living room. It avoids the difficulties of MHP, MHEG5 and is accessible to a large number of developers and thereby to a lot of users without very specialised technical know-how. A breakthrough of HbbTV will lead to more complex technologies and applications. Consider that on a PC in 1992, there was only a Mosaic Browser which could render some simple HTML pages.

To give a second example: Apple with iTunes, iPod and iPhone has instigated the market for the download of audio and video content and therefore increased the demand for such media on the web. The user interfaces of these applications and gadgets are very smart. They created a sort of template for people wanting to use portable players or mobile phones and thus supported the development of mobility and exchangeability of such media.

User expectations increase very quickly and we broadcasters cannot meet all of them. Users do not mind by which technical means they receive television and radio content, they simply require availability, high quality and interoperability, regardless of the distribution medium. Today, HDTV on the internet is no longer unusual and people are asking for it. However, this may escalate both the production and distribution costs, which is very difficult in the present economical situation.

One big challenge is the availability on a lot of different platforms. Only open standards (like HbbTV) that are adopted by the CE industry can allow for the distribution of content to a huge number of devices in a consistent manner, all without an explosion of production costs. Thus we have to continue our shared commitment to supporting or developing and establishing such standards.

Both the ARD and ZDF Mediatheks have been successfully introduced into the market. And they still have a lot of potential to maintain, develop and improve the position of our broadcast events in the hearts of our users.

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