

Market Analysis Smart TV

A Status Report
by the German TV Platform





DEUTSCHE
TV-PLATTFORM

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An Important Stimulus for Interactive Digital Television

Apart from various systems developed by appliance manufacturers and mostly based on standardized programming languages, the international HbbTV (for “Hybrid broadcast broadband TeleVision”) standard has become an established format for merging broadcast and online services. HbbTV was first standardized in June 2010 by the European Telecommunications Standards Institute (ETSI) and has since been developed continuously to the point where it is now being employed by more than 70 television content providers and all appliance manufacturers in Germany.

At the same time, the number of devices in use by consumers has seen a very dynamic development. According to GfK Retail & Technology, a total of 20.5 million Web-enabled consumer devices had been sold by the end of 2013 on the German market, including TVs, Blu-ray players, and set-top boxes.

Fifty-nine percent of the TV sets sold in 2013 were capable of displaying Web-based content and were thus considered “smart TVs” (2012: 50%, or 4.8 million; 2011: 3.4 million). Moreover, a full 92 percent of the smart TVs sold in 2013 supported the HbbTV standard for interactive television via a special red button on the remote control. Not all smart TVs sold in Germany are actually hooked up to the Internet, but a survey conducted in April/May 2013 on behalf of gfu (Gesellschaft für Unterhaltungs- und Kommunikationselektronik) showed the number of those that are connected to the Web now to be close to 60 percent.

Figures published by content providers also point towards a growing popularity of smart-TV options. In June 2013 alone, ZDF registered 1.1 million video requests via smart TV for its media libraryan increase of 250 percent in just 12 months. With a coverage of 5.89 million HbbTV-enabled smart TVs, ProSieben-Sat.1 counted 380,000 active users for ProSieben content alone in December 2013. Even video-on-demand (VoD) providers like Maxdome, service providers like Feratel („Alpenpanorama”), and home-shopping networks like QVC report enormous growth rates in usagemostly via smart TVs. Based on a TNS Infratest analysis, the latest progress report on digitalization issued by the German state media authorities estimates that approximately 1.2 million viewers make frequent or occasional use of the TV broadcasters’ HbbTV options.

Since May 2009, this dynamic development has been the focal issue for the German TV Platform’s working group (WG) called “Hybrid Consumer Devices for the Integration of Broadband and Broadcast,” later redubbed “Smart TV.” The purpose of this working group is to promote the development of the market for smart-TV consumer devices and pertinent services in Germany, taking into account the various business models along the entire supply chain.

In order to keep the public informed at all times, the WG has developed and continuously updated a variety of publications, including consumer brochures and flyers presenting and explaining appliances and services. With professional publications on hybrid/smart TVs such as the “White Book,” published in several revised and updated editions in both German and English –, this working group has, on the other hand, also contributed to a better understanding within the industry, as it did with several workshops and other topical events. A special research project at the Ilmenau University of Technology on the usability of HbbTV content on smart TV devices has shown that there is still much room for improvement, as detailed in a style guide for professional users. A follow-up to this usability study has been projected for 2014.

porting two initiatives: „Smarter Fernsehen” (by ZVEI and BVT) and „Auf ROT geht’s los: Meine Taste für smartes Fernsehen” (by ARD, ZDF, Mediengruppe RTL Deutschland, ProSiebenSat.1, and VPRT).

In the future, the working group’s work areas will increasingly follow aspects of content and intuitive handling. It will also cooperate with the German TV Platform’s “User Guidance” project group, which, in its first brochure („TV in der Zukunft”/“TV in the Future”), has analyzed new trends in searching, finding, and navigating through the broad range of content. This realignment will result in new priorities, including member, trade, and consumer information on all smart-TV concepts; applications for the second screen; coverage data; privacy, consumer, and content protection; and payment methods.



The more than thirty representatives of hardware manufacturers, infrastructure operators, television broadcasters, universities, and other institutions in the “Smart TV” working group thus have their work cut out. After all, we are certain that the trend towards smart TV will generate important stimuli for market development, change the consumption of audiovisual services, and open up television to new content, new providers, and new business models. The publication at hand will be just one contribution. It summarizes the results of our working group from our first four years of work. This market analysis is intended to provide readers with a comprehensive overview of the working group’s subjects and beyond, including trend forecasts and a glossary. I invite everybody who is interested to join our efforts.

Thanks to the commitment of the German TV Platform and its members, smart TV is a rapidly developing mass-market phenomenon in Germany today. This is the appropriate time, the WG believes, to continue the line of White Books with an updated overview as “Market Analysis Smart TV.” Early on, all those involved recognized that consumer education and information as well as an increase in the number of smart TVs connected to the Internet had to take priority as the development progressed. For this reason, the “Smart TV” working group has been focusing its efforts since IFA 2013 on sup-

1.

Overview of Internet and TV



1.1 Web TV, IPTV and Hybrid Reception Devices (“Smart TV”)

From Latin roots, the term hybrid generally means, “blended, a cross between different species” in other words: a combination of parts of various origins. Hybrid consumer electronics combine various, previously separated transmission methods into one consumer device. In this way, different media content from various sources can be displayed on one TV screen. The basis of hybrid media services is the digitalization of content and transmission technologies that allows a combination of various broadcast and IT standards in addition to new, convergent technologies.

Smart TVs are television sets that can display broadcast programs and services from traditional broadcast channels as well as content from the Internet, so that both sources can be used side-by-side as suppliers of information and/or entertainment. The technical facilities are supplied by an increasing number of TV models with integrated digital receivers (iDTV), as well as digital receivers and Blu-ray players/recorders. Smart TV as a linkage between Web and TV on one device is another level of convergence between television and Internet. In a first stage, moving images from the World Wide Web reached computer monitors either as openly-accessible Web TV, as (paid) video-on-demand services, or as live streams. At the same time, IPTV services were offered which were similar to traditional broadcast services, but on the basis of the Internet protocol (IP), reaching the monitor via broadband networks (usually upgraded phone lines).

In the second stage of convergence, all device manufacturers are developing systems to make Internet services usable on TV screens, thus providing users with both a wider diversity and a certain degree of interactivity on the TV set. In addition, more and more TV broadcasters are offering hybrid TV in the form of teletext as well as video libraries (catch-up video-on-demand services mainly offered by public broadcasters) mostly in the HbbTV (Hybrid broadcast broadband TV) standard (cf. 2.3). In addition, various online companies and other organizations offer online content for smart-TV devices. In Europe and around the world, the German market is regarded as a trailblazer in the field of smart TV. In addition to high-definition (HD) and ultra-high-definition (UHD) television, interactive TV has become one of the dominating trends in consumer electronics.

The imprecise use or even confusion of the terms IPTV, Web TV and hybrid or smart TV in the media often puzzles consumers. These various services and types of audiovisual-media delivery and use are frequently mixed and intermingled as “Internet-enabled.” All three do indeed feature a combination of Internet and TV, yet their approaches are entirely different.

IPTV denotes the transmission of (mainly linear) broadcasting services via a broadband network. This means transmitting a signal carrying broadcast content (TV and radio)

and encoded in Internet protocol (IP) on a dedicated section of a broadband link (usually a telephone network) in a guaranteed quality to TV households. To display the transmitted content on a TV screen, an IPTV reception box from the provider is required, together with a service subscription. IPTV is about to establish a fourth transmission method for linear TV, in addition to cable, satellite, and terrestrial broadcast.

The term **Web TV** describes audiovisual media content that is distributed over the World Wide Web, but without quality assurance and generally only for display on PC monitors, laptop and tablet computers or smartphones, i.e. not on large TV screens.

Originating from the consumers’ desire to view moving picture content from the Web and other popular online media also on TV screens whenever they like, the CE industry developed smart-TV devices. These are hybrid TV devices (digital flat-panel TVs [iDTV], digital receivers, and Blu-ray players/recorders) that can receive and display broadcast signals via cable, satellite, or terrestrial antennas, as well as content and services from the Internet (incl. Web TV). The integrated browser uses a broadband network via Local Area Network (LAN) or Wireless LAN (WLAN or WiFi), in order to display the content supplied via the return channel in exactly the same way as TV programming on the TV screen.

1.2

Consumer Electronics and Connectivity

Since early 2009, hybrid TVs have been available on the German market, allowing both broadcast reception and Internet connection as well as an optimized display of Internet services on the TV screen. Initially, this was almost exclusive to digital flat-panel TVs (iDTV/smart TV). By now, an increasing number of manufacturers of digital receivers or Blu-ray devices are relying on the hybrid approach. The benefit: with a “smart” receiver,

almost any flat-panel TV with an HDMI connection can be upgraded to a hybrid device.

These smart TVs also often provide the option to connect with other consumer electronics or the home network. Thus, digital cameras, MP3 players, DVD and Blu-ray devices, and game consoles as well as modern cell phones can be used with the TV screen. Some TV manufacturers also offer solutions

that permit control of the flat screen via smartphones or tablet computers, generally by using specific apps. This allows the various devices to be connected. The content exchange between these consumer devices and those of the communications and IT world is facilitated by dedicated software.

A new form of TV/Web communication is the integration of TV and the increasingly popular social networks such as Facebook, Twitter, and so on –, termed “Social TV” within the industry. The linkage of TV and social networks may be achieved via apps in the manufacturers’ portals or even alongside TV programs running on the main display panel (cf. also 3.3 and 3.4).

Some CE manufacturers even envision their hybrid devices as the control hub of a comprehensive home network that can monitor and control building and household technology. The possibilities for connections within and between sectors that were previously separate seem technically unlimited. Various developers are at least working on the adaptation of various technologies. The key factor in the development of the entire market segment, however, will be whatever finds acceptance with users and thus establishes itself on the market.



Examples for flat-screen remote control via smartphones or tablet computers and state-of-the-art TV remotes



2. Types of Interactive Television



2.1 Overview of Various Hybrid-TV Packages

Initially, it was several manufacturers of flat-panel TVs that drove the development of hybrid TV, starting in 2009. This resulted in flat-panel TVs with various hybrid options for the display of Web content on the TV screen being marketed in Germany. Some device manufacturers and content providers relied on variations of the Internet's HTML (HyperText Markup Language) language for consumer electronics, known as CE-HTML. Others used IT solutions such as JavaScript for their smart-TV portals. Thus the manufacturers offered their services to the viewers on their TVs in proprietary formats mostly as an application (app). For providers of services and content, this meant adapting their packages and coming to an agreement with the respective device manufacturer to access to their particular portal.

Since 2009, a European consortium has been taking care of the harmonization and development of interactive television on smart TVs under the designation HbbTV (Hybrid broadcast broadband Television). Several members of the German TV Platform, such as the Institute for Broadcast Technology (IRT), Philips, and Astra have actively participated as founding members. And since June 2010, the HbbTV specification has been recognized as a standard by the European Telecommunications Standards Institute (ETSI). More and more companies, including all the members of the German TV Platform, now support HbbTV technology (cf. 2.3).



Despite several variations between HbbTV broadcaster packages and manufacturer portals, there are important similarities. Apart from television reception via the traditional broadcast infrastructures of satellite, cable and terrestrial broadcast, all smart-TV consumer devices support the use of services and content from the Internet and can use a return channel to provide genuine interactivity

via the TV remote control. While the new hybrid devices in consumer electronics are certainly not intended to replace the computer, they do provide additional benefits and add a new diversity to television sets. Ever more smart-TV devices even combine both: HbbTV functions with manufacturer-specific portals and multi-media networking.

2.2 Display and Use of Web Services on Smart TVs



By now, there is a wide variety of appliances on the market: Next to flat-panel TVs, there are digital receivers, set-top boxes (STBs) without built-in receivers, and Blu-ray players that can receive and display Internet content and services (including Web-TV) in addition to broadcast signals via cable, satellite, or terrestrial transmission. Nearly all of these devices implement the HbbTV standard. In most cases, manufacturers of “smart” devices not only provide hardware but also offer their own portal for accessing the diverse world of Web-TV and other, non-television-based services.

The manufacturers’ smart-TV portals vary in design and in user interfaces on the one hand and content on the other. Generally, the various manufacturers’ portals offer services such as news, weather, games, and social networks as well as video-on-demand and video-library services. The majority of the services available

Originating from the consumers’ desire to concurrently use moving picture content from the Web and other popular online media on TV screens, the CE industry developed hybrid devices that allow both Internet content and apps to be used on the TV set. On the other hand, TV program providers, together with technology companies and other institutions, developed the HbbTV standard, which allows linear TV programming to be linked with select Web content. Initially, it was primarily hybrid flat-panel TVs (iDTV) that were equipped with the hybrid function.



can be found on the various portals of different device manufacturers, for example YouTube, Bild.de (popular German electronic newspaper), or the video libraries run by the TV networks. From the manufacturer portals, on which the services are often displayed as tiles in a gallery, similar to the well-known apps on a smartphone display, users can access the desired service by means of the remote control. It is possible that depending upon the service there are access conditions, such as registration or payment. Other services are free of charge and instantly available. Some of the portals described above are assembled by the device manufacturers themselves and, in some cases, operated by third-party service providers. What is new are the ways in which users can navigate through this diversity of content: from touchpads integrated into TV remotes via pointers all the way to gesture and voice control.

Portals are offered both by TV manufacturers and the manufacturers of digital receivers and Blu-ray players, but also by infrastructure operators such as Astra (HD+), Eutelsat (Kabelkiosk Choice), and since March 2013 Media Broadcast, operator of a terrestrial broadcast network (Multithek). The Astra and Eutelsat portals can be used by device manufacturers as white-label products and rebranded. Media Broadcast has expanded the limited capacity of DVB-T with a hybrid approach. The scope of services offered by the portals varies from one manufacturer to another, but in general, those who started developing hybrid devices early on are now providing a wider choice of content. Usually, portals offer users an opportunity to configure and personalize services according to individual preferences, to group "favorites" together, and to personalize the screen by selecting additional tiles from a sort of "app gallery" and adding them to the pre-installed selection.



The services that can be accessed via the portal may include the following types:

On smart TVs, HbbTV services offered by broadcasters as well as app portals can be selected simply by the push of a button.

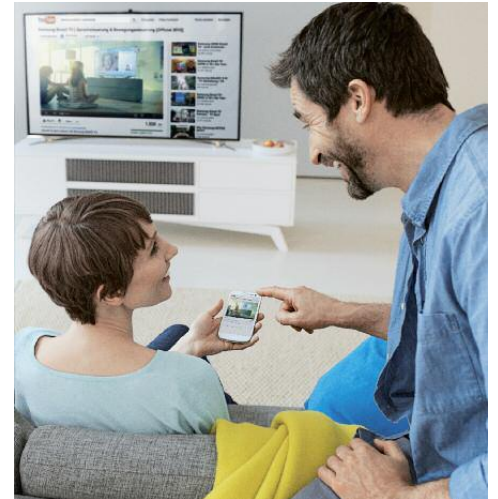
- Services with direct reference to broadcast content, for example the networks' video libraries, where viewers can re-watch or catch up with recent programs or watch certain programs in a livestream (such as newscasts);
- Services with an indirect connection to broadcast content, like e.g. the Web portals of TV broadcaster groups or their commercial video-on-demand portal, from where TV programs can be downloaded exclusively ahead of broadcast;
- Services that have no connection to broadcast content but contain moving images, such as user-generated content like YouTube;
- Services that neither have a connection to broadcast content nor contain moving images, such as e.g. electronic newspapers, social networks, online photo galleries, game portals, auction platforms, or telecommunications services;
- Shopping offers of all major home-shopping networks, partially with options to order via TV.

Regarding the variety of content and services that are available via a portal, the development is still in its infancy. Some portals also offer free Internet access via an open browser. With these devices, users may input any URL and access any Website via their TV. An advantage of curated services is to have the assurance of the best possible display and functionality on screen, as well as the legal security of excluding illegal content, protecting copyright, and locking inappropriate content.

Another way to access more content and service than the TV program via a hybrid device is to access the packages of the TV broadcasters themselves. In this area, it is more or less

These may be thematically linked to the currently watched TV program, or link to a high-definition teletext in a modern design and a comprehensive EPG. Links to the navigation portals of the TV networks or their corporate Website are also feasible. With HbbTV, interactive involvement of the viewer is possible, for example online voting in live programs or home shopping without switching media. With the video libraries, programs can also be watched via Internet depending upon the business model, registration or payment may be required to do so.

It goes without saying that the link from the current program can only be provided by the TV broadcasters that are actually received in



exclusively the HbbTV standard that is implemented. It links the TV signal of a broadcaster with relevant content from the Internet. This way, HbbTV allows a new interactive TV experience. On HbbTV-enabled devices, HTML pages are generally opened and closed by the red button, one of the four colored keys on a standard TV remote. Any Web content defined by the broadcaster as relevant to the current program, can thus be accessed. Under the HbbTV standard, the TV broadcaster is in full control of this process and can guide viewers from the current program to various Websites.

a particular household by the broadcast transmission method available. Technically, the link is transported via the EIT information in the broadcast signal. Infrastructure operators of broadcast services such as cable network operators, satellite operators, and providers of terrestrial broadcast networks offer access to Web services usually in the form of portals that are similar in principle to those of the CE industry. Here, too, graphics, range, and diversity of the services vary.

HbbTV as a Standard: Origin, Application and Outlook

Why HbbTV?

Hybrid devices do not represent an entirely novel concept. For years, there have been attempts by device manufacturers to also display Internet content on TV screens via an integrated browser. But it is only now that affordable, high-bandwidth Internet access has become so widespread and so much attractive media content is available on the Internet that critical mass for a wider market penetration has been reached.



Almost all device manufacturers have introduced smart-TV devices onto the market. For manufacturers, there is a need to set themselves apart in the increasingly competitive market for flat-panel TVs, and the feature of “Internet access” is used as a selling point. On these devices, a “portal” can generally be launched, from which a variety of Internet content can be accessed. Of particular interest is moving picture content, e.g. YouTube or the video libraries of the German public networks, ARD and ZDF. The concepts pursued by the industry, however, have raised a couple of issues.

The resolution of modern HD displays would permit any content from the Internet to be displayed and to be made navigable. Nevertheless, approaches to display content on a TV in the same way as on a PC seem questionable for several reasons. Viewing distance relative to screen size is generally greater with a television than with a PC, which most Internet content is displayed too small and poorly legible on regular TVs. Moreover, Internet content is optimized for navigation with a mouse cursor and keyboard, and both input features seem to be incompatible with common TV usage, where standard remote controls with arrow, number, and color keys are still dominant. However, since IFA 2013, keyboards on TV remotes, pointers, gesture and voice controls have become prevalent. For faster navigation, newer remote controls have even integrated small touchpads, which are familiar to users from laptop computers.

In addition, there are also commercial arguments against the integration of hardware into TVs or set top boxes that would allow the full scope of Internet services to be displayed in the same way as on a present-day multimedia PC. For these reasons, Internet services are only available in a limited form on current hybrid TVs, or they have to be specially processed for display on the TV screen. This means that two problems arise from the service providers’ point of view:

1. Each manufacturer of hybrid devices uses a different browser and supports a variety of streaming formats and protocols. This leads to the problem of having to adapt content individually for various manufacturers, and this heterogeneity represents an immense obstacle for a dynamic market.

2. Inside hybrid devices, the areas of Internet and television are, in fact, separated, even though they share the same screen.

For this reason, various market partners (ANT, APS, IRT, Open TV, Philips, and the French HD Forum, as well as Samsung und Sony more recently) joined to develop a uniform technological platform that would allow the “smart” linkage of universal functions and content from the Internet with that of the TV, using HTML as the basic technology. The objectives for the hybrid system to be developed were:

- It had to be open and standardized, in order to permit efficient development of content independent of individual manufacturers or platform operators.
- It had to be based upon open-source standard technologies as far as possible.
- It should only specify the minimal required components and features, so that the specification could be supported by as many market players as possible.
- It should allow the combination of all broadcasting systems (satellite, cable, terrestrial) with all Internet access technologies (DSL, cable, wireless).
- It should permit connection between linear television content and additional interactive services.
- It should also permit the use of the broadcast channels for the distribution of additional services.
- It should be suitable as a successor to the present-day teletext system.
- It should not affect the integrity of broadcast programs, i.e. not combine services from the Internet with the screen image in an uncontrollable way.

This meant that, in the future, accompanying HTML pages could be launched directly out of a TV program. It also meant visibly better display options for teletext in the age of HD. Additional information, such as news crawls, could be superimposed transparently across the TV image, and information relevant to the TV program could be displayed simultaneously, for example during game shows. But the HTML environment will also be enhanced:

- A smaller TV picture can be integrated into HTML pages, allowing seamless access from the Web page.
- A key reason for employing the HTML is also the simple carry-over of services already developed for the Internet. This way, attractive services can be launched quickly, and not just by broadcasters, as demonstrated by the host of Internet services on hybrid TVs already available.

The objective of developing a standard within the parameters outlined above has been achieved. The specification was submitted to ETSI in late 2009 and published in June 2010 in its initial version as ETSI TS 102 796.

The Technical Concept of HbbTV

The HbbTV standard defines as few new technical elements as possible, but is rather based on existing technical standards. In that respect, the specification is more a profile of what exists than a new technological approach, thus speeding up the implementation on devices. Essentially, HbbTV is based on the following three standards:

The CE-HTML standard, currently available as a 2007 version, is based on W3C Internet standards and specifies an HTML profile for CE devices. This browser profile also forms the technical foundation of HbbTV. It is based on XHTML 1.0, DOM 2, CSS TV profile 1.0 and ECMAScript-262 (JavaScript) and is optimized for the display on HTML/JavaScript pages conforming, by and large, to the Web standards, on CE devices generally TV screens. It should be mentioned that the XMLHttp-

Request object in particular is supported, so that application developers are able to develop HTML applications comparable to current so-called Web 2.0 applications. This compatibility makes it possible for existing know-how, technology, and experience employed in contemporary Web applications to be seamlessly transferred to HbbTV set top boxes while focusing on aspects of broadcast integration. Furthermore, the key codes for the most popular TV remote controls, for example, are also included.

CE-HTML does not, however, contain any elements that specify the connection to a DVB (digital video broadcast) environment, as is the case with digital television. This is, however, achieved by the browser specification of the Open IPTV Forum, published in January 2009. While this specification was written for application in IPTV networks, it contains APIs that can also be used for hybrid decoders. These include, among others, specific features for integrating the TV image into HTML applications, for switching radio or TV channels, for pre-programming recordings, and for accessing DVB data. With elements of both these specifications selected for HbbTV, the key browser features have been defined.

Three important additional features are provided by the “Signalling and carriage of interactive applications and services in hybrid broadcast/broadband environments” DVB standard, which was completed in March 2009 and is available as ETSI standard TS 102 809. First of all, this DVB standard controls how applications that are launched out of a TV or radio program are signaled in the DVB-multiplexes. In line with the previous MHP standards, this is performed via the Application Information Table (AIT) listed in the Program Map Table (PMT) of the respective program. The AIT of any program lists All applications permitted to run alongside a specific program are registered in its AIT. Other applications may switch to this program but are stopped by the system. This ensures that the program is not “hijacked” by external applications and for example superimposed by third-party advertising.

One of the applications assigned to a program can be designated in the AIT as a so-called “autostart application.” It will be launched automatically when the respective channel is switched to and usually displays a red button symbol on the screen that disappears after a brief period. This symbol indicates to viewers that they may launch additional applications by pressing the red key on their TV remote control. An additional signaling option in the AIT is designed for applications that are intended to replace today’s teletext service. This signaling can be linked to the teletext key by the device manufacturer so that a new teletext application can be launched directly. In addition to applications that are linked to a broadcast service via AIT signaling (broadcast-related applications), HbbTV also supports applications that are not necessarily linked to a broadcast service (broadcast-independent applications). These may, for example, be third-party program guides, or applications such as Flickr, YouTube, etc. HbbTV permits the switch from broadcast-related to broadcast-independent applications, but limits access by broadcast-independent applications to broadcast content.

Furthermore, TS 102 809 specifies the transmission of applications via the DVB broadcast channel. This option is interesting in the case of devices that have a browser but are not hooked up to the Internet by the consumer. While the volume of data that can be transmitted via the broadcast channel is limited, it is suitable for simple services such as enhanced teletext.

For the transmission of HTML applications, according to the Blue Book, the DSM-CC standard is applied, which is already being employed for MHP.

The “stream events” with which small data packets can be piggybacked to the broadcast channel in sync with the TV program are also part of the DSM-CC standard. With this, for example, questions or answers may be transmitted at exactly the right time during interactive quiz shows. Via Internet connection, this kind of synchronization of broadcast content and interactive responses would be

quite difficult to achieve, and Web servers would have to be designed to handle millions of simultaneous requests. For these purposes, using the broadcast channel is therefore considerably more efficient.

In total, the HbbTV browser profile represents a pragmatic compromise that offers a flexible and universally usable technical infrastructure for various service options on the one hand, while on the other hand it can be implemented in hardware (iDTV/STB) that is considerably less efficient than the computers commonly used to access the Internet today. A browser that complies with the HbbTV specification can be integrated into any consumer device as an independent component. Providers of complete middleware solutions can, however, also market this browser as an integral part of their product. Depending upon the requirements of individual markets, this browser concept may also be combined in the user devices with API systems that have already been introduced (such as MHP or MHEG5).

The HbbTV Consortium Today

As already mentioned, the HbbTV initiative was initially an informal cooperation between ANT, APS, France Télévisions, IRT, OpenTV, Philips, and TF1, joined by Sony and Samsung in August 2009. At this time, the HbbTV partners announced the new initiative in a press release and open up the possibility for additional companies to join them as supporters, which more than 100 companies and institutions have done in the meantime.

In April 2010, Philips, ANT, Sony, Samsung, OpenTV, SES Astra, IRT, TF1, EBU, and France Télévisions signed a consortium charter to

regulate further cooperation and open up HbbTV to new members. In the meantime, this consortium is a legal entity registered in Switzerland. Over 60 companies have joined as members so far. The further technical activities are being driven by a series of working groups. These activities are primarily:

- a review of the first version of the HbbTV standard to correct errors or ambiguities, as well as to integrate some new features, such as the DASH standard for adaptive streaming; this new version of the HbbTV standard, designated “HbbTV 1.5”, was published by ETSI in November 2012 as ETSI TS 102 796 v1.2.1;
- the development of a test suite for testing with HbbTV devices; this test suite is intended to ensure a uniform and consistent implementation of HbbTV in all devices and reduce expenses for testing devices; this test suite has been available to all market partners since 2012;
- the development of a 2.0 version of the standard, offering a number of new features, including HTML5 support and interactivity options between devices; technical specifications for “HbbTV 2.0” are more or less complete;



- discussion forums and workshops, in the course of which implementation questions and potential errors will be discussed on the basis of past practical experience and know-how in all aspects of HbbTV will be assembled.

Status of Market Development: HbbTV Services in Germany

Since IFA 2010, all four free-to-air television broadcast groups in Germany (ARD, ZDF, RTL, and ProSiebenSat.1) have been offering HbbTV services. While public broadcasters have focused mainly on media libraries, teletext, and EPG, the commercial broadcasters have emphasized colorfully upgraded variations of their teletext pages with photos, video clips, and interactive advertising, and Pro7 and Sat.1 also offer games and voting. An outstanding example for the potential of HbbTV was demonstrated during the 2012 Olympic Summer Games and the 2014 Olympic Winter Games with the integration of six and four livestreams, respectively, into the HbbTV Olympics apps of ARD and ZDF.

But smaller broadcasters also regard HbbTV as a valuable extension feature to their program activities: By now, Sport1, HSE24, QVC, Sonnenklar TV, and Astro TV have launched their own HbbTV options. Interestingly, a growing number of local TV broadcasters is also providing HbbTV content bringing the total to 70 program providers offering HbbTV services (as of September 2013). They already include applications that allow bookings or purchases. There is no doubt that such applications will also be offered by many more providers in future.

Status of Market Development: HbbTV Devices

By the end of 2009, the Humax iCord HD+ was introduced as the first HbbTV set top box for satellite reception. In the course of 2010, further manufacturers of DVB-S STBs followed with VideoWeb, Smart, and Inverto. At IFA 2010, more major manufacturers, including Philips, LG, Toshiba, Loewe, and Technisat, followed, particularly with inte-

grated TV receivers (iDTV) that supported HbbTV. In the meantime, virtually all major device manufacturers – currently more than 50 – have HbbTV-enabled devices on the market (for specific data, please refer to chapter 4).

HbbTV on Various Transmission Channels

HbbTV is a standard that can be generically applied to all combinations of broadcast networks and Internet access, i.e. also via DVB-T and mobile Internet. Here is a brief overview of the status of HbbTV in the various German DVB distribution channels:

DVB-S is, as for many other new developments in digital television, the earliest market segment. Many of the HbbTV services mentioned above are available free of charge via satellite, and quite a few of the HbbTV devices available support satellite reception. Paid services are offered mostly via the HD+ portal with a service called “replay.”

A regional portal operated by the state media authorities combines various regional services on one satellite transponder.

DVB-T: At the „Medientage München” congress in Munich in October 2010, ARD, ZDF, and ProSiebenSat.1 switched HbbTV signaling onto their terrestrial multiplexes and demonstrated their HbbTV packages on HbbTV prototype devices or with a DVB-T frontend. Virtually all of the HbbTV iDTVs from major manufacturers marketed in 2011 also support DVB-T reception. In the meantime, broadcast network operator Media Broadcast has added Multithek.

DVB-C: In cable, HbbTV signaling for all channels is already available across all networks. As with terrestrial broadcast, HbbTV iDTVs from major manufacturers are generally also equipped with DVB-C tuners. Thanks to the CI Plus interface, they can be used in all major cable networks. A special service by Eutelsat with a white-label HbbTV portal called “Choice” is directed explicitly at cable network operators.

HbbTV can even be an issue for IPTV networks: The hybrid standard can be employed here in the same way as in conventional DVB networks, and in this segment, too, some IPTV providers have already started working on their HbbTV decoders. There are thus no more obstacles in the way for HbbTV to become a universal standard for hybrid television across Germany.

HbbTV and Second Screen

Usage of a “second screen” while watching television has become increasingly popular, as the vivid interest for a conference on this subject, hosted by the German TV Platform,

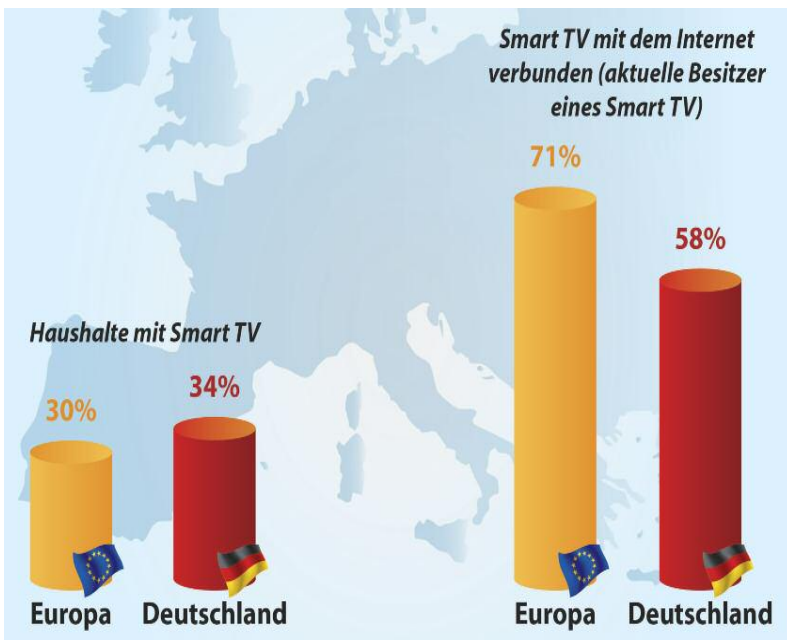


on the secondary device. Since it is entirely browser-based, implementation is platform-independent. Due to its HbbTV-compatibility, services directly related to TV program content can be implemented. This system has been operational since IFA 2012 with ARD's HbbTV EPG and has been marketed by T-Systems since March 2014 under the brand name, “First Connect.”

The Status Quo of HbbTV in Europe and around the World

Germany was a pioneer in the launch of HbbTV on an international scale. The French market had already played a key role in the development of the HbbTV standard, and by now, TF1, France Télévisions, and Canal+ are using HbbTV. Internationally, HbbTV has since made great strides: In Europe, nine countries have regular HbbTV operations (Austria, Belgium, the Czech Republic, Denmark, Finland, the Netherlands, Poland, Spain, and Switzerland). A number of other European countries are planning the launch of HbbTV or have commenced test runs (Hungary, Norway, Portugal, Sweden, and the United Kingdom). Even beyond Europe, HbbTV has been reviewed, and in some cases, introduction has already been greenlighted. Russia and China have conducted field tests, and Turkey included HbbTV in their DVB-T2 specifications. This combination of DVB-T2 and HbbTV will most likely be used in Malaysia, Vietnam, and other Asian countries as well. In Australia, HbbTV services will be rolled out in May 2014. In South America, a combination of HbbTV and ISBD-T is being tested, and in the United States, HbbTV is being discussed as a technology component of the new 3.0 version of the ATSC standard.

demonstrated. Since the current version of the HbbTV standard does not permit direct communication with a second screen, IRT has developed a system that allows the integration of a mobile device into HbbTV services even today. This way, HbbTV applications can, for example, be controlled remotely from the second screen, or certain information may be pushed from the TV to the second screen. To establish a connection between the devices, the user simply has to scan a QR code on the TV screen with a suitable application on his secondary device. Following a successful handshake, the second-screen application is launched automatically



According to a gfu study, the penetration of German households with smart TVs is above the European average, but they lag behind in actually connecting these devices to the Internet.

Source: gfu – Gesellschaft für Unterhaltungs- und Kommunikationselektronik. Representative study by gfu in 2013: 8,000 households surveyed in Germany, seven other European countries, and Turkey

2.4 The Smart TV Alliance and SDK Options

The requirement for a speedy development of hybrid television has compelled major CE manufacturers to cooperate. In early July 2012, they founded the Smart TV Alliance in Los Angeles, initiated by LG Electronics, TP Vision (a Philips subsidiary), and Toshiba, all of which are also members of the German TV Platform and active collaborators in the Smart TV working group. In the meantime, Technisat, Panasonic, Vestel, and 14 other companies have joined the Alliance.

Together, these companies intend to support an improved infrastructure for TV applications and platforms, allowing Web services, on-demand services, games, and music to be used or played on all flat-panel displays and other TV devices under uniform specifications. As a first step, a version of their software development kit (SDK) is available for download by app developers. It is based on open-source Internet technologies (such as HTML5) and allows applications to run on all smart TVs produced by the participating manufacturers, independent of their platform.



Smart TV Alliance

The Smart TV Alliance is open to other hardware manufacturers, broadcasters, and content providers, as well as infrastructure operators. At the same time, the Alliance's founders support the Hybrid broadcast broadband TV (HbbTV) standard, which has its own organization (cf. chapter 2.3) and is applied by TV broadcasters in Germany and other countries.

Manufacturers that are not members of the Smart TV Alliance such as Samsung also offer software development kits and regularly host developer meetings. This makes it easier for companies that do not manufacture hardware to develop services for the various smart-TV portals. Even for Google's new Chromecast dongle, there is an SDK called Google Cat that allows third parties to develop apps and services for this digital media player.

The more than 70 broadcasters who offer HbbTV services in Germany also include numerous local TV stations, whose videos can be accessed via a portal, as well as home-shopping networks such as QVC.



The number of hybrid consumers devices in Germany is growing rapidly. All relevant device manufacturers have offered HbbTV support in their hybrid devices off the shelf since fall 2011. The major TV broadcast groups and also a growing number of smaller broadcasters have developed and launched HbbTV applications. At the same time, the number of information and entertainment options that TV viewers can access in the portals of their TV device manufacturers (so-called "TV apps") is growing. Most market players assume that the combination of linear broadcasting reception and the Internet-based transmission of content will have a major impact on the TV market in the years to come. After PCs, smartphones, and tablet computers, television will become another highly attractive sales channel for new types of advertising and e-commerce, or rather "TV-commerce."

Video Advertising

While the HbbTV packages from the public broadcast groups do not pursue any commercial interests but are rather intended to be a method of combining enhanced teletext, EPGs (Electronic Program Guide), and free access to some cases very expansive video libraries, the marketers of commercial broadcast networks regard HbbTV more and more as a venue for new advertising formats. Apart from the display ad formats familiar from the online sector, video ads are increasingly being used in the shape of pre-rolls. For the providers of commercial TV apps in the manufacturers' portals, revenues from video advertising in particular are the substantial source of funding their efforts today.

According to projections made by Goldmedia in 2011, the net advertising turnover for on-line video advertising will increase from €80 million then to approximately €350 million in 2015.

The percentage attributed to hybrid TV is still relatively small, but according to the moving-image marketer, smartclip, providers of high-coverage TV apps will be able to generate annual advertising revenues in the low-to-mid-six-figure range with an upward trend, since the number and reach of apps increases, as does their quality.

TV Commerce

In contrast, the segment of paid content already plays quite an important role by now. In fact, Maxdome announced in early 2013 that half of their one million registered users stream movies via smart TV. And non-commercial providers, such as public broadcaster ZDF, also report a sharp increase: In April 2013, 1.6 million of their video items were viewed via HbbTV.

According to a 2012 study by the Munich consultancy firm, Mücke, Sturm & Company, a wider use of these packages in Germany as well as further transaction-based business models for smart TVs (home shopping, direct-response TV, contests, games, call-to-action campaigns, etc.) can only be realized after processes for customer-friendly and secure purchase and payment methods have been established on the market. It is only then that a part of the purchases made today via traditional television will migrate to smart TV. Apart from that, new players will come from the Internet realm that will use television as an additional sales channel, such as e.g. operators of e-commerce sites or shopping portals. According to this study, merchandise worth over €1.8 billion will be sold this way in five years' time.

It should, however, be noted that the user scenario is different for television, compared with PC and smartphone. The viewer uses TV offers in a relaxed situation and is not using a keyboard but rather a remote control with a limited number of keys. It remains to be seen how RC-integrated keyboards or voice control will change viewer habits. But in or-

der to successfully establish the previously mentioned business models, an unambiguous identification of the television viewer is necessary. On the Internet, this is generally performed by authentication of the user with the combination of user name and password.

One of the solutions lies certainly with “second screens” or “companion devices,” i.e. additional devices, such as smartphones or tablet computers, that allow more complex inputs. Here, too, user-friendliness is the key to success in consumer acceptance.

With an increasing number of content or service packages that require registration and/or payment, both on manufacturers’ portals as well with broadcasters, the necessity arises for a TV-compatible central authentication or single sign-on system (SSO) as a payment system for vendors and customers. The example of iTunes shows how important this factor can be for the commercial success from the content provider’s point of view, and the study by Mücke, Sturm & Company also confirms: “Entering user data and payment information is by far the conversion killer par excellence for every sale via remote control.” In that respect, the announcements by several device manufacturers that they will be introducing their own authentication and payment systems are a basic step in the right direction, as they are designed to increase user-friendliness for consumers, thus reducing purchase inhibitions. Unlike in the case of smartphones, no one manufacturer has a dominant market position so far, so that content and service providers are forced to provide their offerings to as many manufacturers as possible. Adaptation of the service to the respective manufacturer’s authentication and payment system (if at all available) provides sellers with complex adaptation and administration processes that block rapid market penetration.

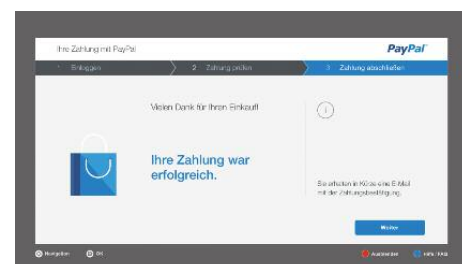
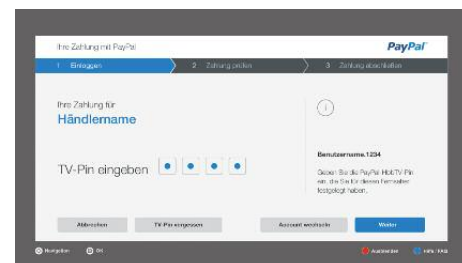
One possibility is therefore to introduce special payment systems that are tailored to the HbbTV standard, since one of the key properties of the standard is that it combines the most diverse CE devices (TVs, sat receivers, Blu-ray players, etc.), so that services can be

displayed uniformly and independently of device manufacturer and type. One example of this is the TV-ID service offered by teveo interactive. Similar to Facebook Connect on the Internet, it offers customers on interactive television the option to register with all connected services, irrespective of which device the customer is using the service on. In addition, the customer can also use paid content that is then billed via the TV-ID on behalf of the provider. For service providers, this means that they can use the same system on all devices with the same procedures, without having to adapt their services to each device. Another example is offered by Ping 24/7, which presented its solution for TV commerce to the German TV Platform in April 2011 on a smart TV (cf. chap. 3.3). Apart from the convenience of SSO, this system offers the option to choose between various payment methods. Authentication is performed conveniently through a PIN.

PayPal also offers a payment solution for HbbTV, which allows to access HbbTV paid content and pay for the service via PayPal. Registration is easy: Once the user has decided on a product or paid content, he or she only needs to hit the “Buy and pay by PayPal” button. The user then opens the paypal.de/hbbtv Website on a secondary device (e.g. a PC or smartphone) and enters the five-digit code displayed on the TV screen. He or she is then automatically directed to PayPal’s log-in page, and logs in with his or her personal PayPal access data. Back at the TV, the customer only has to confirm his or her purchase by entering a four-digit authorization code.

For future purchases, the user only needs the authorization code, regardless of channel, merchant, product, or content. For users, PayPal’s new HbbTV payment solution offers an easy and convenient way to conduct a transaction. After his or her initial registration, the user does not have to enter any text nor does he or she have to use any device other than his or her TV. These kinds of solutions may encourage both content providers and users to shed their reservations and carry out transactions via TV.

A new, independent payment option for smart-TV services in the HbbTV standard is offered by eBay’s well-known Internet money-transfer service, PayPal.



Such options for conducting transactions directly on TV open up exciting development prospects. Moreover, the second screen will offer an increasing number of application scenarios for e-commerce, e.g. for ordering products displayed in a broadcast program. Home-shopping networks are already finding ways of offering users merchandise presented in their programs for direct purchase via remote control. Apart from traditional products, virtual products such as moving-picture content and games are the driving forces towards profitability. But there is yet no clear road map for the dominant models in this segment in sight, and this conclusion is shared by a study commissioned by the state media authorities, entitled „Wie smart ist die Konvergenz? Markt und Nutzung von Connected TV“ (“How Smart is Convergence? Connected TV Market and Usage”).

New Types of Advertising

As soon as adequate penetration has been achieved in the smart-CE-device market, new forms of advertising will develop from the possibilities of directly addressing the customer on television, where interactivity and close proximity to the purchasing decision are primary factors. One possibility would be to personalize traditional TV commercials. For this, TV broadcasters or advertisers would be provided with anonymous profile data of viewers in real time, putting them in a position to adding narrowly targeted content and linking their commercials to a dedicated Website, thus encouraging viewers to take action or stimulating spontaneous purchases.

This direct contact to customers via television is not limited to TV commercials, either. It is also conceivable that the broadcaster fades in a personalized display that is linked to the current program. Advertising will benefit from the emotional framework provided by the linear television program and in this way clearly increases the likelihood of customer response. This option goes far beyond the potential of purchasing within TV apps on manufacturers' portals but it is extremely demanding with regard to the checkout process being simplified (e.g. a central PIN to all

transactions) and privacy laws being observed. As soon as these new advertising formats have established themselves on the market, the TV advertising market will clearly expand.

To gain acceptance among advertisers and boost profits for HbbTV and app providers, it is vital that advertising effects can be quantified and compared to other media. For this purpose, various projects have been initiated by established service providers such as ivw, AGF, Agof, and agma whose main objective is to establish a uniform currency for using moving images on the Internet and on smart TVs and to create a standard that allows comparisons with other advertising media. Some of these institutions have given lectures on this topic at the German TV Platform. A survey on the current situation can be found in Guido Schneider's chapter, „Das Ringen um die Währungsunion Bewegtbildmessung im Fernsehen und Online“ (“The Struggle for Monetary Union Moving-Image Quantification on Television and on Line”), in the state media authorities' 2013 digitalization report.



Over-the-Top (OTT) TV: Important National/International Players

The term Over the Top (OTT) refers to the on-line transmission of video and audio content, even without an Internet service provider (ISP) controlling the OTT offer. No registration is usually needed to access the content on the platform in question. The ISP is aware of the transferred IP packages but is not responsible for copyright, use of the material, and any further transfer of the content. The transfer is independent of Internet bandwidth, which means that technical quality cannot be guaranteed. Users can receive OTT content via online-enabled devices, such as personal, laptop, or tablet computers, smart TVs, set top boxes, or game consoles. Access is mostly accomplished by an IP address check and can therefore be restricted to certain territories, if desired. OTT is not broadcast, DVD, or PVR.

OTT TV refers to television sets receiving program content from the Internet. Even peripheral devices such as Blu-ray players/recorders, or game consoles can receive content from the Internet via a LAN or WiFi connection. This content is then relayed to the TV screen, often customized for TV to allow simple navigation via the TV's remote control.

As OTT providers are generally individual companies, it is difficult to achieve a standardization of the consumer devices and their OS software. Each operator is tempted to promote their own proprietary solutions on the market to try to force competing companies off the market. OTT TV is a software-based approach. As such, the service provider needs to work together with the device manufacturers of Blu-ray players, STBs, TVs, and game consoles, since, after all, it is these manufacturers that bring the software to the consumer in their devices.

Google TV

In May 2010, Google presented its Android-based TV platform. With its Google TV, Google is one of the largest representatives of OTT TV and typically intends to bring all services offered via Internet to the TV screen, alongside traditional broadcast programming. The platform contains a search function similar to that on mobile devices using Android technology. In addition, Google offers features similar to those of other smart-TV providers. Google TV is based on the Android operating system and the Google Chrome browser. For displaying all moving content from the Internet including videos and animation, a full-fledged Flash plug-in has been integrated into Chrome. Google TV was launched in Europe with special Sony devices, and Google-TV sets from Sony have been available in Germany since fall 2012. For 2014, Philips/TP Vision is offering an Android-based smart TV. The latest attempt to launch a device-independent Google TV is called "Chromecast" and consists of an HDMI dongle that allows TV sets to access streaming services via WiFi.

Skype Goes TV

Thanks to OTT-TV, Skype, the Voice-over-IP software with instant messaging, has also found its way to television sets. This way, news and calls can be enjoyed directly in the living room on a big screen. Skype is integrated by Oregon Networks into various TV devices. The Oregon media browser is an embedded software for Internet and IPTV services. CE device manufacturers such as LG, Panasonic, and Samsung supply the additional system prerequisites: Skype-compatible TVs and Freetalk TV cameras with a special microphone system.



Apple TV: Primarily for iTunes Content

With Apple TV, Apple is following a concept different from and not competing with Google or Yahoo!, since Apple does not intend to provide access to the free Internet. Apple presented the second generation of its Apple TV on 1 September 2010 and the third generation on 7 March 2012: a device to play iTunes content such as music, podcasts, videos, movies, and your own photo collection. The small streaming box is connected to the television or a screen and permits access to media content which is fed from a local network or saved on the integrated hard disc, synchronizing computer and Apple TV via AirPlay. An additional five computers can also stream data to the Apple TV, but without an option to save.

The device is visually very plain and also features various connections and interfaces (HDMI, optical-fiber audio connection, Ethernet, integrated IR receiver, micro USB for service/support) and, except for the remote control, has no buttons. A training program is integrated, though, allowing various remote controls such as iPhone or iPad to control the complete home cinema. As mentioned above, Apple TV has no built-in TV receiver, which is why only content from the iTunes library can be played now also in HD 1080p. Services like YouTube, Flickr, Vimeo, and WSJ live (Wall Street Journal videos) can now be accessed, as can some subscription services like MLB.tv. There has only been speculation so far regarding a TV made entirely by Apple.



3

Results of the Smart TV Working Group



Jürgen Sweczyk, head of the working group, at the Platform's press conference at the IFA trade show

As one of its first tasks, the Smart TV (formerly Hybrid Consumer Devices) working group took on the definition of commercial requirements in 2009. Defining the following commercial requirements took several months and was accompanied by lively discussions. In order to remain as close as possible to market development, the

requirements referenced existing specifications and standards as closely as possible, including the HbbTV specification. Taking into account the international significance of hybrid TV, these commercial requirements were phrased in English from the beginning.

3.1 Commercial Requirements

The following table lists the main Commercial Requirements for Hybrid broadcast broadband TV devices which are regarded the basis for the Smart TV working group of the

German TV Platform. They are compared to modules of a technical concept for such devices.

No.	Commercial Requirement	Realization in HbbTV Specification
1	Technology must be based as far as possible on open standards and allow easy realization of applications	State of the art browser technology: XHTML 1.0, ECMAScript-262, DOM 2, CSS TV Profile 1.0 (CEA-2014-A / chap. 5.4)
2	Access to and control of broadcasting service related (bound) applications shall be easily possible for the user	The “Red Button” functionalities and the application lifecycle function in HbbTV cover this requirement
3	Access to and control of non broadcasting related service (unbound) applications shall be easily possible for the user	HbbTV does not mandate any easy access mechanism to unbound applications and does not prohibit a device manufacturer to implement the system in way that he is a gatekeeper for unbound applications in “HbbTV Implementation Guidelines” the implementation of an easy URL entry (soft-keyboard or selection from a list of all available apps) and the possibility of permanent storage of favorite apps should be mandated
4	The system shall allow the implementation of application platforms, where the system features, including application access and control functions, for both bound and unbound applications are well balanced, especially also from a customer usability and convenience perspective	See 3
5	Starting and stopping of applications (including teletext replacement) triggered by DVB services must be possible	Signalling based on DVB BlueBook A137, detail clarification by HbbTV profile
6	Applications must be able to trigger a service change	A service change can always be triggered by the application (OITF-DAE / chap. 7.4). If the application is not signaled on the new service, it will be terminated.
7	For users it shall be easily possible to terminate a running application	The concept of HbbTV is to avoid killing an application in the technical sense (this could be done via an EXIT key which is optional for the RCU) but to allow launching and hiding applications using the red button. This is part of the application guidelines.

No.	Commercial Requirement	Realization in HbbTV Specification
8	The Transmission of applications via the broadcast channel must be possible	Usage of DSM-CC object carousel according to DVB BlueBook A 137 (future ETSI TS 102 809) is possible for application transmission. DVB-SI has to be extended to allow the signaling of pure HbbTV data services.
9	Secure data exchange shall be possible	covered by HbbTV-Specifications (https server certificates)
10	The inclusion of one TV signal in the applications must be possible (picture in graphic). Some broadcasters have the requirement to control PiG in their applications exclusively.	OITF-DAE / chap. 7.7
11	Applications must be able to use resident storage	OITF-DAE / chap. 9.1 minimum 100 cookies; each 4 kByte
12	Access to EIT data (EIT present / following and EIT schedule actual and other) must be possible by applications	OITF-DAE / chap. 7.9 HbbTV profile: restriction to EIT p/f (complete EPG data can be transmitted via IP). EIT schedule is optional
13	Synchronization of interactive content and broadcasting services must be possible	1) Polling is possible 2) AJAX according to CEA-2014-A / chap. 5.5.2 3) DSM-CC stream events (DVB BlueBook A137)
14	Individual programming of PVRs by customers should be possible via trusted applications	HbbTV Annex A1: PVR API only for "trusted applications" (triggered by manufacturer or broadcaster) – HbbTV chap. 10.1.2: applications could read signs only from applications of the same domain. Manufacturer can create further dialogs (10.2.3.3)
15	Transmission of still pictures must be possible using state of the art encoding GIF, JPEG, PNG	(CEA-2014-A / chap. 5.4)

No.	Commercial Requirement	Realization in HbbTV Specification
16	<p>Streaming formats and protocols must comply to the state of the art</p> <ul style="list-style-type: none"> - unauthorized download of streamed content shall not be possible 	<ul style="list-style-type: none"> - HbbTV profile (Minimum) protocols: http (https), RTSP container: MPEG2-TS/MP4 encoding: H.264, HE-AAC - a full DRM system can be integrated (optionally)
17	<p>There must be a defined common set of input keys for application control (red button, colour buttons, number buttons 0-9, P+, P-)</p>	<p>basis: CEA-2014-A / chap. 5.4.1 details: HbbTV chap. 10.2.2</p>
18	<p>Entry of short text (words) into HTML-pages must be possible</p>	<p>HbbTV profile mandates manufacturer specific solution</p>
19	<p>It shall be possible for EPG-applications (bound or unbound) to tune to a service selected by the customer. Furthermore it shall be possible for an EPG-application (bound or unbound) with the permission of the content provider to present a preview of a service as a downscaled live video at any time, without termination of the EPG application</p>	<p>HbbTV-Standard: only if the broadcaster allows the EPG-Application</p>
20	<p>Applications must be able to tune to a service or select a (VoD) event delivered via both the broadcasting transmission path (DVB) or the Ethernet path (IP). This shall not be restricted to services provided by the channel list (tuning by frequency), but also cover e.g. VoD services via DVB or IP</p>	<p>Streaming video via IP is specified in section 7.3. of the HbbTV specification plus the referenced standards. Section 6.2.2.2 of the HbbTV spec. clarifies that tuning can also be done to VoD channels which have no SDT entry.</p>
21	<p>Applications (bound or unbound) shall be able to access to DSM-CC-carousel data. This would allow especially also applications for CPEs without or not yet activated return channel capabilities.</p>	<p>Section 8.2.2 of the HbbTV specification states that for accessing the content of a DSM-CC carousel file, the XMLHttpRequest object can be used.</p>

Content Guidelines

Hybrid devices and the associated changes in use of media provide a whole range of challenges for the sector. Hybrid reception devices have the potential of triggering long-term changes in the user habits of TV viewers, who are turning more and more into active media users and are in a position of compiling their media intake from various sources. Players from the traditional broadcast sector find themselves facing competition from the “Web.”

The interplay of media from various distribution channels on a single TV screen has not yet been resolved. The regulations in force to this day such as the European Audiovisual Directive, implemented into German law as the 13. Rundfunkänderungsstaatsvertrag (“13th Amendment to the Interstate Broadcast Treaty”) differentiate between linear services on one hand and non-linear services on the other, with different degrees of regulation for each. In view of the new technological possibilities of smart TV, however, it remains unclear, which rules apply to the interaction between linear broadcasting and online services. The new generation of TVs also raises new questions in the areas of copyright and the protection of minors.

For several years, the German TV Platform and its “Smart TV” working group have been hosting discussions between public and commercial TV broadcasters and the consumer electronics industry, where the networks’ demands on hybrid consumer devices in general and HbbTV devices in particular were discussed, with a focus on audiovisual content. The aim of the discussions was to align the supply-chain partners’ visions and expectations and to create the best possible framework for the introduction of services and devices. These discussions have honed the market players’ sensitivity towards and understanding for each other. Thus far, the mediation of the TV Platform had a considerable effect on the positive development of the market.

At this point in time, it can be said that the widest consensus currently possible has been reached. The market partners’ divergent ideas especially on scaling, dissolve, and overlay are well-known, and it is now up to the various companies to draw their conclusions. The basis will be three different documents that were contributed by and discussed at the German TV Platform over the past three years:

- discussion paper of the industry on the 2010 VPRT requirements
- ARD and ZDF’s demands on HbbTV user devices as of August 2012
- comments of ZVEI on the demands of ARD and ZDF as of July 2012 (in reaction to the state of the discussions by mid-year)

The VPRT supports the guidelines introduced by ARD and ZDF as specifications shared by all content providers.

It can be expected that discussions on content handling for smart TV will continue on various bilateral levels. The German TV Platform will follow this development on behalf of its members and report on it. If necessary or expedient, the “Smart TV” working group will revisit the subject and deal with it in greater depth.

Workshop of the German TV Platform: “From Smartphone to Smart TV: Apps Conquer TV”

Workshop of the German TV Platform on hybrid TV and apps (1)

Workshop networking: Jürgen Sewczyk, Board Member of the German TV Platform and Head of the “Smart TV” working group, talking to attendees in Potsdam (2)



Carine Chardon, Executive Secretary of the German TV Platform, welcomes Uwe Welz, Director of the ARD Payout Center (3)

The German TV Platform with its dedicated working group had long foreseen the development from hybrid TV to smart TV and made it the topic of an event. At the “Smartphone to Smart TV: Apps Conquer TV” workshop on 6 April 2011 in the “media city” of Potsdam-Babelsberg, over 120 experts discussed in ten lectures and panel discussions how smart TV can add real value and provide a new television experience to viewers. The unanimous opinion was that, in addition to attractive content and services, a user-friendly navigation was essential. Uwe Welz, director of the ARD Payout Center, described rules how a combination of linear and non-linear



tablet computers. Dr. Stefan Arbanowski of Fraunhofer FOKUS gave an overview of the introduction of the Web programming language, HTML 5, and the related opportunities for the CE industry and the TV sector, including the option of cloud-based apps. Volker Blume, Philips Consumer Lifestyle, presented the various possibilities of smart TVs. Along with a comprehensive media portal with access to content offers from the Internet and digital teletext from the TV broadcasters, the devices offer an advanced interactive program utilizing the red key on the remote control. As remote control for the smart TV, Volker Blume envisions the use of both smartphone and tablet computer.

Carsten Urbanski of Ping 24/7 explained how viewers will soon be able to buy directly via a smart TV’s remote control. According to Urbanski’s forecast, home shopping

television in the fashion of HbbTV could be organized. This required continued arrangements among all market players. Rike Brecht from the Illmenau University of Technology called for uniform operational concepts across all devices and services. With reference to the current different navigation concepts of the major TV networks, Brecht explained that for the use of video libraries and digital teletext, improvements were required.

Matthias Greve of VideoWeb illustrated how hybrid flat-panel TVs could be turned into multimedia terminals and gave practical tips for HbbTV implementation in interactive devices. Professor Claus Sattler, managing director of Goldmedia Innovation, does not see the development of consumer electronics stopping short at the TV screen. Instead, smart TVs would be linked seamlessly with mobile devices such as smartphones and

ping will gain a new meaning with the connection between TV and Internet. This required easy solutions for secure payment systems on smart TVs. How well HbbTV is also suitable for B2B solutions was shown by Matthias Schwankl of Eutelsat Kabelkiosk, using Kabelkiosk Interactive as a white-label portal for cable network providers. Lars Friedrichs of SevenOne Intermedia outlined new advertising and marketing options for commercial providers in a networked TV environment and announced new HbbTV applications for ProSiebenSat.1.

3.4

Symposium of the German TV Platform on Second Screens: Perspectives on Smart TV and Social TV

The trend towards a “second screen” and thus the prospect of smart TV in combination with other consumer devices was a central theme of six specialist lectures and a panel discussion at the 21st Symposium of the German TV Platform on 24 May 2012. Although the simultaneous use of smartphones, tablet or laptop computers alongside the stationary TV may distract viewers, the smart TV screen will not fall behind as a result quite the contrary. That was the conclusion of the event in the Rhein-Main-Hallen in Wiesbaden with over 200 participants. Intelligent networking and synchronization of the devices means that TV networks can benefit from multi-

experimented in the first season of *The Voice of Germany* with social TV apps. These will be expanded due to the overwhelming viewer response. But he emphasized that money also needed to be made. Strubel added that the advertising industry is already interested in the new forms of usage, but that quantification issues still needed to be worked on.

Dr. Marc Mogalle of Zapitano showed that second screen services also provide opportunities for new companies. The start-up company sees itself as a social-TV platform and wants to modernize television by turning it into “permanent public viewing.” The vision



Impressions from the German TV Platform's symposium on second screens (left to right):
Guido Bülow, SWR
Stephan Strubel, ProSiebenSat.1
Dr. Marc Mogalle, Zapitano
Oliver Lewis, Sky

screen applications. For the viewers, the second screen offers a clear benefit through additional information, convenient interaction, and social TV.

Guido Bülow of Südwestrundfunk (SWR) said: “Viewers like to interact with the television program and participate in a community experience.” The online expert gave a comprehensive overview of worldwide apps and platforms for second-screen applications. With the use of such apps, TV broadcasters can already actively involve their viewers, as demonstrated by first experiences with “Tatort+” as an extension of the popular crime drama into the Web.

Stephen Strubel of ProSiebenSat.1 regards the use of interactive applications as an important strategy for building viewer loyalty towards specific TV network. ProSieben already

of TV viewers as members of a community is at the heart of Zapitano's strategy: a community connected by the TV medium. Dr. Mogalle said that second screens are not a threat, but that they breathe new life into the smart first screen.

Oliver Lewis showed how much multi-screen solutions were already in demand by using the example of Sky+ and SkyGo, which permit the pay-TV subscriber to enjoy their favorite program on any screen of their choice. Particularly popular is the use of Sky content on the iPad. Social features that have recently been introduced allow more interaction on Skyboth with the program and with the community.

Dr. Peter Baum of Technicolor explained which available technology allowed the synchronization of first and second screens. He

explained the methods of audio watermarking and audio fingerprinting, which both require a matching of data streams. Baum also sees a benefit of second screen applications in the personalization of services.

Dr. André Schneider of Samsung showed how wide the fields of application for second screens are: The smart screens can be connected to browse content, control content, or use them on the go. For the “allshare” offer, user-generated content in the cloud is available anywhere and could be transferred to the neighbors’ TV screen, for example, via second screen. Also, the networking options of the devices are comprehensive: tablet computers, smartphones, and cameras are connected to flat-panel displays and Blu-ray players/recorders. Multifunctional applications also play a central role, such as the “smart view” app by Samsung.



Insights at the German TV Platform’s symposium on second screens by (left to right):
Dr. Peter Baum, Technicolor
Dr. André Schneider, Samsung
Gerhard Schaas, Loewe

In the concluding panel discussion chaired by Prof. Ulrich Reimers of the Technical University of Brunswick, the question whether the viewer “still actually watches the TV proper” was clearly affirmed. Dr. Andreas Bereczky (ZDF) and André Prah (RTL Deutschland media group) emphasized that second screens owe their attraction to the content displayed on the first screen. However, the inclusion of social media into the concepts of the program providers had become imperative. In the opinion of the experts, the non-linear use of moving-picture content is also becoming more important. Gert von Manteuffel (German Telekom) describes the development that is currently taking place as “emancipating television from the television set.” Interoperability based on standardized procedures for the connection of first and second screen is the crucial factor in the supply chain, according to Gerhard Schaas. The chairman of the German TV Platform sees this as an important challenge for companies over the coming months and years.

HTML5 expands Smart TV and HbbTV

An important role for the future development of Smart TV and HbbTV falls to HTML5 as a new, emerging standard. HTML5 is not yet an official standard, however it is already widely used in some areas, e.g. in developing Web apps, which are Websites in an app look with touch functionality. They are able to run in the browser across all systems on virtually all operating systems. For providers and developers, they thus appear to be a bridge and an efficient alternative to native apps, which would have to be programmed individually for iPhone, iPad, Android, and other operating systems.

Essential HTML5 procedures like WebSockets, Canvas, WebStorage and Application Cache enable intelligent apps with completely new user interfaces that work well on the smart-TV screen and outsource CPU-intensive or time-consuming tasks into the cloud.

An example of this are the projects of the CELLULAR agency, specifically the networking of third-party apps with smart TVs. At the same time, the desire of the HbbTV consortium to integrate HTML5 into future versions of the HbbTV standard is a logical next step that shows how important this key technology is for multi-device apps.

With hybrid TV, conditions have changed in comparison to personal, laptop, or tablet computers. A key aspect, for instance, is screen size. In the case of computers, it is comparatively small, while TVs use screens that are as large as possible. This is related, of course, to the typical use of these devices. While computers are primarily intended for a single user and the distance between viewer and screen is relatively small, TVs are designed as consumer electronics (CE) entertainment devices for multiple viewers, and the distance to the screen is correspondingly large. There is also a substantial difference in operation. On the one hand, there are the keyboard and mouse mainly used with computers, on the other hand the remote control for TVs. Since IFA 2013, however, keyboards on TV remotes, pointers, gesture and voice controls have entered the field. For faster navigation, newer remote controls have integrated small touchpads, which are familiar to users from laptop computers.

Nevertheless, this raises the question how Internet use via TV should be designed in order to achieve sufficient acceptance among users. Apart from a presentation during a German TV Platform's workshop, representatives of the Ilmenau University of Technology have given lectures on the topic at several meetings of the German TV Platform's "Hybrid Devices" (now "Smart TV") working group. The following comments are based on these contributions.

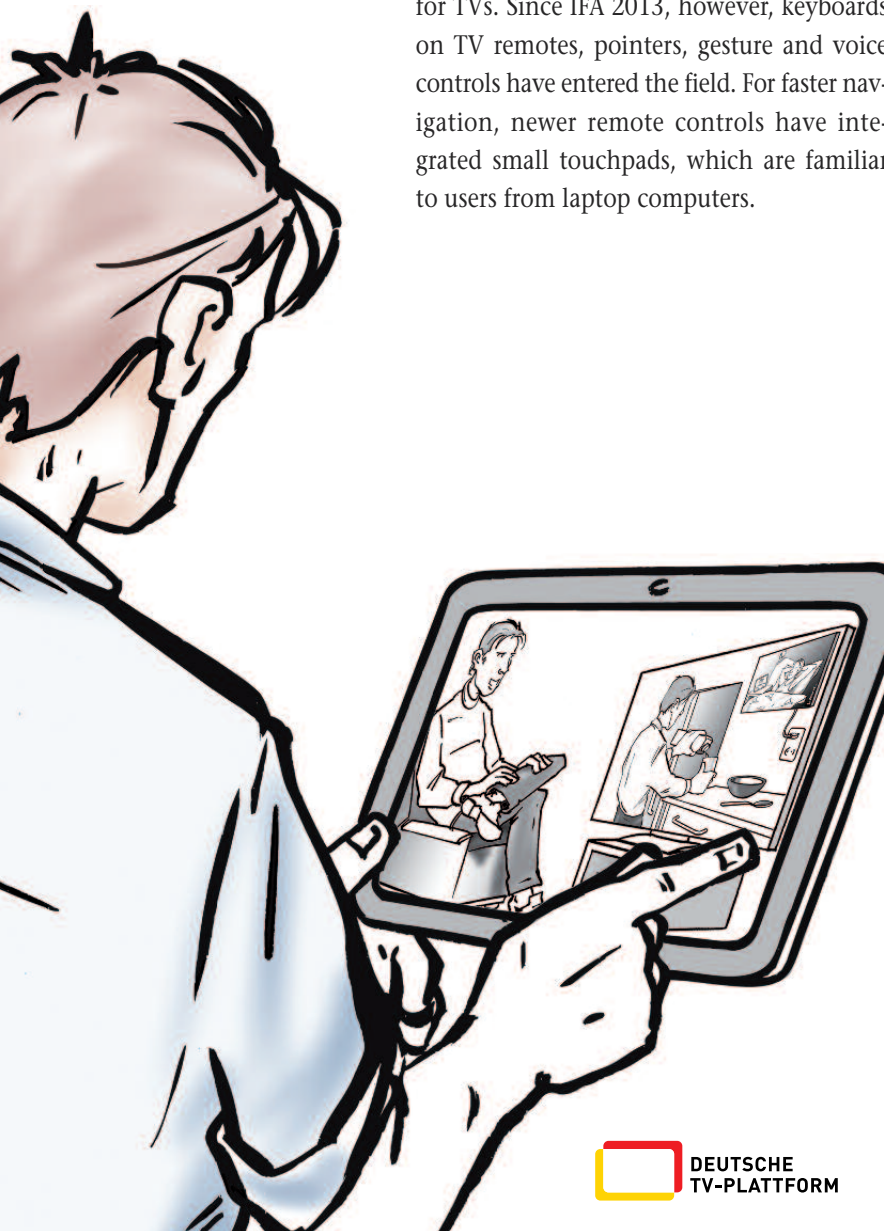
The definition of the term usability can be derived from the DIN EN ISO 9241-11 standard, "Ergonomic requirements for office work with visual display terminals (VDTs), Part 11 Guidance on usability" for the following definition: "Extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use."

The following guidance criteria must be met:

- effective solution of the tasks to be achieved
- efficient use of the system
- user satisfaction

In principle, users view hybrid TV in positive terms, since the simultaneous use of the Internet parallel to watching TV facilitates access to more content. This includes, for example, the video libraries now available on the TV screen, the more diverse teletext but also the large number of applications which can be accessed directly by clicking on an icon rather than by entering an URL. Either way, this involves the effective adaptation of visual content to the large television displays. Another advantage is seen in the fact that all the information is current, due to the Internet connection.

Cover of the German TV Platform's
„TV in der Zukunft“
("TV in the Future") brochure



The experience, however, will only be enjoyed by users under optimal usability conditions. Here, user interface and processes play a major role. It should be noted that with hybrid TV, only the remote control is available. It provides fewer features for Internet use than the keyboard or mouse with a computer.

Well-structured navigation in the portal of a smart TV manufactured by TP Vision/Philips



A very important requirement is in fact that the user does not want to lose reference to the current program. Therefore any action must always offer a quick return path to the previously visited content.

Rike Brecht of the Ilmenau University of Technology emphasized the fact that, apart from the fundamental requirements, the specific tasks of the user must always be considered. The core duties of an HbbTV offering include:

- switching the HbbTV package on and off
- return to the home page
- navigate within the package
- access teletext
- parallel TV viewing
- personalization
- change settings
- using help

A variety of content is usually displayed in the form of menus, and it is therefore necessary to support fast access to information through transparent navigation. Only a few individual steps should be required. Users must at all times have clear navigation options at their disposal to show them how they can return to the home page of the hybrid-TV package, and this should be possible in a single step.

The teletext now available on hybrid TV is substantially more powerful than the previous version. For the user however, no adaptation in operating it should be required.

Especially in case of program-related applications, users are often interested in watching these at the same time as a program, which is usually referred to as “parallel viewing.” In order to do so, there should be various options. One would be to display the television picture in the background, another the split-screen display of application and program. Another popular concept is to display the television picture in small format in a corner of the screen. Switching back to the television program in full format must in all cases be possible in a single step.

The usage concepts must be based on the following keys on the remote:

- number keys (0 through 9)
- arrow (cursor) keys
- OK/enter key
- color keys (red, green, yellow, blue)

User expectations must not be overlooked, and usage should be designed to be equally simple for children and senior citizens. This includes particularly clearly visible displays on system status and actions taken. Each user action must thus lead to a clear feedback. Users would also like to have their customary passive “lean-back position” preserved and not be forced into an active “lean-forward position” for the Internet. In the case of hybrid TV, the various usage options of television devices should be also taken into account. Thus there would have to be a distinction between individual television use, a cozy TV night in a small circle, the broadcast of a sports event with more viewers, and other scenarios.

Personalization means nothing else than the possibility for all users to tag applications and/or programs with individual identifiers to facilitate targeted access. This includes bookmarks, favorite lists, and reminders.

When settings have to be changed or the help function is used, it is absolutely vital that necessary instructions for the user are unambiguous and clear.

In all hybrid-TV applications, special attention must be given to the legibility of text on the display. Font size, in particular, plays an important role for the typical viewing distance of 2.5 meters and more to the television screen. In case of computers, considerably more text can be better displayed on the screen because of the substantially smaller viewing distance.

Adapting to the situation of hybrid TV leads to the following requirements:

- use an appropriately sized font
- avoid long copy and subdivide wherever possible
- reduce the horizontal extension of lines and separate into text blocks
- design text blocks in a way that they can be accessed individually
- avoid scrolling

These conditions for the layout on the screen correspond to the operational features offered by remote control with hybrid television. Observing these criteria will substantially affect user acceptance. This raises the question of how the requirements listed are satisfied in practice, and in this respect, there are still considerable deficits because content is particularly heterogeneous and the structure of user interfaces is quite diverse. This considerably affects user satisfaction and also puts high demands on future standardization in this sector.

For the above reasons, there is a continuing need for action on the harmonization of user interfaces. This can be achieved by the following steps:

- avoid long navigation strings
- ensure that returning to the home or previous page is possible in a single step
- adapt the display size to the TV screen size
- display each navigation option in a clear manner
- ensure display of system status and user actions

First tests and usability studies provide interesting indications including one study commissioned by the German TV Platform from the Ilmenau University of Technology (July/August 2011). The study, which focused on the usability of HbbTV “red button” applications, was performed at the Institute for Media Technology by a team of scientists under the leadership of Professor Heidi Krömker. The objective was to identify the strengths and weaknesses of HbbTV “red button” offers, in order to map out the usability optimization potential and provide style guide suggestions.

Samsung demonstrates their range of smart TVs, which are subdivided into various areas of application for enhanced user-friendliness.



As seen, the inconsistency in the user-interface concepts of various TV broadcasters (e.g. color key layout), the slow response time of several HbbTV options with sometimes poorly visible navigation confirmation and missing personalization features hamper user-friendliness. "However, since usability apart from the actual services and information strongly affects the success and acceptance of HbbTV options, ergonomic guidelines should be observed in design, as well as user-oriented development," according to the style guide, "Usability of HbbTV Red Button Offerings" by the Ilmenau University of Technology.

At the same time, it contains specific suggestions on navigation, displaying information, speed of response, media control, help and personalization features. The style guide proposes generic usability guidelines as recommendations for developers and designers of HbbTV offerings. Their intuitive operation has substantial influence on whether viewers take advantage of "red button" options, according to the Ilmenau researchers and

others. A usability study commissioned by ARD in early 2011 indicated that HbbTV services "at their current state of development are already very positively accepted by potential users and seen as clear added value to existing digital television." Increased acceptance could be achieved by improved usability and particularly by harmonizing the user interface concepts of the various TV broadcasters.

In order to analyze the current development of smart TV and issue specific recommendations for the user-friendly design of HbbTV applications, the German TV Platform has commissioned another study in late 2013. For this study, the University of Applied Sciences in Mainz will test about 15 select HbbTV offers by German TV broadcasters on five common smart TV sets with various test subjects and evaluate usability. Early advance tests were conducted during the Olympic Winter Games in February 2014, but the main study will take place in spring/summer, and results are scheduled to be published in early September at IFA 2014.



DEUTSCHE
TV-PLATTFORM

MICHAEL STRASZYL

Illustration of typical usage scenarios from the German TV Platform's „TV in der Zukunft“ (“TV in the Future”) brochure

Representing the hosts:
Carine Chardon (German TV Platform), Dr. Jürgen Brautmeier (die medienanstalten), Dr. Tobias Schmid (VPRT)



On 4 November 2014, the Verband Privater Rundfunk und Telemedien (Association of Commercial Broadcasters and Tele-Media, VPRT), the German state media authorities, and the German TV Platform will present recent developments in the area of user guidance and control of smart TVs at a joint event entitled „SuchenFindenNavigieren” (“Search-FindNavigate”). “The devices’ new technical options also offer new potential for content, and we all have to adapt: regulatory bodies, content providers, hardware manufacturers, and users. We are only at the threshold of a potentially revolutionary development,” declared Dr. Jürgen Brautmeier, President of the State Media Authorities’ Commission for Licensing and Supervision (ZAK). “Convergence is an extremely exciting and challenging opportunity for broadcasters. We intend to explain these complex processes, because the gain in diversity does, of course, also raise questions about how content can be located,” added Dr. Tobias Schmid, Chairman of VPRT. “As an industry forum that transcends individual interests, we are happy to contribute, with this event, to an open dialog on the opportunities and challenges of changing media usage. It is the common goal of all market players to create added value for the user,” Carine Chardon, Executive Secretary of the German TV Platform, emphasized in front of approximately 200 attendees.

At the beginning of the lectures, Dr. Kristian Kunow, Advisor on Platform Regulation and Digital Access (die medienanstalten), demonstrated the market’s basic economic parameters for smart-TV portals. Although the current variety of available offers was quite gratifying, there was no guarantee that it would endure as the market developed. A comparison with similarly structured marketssmart-phones, for example showed that it might eventually concentrate on just a handful of user interfaces and app stores. Another key factor was whether users were committed to a certain method of accessing content, or whether they were free to choose and would do so. The figures in the state media author-

ities’ Digitalization Report showed a tendency of German smart-TV users to access video content directly via the device and less frequently via secondary devices, such as personal computer, laptop or tablet computer.

Next, Michael Wörmann, Managing Director of Facit Digital, presented the results of an ethnographic study on smart-TV usage, which documented behavior patterns in Internet-connected TV households. It showed that linear television programming still played an amazingly central role in the subjects’ daily lives. The media authorities’ study, „Wie smart ist Konvergenz?” (“How Smart Is Convergence?”), which was first presented at this event, also showed that the distribution channel broadcast or Internet was barely relevant from the user’s point of view: What counts is content. Moreover, the study conducted by Facit Digital in Munich showed that the households mainly used their smart TVs to access video on demand. While EPGs and listings are a key factor in accessing broadcast content, the pre-installed layout of the manufacturers’ portals influences the choice of Internet-based content. It was one of the key results of the study that users will rarely add extra apps to those pre-installed on their devices.

In a practical demonstration hosted by Sebastian Artymiak (VPRT), Head of the “User Guidance” project group within the German TV Platform’s “Devices and Connectivity” working group, new features that will revolutionize content search, access, and retrieval while watching TV such as program listings, gesture and voice control, or recommendation management were shown on smart TVs from various manufacturers. Online features were demonstrated via browsers and “red button” functions that facilitate access to the broadcasters’ HbbTV content. In addition to installing and sorting apps on the device portals, it was demonstrated how online streams can be integrated into the existing channel list, thus making broadcast and Internet content indistinguishable to the viewer.



Panel discussion on the regulation of smart TV, hosted by Dr. Christian Stöcker (Spiegel online). Participants: Gareth Barr (Ofcom), Dr. Hans Hege (mabb), Dr. Matthias Knothe (Office of the Prime Minister of Schleswig-Holstein), Dr. Tobias Schmid (VPRT), Dr. André Schneider (ZVEI), Stephan Zech (Axel Springer).

In the future, recommendations for TV and video usage will play an ever-growing role. Recommendation systems based on viewer habits and personal preferences were demonstrated. Finally, various features for the integration of a “second screen” (smartphone, tablet computer, etc.) were demonstrated, including the transfer of TV content from the smart TV to a smartphone.

In a keynote speech, Gareth Barr, Head of Public Service at the U.K. Office of Communications (Ofcom), outlined how Britain deals with the challenges of connected TV and new platforms. He called for the development of ways and means to prevent discrimination in the findability of content and to safeguard equal opportunity. The question how this might be achieved in Germany was the main topic of the subsequent panel discussion. The panelists agreed that the technological development offered a wide range of opportunities for all players. A heated debate followed on the necessity, scope, and implementation of rules for smart TVs and their content.



Top: Sebastian Artymiak (VPRT) moderated the appliance demonstrations; bottom: Gareth Barr from the British Office of Communications (Ofcom)

3.7

Consumer Protection with Smart TVs and HbbTV

The media have repeatedly reported on security loopholes in interactive television: computer viruses that might damage hardware, Trojan horses that may spy on passwords or the users’ banking information, and even cyberattacks that could instrumentalize hybrid TV and STBs for large-scale network attacks. Another cause of concern is the fact that viewing habits might be transmitted, recorded, and exploited, for instance, through the use of cookies. The German TV Platform is concerned with both aspects of consumer protection, which will be examined in the following sections, in order to contribute to an objective debate by naming and explaining the facts.

1. Security

The manufacturers of consumer electronics (CE) are taking the issue of security i.e. the shielding of devices against hackers and viruses very seriously. First of all, the intrinsic structure of smart TVs already provides a high level of security: From a technological point of view, these devices are, by and large, closed and thus secure systems. This makes the installation of malware or the clandestine, unauthorized retrieval of data far more difficult for hackers. In addition, security mechanisms, such as data encryption within the device, are constantly being developed and updated. Firmware updates will allow users to reliably close even those security gaps that might be discovered after delivery to the consumer.

Although smart TVs are hooked up to the Internet via LAN or WLAN (WiFi), they access the Web mainly in two ways: either via apps supplied through the hardware manufacturers' portals, or via HbbTV (Hybrid broadcast broadband TV) services that are linked to directly from the broadcasters TV programs. In both cases, the service providers or operators ensure the best possible protection for the receiving devices.

Smart-TV Portals and TV Apps

In the case of app services supplied via manufacturer portals, the security is provided by the fact that the hardware manufacturer or any third party he has commissioned will check all applications before offering them to consumers on the portal. In many of the devices, the apps are not downloaded directly to the device, but a connection is established to the manufacturer's secure server instead. The portal provider's preliminary check will include the exclusion of viral infections and security gaps, and it will be applied in particular to apps that were created by a third party using an open-source software development kit (SDK).

The HbbTV Standard and Pertinent Services

The same applies to the TV network's HbbTV applications and to the HbbTV offers provided by infrastructure operators for satellite, cable, or terrestrial broadcast. HbbTV, an international ETSI standard, is based on established Web standards and does allow the setting of cookies. However, it does not provide any interfaces that would allow Websites to install scripts, plug-ins, or other executable files. In other words: Apart from setting cookies, apps have no access to the system under the HbbTV standard. It is thus impossible to smuggle spyware, e.g. for recording viewer habits, into the TV set.

Free Internet Access via a TV-integrated Browser

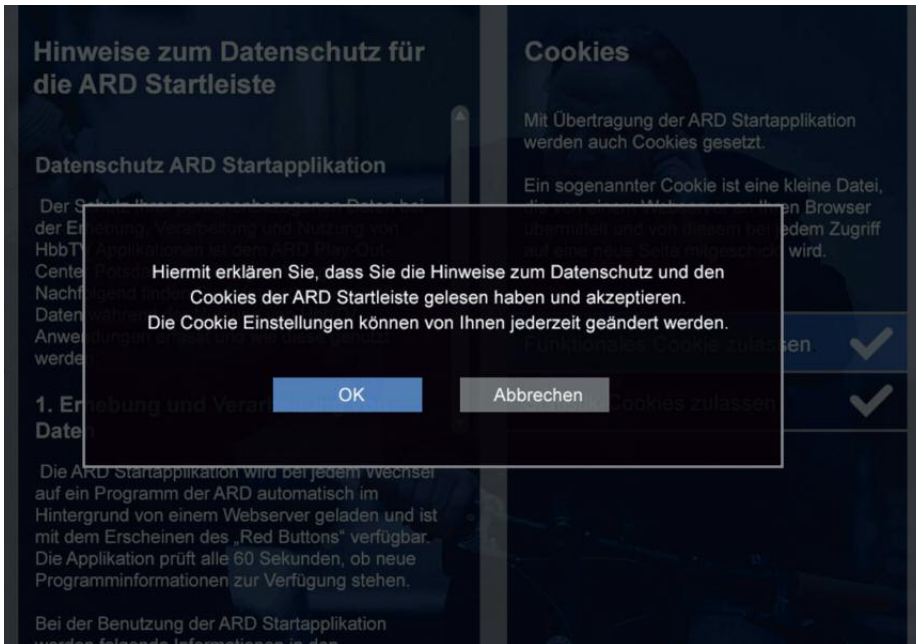
There are also smart TVs that allow users to freely enter an URL as free text via an integrated browser. In these cases, the manufacturer minimizes potential risks through browser settings for example by blocking plug-ins that the user cannot change or manipulate.

Connections within the Home Network and with Other Devices

In addition to app portals, HbbTV services and the free-text input of URLs, many smart TVs offer a variety of connectivity options, e.g. with IT, telecommunications or other equipment in the home network, or with game consoles. For these cases, smart-TV manufacturers have also taken various precautions to prevent damage to the TV set caused by the transfer of malware as long as viewers keep using the device manufacturer's original software.

As a rule of thumb, users should handle all devices connected to the TV panel responsibly. This applies, in particular, to the so-called "second screens" (smartphones, tablet computers, etc.) and the home network, which should be protected using passwords and encryption technology for the router. The TV's firmware, on the other hand, should be updated frequently from the manufacturer's server and always reflect the very latest version available.





Technically, a viewer accesses the Internet when using HbbTV services or a TV app. Similar to using equivalent services on a computer, certain information has to be acquired (e.g. the TV's IP address) in order, for example, to stream a program from a media library. Only information that is technically required will be collected. At the same time, both broadcasters and portal providers are well aware of the sensitive nature of this issue and try to keep their users informed. Contrary to certain media reports, no personal data are collected but only data pertaining to the device. Moreover, a distinction has to be made between various contexts in which the information is acquired.

2. Privacy

The handling of user data in connection with smart TVs and HbbTV services is an important subject, since the viewers' trust is key to their acceptance and thus the success of smart TV and HbbTV services. For this reason, the German TV Platform has dealt at great length with the handling of user and usage data and their protection against misuse.

Television ratings are and have been determined in Germany by the Television Research Consortium (Arbeitsgemeinschaft Fernsehforschung, AGF) that analyzes TV usage by means of special viewer panels. Unlike when using for instance a personal computer, the average viewer in front of a TV watching linear programming is anonymous. This situation changes, however, as soon as he or she uses HbbTV-capable smart TVs at least when using the additional options the device offers.

Using Smart-TV Portals and/or Smart-TV Apps

In order to be able viewers to make full use of the device-based services offered by a smart TV, it is necessary for manufacturers to acquire certain device information. This applies, for example, to all personalized services, such as viewing suggestions. For the viewer's maximum convenience, certain information is also acquired via cookies, e.g. the access data of frequently used services, so the viewer does not have to enter them again each time he or she uses the service.

In all of these cases, data acquisition takes place within the framework of currently applicable privacy laws and regulations, which include the requirement for users to give their advance consent to the acquisition of their data. During set-up or first use of device-based Internet services, such as the smart-TV portal, the user will thus receive a statement of the manufacturer's privacy policy, in which the information acquired via the portal has to be specified. Only after the user has given his or her express consent will this information actually be acquired and the services can be used. In this manner, manufacturers provide the greatest possible transparency in collecting user data.

Using HbbTV Services

In order to signal the availability of supplemental features to viewers by inserting a “red button” into the linear program, the transmission of the smart TV’s IP address is a technical necessity. Some TV broadcasters anonymously count devices and red-button usage, always within the boundaries of applicable German privacy laws and regulations.

Cookies, which collect usage information—such as browser ID, IP address, or hardware information—are familiar to computer users. Cookies like these can also be employed by service providers for smart TV; however, they do not record user names, mailing addresses, or other personal data, nor do they relay such information to third parties. As on a computer, cookies are used, for example, to anonymously register the frequency of use for certain services or to customize content, such as barrier-free services, to the user. The precise manner in which cookies are used is usually described in the content provider’s privacy policy and/or terms and conditions. The major public and commercial broadcasters allow consumers to switch the usage of cookies on or off.

From the outset, the German TV Platform’s “Smart TV” working group has dealt with the issues of security and privacy in hybrid television. Since January 2014, members—which include representatives of the state media authorities, the Federal Network Agency, and the offices of the German states’ prime ministers—have been discussing with increased intensity the specifics of data protection as well as security issues concerning consumer hardware, platform operators, and content providers.

Apart from exchanging information, they have consulted corporate and institutional privacy experts and in the interests of all market players taken a critical look at the situation. The goal is to achieve a consistently high level of privacy for all smart TVs and services in Germany.



3.8 New Focuses of Activity and Open Questions of the Smart TV Working Group

The “Smart TV” (formerly “Hybrid Devices”) working group of the German TV Platform has discussed and answered many questions since 2009. However, other points that have not been settled or new points for discussion continuously arise from the ongoing development process.

Coordinated Consumer Education / Marketing

The term “smart TV” seems to have prevailed over terms such as “hybrid TV” or “connected TV.” The abbreviation “HbbTV” for the standard most commonly used, however, appears mostly in technical publications, while the term “red button” has gained hold in consumer communication. In two initiatives

“Smarter Fernsehen” (“Smarter TV Viewing”) and “Auf ROT geht’s los: Meine Taste für smartes Fernsehen” (“RED means Go: My key to smart TV”), the working group will continue to align the terminology used by all parties concerned, in order to facilitate the marketing of smart TV and HbbTV. The objective is to inform and educate consumers by focusing on the various aspects of smart TV. All these activities are most effective when all market players act in sync, both in terms of timing and content. For this reason, the “Smart TV” working groups will focus on supporting market partners and their marketing activities.

Usability of content

The simple method of accessing and using content and applications is often key to the success of new devices and services. This has become especially evident in the market for smartphones, which has grown exponentially in the last three years. The manufacturers of consumer devices have managed to introduce new device features in a playful manner. This has, in turn, stimulated the development of interesting, diverse applications and services. The German TV Platform believes that smart TVs and interactive services from TV networks and other providers have a similar potential. And so the working group in collaboration with the “User Guidance” project group will intensify its focus on user-friendliness and the intuitive control of HbbTV services and smart TVs, in order to continue contributing to consumer-friendly solutions now and in the future.

OTT and Second Screen

The term Over the Top (OTT) refers to smart TVs accessing online video and audio content. OTT TV is a method that allows the customer to receive Internet content on their television, frequently in a form specially adapted to the medium. Second screens are also often used in this context, especially for social TV. The summaries on these topics in versions 1.0 and 2.0 of the German TV Platform’s White Book as well as the present Market Analysis are intended to reflect preliminary results at this point in time. The working group will continue to observe and analyze the national and international market development here, particularly in terms of the relationship with smart TV and HbbTV services.

Business Models and Consumer Protection

The search for business models for smart TV and HbbTV is still in its initial stages. Commercials, e-commerce and VoD seem to be among the primary moneymakers of the future, yet there are many issues to be resolved in all three areas, such as user-friendly payment methods, coverage quantification, and

types of advertising. There are also issues related to privacy and consumer protection, especially since social media are already incorporated into smart TV (“social TV”). The working group will continue to monitor and analyze these developments and contribute to an exchange of information between all parties.

Smart TV and Regulation

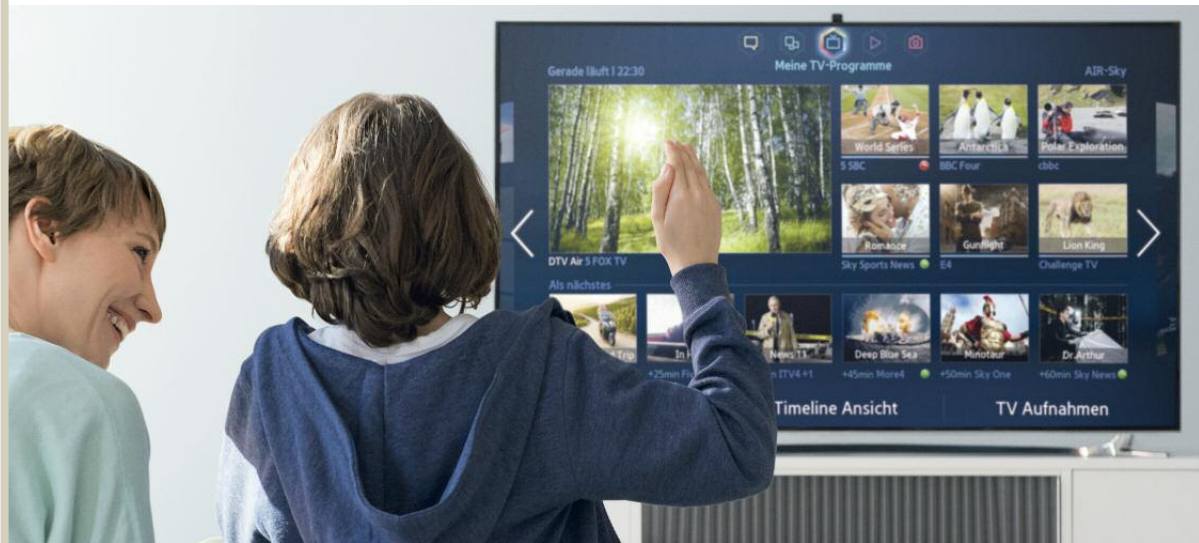
Two services that were previously subject to separate regulations have merged in smart TV devices: TV is subject to broadcast law, Web content is subject to telecommunications law, and other services are not regulated at all. Moreover, some services come pre-installed with the device, and applications may be bundled. In addition, services and apps may be downloaded individually by the smart-TV user, who can install or deinstall or sort services and apps according to individual preferences. In view of the increasing number of options and features that hybrid TVs offer, it is important to discuss the regulatory framework for smart TVs and their content. On this topic, the European Commission has mailed a comprehensive questionnaire to the industry that had to be filled out in 2013. The German TV Platform will participate in the discussion as far as possible, taking the heterogeneity of the membership into account.

DRM and Content Protection

Content protection is becoming more and more complex as the range of consumer devices and contents grows. How will the content be played back over the various platforms, such as TVs, smartphones, or tablet computers? What are the market needs of the consumers, Internet providers, and device manufacturers? What can the various procedures achieve, and what does the market require? How can content protection work with all the devices in the home network? The working group will tackle and discuss these issues.

4.

Market Situation, Audience Acceptance, and Forecast



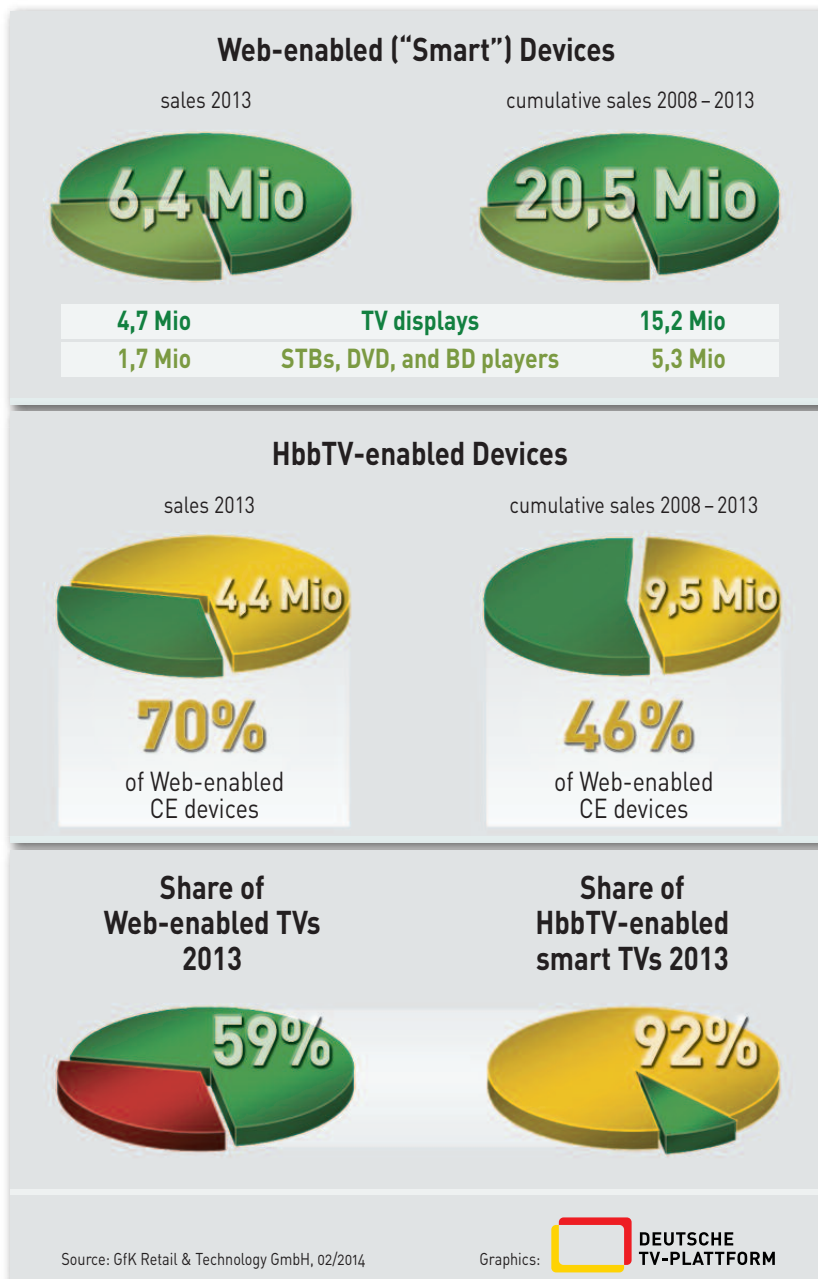
4.1 Appliance Sales and Usage Development

According to GfK Retail & Technology, 20.5 million Web-enabled consumer devices had been sold by the end of 2013 on the German market, including TVs, Blu-ray players, and set-top boxes (STBs). The share of HbbTV-capable smart TVs was 92 percent at that time.

In 2013 alone, 6.4 million consumer appliances were sold which are capable of displaying Web-based content ("smart TV"). In spite of a decrease in the overall number of items sold, the dynamic rise of Web-enabled consumer electronics is virtually unbroken, compared to the previous year (6.5 million).

Again, with 4.7 million items sold, TVs account for the largest share of Web-enabled consumer devices. This corresponds to 59 percent of all TVs sold in 2013, an increase of 9 percentage points in 2012, 50 percent of the TVs sold were Internet-enabled.

A total of 92 percent of all smart TVs sold in 2013 support the HbbTV standard for interactive viewing via a red button on the remote control and are able to display corresponding content. The HbbTV share was first surveyed in 2011, when only about 8 percent of the devices were HbbTV-capable, while the percentage was close to two thirds (89 percent) in 2012. All told, about 9.5 million HbbTV-devices had been sold to German consumers



by the end of 2013, including STBs. 4.4 million were sold in 2013 alone, which corresponds to a share of 70 percent of consumer electronics.

As in the past, not all smart TVs sold are actually being connected to the Internet: A study of the Gesellschaft für Unterhaltungs- und Kommunikationselektronik (gfu) showed in April/May 2013 that nearly 60 percent of the smart TVs in German households are indeed hooked up to the Internet. In summary, it can be said that both the share of Internet-enabled and HbbTV-supporting consumer devices on the German market and their usage are on the rise.

German TV Platform infographics (02/2014) on the Status quo of market penetration in Germany

4.2

Smart TV and Audience Acceptance in Germany and Beyond

“Smart TVs have spread in German households faster than almost any other type of appliance,” the Zentralverband Elektrotechnik und Elektronikindustrie (ZVEI) stated as early as 2012 (Pr-84/2012).

Important information on acceptance and usage of smart TVs and HbbTV by German consumers and viewers is also contained in numerous recent studies.

1. Digitalization Report by the State Media Authorities

The state media authorities’ “Digitalization Report” is based on a survey conducted by TNS Infratest. Under the heading, “Connected TV,” it is pointed out that in the course of 2013, a 40-percent increase in the number of smart TVs connected to the Internet was observed. At the same time, smart TVs only rank third in the list of devices used to access video content on the Internet behind per-

sonal or laptop computers and smartphones, but ahead of tablet computers. Concerning HbbTV, the Report notes a dynamic increase in awareness and usage in Germany. In fact, 54 percent of smart-TV owners know about the “red button” and its purpose, and one quarter frequently or occasionally uses the broadcasters’ extra options via HbbTV.

2. gfu – Gesellschaft für Unterhaltungs- und Kommunikationselektronik Study

According to a representative study commissioned by gfuGesellschaft für Unterhaltungs- und Kommunikationselektronik and conducted by Concentra Marketing Research in April/May 2013 (based on a survey of 1,000 households in Germany and an additional 7,000 in seven other European countries and Turkey), 14 million more than a third (34%) of all German households use a smart TV as their primary TV. Overall, the results of the survey attest to the interest in and acceptance of smart TV on the part of viewers as well as the general trend to connect devices with/to each other, both in German households and in other European countries.

On the other hand, the results also show that, in comparison with other European countries and Turkey, Germany lags somewhat behind

in terms of connectivity. With 34 percent of households using a smart TV as their primary TV, Germany ranks in the middle: In Britain, the rate is only 21 percent, and the Netherlands (26%), Spain (26%), and Italy (28%) also have a lower rate than Germany, while Poland (36%), Turkey (40%), and France (42%) show higher rates of “smart” primary TVs in their households.

In terms of the percentage of smart TVs actually connected to the Internet, Germany, with a rate of 58 percent, also lags behind other European countries and Turkey: The leader in Internet hook-ups is Britain with 86 percent, followed by France (79%), the Netherlands (76%), and Turkey (73%). The other countries surveyed had rates in the mid- to upper 60s percentile range.

One of the conclusions of this study is thus that there continues to be a need for consumer education and information, especially in Germany. For this purpose, ZVEI and the German TV Platform are working together in publishing a variety of brochures such as a “Connected-Devices Shopping Guide” and a “Smart-TV Shopping Advisor” – and flyers on HbbTV and interactive television (both available [in German] on the German TV Platform’s Website).

Reasons for Purchasing a New TV in Other Countries for Comparison

Lowest offer	flat-panel instead of CRT	new TV should be Internet-connected
France 74%	Germany 52%	Turkey 58%
Belgium 74%	Italy 39%	Spain 57%
Netherlands 67%	United Kingdom 37%	United Kingdom 56%
European average 57%	European average 33%	Netherlands 50%
Spain 56%	Belgium 31%	Poland 49%
United Kingdom 49%	Spain 29%	European average 48%
Italy 49%	France 28%	Italy 45%
Turkey 47%	Poland 28%	Belgium 43%
Poland 43%	Netherlands 27%	France 41%
Germany 35%	Turkey 16%	Germany 39%

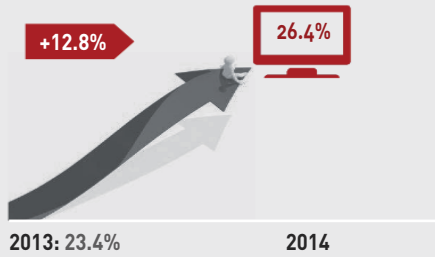
Source: based on a representative study on behalf of gfu – Gesellschaft für Unterhaltungs- und Kommunikationselektronik, conducted in April/May 2013 by Concentra Marketing Research.

TOMORROW FOCUS Media has been studying smart TVs in German households since 2013. Graphics from the study, "Smart TV Effects 2014-I."

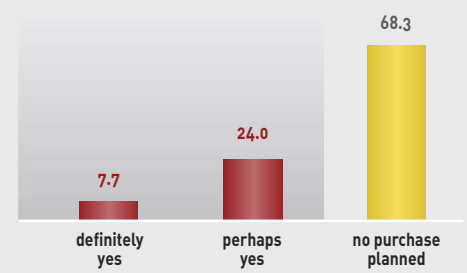
One out of four owns a smart TV

"Is your TV smart?"

Figures in %



"Do you intend to purchase a smart TV within the next 12 months?"



More than one quarter of those surveyed owns a smart TV, and nearly one third of those who don't intend to buy one in the coming year.

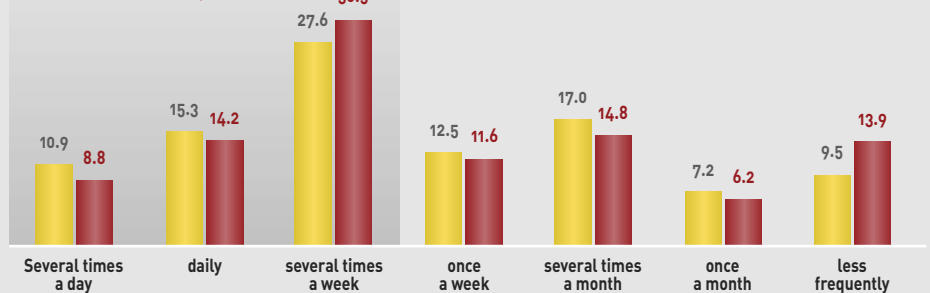
Source: On-site survey in the TFM network; base: n = 5,797 (cases: 5,166 / 3,313); February 2014; in "Smart TV Effects 2014-I"

One out of two goes on line several times a week with his smart TV

"How many times do you access the Internet with your smart TV?"

Figures in %, yellow = 2013, red = 2014

Sum "several times a week" to "several times a day" = 53.5%



Source: On-site survey in the TFM network; base: n = 5,797 (cases: 466); February 2014; in "Smart TV Effects 2014-I"

Smart TVs are not purchased "by chance." Asked whether the "smart" features influenced their decision to purchase a new TV, 25 percent of smart-TV owners replied with a clear "yes." Another 33 percent replied "likely yes." This means that for more than half-nearly 60 percent of German smart-TV owners, the hybrid features played, at least in part, a key role in their purchase decision.

In other European countries and in Turkey, the "smart" attribute proved to be a much stronger buying incentive: "yes" or "likely yes" was the reply of 85 percent of those surveyed in Turkey, 77 percent in Spain, and 76 percent in Britain. In most other countries, the "smart" features also have a stronger appeal than in Germany. Only in France (50%) and Belgium (43%) are they a less relevant factor in making a purchase decision.

Smart-TV owners in Germany who also make active use of their TV will, for the most part, use typical TV features, first and foremost the Electronic Program Guide (EPG) with 30 percent, followed by the broadcasters' media libraries (28%), Facebook (27%), and YouTube (23%). Of all smart-TV owners, 15 percent access charged video-on-demand (VoD) content from online media libraries.

ices like Skype or e-mail, in which communication with others is the primary function. The study also points out that the enthusiasm for and the usage of smart TVs depends heavily on the user's age, as shown by the discrepancies in the connection rate: While two thirds of 16- to 39-year-old owners in Germany hook up their smart TV to the Internet, only half the owners over 60 do so.

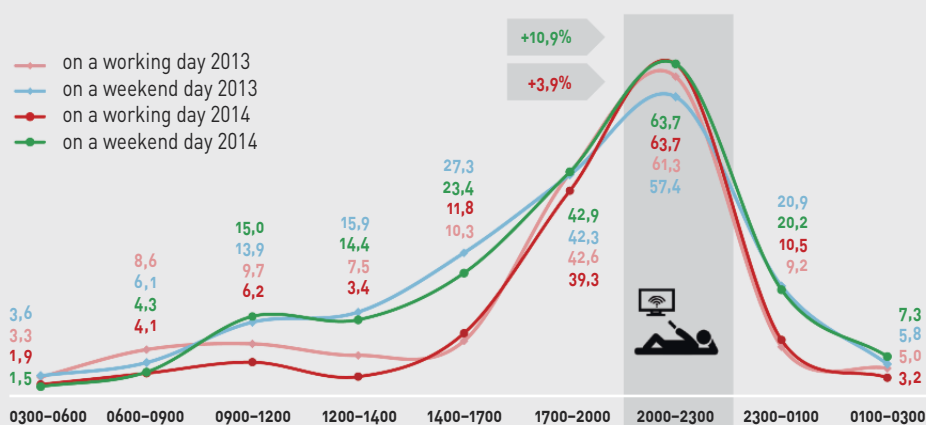
There are discrepancies by age and gender in the usage of smart TVs: While older users make disproportionate use of media libraries, women are more likely than men to use serv-

The effect on their purchase decision is also far more pronounced among younger buyers than among those over 60. And so the relatively modest enthusiasm for smart TV in

Web-surfing via smart TV peaks at prime time

"At which time of the day do you access the Internet on your smart TV?"

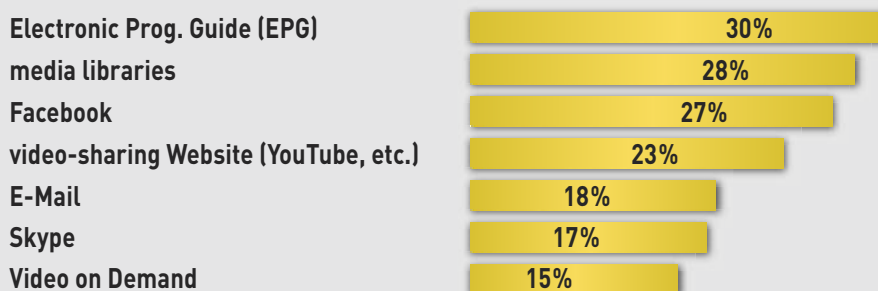
Figures in %



Source: On-site survey in the TFM network; base: n = 5.797 (cases: 466); February 2014

in „Smart TV Effects 2014-I“

Smart TV: Usage Habits in Germany (smart TV owners)



Source: based on a representative study on behalf of gfu – Gesellschaft für Unterhaltungs- und Kommunikationselektronik, conducted in April/May 2013 by Concerta Marketing Research.

Germany, compared to other European countries, may also have a demographic explanation, since the German population has the oldest age average in Europe.

This should be taken as an incentive for trade and industry to “pick up” the older generation and introduce them to the benefits of smart TV. Currently, the previously mentioned joint campaign of trade (BVT) and industry (ZVEI), „Smarter Fernsehen,” is intended to support this effort by demonstrating uses that appeal especially to the older generation.

3. Tomorrow Focus Media Study

According to a February 2014 study by Tomorrow Focus Media (“Smart TV Effects 2014-I”), more than a quarter of those surveyed already own a smart TV, and nearly one third of those who don’t are planning to buy one in the coming year. For this study, 5,797 persons were surveyed, and the focus of the study was the awareness and usage of smart TV. Results were compared to those of the first “Smart TV Effects” study, conducted in 2013.

While only 20.4 percent of those surveyed had actively accessed online options on their smart TV in 2013, the percentage of active Internet users via smart TV had grown to 25.1 in early 2014. One out of two users surveyed accesses the Internet several times a week via their smart TV and uses smart-TV apps. The most frequently used apps are news (60%) and weather (58.5%) apps.

However, many users found Internet access via smart TV inconvenient: 50 percent complained about the TV’s long load time, and nearly 80 percent found it cumbersome to access smart-TV functions via a TV remote control. With regard to the average smart-TV user, the study, in summary, comes to the conclusion that he is typically a male (70.2%) between the ages of 40 and 59 years (47.7%). He is also an early adopter, since he and his friends like to try out new technologies (70.4%). The typical smart-TV user is on line several times a day and accesses the Internet more than the population average from a mobile device, such as his smartphone (66.1%) or tablet computer (44.8%).





The German TV Platform is committed to open standards for digital television technology. The networks, in particular, have repeatedly pointed out the need for a standard in interactive television from the outset. In the German TV Platform's dedicated working group, the development of an HbbTV specification was closely monitored from the beginning. After the international standardization of HbbTV (Hybrid broadcast broadband Television) by the European Telecommunications Standards Institute (ETSI) in June 2010, the potential for market players became much clearer. Even the most recent sales figures surveyed by GfK indicate that the market is headed in the direction of HbbTV. It should be noted here that from the CE manufacturers' point of view, HbbTV represents only one of several features of smart TV, and that specific device portals exist alongside HbbTV without any "cannibalism" taking place.

The following section will thus address the HbbTV standard in some more detail (cf. also chapter 2.3). HbbTV has repeatedly been described as "improved, modern-day teletext" because it does much of what was impossible with the old version of teletext technology:

It is fast and thanks to the Internet connection television becomes interactive. Furthermore, HbbTV offers a wide range of options for content of all types starting from text through a variety of illustration options all the way to high-resolution video. In addition to the added value of more content and new ways of usage, HbbTV brings even more benefits for broadcasters and viewers:

- Many HbbTV-based services are free of charge, with the exception of the purchase cost of an HbbTV receiver.
- Because of its recognition by a European standardization organization, HbbTV is a standardized system with a high probability of international recognition, resulting in a mass market potential that can be leveraged for driving prices down.
- Using HbbTV, a number of value-added services can be developed with a high demand potential as well as modern usability and functionality.
- For the use of HbbTV-based services, connection to an IPTV network is not required. This however applies also to all services offered via hybrid user devices. The drawback is that the quality of service (QoS) cannot be guaranteed (signal stability, uninterrupted real-time transmission etc.).

The bottom line: Smart TVs with HbbTV enable users of traditional television distribution systems (satellite, cable, and terrestrial broadcast (DVB-T)) to enjoy interactive television and offer them a variety of options.



State-of-the-art remote controls with a touchpad also include color keys. The red key provides access to the broadcaster's HbbTV services.

In order to acquaint viewers and customers with the benefits of smart TV and HbbTV, two initiatives were launched in 2013, actively supported by the German TV Platform. On the occasion of IFA 2013, the joint industry initiative of ZVEI (Zentralverband der Elektrotechnik und Elektronikindustrie e.V.) and BVT (Bundesverband der Technik des Einzelhandels e.V.), was launched under the title „Smarter Fernsehen.“ This campaign was backed by twelve companies in the industry and four trade associations with their respective subsidiaries. It was the goal of the campaign to familiarize consumers with the experience of interactive television viewing, since many consumers were not yet familiar with the options available on a smart TV.

The focal point of communication with consumers were practical scenarios for smart-TV usage: accessing the broadcasters' media libraries via the red button on the remote, video on demand, YouTube, social media, Skype, and watching images on a large TV screen. These realistic scenarios were illustrated by cartoon-style moving images and texts that showed real-life applications in an easy-to-understand form. TVs labeled with the „Smarter Fernsehen“ logo are guaranteed to provide Internet access, contain a browser, offer the option to connect to the Internet via WiFi, and have TV apps for numerous bonus features and added content. Participating retailers also adopted the „Smarter Fernsehen“ logo to advertise their expertise in letting customers experience smart TV in the shop, giving them advice, and if requested delivering the TV to their home and connecting it to the Internet.

This and further information can be found on the campaign's Website, www.smarterfernsehen.info, which is also the campaign's communication hub.

To promote the usage of HbbTV in particular, the „Auf ROT geht's los“ („RED means Go“) information campaign was also launched at IFA 2013, a nationwide joint initiative of both public and commercial broadcasters. Under the title, „Auf ROT geht's los! Meine Taste für smartes Fernsehen“ („RED means Go: My key to smart TV“), it is intended to introduce viewers over the next few years to the benefits of HbbTV:

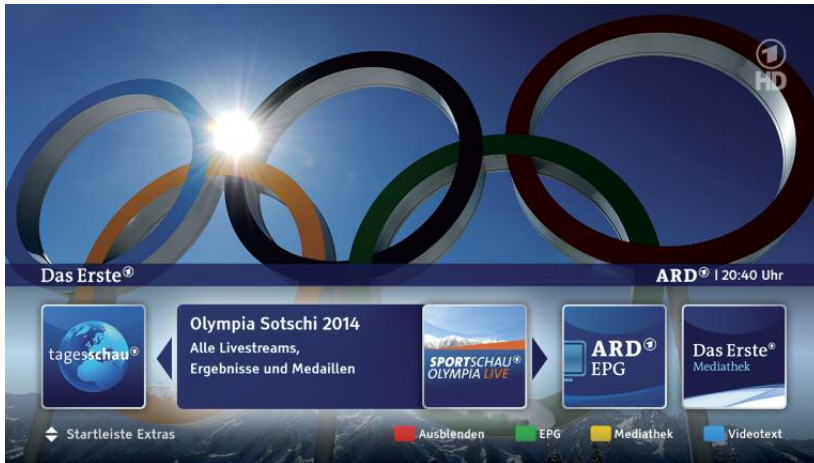
The focal point of the campaign is the red button on the remote control, since it leads viewers straight to the HbbTV content associated with the German TV broadcasters' television programs. It also allows users to retrieve programs independent of scheduling in addition to the linear broadcast. Depending on what a network decides to offer, this might include access to media libraries, VoD, livestreams for special events, customizable teletext, interactive games, voting, shopping offers, etc.

With a variety of information schemes including TV spots, information material, and service offers via teletext and Internet –, the participating networks are bringing the red button's various options and benefits to the attention of their viewers.



Regarding smart TV, trend forecasts can only be made on the basis of market figures to date, as well as assessments from various market players that may be tinted by a subjective view. The following collection does not claim to be exhaustive:

easy access to content, the intuitive use of collateral offers without switching media or devices, the market penetration of smart flat-panel TVs, increasing broadband coverage, and consumer experience with personalized media usage could all be contributing factors to a long-term success on the mass market. Moreover, HbbTV offers new transaction options to the advertising and Internet industry as well as portal solutions, e.g. for hotels.



Examples for interactive offers accessible via the red key: ARD for the 2014 Winter Olympics

In their report on IFA innovations, "Trends in Consumer Electronics 2012," gfu expresses their belief that an enormous surge for smart TV is still in the offing. The fusion of television and Internet, which has been a growing market trend, was seen by the gfu as "not just a technological trend, but also a paradigm shift in the business models for the CE industry: The successful linkage of devices equipped with content options as well as industry-wide cooperation between companies from the hardware and content industry, will considerably impact on future business success."

All major CE brands support the current development, and nearly all manufacturers offer smart TVs, most of which support HbbTV. Gradually, all TV models will be turned into smart TVs, including those with smaller display sizes. Smart TV and thus HbbTV are well on their way to becoming standard products, just like iDTV (TVs with built-in digital tuners and HDTV receivers have almost completely replaced "plain" flat-panel TVs). And this trend is by no means limited to the German market: Since 2011, nine more countries have launched HbbTV services, and there is also a growing interest in other parts of the world to introduce HbbTV (cf. chapter 2.3).

Two further aspects that became apparent from a study carried out in 2011 by Facit Digital have now been confirmed:

The Institute for Broadcast Technology (IRT) also saw excellent prospects for the HbbTV standard as a liaison between linear viewing and individual forms of usage. The quick and



The IRT in Munich even has an HbbTV test lab and is working on the continued development of the standard, including handicapped-accessible offers.



- The majority of tech-savvy respondents reported using television, Internet, and smartphones simultaneously. The use of other screens other than the TV display for video media (“second screens”) is already no longer a rare exception. The German TV Platform dedicated this year’s symposium in May 2012 to this phenomenon, along with all its corollary aspects, opportunities, and challenges (cf. also chapter 3.4)



- “In the industry, HbbTV is increasingly referred to as ‘smart TV’,” wrote Facit Digital in 2011. In the meantime, the term “smart TV” has replaced the term “hybrid TV” almost completely, and while “connected TV” is still used on occasion, the term “smart TV,” which is catchy and memorable for consumers, has gained currency by now. The German TV Platform has stated repeatedly that “smart TV” does not designate the same as “HbbTV,” yet it is a fact that an increasing number of smart TVs support the HbbTV standard (currently more than 90 percent of new TVs sold, cf. chapter 4.1).

By 2014, there will be a total of 23 million HbbTV-enabled flat-panel TVs in German households: This was the November 2010 forecast by the Munich-based consultancy

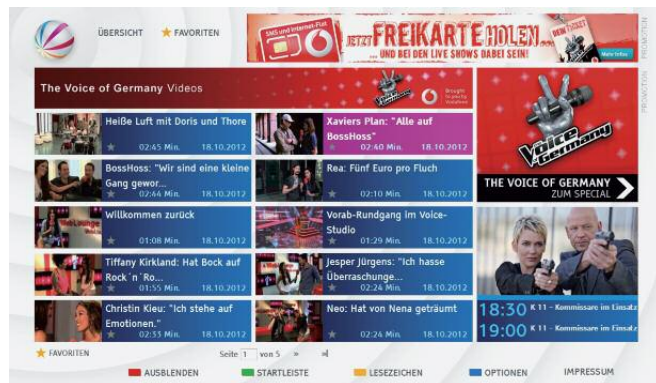
firm, Mücke, Sturm & Company (MS&C), in their study entitled “HbbTV.” The three factors that MS&C had seen as a precondition for the breakthrough have now been largely fulfilled:

- an increasing market penetration of devices with integrated HbbTV,
- high-end quality content, and
- a user-friendliness.

Because of the open standard, HbbTV has the best chances to win against company-specific proprietary solutions, such as Google TV and Apple TV. The study summarizes: “From device manufacturers to broadcasters to online portal- and e-commerce providers, all of them benefit from the free market approach of HbbTV, an approach that promotes diversity.” This analysis is still valid.

All of the major commercial networks are also offering HbbTV services with their programming.

Screenshots of ZDF’s HbbTV service during the 2012 Summer Olympics and the 2014 Winter Olympics



Situation & Forecast

5. Glossary

Key Terms and Abbreviations*

Ad(vertisement) forwarding

Manual skipping of commercial breaks within an audiovisual program by fast-forwarding within a recorded program

Ad(vertisement) skipping

Automated skipping of commercial breaks within a recorded audiovisual program

Android

Google operating system, used by Google TV

App

short for application

Application

A defined interactive service via Internet for smartphones, tablet computers, and also smart TVs, usually depicted as a 'tile'

Authentication

Process of secure connection of a user to a system

Bound application

Application that relates directly to the current television program

Broadband access

Internet connection with a data transfer rate of at least 1 Mbit/s

Catch-up TV

Collective term for time-delayed TV that can be viewed on demand, e.g. in media libraries: catch-up TV can also be used on TV screens through the HbbTV standard or via the app portals of smart TVs

Connect(ed) TV

An alternative term for hybrid or smart TV

Consumer electronics hypertext markup language (CE-HTML)

Version of the HTML Internet programming language, adapted for use in consumer electronics (CE)

Cross-media

The usage of several media for a single purpose

Data rate

The amount of data that is transferred per unit of time via a cabled or wireless connection, indicated in bits per second as kilobit (kB), megabit (MB), or gigabit (GB)

Electronic Program Guide (EPG)

Electronic guide that provides users with detailed information about television programs, radio programs, and screen services available

Google Chrome

Google browser, used for Google TV

Graphical User Interface (GUI)

Graphical arrangement and function of user-operated elements in devices and systems

HbbTV

Hybrid broadcast broadband TeleVision: a European standard since mid-2010 that defines the technical specifications for the connection of TV and Internet in TV reception devices with an Internet connection: a central feature is the red teletext key on the TV remote control ("red button")

Hybrid television

A form of television that permits access to the Internet in addition to viewing linear broadcast content from TV broadcasters; interchangeable with connected or smart TV

* detailed explanations and further terms are available (only in German) at: www.tv-plattform.de/de/digitales-fernsehen/glossar.html

Insert

Full or partial superimposition of one picture with another

Interactivity

Bi-directional communication of the user of a system with the aid of a return (feedback) channel.

Internet-capable TV

Television device which is equipped with connections for broadcast signals (terrestrial, cable, satellite) and Ethernet for Internet access via LAN or WiFi and capable of displaying each form of content in the correct format

Internet TV

see: Web TV

Interoperability

The usability of devices in different networks and/or for different applications

Intuitive operability

Self-explanatory operation of devices and systems, so that the user requires neither a manual nor training for their operation

IPTV

Internet Protocol Television: transmission of television signals via a DSL network, using the Internet protocol; unlike Web TV, IPTV has a guaranteed signal quality so that programs can be viewed on television in the same way as via terrestrial, cable, and satellite transmission; IPTV was established in 2006 as a fourth broadcast transmission method alongside these alternatives

LAN

Local Area Network which permits data to be exchanged via cable; in cases where the exchange is wireless, it is called Wireless LAN, or WLAN (often incorrectly used as a synonym for WiFi)

Language recognition

The control of operating processes by voice input

Linear television

Real-time reception and viewing of broadcast television programs

Mediathek

German video-on-demand service that provides easy and convenient access to various audio and video files online (media libraries)

Media disruption

Switching of devices in media use (e.g. watching TV and picking up a telephone to call a number displayed on screen)

Network / Home Network

A connection of networkable home entertainment components (TVs, Blu-ray players, game consoles, computers, data storage devices, etc.) into a private network, either linked by cable or wirelessly in several rooms or throughout the house

Non-linear television

Time-delayed reception of television programs via intermediate storage or video on demand (VoD)

OTT (over the top) / OTT TV

The online transfer of video and audio content, regardless of available bandwidth; the material can be displayed on all Internet-capable devices, but if the device is a TV set, it will be referred to as OTT TV

Overlay

Superimposition of image content on the screen by other content

Package (service)

A structured information package delivered via Internet connection to hybrid television devices

Personalization

User-specific settings for channels, services, and applications

Picture-in-Picture (PiP)

Insertion of a second, smaller picture in a section of the main image; if the images are juxtaposed in equal size, this is referred to as PnP or split screen

Proprietary

Technology specific to one manufacturer or provider and generally developed by or for them

PVR

Personal Video Recorder: Recording device in the form of hard drives, Blu-ray or DVD recorders or as a receiver/set top box with an integrated hard drive; some TVs have built-in hard drives for digital recording; allows timeshift

“Red button” feature

Special use of the red teletext key on a TV remote control to launch and terminate program-related applications while a television program is running

SDK

Software Development Kit: a set of tools that allows the development of applications for specific smart-TV portals, enabling third-party providers to make their services compatible with the portal at hand

Second Screen

A mobile display device (tablet computer, smartphone) that can interact with smart-TVs and also with the members of a social network, discussing TV programs (“social TV”).

Signal integrity

The consistency of the television signal received during playback

Signal protection

Measures against manipulations of the broadcast signal

Smart TV

Generic term for the new generation of TVs and related CE devices that allow viewers to access a variety of additional services and content from the Internet via an app gallery or via HbbTV out of a running program.

Smart TV Alliance

Manufacturer alliance founded by LG, Philips/TP-Vision, and Toshiba in early 2012 for the purpose of standardizing the programming of apps for TV portals; numerous other manufacturers have joined in the meantime

Split screen

Division of the screen for the concurrent display of a television program and an application or the simultaneous display of two television programs

Streaming

The distribution of video content that can be received over the Internet as a continuous data stream without first having to be downloaded

Time-delayed television / timeshifting

Non-linear viewing that permits flexible pausing, repeating, and continuing of a TV program recorded before or being recorded while watching

Unbound application

An application which is not related to the current television program (program-independent application)

Usability

General term for the extent to which a device or system can be operated easily by the average user

User data

All relevant personal information about the user of a service or application

USB

Universal Serial Bus: computer interface for the connection of external components; today, many TVs and connectable devices such as Blu-ray players and game consoles have USB interfaces so that flash drives or external hard discs can be connected

Video on Demand (VoD)

Service that allows reception of specific video content at any time from “video library”; there is a distinction between on-demand streaming (no download), near-on-demand streaming (loop or carousel), download (option to save content locally), and podcast (download with subscription).

Web TV

Random programs freely accessible on the Internet to be used anytime and anywhere; unlike with IPTV, TV-compatibility and signal quality are not guaranteed.

Widget

Small programs that appear as icons on the TV screen (or computer desktop), allowing certain Internet services to be used, also on some smart TVs.

6.

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Disclaimer

The information in this report was accurately and thoroughly researched and consolidated to the best of the knowledge and under neutral approach of our Working Group. Any information reflect the current status at the time of the editorial deadline for each chapter. However, the members of the Working Group and the German TV Platform cannot guarantee that the compiled information is current, correct, and complete, and therefore cannot accept any liability for material or immaterial loss or damage arising as a result of inaccuracies or omissions or the reliance on or application of false or incomplete information.

The "Smart TV Market Analysis" (May 2014)

is a revised version of the eponymous brochure published in October 2013, based on the professional publications, "White Book Hybrid TV" (2011) and "White Book Hybrid TV / Smart TV" (2012) of the German TV Platform.

In addition, the German TV Platform has published consumer information in German on the subject of smart TV: Interaktives Fernsehen (flyer, 2012)
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Hybrid-TV (brochures, 2010 and 2011)
Einkaufsberater Vernetzte Geräte (brochure, 2012)
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About the German TV Platform

The German TV Platform is an association of commercial and public-service broadcasters, device manufacturers, network operators, service and technology providers, research institutes and universities, state and federal authorities, and other companies, associations, and institutions concerned with digital media. For more than two decades, it has been the goal of this non-profit organization to establish digital technologies in television broadcasting, based on open standards. In our Working and Project Groups, representatives from nearly every field in the consumer-electronics and media industry are committed to set the course on key issues of digital broadcasting.

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