

11 Web Radio, Web TV and IPTV

11.1 Web Radio

11.2 Web TV

11.3 Interactive TV

11.4 Audio and Video Streaming over IP

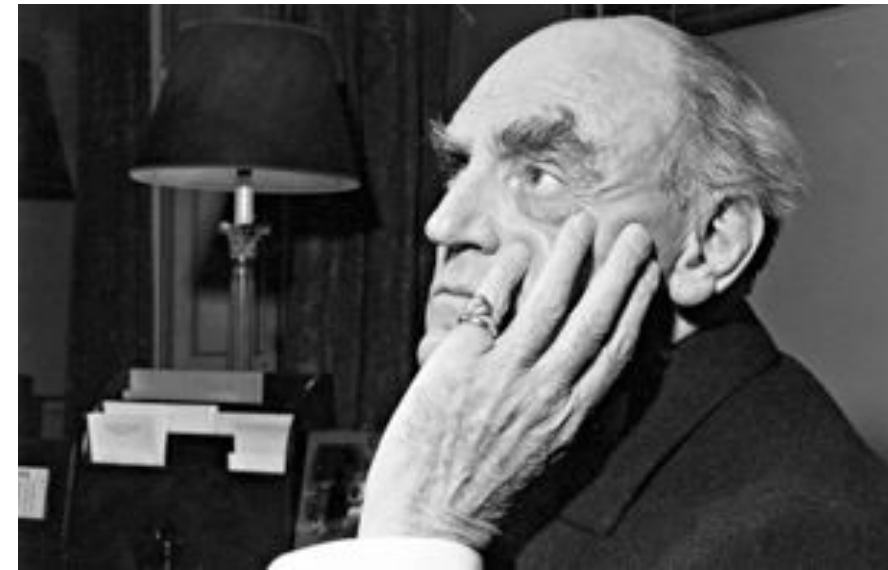
Literature:

Chris Priestman: Web Radio, Focal Press 2002

A British Radio Pioneer, 1924

John Reith,
Broadcasting over Britain, 1924

Founder of the BBC



“We are missing infinitely more than we are receiving ... Thought is probably permanent, and a means may be found to ally thought with ether direct and to broadcast and communicate thought without the intervention of the senses or any mechanical device, in the same manner as a receiving set is today tuned to the wave-length of a transmitter so that there may be a free passage between them.”

- “free passage between them” clearly indicates bi-directionality!

What Is Web Radio (Internet Radio)?

- Web radio is about *live audio streams*
- Continuous audio content
 - Delivered to large audience, in *identical form for all listeners*
 - No pause/rewind, no download, no “on demand” service
- “Simulcast”: Traditionally produced radio program is transmitted in Internet simultaneously



Historic Parallels between Radio and Web Radio

- Technical problems with sound quality
 - Early radio transmission (1920's) were of poor sound quality, short wave radio still is today
 - Early radio transmission over the Internet was of poor sound quality, but the situation has improved drastically
- The ever-repeated threat situation between new and old media
 - Early radio was considered a threat to news and entertainment industries
 - » Like TV for movie industry
 - Web radio as a threat for traditional radio, news, entertainment?
 - Lesson from history: Media grow into complementary, synergetic situation (“Riepl'sches Gesetz”)
- Driving force are amateurs
 - Early radio program development, at least in the U.S., driven by amateur stations
 - Exactly identical situation for Web radio today
- Private/public/commercial, funding models, ...

Radio and Democracy

- Bertolt Brecht, 1930:

“Radio could be the most wonderful public communication system imaginable, a gigantic system of channels – could be, that is, if it were capable not only of transmitting but of receiving, of making listeners hear but also speak, not of isolating them but connecting them.”

 - Bertolt Brecht even conducted amateur experiments with the new medium “radio” himself
- Radio, if not restricted by monopolies, is a decentralized, democratic medium
 - Web radio may be the way to remove the constraints (frequency shortage) which have led to monopolies
 - Web radio removes spatial constraints of radio (global medium)
- “Vertical” organization (centralized, hierarchic, top-down) vs. “horizontal” organization (decentralized, peer-to-peer, bottom-up)
 - Radio started as a horizontally organized experiment

Types of Web Radio Stations/Programmes

- According to traditional sectors of the radio industry:
(Lewis/Booth: *The Invisible Medium*)
- Sector 1: Early European Model
 - Public service and state radio as governmental organizations, often monopolies
 - » Web radio as additional distribution channel, as platform for global services, for cross-media effects with other parts of Web presence (information, shop)
- Sector 2: American Model
 - Commercial enterprises funded through advertising
 - » Web radio as platform for advertising (also for the traditional broadcast)
 - » Web radio as additional source of revenue (through e-Commerce)
- Sector 3: Alternative
 - *Community stations (free radio)*, see www.amarc.org
 - *Underground stations*
 - Web radio as a cheap technology, avoiding also many licensing problems

Experience of Radio Listening

- Experience formed by receiver technology:
 - 1930s: Large valve radio as important “furniture” in the living room
 - 1950s onwards: TV taking over as centre of living room
 - 1960s: Transistor radios make radio receivers portable, enable car receivers
 - 1970s: Stereo high-fidelity systems change expectations of audience
 - Today: Mainly background music and car receivers
- Market niche for Web radio:
 - High-quality terrestrial radio (FM) has limited local range
- Competitors for Web radio:
 - Global-range radio of good quality (Satellite radio, Digital Radio Mondiale)
- Web Radio experience, integrated into daily life:
 - Computer as playback device?
 - Must seamlessly integrate with existing devices
 - » ...or be completely stand-alone and innovative
 - Smartphones, speaker systems for portable players, specialized devices

Physical Devices for Internet Radio

- A radio receiver should look like one, even if it is Web radio...
 - Standalone Internet radio devices
- Product pioneers around 2000:
 - Kerbango, SonicBox
- Technical problem in early systems:
 - Power requirements, battery life
- Trend since 2010: Broad range of products



Kerbango's Internet Radio



SonicBox device

Logitech
SqueezeboxPure
One Flow

Sony CMTMX750NI



Medion P85015

Parrot Asteroid
Car Radio

Internet-Based Audio Services

Vom Webradiomonitor erfasste Angebote

Online Only-Webradios	<ul style="list-style-type: none"> Ausschließlich für das Internet produzierte Radioprogramme, die auch nur online publiziert werden Zumeist spezialisierte Radioprogramme mit spezieller Musikfarbe oder sonstiger Ausrichtung
UKW/DAB+ im Internet (Simulcast)	<ul style="list-style-type: none"> Eins-zu-eins-Streaming klassischer, über UKW bzw. DAB+ empfangbarer Radioprogramme
Online-UKW/DAB+-Submarke	<ul style="list-style-type: none"> Zusätzliche Webradio-Streams der klassischen UKW-Marken, die ausschließlich über das Internet verbreitet werden und meist auf eine Musikfarbe ausgerichtet sind
Musik-Plattformen (Musik-on-Demand)	<ul style="list-style-type: none"> Zumeist über Abonnements finanzierte Musik-Plattformen, bei der die Nutzer eine Musikdatenbank zu jeder Zeit uneingeschränkt nutzen und Playlists erstellen können Oft auch mit Radiofunktion
Personal Radio	<ul style="list-style-type: none"> Hörverhalten wird aufgezeichnet und analysiert Auf Basis der Daten wird durch Algorithmen oder redaktionelle Bearbeitung ein personalisiertes Angebot erstellt
User Generated Radio	<ul style="list-style-type: none"> User erstellen Playlists oder Radiostationen, auf die andere User zugreifen können
Radio-Aggregatoren	<ul style="list-style-type: none"> Kein originärer Content-Produzent Bündelung von verschiedenen Webradioangeboten auf einer einheitlichen Oberfläche/Plattform Inhaltliche Clusterung zur besseren Orientierung für Nutzer
Download-Plattformen	<ul style="list-style-type: none"> Musik-Shopping-Portale, bei denen die Nutzer Auszüge der von ihnen gesuchten Lieder hören können

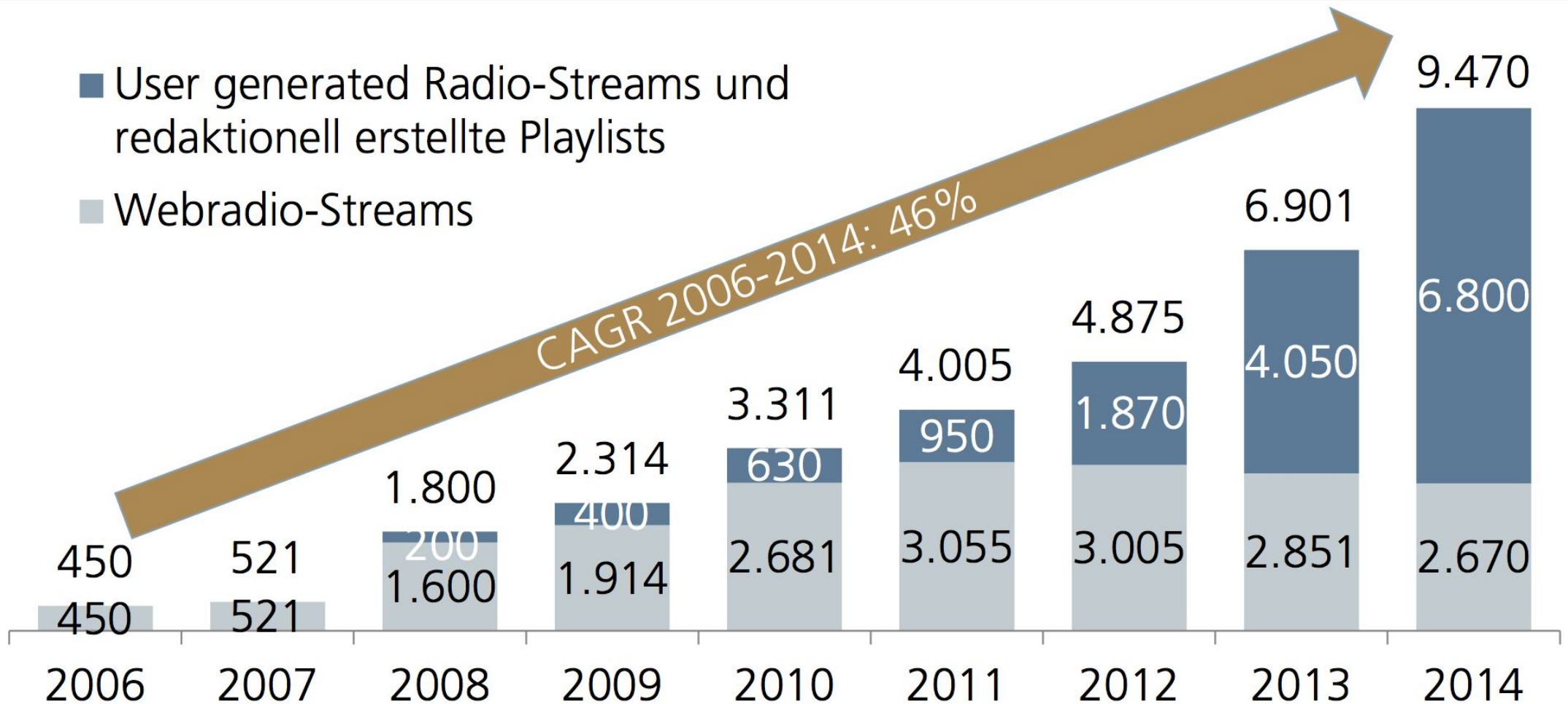
Beispiele:

Quelle: Webradiomonitor 2014

Eine Studie im Auftrag der BLM und des BVDW

Internet Radio Market (1)

Zahl der Online-Audio-Angebote in Deutschland 2006 bis 2014



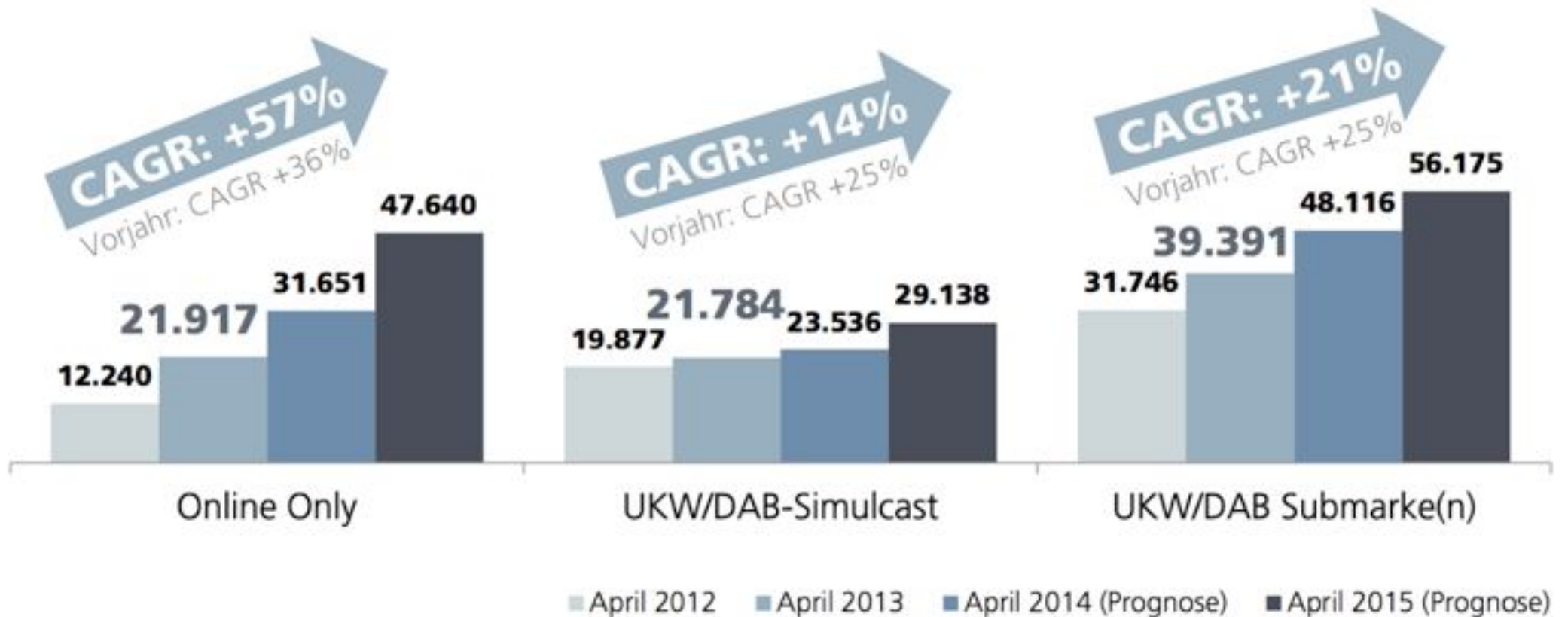
Quelle: Webradiomonitor 2014, Medienanstalten, Goldmedia Analyse, CAGR: Compound annual growth rate

Eine Studie im Auftrag der **BLM** und des **BVDW**

Traditional Web radio streams decreasing, other streaming services grow fast

Internet Radio Market (2)

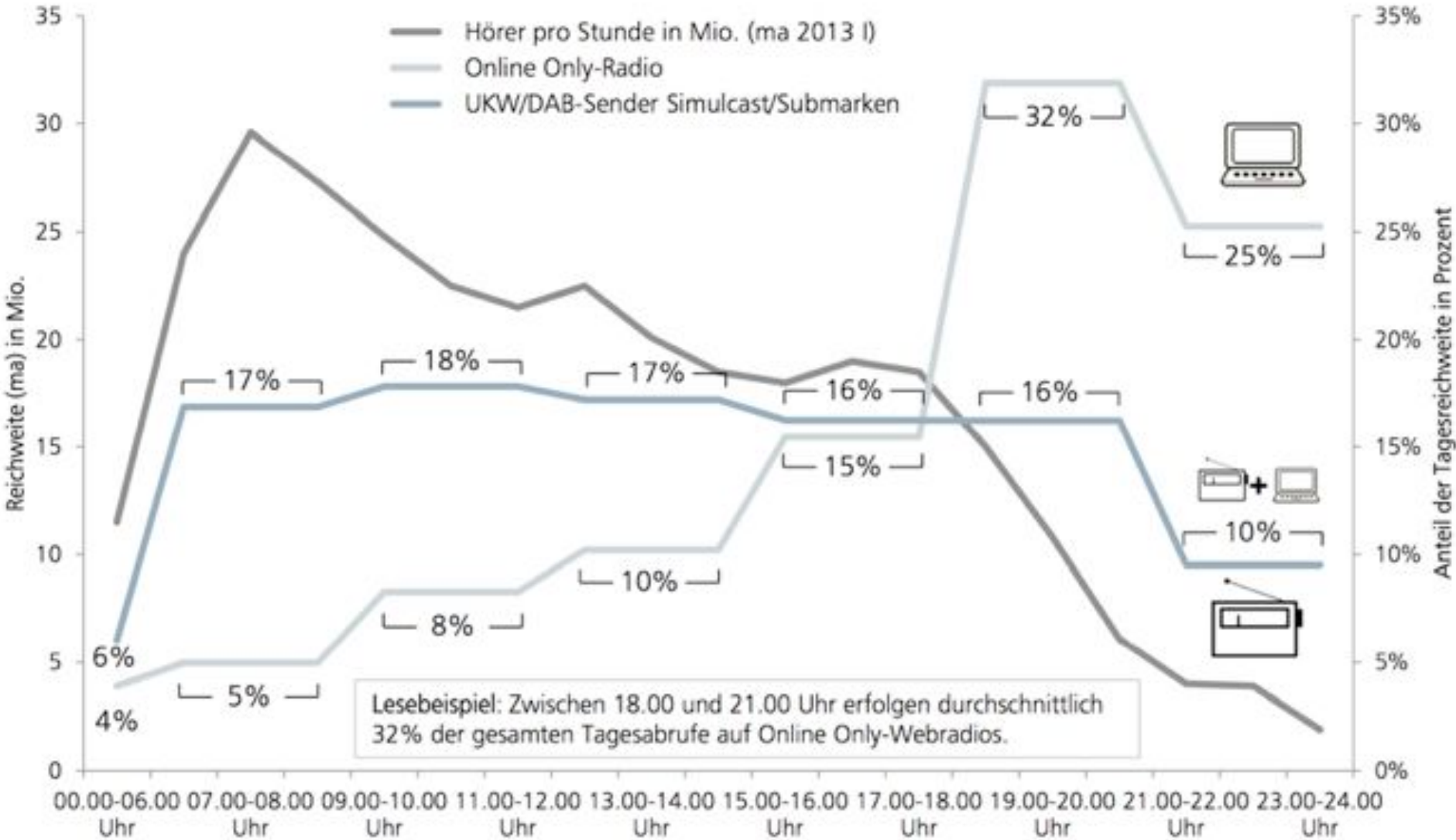
Zahl der durchschnittlichen Abrufe pro Webradiostream pro Tag in Dt. 2012-2015



www.webradiomonitor.de

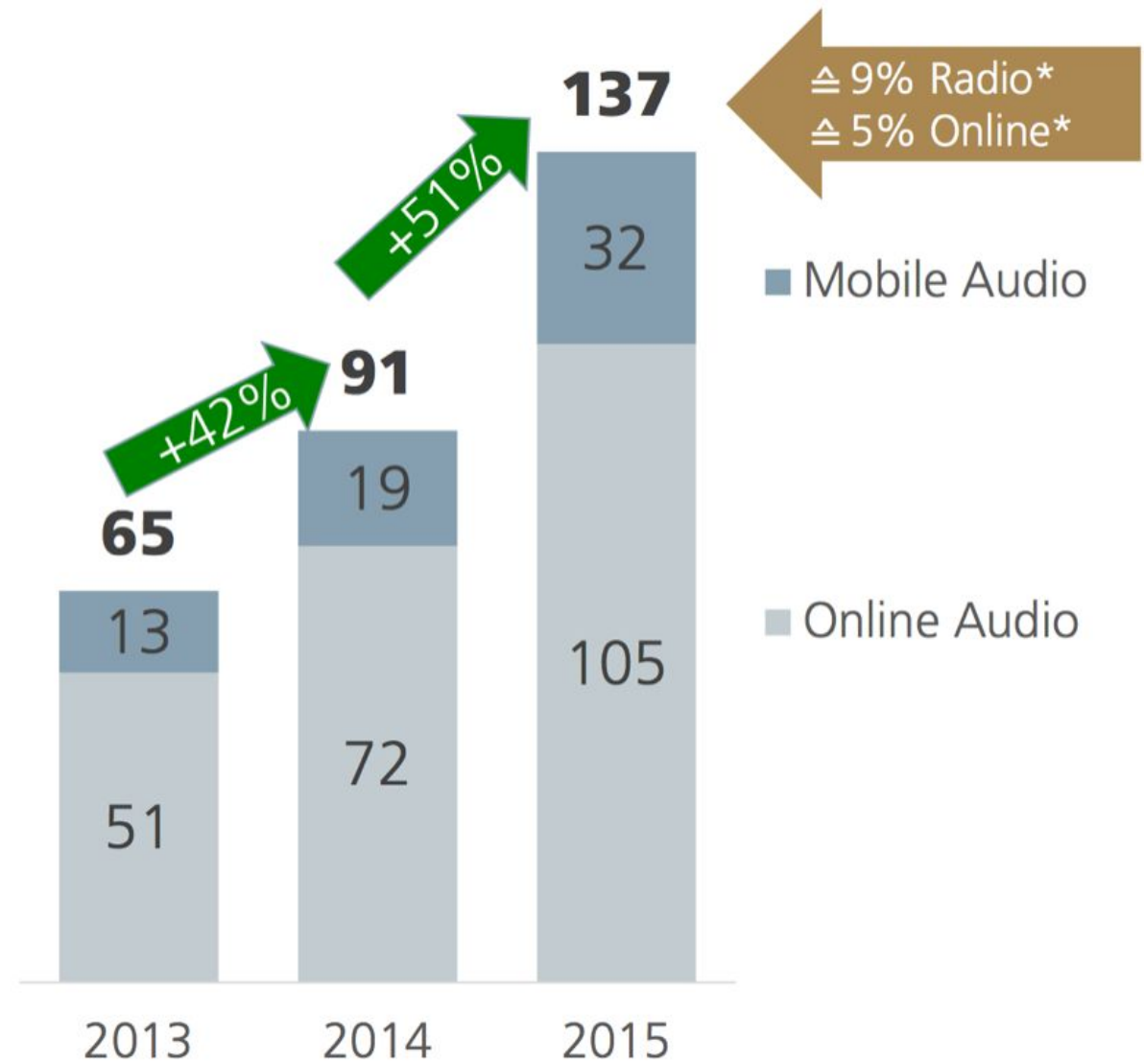
Internet Radio Market (3)

Nutzung von klassischem UKW-Programm und Webradio im Tagesverlauf (04/2012)



Internet Radio Market (4)

Prognose: Werbemarktentwicklung (brutto) für Online-Audio bis 2015 in Mio. EUR in Dtl.



Advertisement Revenues

Quelle: Goldmedia-Analyse, Webradiomonitor 2014, CAGR = Compound Annual Growth Rate

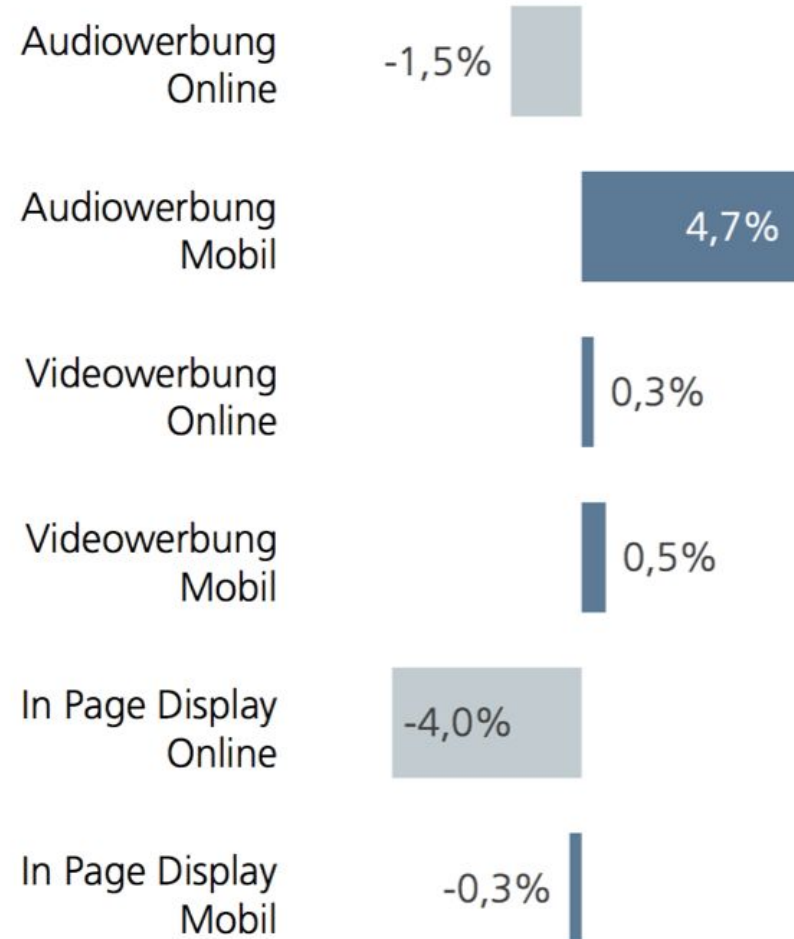
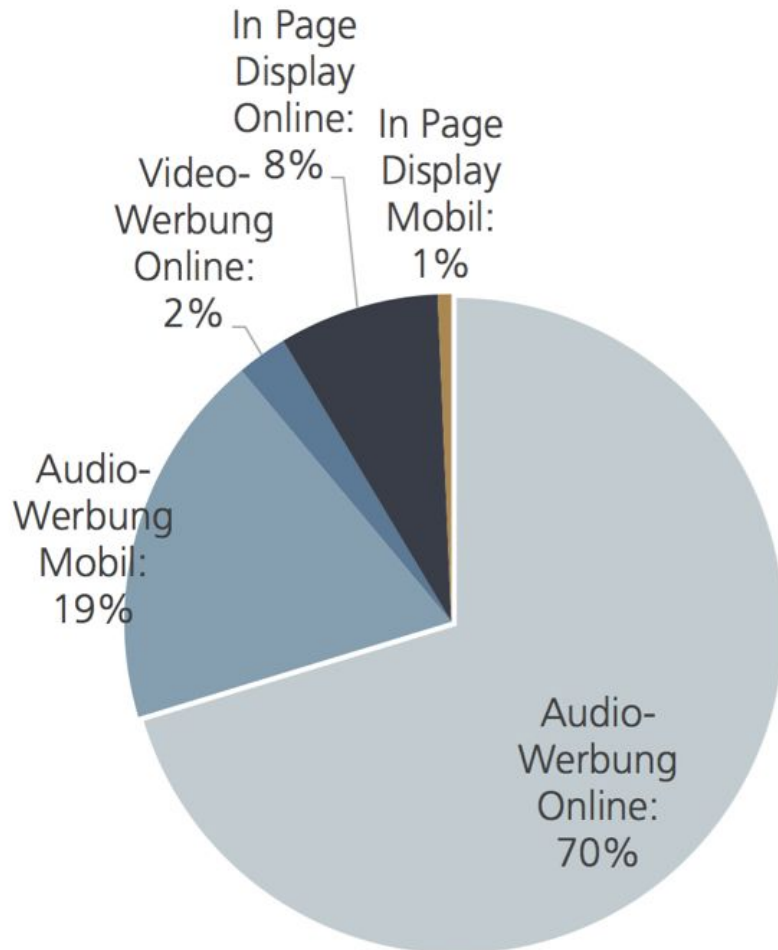
*Relation zu Bruttowerbeerlösen i.H.v. 1,59 Mrd. Euro (Radio) bzw. 2,96 Mrd. (Online) 2013 nach Nielsen Media Research

Eine Studie im Auftrag der **BLM** und des **BVDW**

Forms of Advertisement – Not Only Audio

Anteil der Werbeformen an den gesamten Werbeeinnahmen in Dtl. (6/2014)

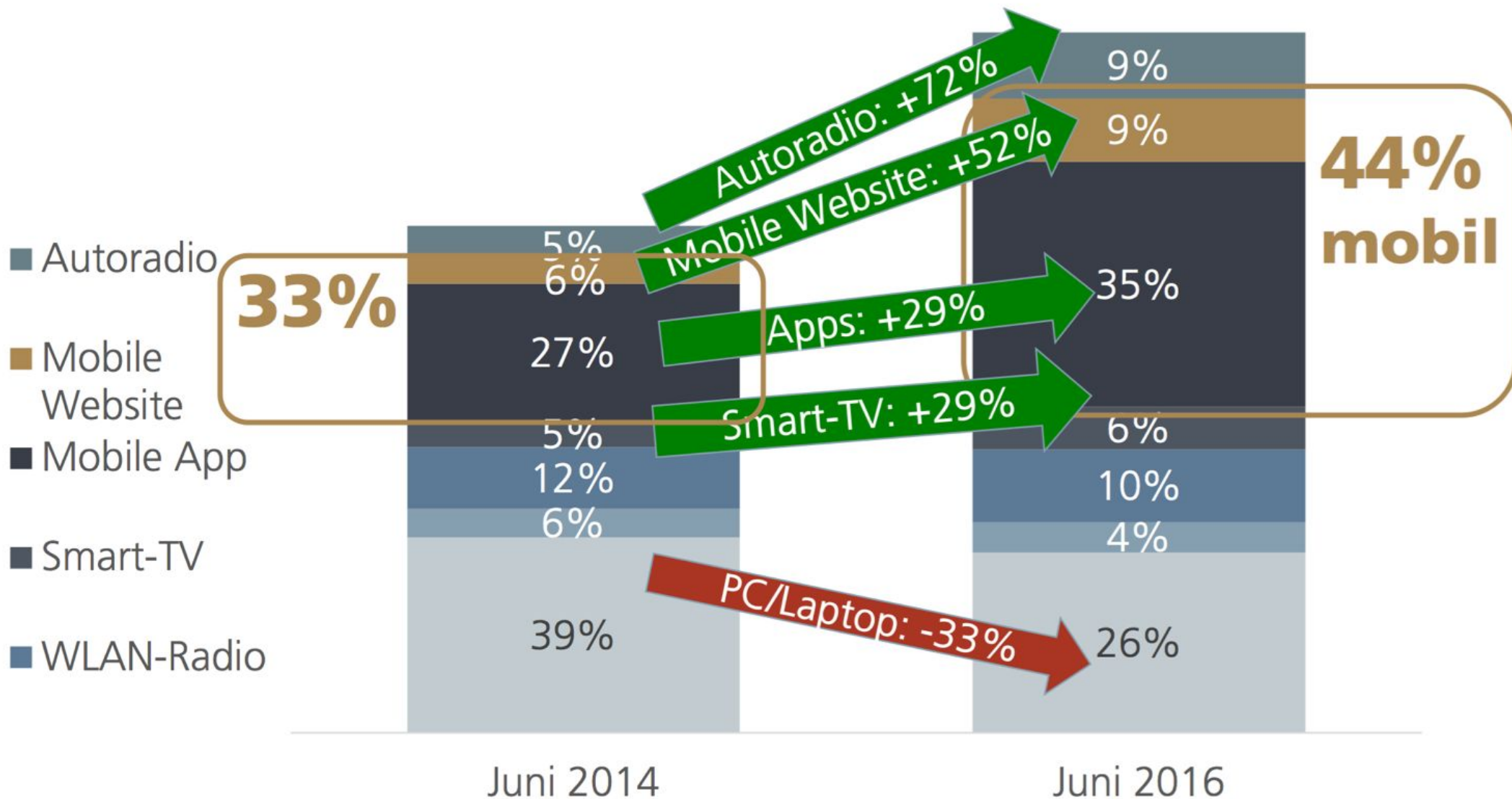
Veränd. der Anteile der Werbeformen der Online-Audio-Anbieter 6/2016 ggü. 6/2014



Quelle: Webradiomonitor 2014,
Basis: Angaben von Online-Audio-Anbietern mit Werbung im Umfeld des Angebots, n=121

Eine Studie im Auftrag der **BLM** und des **BVDW**

Trend: Mobile Usage of Web Radio



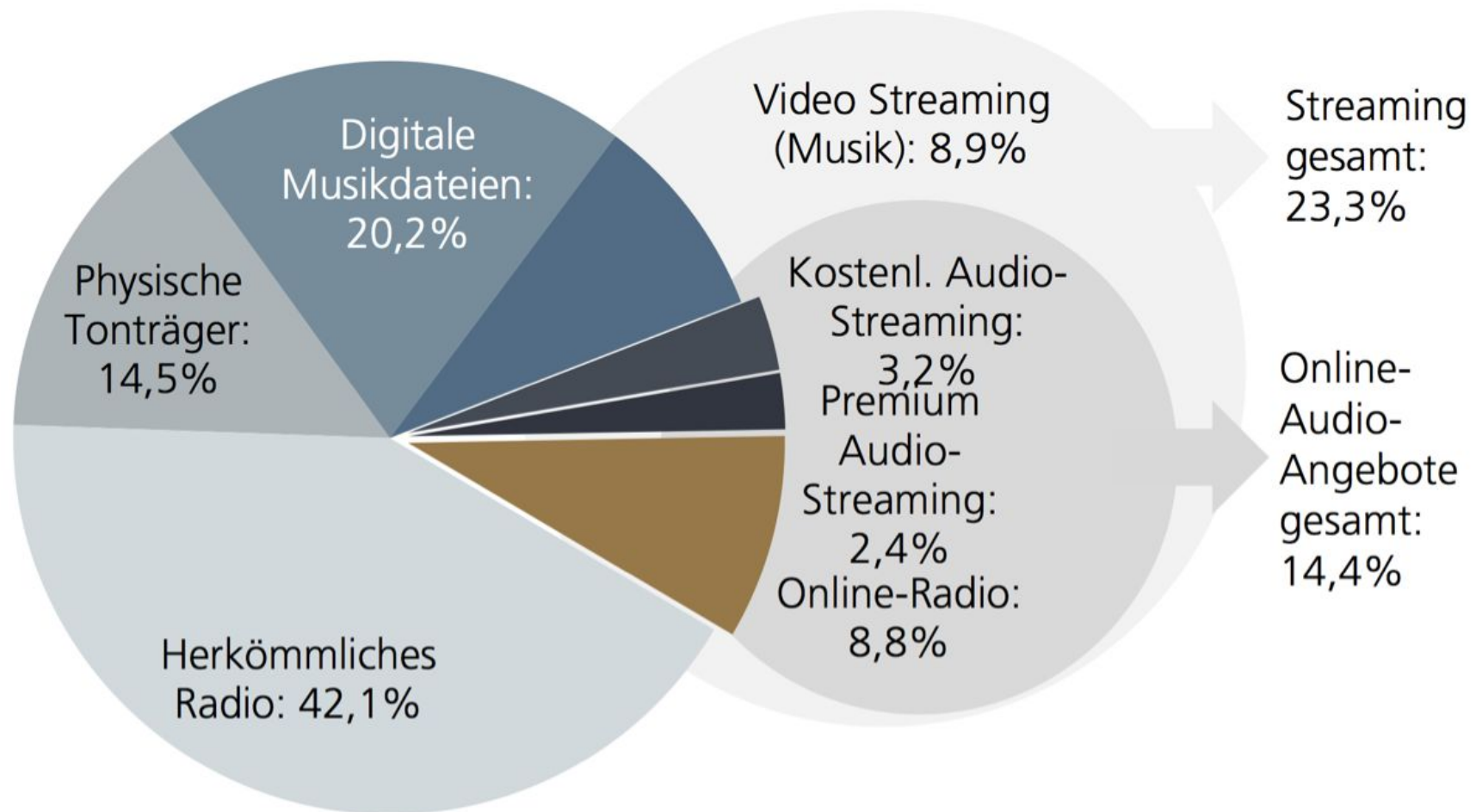
Quelle: Webradiomonitor 2014, Basis: Online-Audio-Angebote, n=558

Eine Studie im Auftrag der **B|LM** und des **BVDW**

www.webradiomonitor.de

Music Listening in Germany: Streaming More Important than Physical Media (CD-Audio)

Prozentualer Anteil an der Gesamtzeit des Musikhörens in Deutschland, 1/2014



Quelle: respondi AG im Auftrag des Bundesverbandes Musikindustrie e.V. (BVMI), BVMI Jahresbericht 2013, Onlinerepräsentative Befragung im Januar 2014; n=1.000

Eine Studie im Auftrag der **BILM** und des **BVDW**

Web Radio / Music Shop Integration 2004

Webradio antenne BAYERN 11:14 Uhr >> Homepage >>

Antenne Bayern
Rockantenne

Aktuelle Sendung: Extra
Aktueller Titel:
>> ANASTACIA, SICK AND TIRED

Songs anklicken und im Shop bestellen

Playing 65Kbps 4:34 / Live

News: Frankfurter Polizei-Vize zu Geldstrafe verurteilt... >> mehr

ROCK ANTENNE >> Rockantenne

powered by **TISCALI**

Music Shop
antenne BAYERN

Schnellsuche

>> Suche starten

Kategorie

- >> [Rock & Pop Hits](#)
- >> [Pop Angebote](#)
- >> [Jazz Hits](#)
- >> [Klassik Hits](#)
- >> [DVD Hits](#)
- >> [DVD Angebote](#)
- >> [Video Hits](#)

Service

- >> [Warenkorb](#)
- >> [Kontakt](#)
- >> [AGB](#)

music | charts | **neuheiten** | specials | überblick | suche

Ihr Suchergebnis:

Seite drucken

Sortiert nach: Medium: Veröffentlichungstermin: Verfügbarkeit:

Interpret auf Alle (176) Alle (176) Alle (176)

Anzeige: 1 bis 25 von 176
Seite: 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |


Interpret	Medium	EUR	Lieferbarkeit	
>> Amos, Tori: Under The Pink	CD	19,99	innerhalb einer Woche	bestellen merken
>> Anastacia: 50 Anos De Forro	CD	17,99	innerhalb 3-4 Wochen	bestellen merken
>> Anastacia: Anastacia (2004)	CD	14,99	Artikel am Lager	bestellen merken



Web Radio / Music Shop Integration 2011


[Antenne.de](#) / [Radio](#) / [Sendungen](#)



Das lief im Webradio

► **Channel: ANTENNE BAYERN**

 **Counting Crows** feat. Vanessa Carlton mit "Big yellow taxi"
lief am 12.01.2011 um 12:26 Uhr

 **Nickelback** (» [Fotos](#)) mit "If Today Was Your Last Day"
lief am 12.01.2011 um 12:23 Uhr

Welcher Titel lief im Radio?

Musik, die Sie im Programm gehört haben!

ANTENNE BAYERN ▾

An welchem Tag und um wieviel Uhr (hh:mm) haben Sie den Titel gehört?

12 | 35 | 12.01.2011 ▾ :

suchen

Big Yellow Taxi
Counting Crows



Titel: 3:45 min
Genre: Pop
Typ: MP3
Qualität: 320 kbit/s
 € 1.29



Titel: min
Genre:

Titelliste

Titel	Interpret	Format	Preis	Aktionen
1.		min		

Web Radio / Music Shop Integration 2014



Aktueller Titel:
Boulevard of broken dreams
Green Day

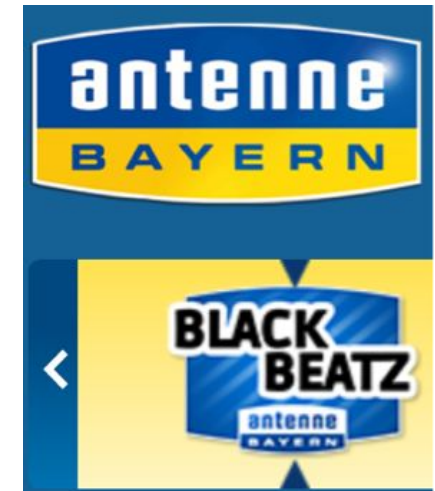
Kaufen

Full text search on amazon.de MP3 archive

Full text search on amazon.de



Web Radio / Music Shop Integration 2015



Full text search in amazon.de music downloads

Convergence of Broadcast and Web Media

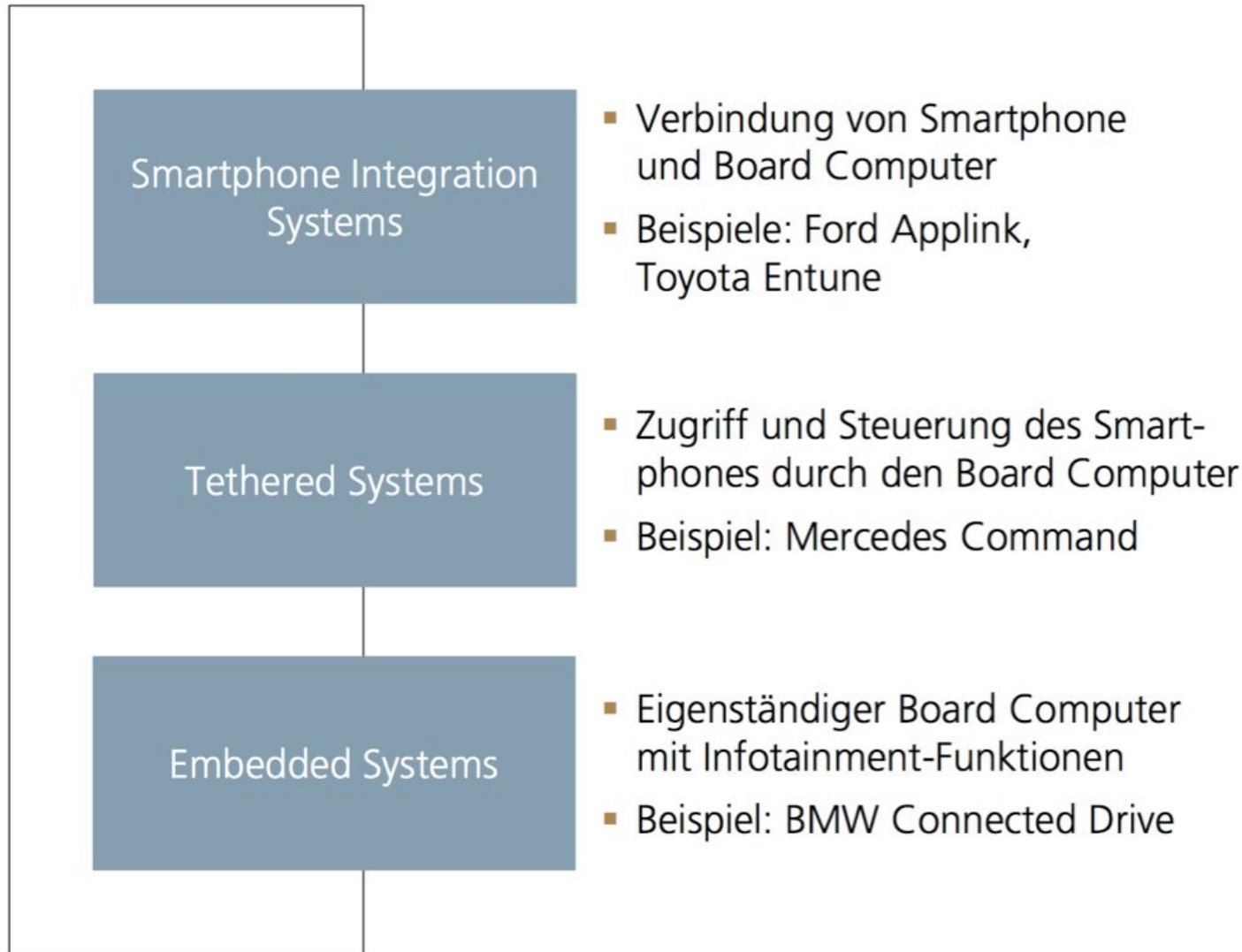


Picture: Revo

- Upcoming standards for side-band signaling of Web-related information in broadcast signal
 - RadioDNS, RadioVIS
 - Partially based on Comet
- End systems presenting multimedia content related to radio program
- Traffic info, weather, news etc. transmitted over Web
- Prototypes of hybrid radio receivers
 - e.g. IRT DABberry 2013
 - Switching automatically between broadcast and IP streaming for program

Radio in Car Infotainment Systems

Überblick über verschiedene In-Car-Entertainment-Systeme 2014



Quelle: Goldmedia Analyse, Bilder. Screenshots GSMA

11 Web Radio, Web TV and IPTV

11.1 Web Radio

11.2 Web TV

11.3 Interactive TV

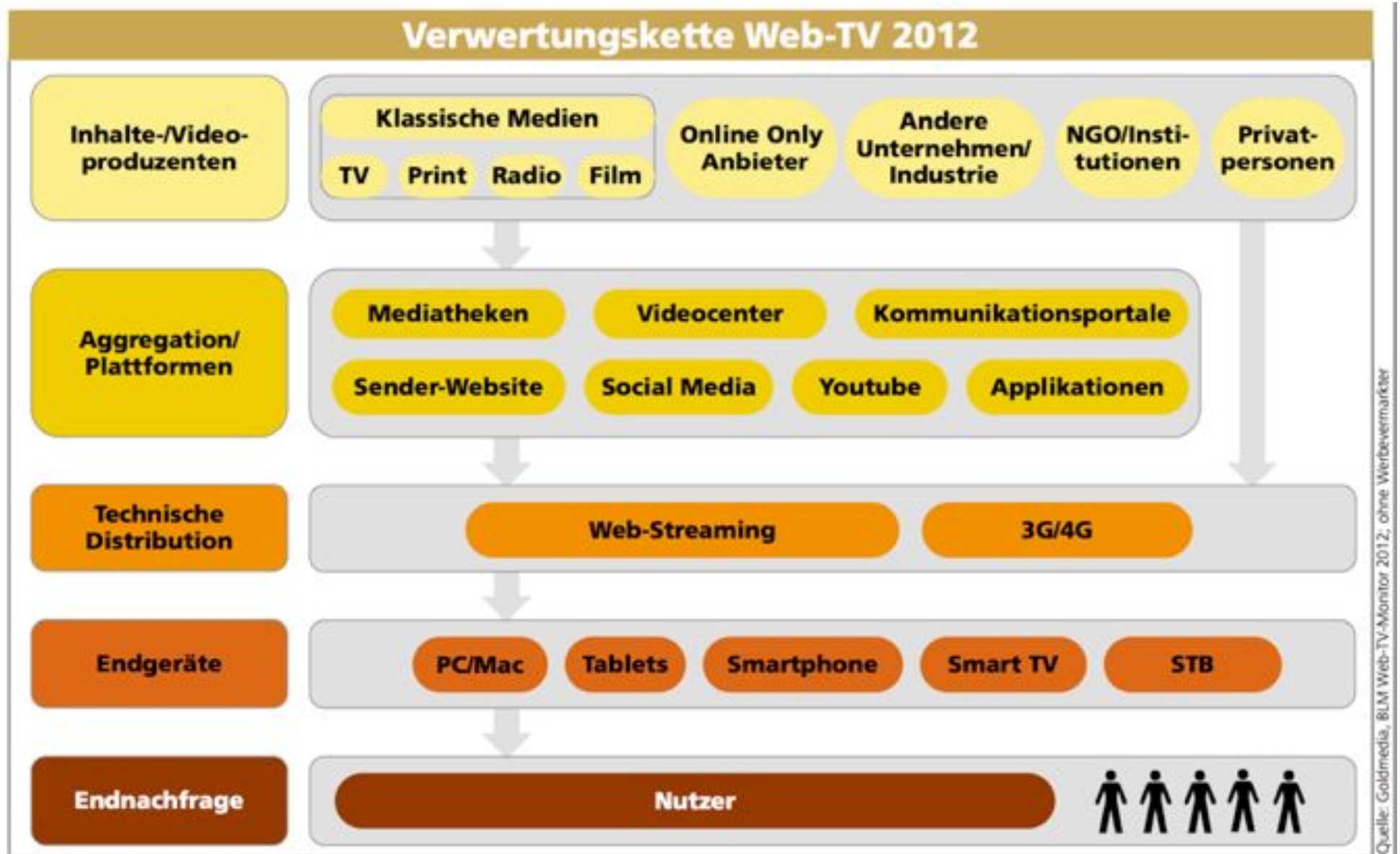
11.4 Audio and Video Streaming over IP

What is WebTV?

- Tentative criteria for WebTV:
 - Web site with video/moving picture as central element
 - Usable with standard browser software
 - » Plugins may be required
 - » True streaming, download, progressive download
 - More interactive than traditional broadcast
- Difficult to distinguish from:
 - Enhancements of digital broadcast TV
 - » E.g. Catch-up TV
 - Smart TV sets or set top boxes with browser software
 - Video podcasts

WebTV: Complex Value Chain

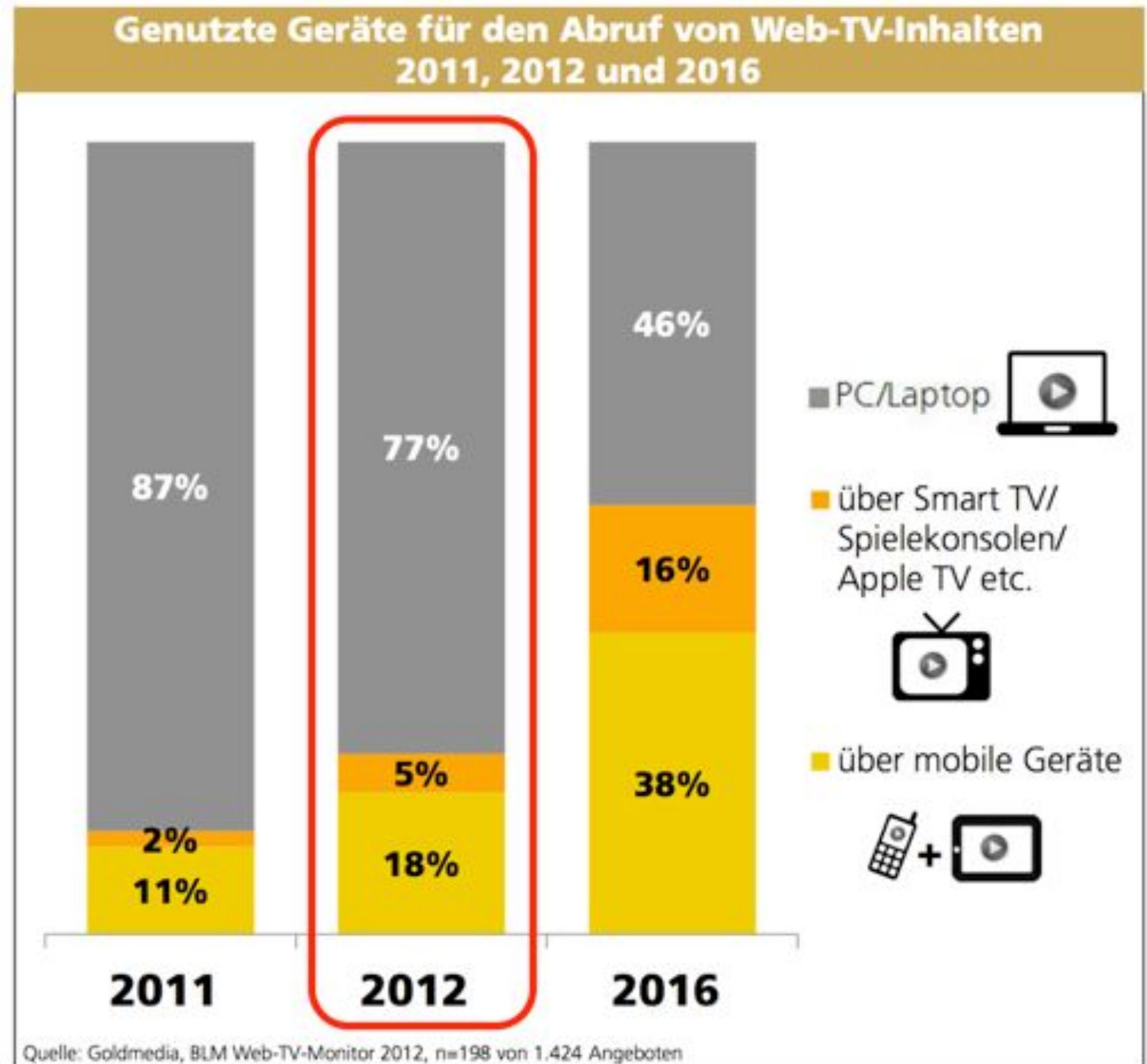
www.webtvmonitor.de
only until 2012!



Platforms for WebTV

PC usage decreases quickly

Smart TV and mobile devices increase



Web TV Simulcast

- Many streams available
E.g. de.wwiTV.com lists 54 live TV streams only for Germany (Jan 2014)

n-tv.de
20.12.2004 11:44 Uhr

Wahnsin
Bis Weihn
bei eBay f

Der Tag | Wirtschaft & Börse | Chat & Foren

Begriff Suche

Web Archiv

Übersicht
n-tv Programm
Politik
Wirtschaft
Sport
Formel 1
Vermischtes
Kult & Kultur
Lesen & Hören
Essen & Trinken
Computer
Automobil
Reisemagazin
Dossier
Wetter
Finanzmagazin
Partnersuche

CDU

Nebeneinkünfte für Politiker?
n-tv Umfrage
CDU-Generalsekretär Meyer steht wegen RWE-Zahlungen unter Druck. Dürfen Politiker Nebeneinkünfte haben? [weiter](#)

US-Lauschangriff
El Baradei wehrt sich
Neuer Streit um Dosenpfand
"Chaos-Strategie" des Handels
"Verleumder entfernen"
Forgeard steckt Ziele ab
Werben um die LSE
Euronext plant Gegenangebot
Strohmann für Gasprom?
Yukos-Tochter geht an Nobody
"Nehmt Ölbestände ins Visier"

Der letzte Tag im Amt?
Noch mehr Kohle für Meyer
Nach den Enthüllungen über Zahlungen des Energiekonzerns RWE droht CDU-Generalsekretär Laurenz Meyer als Weihnachtsgeschenk der Rauswurf. Medienberichten zufolge will CDU-Chefin Angela

NTV - NTV - (...)

RealOne Player

Playing 300Kbps 1:13/Live

NAME KEIN TABU

Deutsche Börse

Appell an "sein Volk" Saddam spricht

NsdqC	2135.20	-0.51%
NsdqF	1619.50	+0.56%
Nikkei	11103.42	+0.23%
EUR/\$	1.3358	
Gold	441.975	
ÖlBrent	43.10	

- American Express Gold Card + USB-Stick 128 MB oder Reisetrolley - jetzt kostenlos!
- 6% mit BMW Spar&Invest. Die Erfolgskombination mit dem Top-Zins.

TV-Highlights

n-tv
2004

Web TV Simulcast – Nine Years Later (2013)

Jetzt
n-tv live

Hauptversammlung 2013

SIEMENS-HAUPTVERSAMMLUNG
Aktionäre überwiegend zufrieden

USÖL -0,2% | DELL 13,05 -0,5% | DISNEY 53,40 +1,3% | n-tv 18:24

DAS NEUESTE

- n-tv Sport kompakt
23.01.13 – 01:27 min
- n-tv Wirtschaft kompakt
23.01.13 – 01:31 min
- n-tv Nachrichten kompakt
23.01.13 – 02:11 min
- Sendung in voller Länge
Telebörsen von 15:40 Uhr
23.01.13 – 12:21 min

MEISTGESEHEN

- Sendung in voller Länge
Nachrichten von 15:00 Uhr
23.01.13 – 15:36 min

From Simulcast to Video on Demand

n-tv.de 2015

n-tv Suchen auf n-tv.de

BERLIN 6° MI 5° / 8° DO -1° / 8°

Home Politik Wirtschaft Börse Sport Panorama Unterhaltung Technik Ratgeber Wissen Auto Wetter Mediathek

n-tv Live Teletext Telebörse now Zertifikate Apps Spiele Empfehlungen Newsletter Themen Art

▼ Dax	9.912	-0,3%	▼ TDax	1.432	-0,2%	▼ Dow	17.614	-0,2%	▼ NAS	4.166	-0,1%	▼ N225	16.796	-1,7%	▼ Öl	45,79	-0,2%
▼ DB-Dax	9.912	-0,3%	▼ ESX	3.126	-0,3%	▼ S&P	2.023	-0,3%	▼ NasF	4.144	-0,3%	▼ EUR	1,1758	-0,2%	▼ Gold	1.230,17	-0,1%

DAS NEUESTE

12:56 Mufti kritisiert neue Charlie Hebdo **So gütig war Mohammed noch nie**

VIDEOS

Plötzlich in der ersten Reihe Sarkozy erntet Spott für Drängerei beim Schweigemarsch

14.01.15 – 01:09 min

Anzeige

11 Web Radio, Web TV and IPTV

11.1 Web Radio

11.2 Web TV

11.3 Interactive TV

11.4 Audio and Video Streaming over IP

Literature:

David Feinleib: The inside story of Interactive TV and
Microsoft WebTV for Windows, Morgan-Kaufmann 1999

Johan Hjelm: Why IPTV? Interactivity, Technologies and Services,
Wiley 2008

History of Interactive TV: Microsoft WebTV and ATVEF

- ATVEF: Advanced Television Enhancement Forum Initiative
 - Industrial consortium: CNN, Disney, Intel, Microsoft, Sony, and others...
 - Defined standard 1997-1999
 - Triggers embedded into TV program to activate Web-based content
 - » “crossover links”
 - » Using the Vertical Blanking Interval (Austastlücke)
 - To synchronize Web presentations with TV content
- Microsoft’s WebTV initiative
 - Selling set top boxes
 - » Web browser and ATVEF decoder
 - Providing interactive content through media partners
- Historical *failure*...
 - ATVEF no longer supported in 2004

Microsoft MSN.TV



- Short term commercial interest (2004):
 - TV as end system for Internet access (Web/email)
 - Integrated media player
 - No integration with TV programmes

Examples of Interactive TV from MS WebTV

- Enhanced versions of popular soaps like “Baywatch”, sports reporting, news, and game shows
 - For some time produced by NBC and other large stations
- Background information for TV drama:
 - Information of actors currently seen (name, pictures)
 - Information on location (including advertisements)
 - Additional views not visible on TV
 - “What happened until now” function
- Background information for sports programmes:
 - Players, team history, medal counts, ...
- Customized information in news programmes:
 - News tickers, headlines, travel news customized for individual viewer (selected by set top box)

Screenshot from Interactive Version of Baywatch

The screenshot is divided into two main panels. The left panel features a photograph of a woman in a yellow top looking at a patient in a hospital bed. Below this is a CT scan image of a brain. The right panel shows a scene from the show with three people on a boat. A vertical navigation bar on the right side of the screen contains the text 'BAYWATCH INTERACTIVE EXIT HELP WEB' and a series of small thumbnail images.

Alaska Airlines

Patient suffered a closed head injury leading to a cerebral contusion - Patient underwater an unknown length of time - currently in a comatose state

Pacifica Medical

Computerized Tomography (CT)
Patient: Robby Quinn

Alaska Airlines

DIVE BOAT

See behind the scenes photos of filming at sea.

The crew films boat to boat as Leslie (Heather Stevens) prepares to use a scuba tank wrench to knock out her boyfriend.

See behind the scenes photos of filming at sea.

Levels of Interactivity in TV

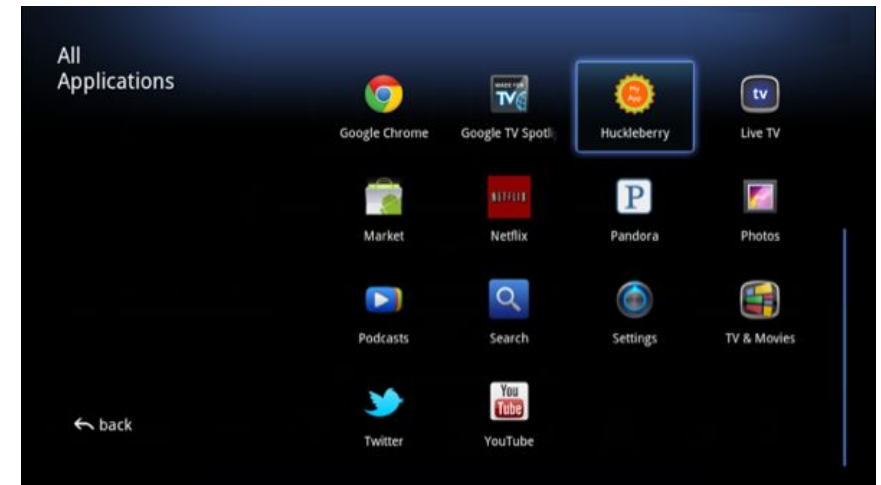
(according to Johan Hjelm 2008)

- Level 1: Interaction with meta-information about the TV programme
 - Electronic/online program guide
 - Personal video recorder
- Level 2: User accesses external information
 - Teletext
 - On-device portals
- Level 3: User influences program by voting
 - Big Brother, Americal Idol etc.
 - May include chat and other interaction with other users
 - Either through separate phone/Web interaction or through Set Top Box
 - » UK: BBC/BSkyB: "red button" for interactive services / teletext
- Level 4: Story or other content of TV program changed by interaction
 - Simple form: Add-On multimedia material (e.g. BskyB "green button")
 - Extrapolation: TV converging towards games

Success Stories of Interactive TV?

- Voting is popular:
27 % of all young European users of mobile phones have voted or otherwise participated in interactive game shows via phone
- BBC:
During 2004 Olympics, more than 60% of viewers watched the event in an interactive way
- Johan Hjelm, based on research of EU project LIVE:
 - Interaction works best in documentaries and news
 - In fiction, people want interaction as unobtrusive as possible
 - Most viewers are not programmers, and they *may not know their own needs*
 - People want to belong to groups
 - TV viewers expect to be surprised
- “Lean back” vs. “lean forward” attitude!

Google TV: Another Failure Story



donaldderek.com

The future of TV is coming to your TV.
Logitech Revue
with Google TV



2010

**Logitech confesses to
'gigantic' mistake with
Google TV**
cnet, November 2011

Introduced in October 2010,
discontinued in January 2015
Successor "AndroidTV"

Integration Web – TV



Apple TV



Smart TV

Picture: LG/wikimedia



Google Chromecast

Roku player

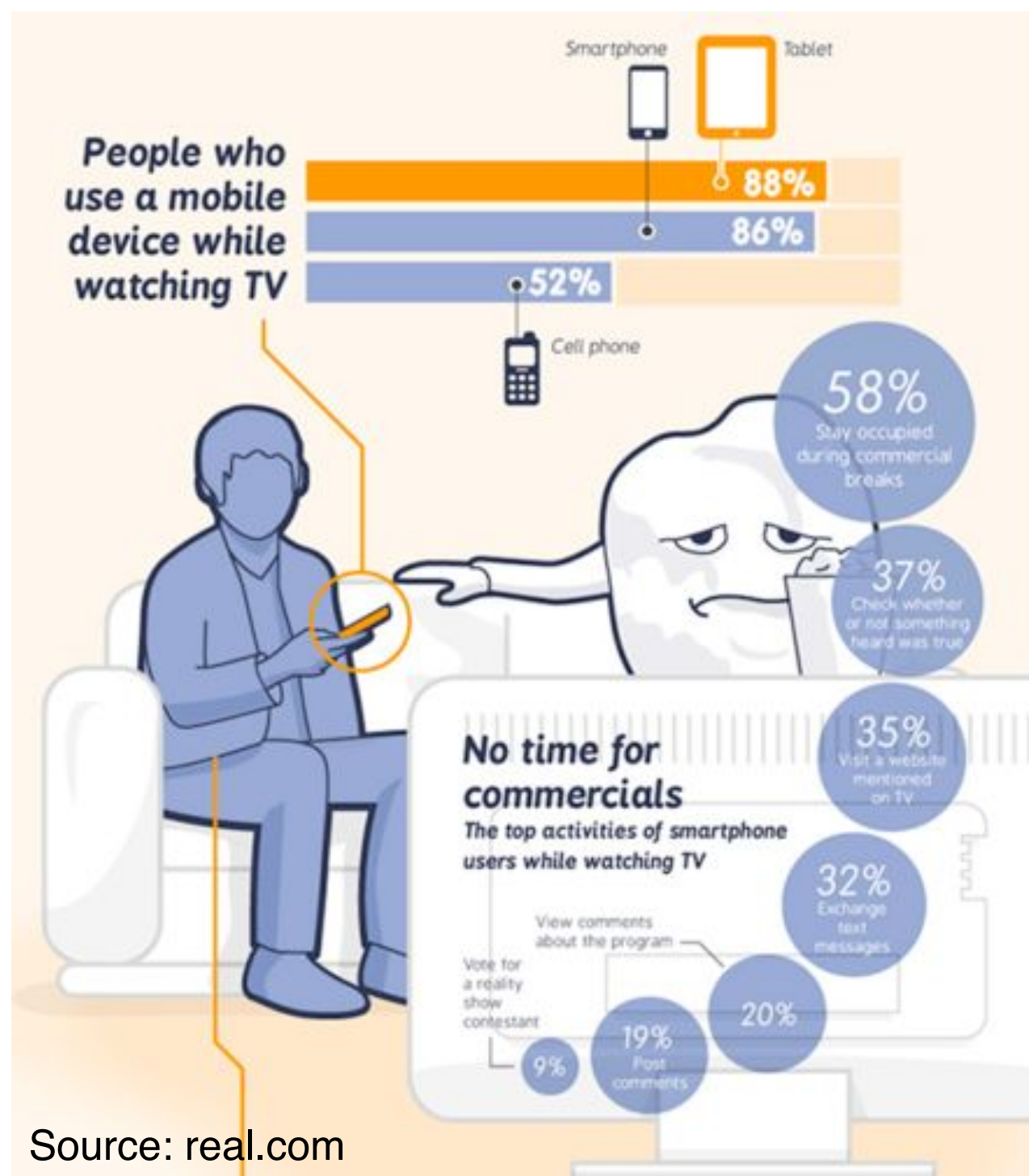


Picture: roku.com

“Second Screen” Usage



Image: ljclgroup.com



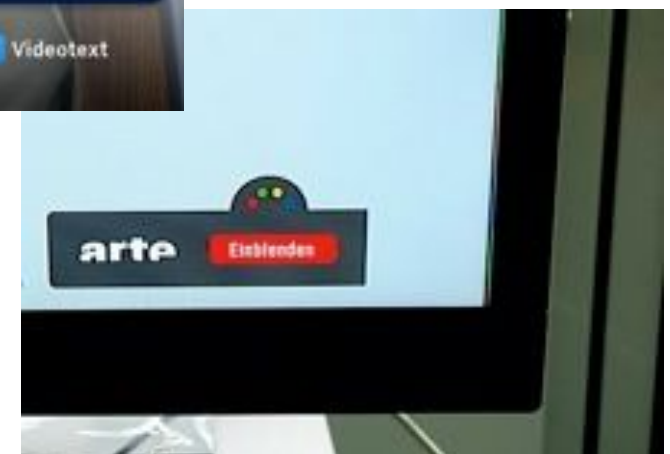
Source: real.com

Hybrid Broadcast Broadband TV (HbbTV)



- European initiative
 - Standardization through ETSI
 - Based on Multimedia Home Platform (MHP)
- Founding members of consortium:
 - ANT Software, EBU, France Televisions, IRT, OpenTV, Philips, Samsung, SES ASTRA, Sony, TF1
- Many additional supporters, e.g. from Consumer Electronics:
 - Haier, Humax, Loewe, Sharp, TechniSat, TopField, VBox
- Standard supported by devices from most major brands:
 - (additionally:) Grundig, LG, Telefunken, Toshiba, Panasonic
- Many broadcasters offer actual service:
 - ARD, ZDF, ARTE, RTL, SAT.1, Pro7, ...
- Basic idea:
 - Replacement for traditional videotext by bi-directional Internet channel
 - TV or Set Top Box to be connected to Broadband Internet

HbbTV Service Examples: Menus



“Red button” on Remote Control
for start/termination

HbbTV Service Examples: Mediatheken

ARD Mediathek 14.07.2011 | 09:51 Alle Mediatheken 3 Impressum 4

Tipps der Redaktion 3 / 15

10.07.2011 88 Min

Tatort: Schweinegeld

Im Kühlhaus seiner Fabrik wird der Berliner Fleischkönig Hans Merklinger tot aufgefunden. Der ...

aus: Tatort
Das Erste

Sendungen A-Z

A

Abendschau
Allina
alles wissen
Ansichten
ARD Buffet
ARD-Mittagsmagazin
ARD-Ratgeber: A
ARD-Ratgeber: B
ARD-Ratgeber: G
ARD-Ratgeber: G

Sendung verpasst?

HEUTE

Das Erste 8
Bayernische Fernsehzeitung
10.07.2011

Startleiste 0 Hilfe 1 Suche 2 Ausblenden

Navigation: < heute > Sendung verpasst Montag > Sendungen A-Z

ARD

Navigation: < + > < >

HbbTV Service Examples: Data Presentation

The screenshot displays the BR Bayerntext HbbTV service interface. The main content area shows a weather report for Bavaria on Thursday, September 29, 2011, at 16:26. The report states: "Wetter: Vielerorts sonnig, Höchstwerte 18 bis 26 Grad." Below the text is a map of Bavaria divided into regions: Unterfranken, Oberfranken, Mittelfranken, Oberpfalz, Schwaben, and Oberbayern. Each region has a weather icon and a temperature reading. A "Bericht" button is located at the bottom left of the weather section.

On the left side, there is a navigation menu with the following items: Seite 601, Startseite, Nachrichten, Bayern, Sport, Fernsehen, Radio, Wetter, Verkehr, BR-Intern, A-Z, and Hilfe.

On the right side, there is a section titled "Jetzt im Bayerischen" featuring a video thumbnail of a woman and a list of programs: 15.30 Wir in Bayern, 16.45 Rundschau, and 17.00 Das etwas andere Bier: Zoigl.

At the bottom, there is a navigation bar with buttons for "Bayern", "Regionen", "7-Tage-Wetter", "Bergwetter", "Deutschlandwetter", "Biowetter", and "Reisewetter". Below this bar is a legend for navigation controls: a red square for "Ein | Ausblenden", a yellow square for "Lesezeichen", a blue square for "Hauptmenu", and a white square with a black border for "BR Start".

HbbTV System Overview

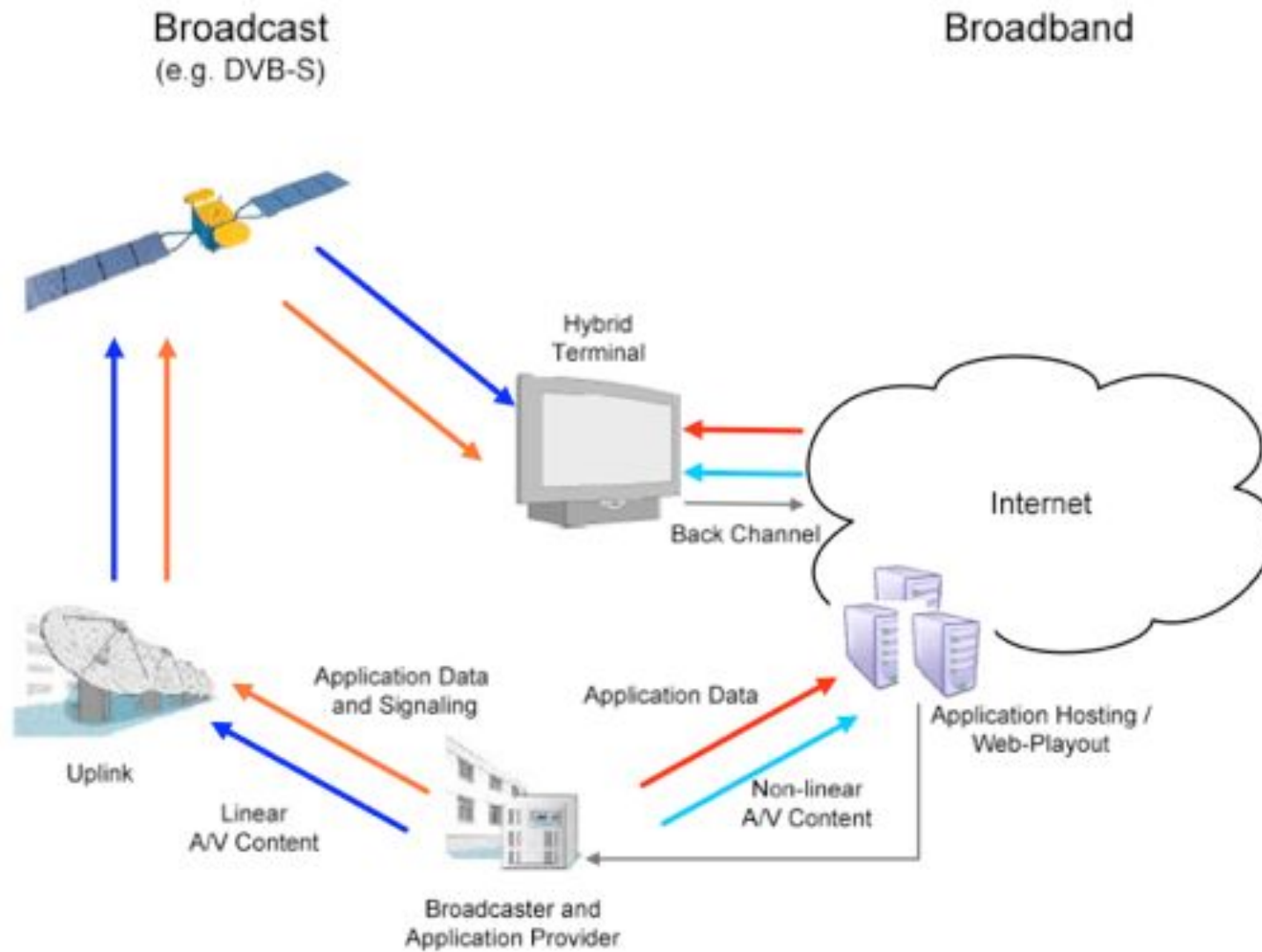
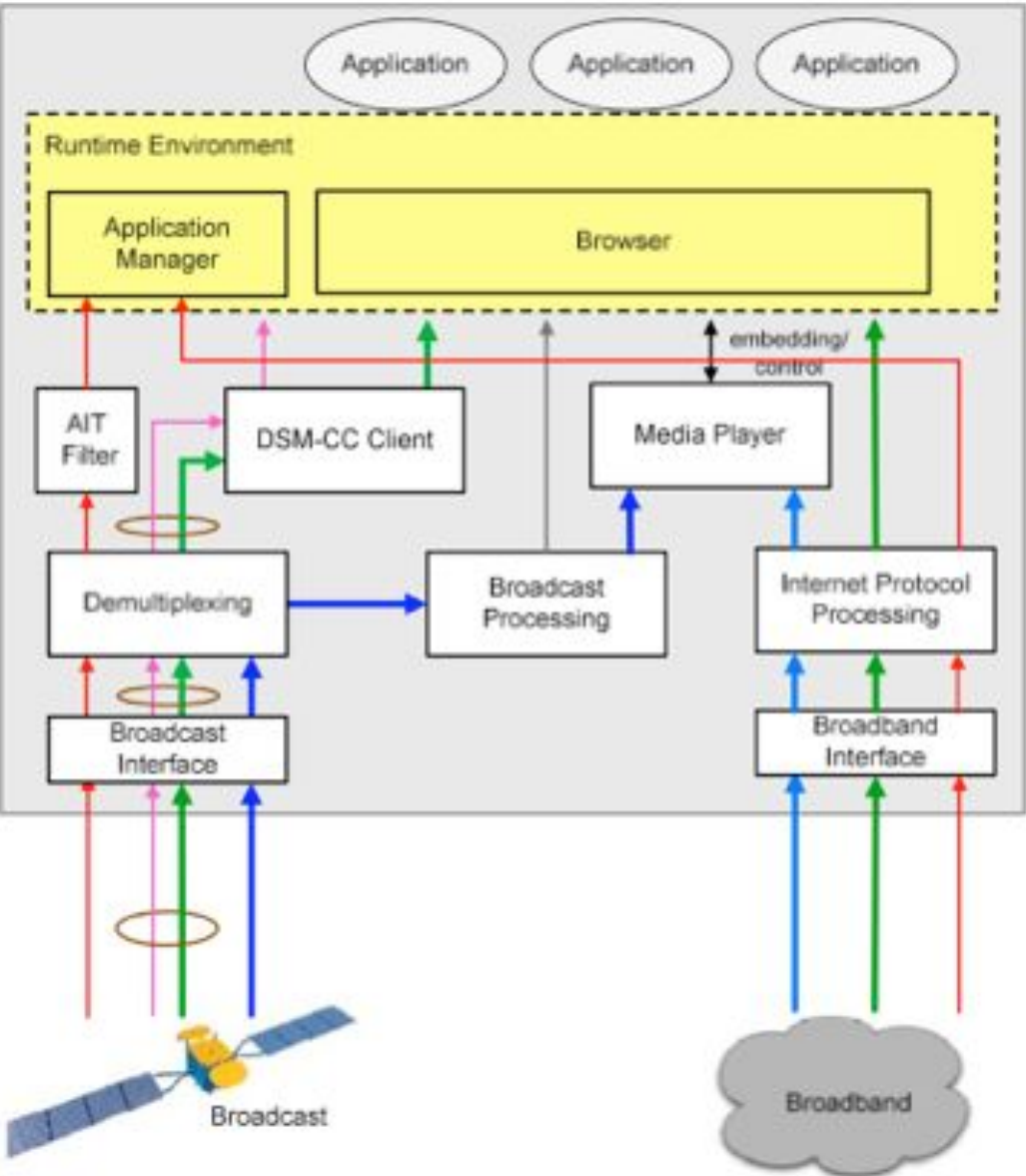
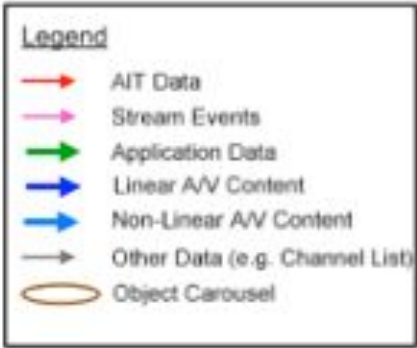


Figure 1: System Overview

HbbTV Terminal Functional Architecture

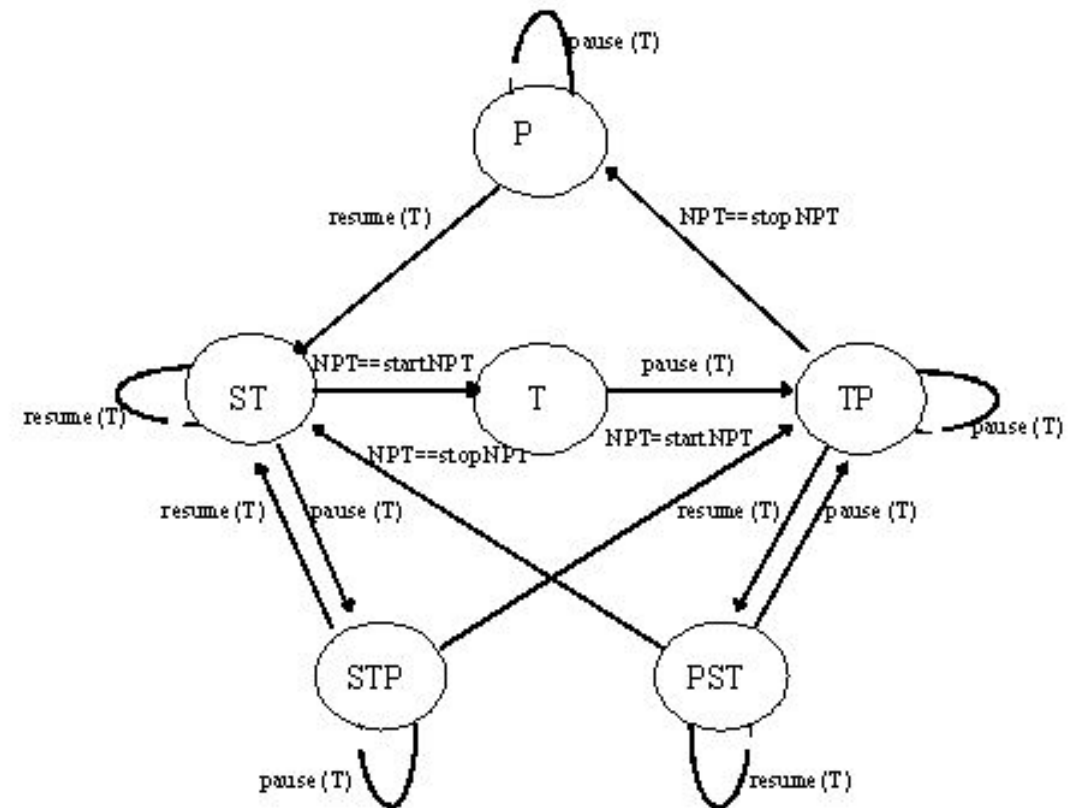


AIT = Application Information Table
 DSM-CC = Digital Storage Media –
 Command and Control



Digital Storage Media – Command and Control

- DSM-CC
 - Relatively old (1996) ISO/MPEG standard
 - Control interface for digital media delivery
- VCR-like control:
 - Covering client-server setup
 - NPT = Normal Play Time (user-related time scale)
- Multiplexed data embedded into transport stream
 - Data carousel
 - Object carousel



Content Formats in HbbTV

- Browser-based technology: CE-HTML
 - Developed by Consumer Electronics Organization (CEA-2014)
 - Adoption of HTML 4 and CSS to TV sets
- Dynamic interfaces based on JavaScript
 - Using additional, TV-specific APIs
- Declarative Application Environment (from OpenTV forum)
 - Applications based on ECMAScript, SVG, CSS
 - Dynamic DOM, including AJAX-style asynchronous requests
- Various standard image, audio and video formats
 - JPEG, GIF, PNG
 - MPEG1-L3, HEAAC, E-AC3
 - MPEG4 AVC (SD and HD)

Streaming support in HbbTV

- From the HbbTV specification:
- “7.3.2.1 Protocols for streaming
 - Unicast streaming using HTTP 1.1 shall be supported as defined in clause 5.2.2.2 of the OIPF protocols specification [4] with the addition that the range header shall be supported in seek operations. The terminal should only buffer data equivalent to approximately 10 seconds of normal play in advance of the current play position unless the download rate is consistently lower than the consumption rate.
 - Where unicast streaming of non transport stream based MPEG4/AVC video and MPEG/AAC audio using RTSP and RTP is supported, this shall be as defined by clauses 6, 7 and 8 of ISMA [6]. The terminal shall support the "Interleaved RTSP & RTP/AVP over TCP transport" method. For audio and video the restrictions of the present document apply.”
- OIPF = Open IP TV Forum, see www.oipf.tv

HbbTV: Further Development

- HbbTV 2.0 standard:
 - Expected to be finalized early in 2015
 - First devices second half of 2015
 - To be implemented in large scale from 2016 on
- Proposed features:
 - Improved support for HTML5
 - Companion screen app launching and synchronization
 - Push VOD support
 - Improved support for ad insertion
 - Improved synchronization between media and applications
 - Support for HEVC video
 - Improved support for MPEG DASH

Sources: http://www.w3.org/2013/10/tv-workshop/papers/webtv4_submission_11.pdf
<http://www.v-net.tv/hbbtv-20-to-go-mainstream-in-2016>

10 Web Radio, Web TV and IPTV

10.1 Web Radio

10.2 Web TV

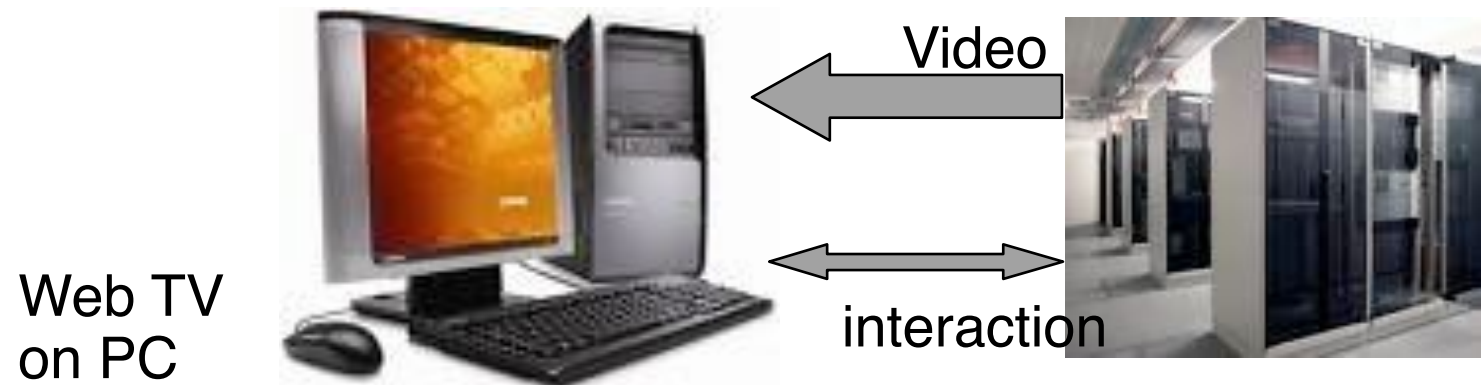
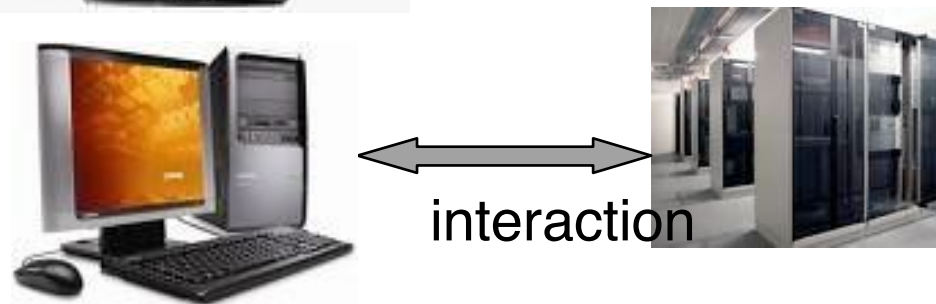
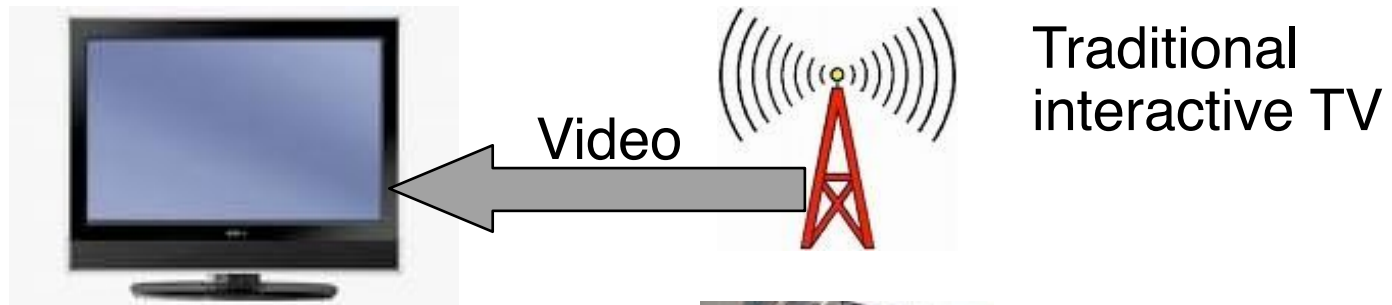
10.3 Interactive TV

10.4 Audio and Video Streaming over IP

Literature:

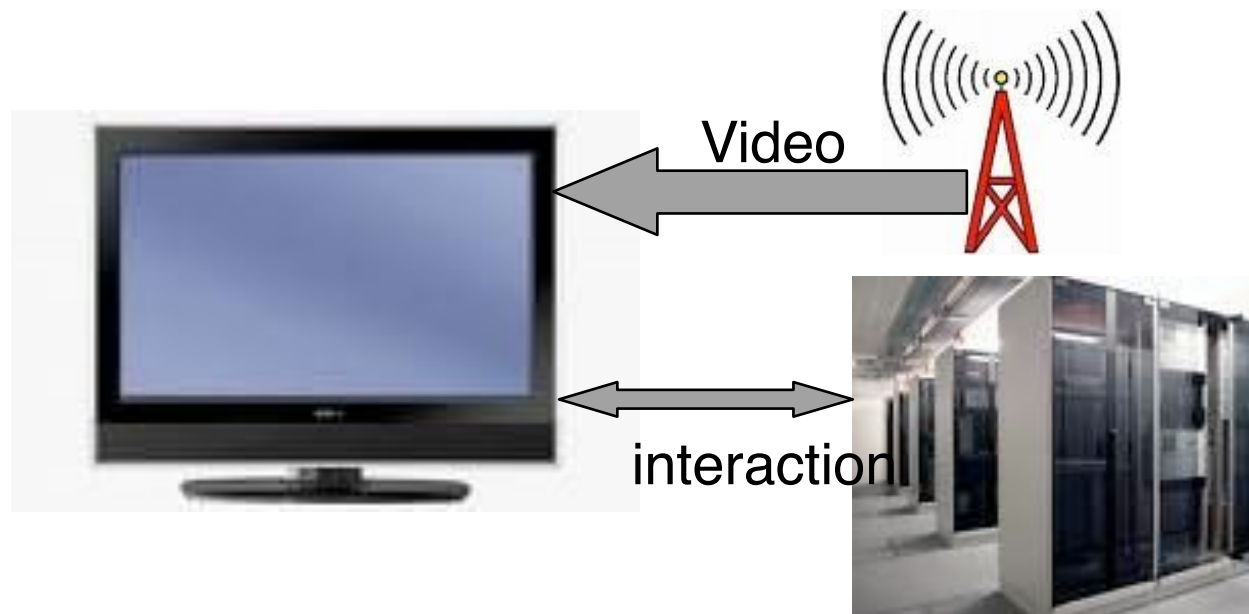
Johan Hjelm: Why IPTV? Interactivity, Technologies and Services,
Wiley 2008

Traditional TV, Web TV and IPTV (1)

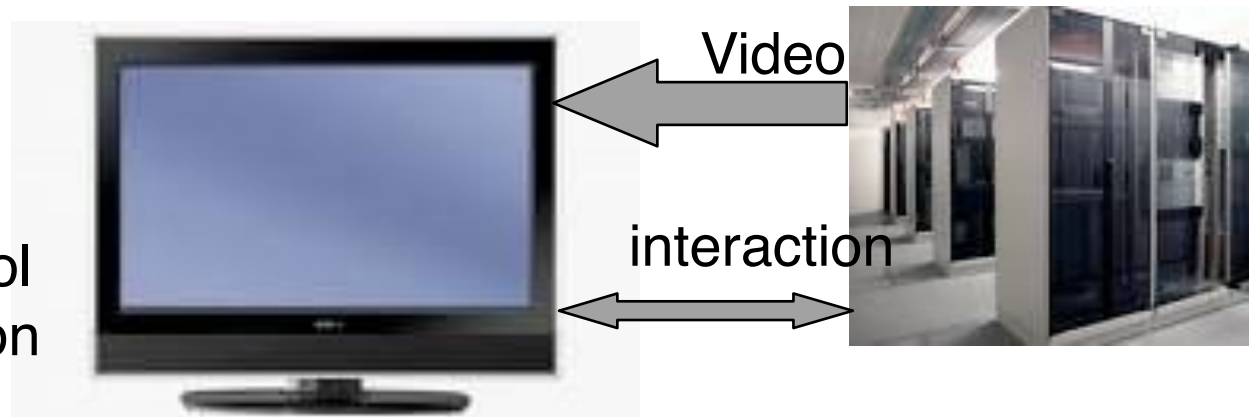


Traditional TV, Web TV and IPTV (2)

SmartTV,
HbbTV



IPTV =
Internet Protocol
Based Television



TV programme is carried over Internet, no radio broadcasting or TV cable

Profile & Presence

- Users need to be authenticated for IPTV
 - Subscription management
- *Presence* information can be valuable for interactive TV
 - Who is online?
 - Who of my friends is watching this?
 - Real-time recommendations
- Presence can be managed in two ways:
 - Server/application based (e.g. Skype), heterogeneous solutions
 - Network based standard solutions (e.g. presence support in IMS, based on 3GPP)

Media Streaming in Home Networks

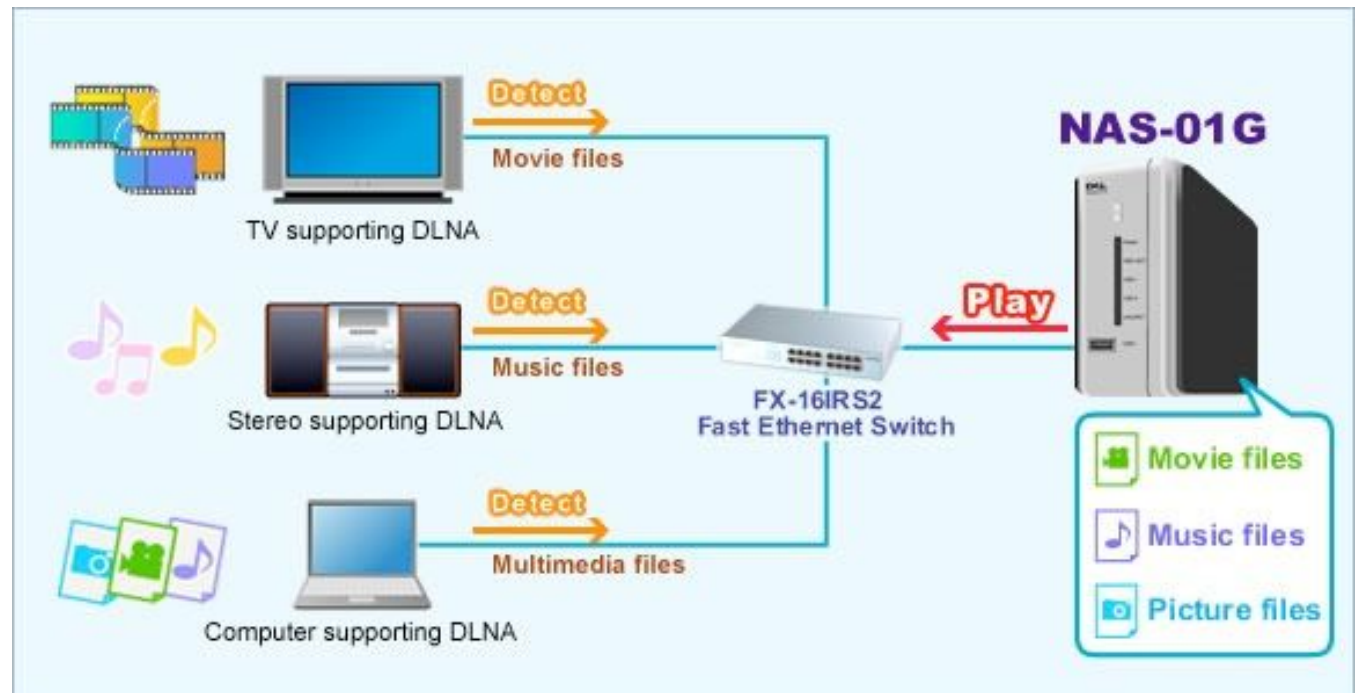
- Streaming solutions for the home network:
 - Streaming audio, video and images from server to clients (e.g. TV set)
 - Streaming audio and video from CE devices
 - » e.g. TV program from TV tuner to mobile devices
- Dominating standard:
DLNA
(Digital Living Network Alliance)
 - based on Universal
Plug and Play (UPnP)



DLNA: Streaming Protocols and Media Formats

- Streaming:
 - HTTP 1.1 streaming over TCP as standard method
 - RTP streaming optional
- Media formats:
 - JPEG, LPCM, MPEG-2 as standard formats
 - Other formats optional: MP3, AAC, MPEG4, ...

planex.net



Streaming Technology Applications 2014

- IP networks tend to replace all traditional networks
 - Phone network
 - Home networks
 - Broadcast networks (partially)
- IP and Web technology creates a huge amount of flexibility for product solutions
- Intelligent solutions for home entertainment and commercial use are on the market and rapidly developed
 - Key problem is user acceptance and usability

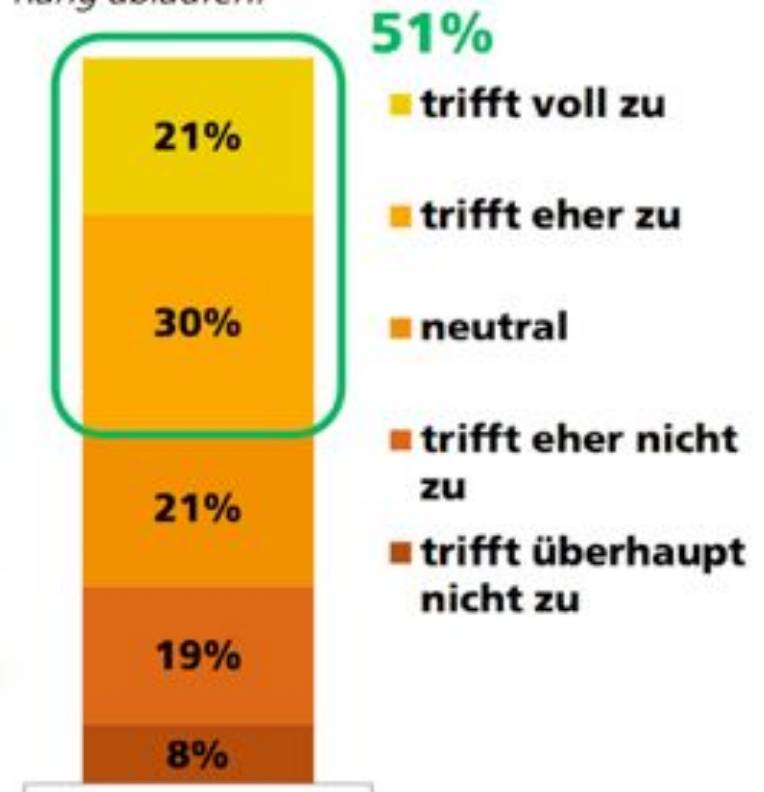
telekom.de



WebTV and Traditional Broadcast TV

Einschätzung: Web-TV und klassisches TV

„Die Nutzung von Web-TV wird zukünftig dem klassischen TV den Rang ablaufen.“



www.webtvmonitor.de

Quelle: Goldmedia, BLM Web-TV-Monitor 2012, n=198 von 1.424 Angeboten
Bild: iStock_000012822690XSmall_TVrss_Motiv_Talaj