

11 Internet Radio & Internet TV

11.1 Internet Radio

11.2 Internet TV

11.3 Interactive TV: Dream or Reality?

Literature:

Chris Priestman: Web Radio, Focal Press 2002

<http://www.webradiomonitor.de>

A British Radio Pioneer

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 direct¹ 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 passage² between them.”

1: “thought with ether direct” indicates brain-computer interfaces!

2: “free passage between them” indicates bi-directionality!

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 as a decentralized, democratic medium
 - Internet radio removes the frequency shortage constraint
 - Internet radio removes spatial constraints (global medium)
 - Internet radio drastically reduces production cost

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

What Is Web Radio (Internet Radio)?

- Web radio is about *real-time audio streams*
 - Transported over IP
- Continuous audio content
 - Delivered to large audience, in *identical form for all listeners*
- Linear service
 - No pause/rewind
 - No download
 - No “on demand” service



Categories and Examples of Internet Radio

- Online-Only Web Radio
 - Produced only for distribution over Internet
- Simulcast
 - Traditionally produced program, broadcasted and streamed
 - Sometimes online-only sub-brands
- Music platforms
 - Music archive with playlists and radio
- User-Generated Radio
 - Users produce playlists and radio program
- Radio Aggregators
 - Bundling of various offers in one interface



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:
 - Playback device: Computer, smartphone, speaker systems, network player

Internet Radio Devices – Pioneers



Start-up company 1998
– Acquired by 3Com in 2000

Kerbango radio appliance
– Interface design partially
by Jim Reekes
(Apple QuickTime team)
– Never released
(terminated March 2001)
– Embedded Linux
– RealNetworks player



Internet Radio Devices – Pioneers

Start-up company 2000

- Renamed iM Networks
- Various license deals



Device set (Sonicbox/iRhythm)

- Base station, connected to PC
- Receiver, connected to stereo system
- Portable remote control
- Wireless operation (900 MHz band)

Internet Radio Devices – Milestones: Squeezebox



SliMP3 (2001)

Wired Ethernet only, MP3 only

Start-up company

"SlimDevices" 2000

- Acquired by Logitech 2006
- US-\$ 20 mio.



Squeezebox 2 (2005)

WiFi, many formats



Logitech Squeezebox
Radio (2009)

Internet Radio Devices – Milestones: Pure Flow



PURE (UK)

- Established 2002
- Part of
Imagination Technologies

PURE Evoke Flow (2008)

- Portable Device
- DAB + Internet Radio
- Database of Internet radio offers
- FM radio

Internet Radio Devices Since 2010 – Broad Range of Products



Dual IR 7 S

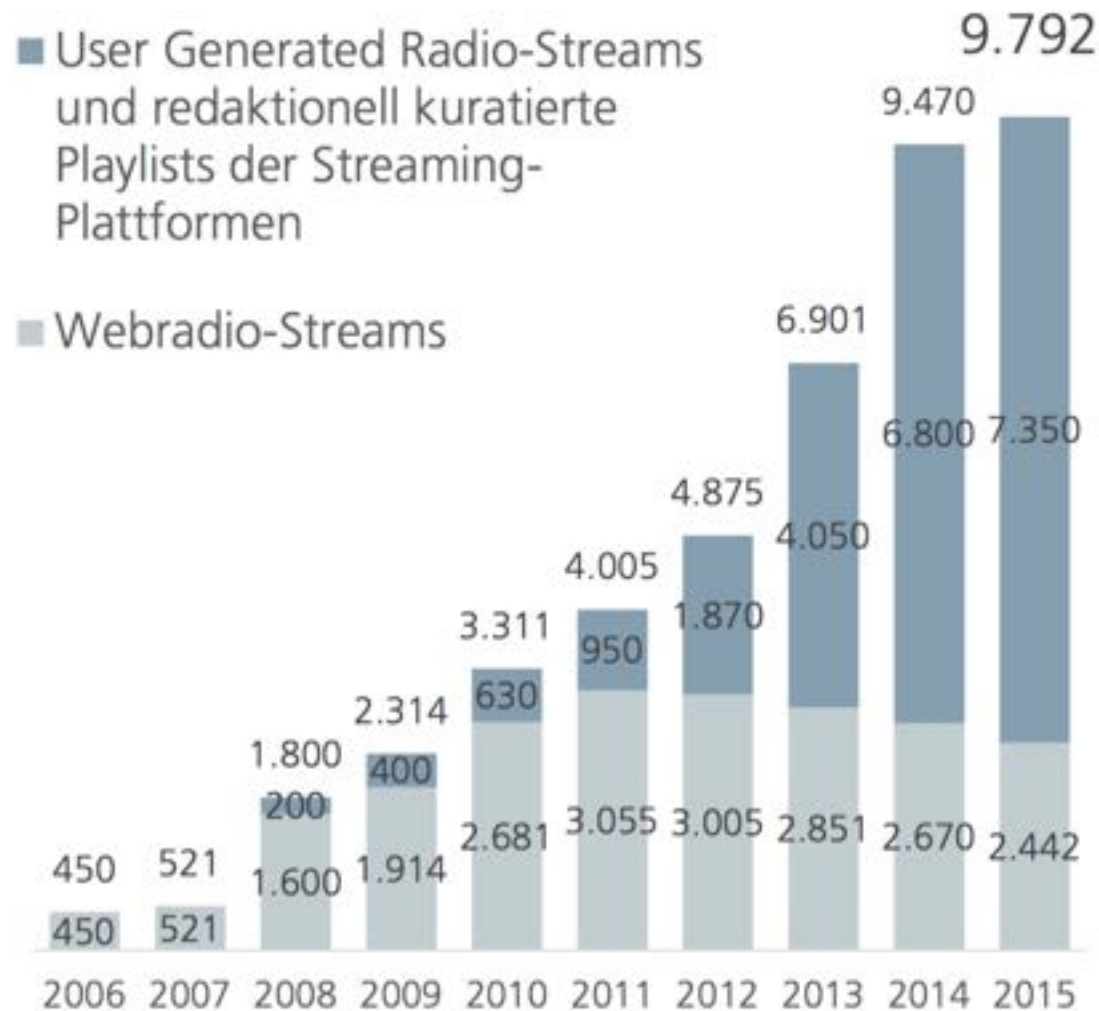
- Internet radio
- Spotify
- Local media
- DAB+
- FM

Cambridge Audio CNX

- High-end streaming player
- Spotify
- AirPlay, Local media
- Bluetooth



Internet Radio Market (1)



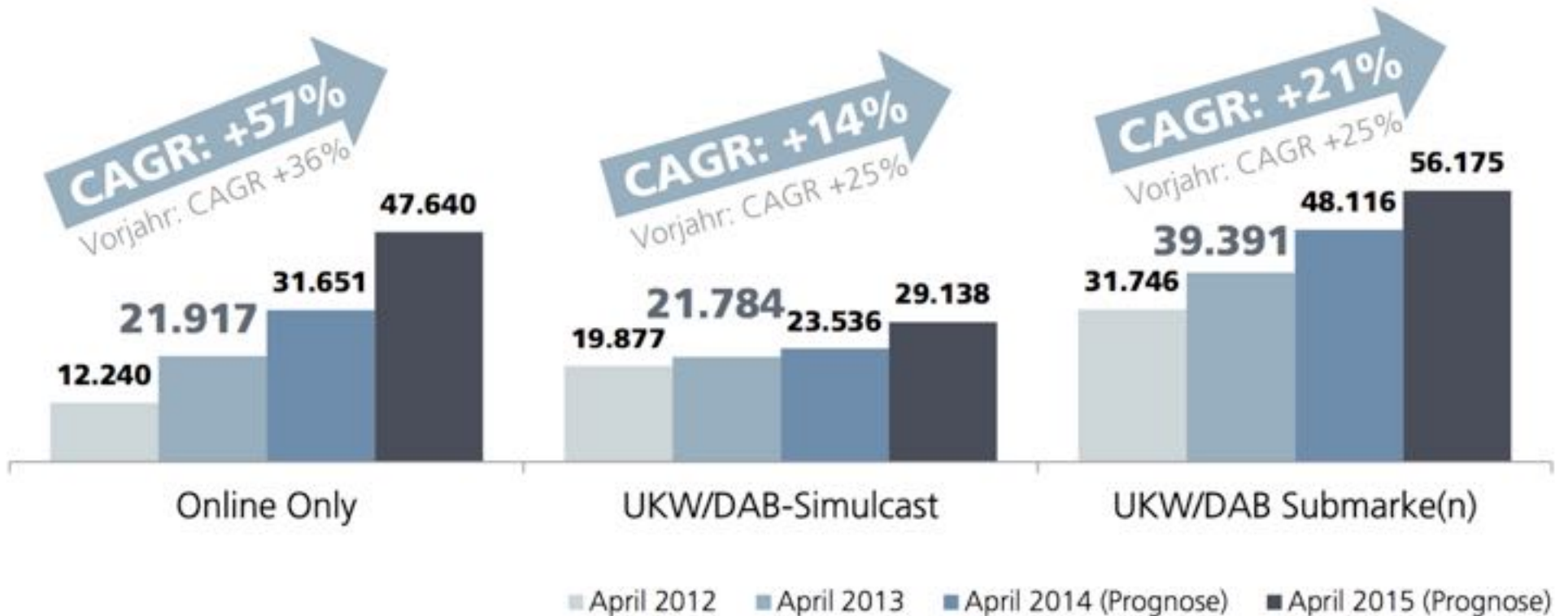
Quelle: Webradiomonitor 2015

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

Traditional Web radio streams decreasing, other streaming services grow fast

Internet Radio Market (2)

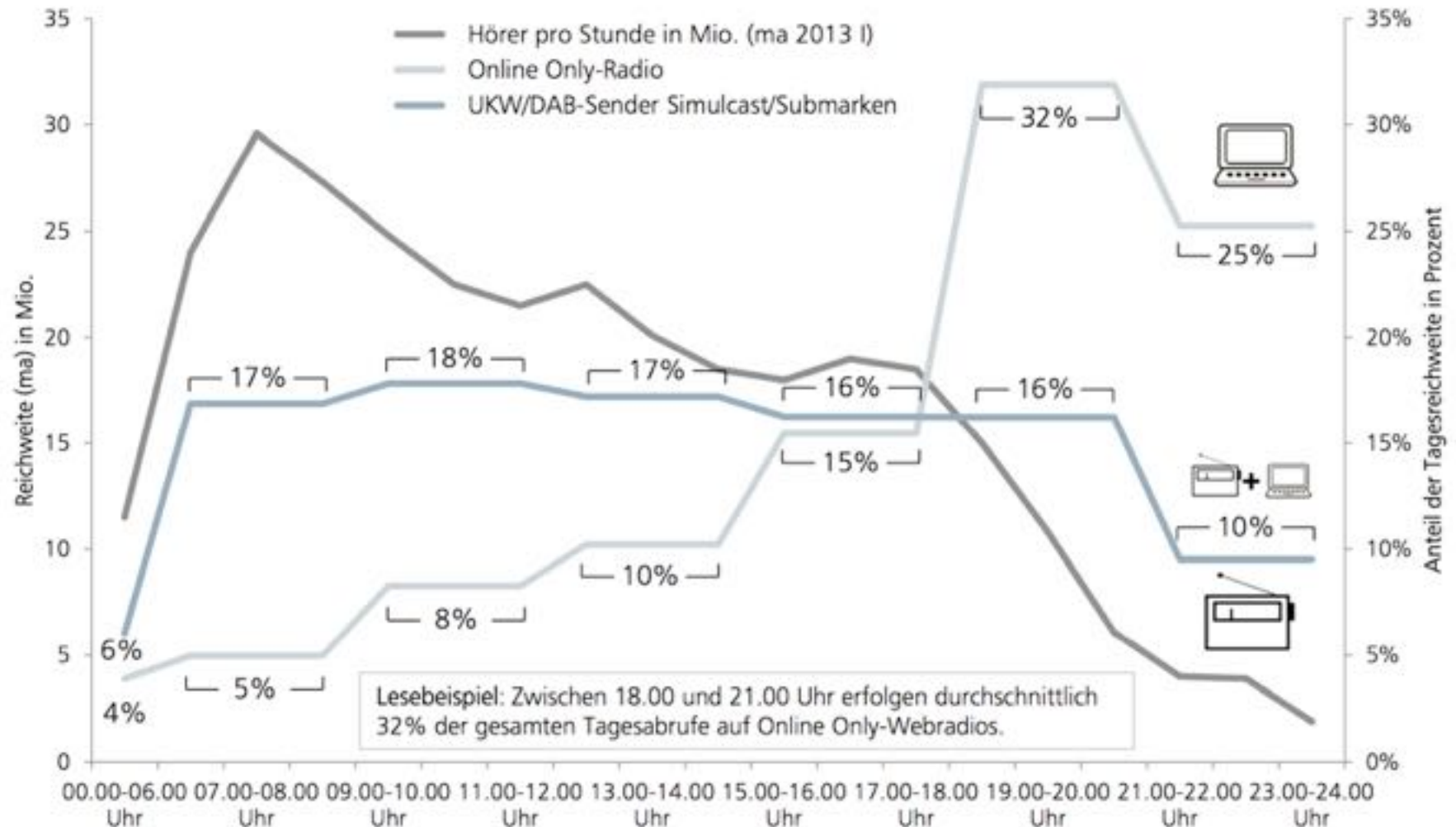
Zahl der durchschnittlichen Abrufe pro Webradiostream pro Tag in Dt. 2012-2015



www.webradiomonitor.de

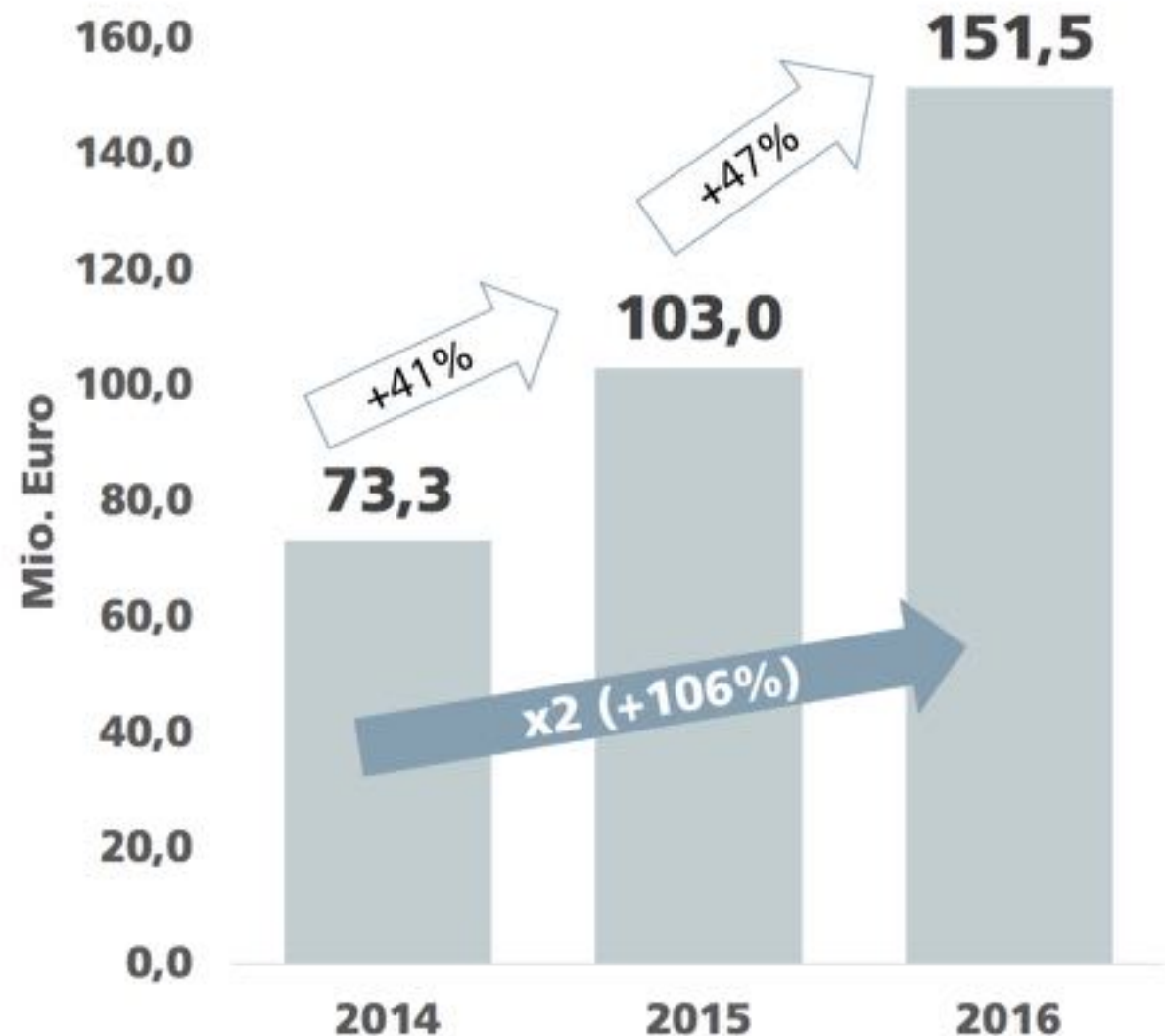
Internet Radio Market (3)

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



Internet Radio Market (4)

Advertisement Revenues from only audio



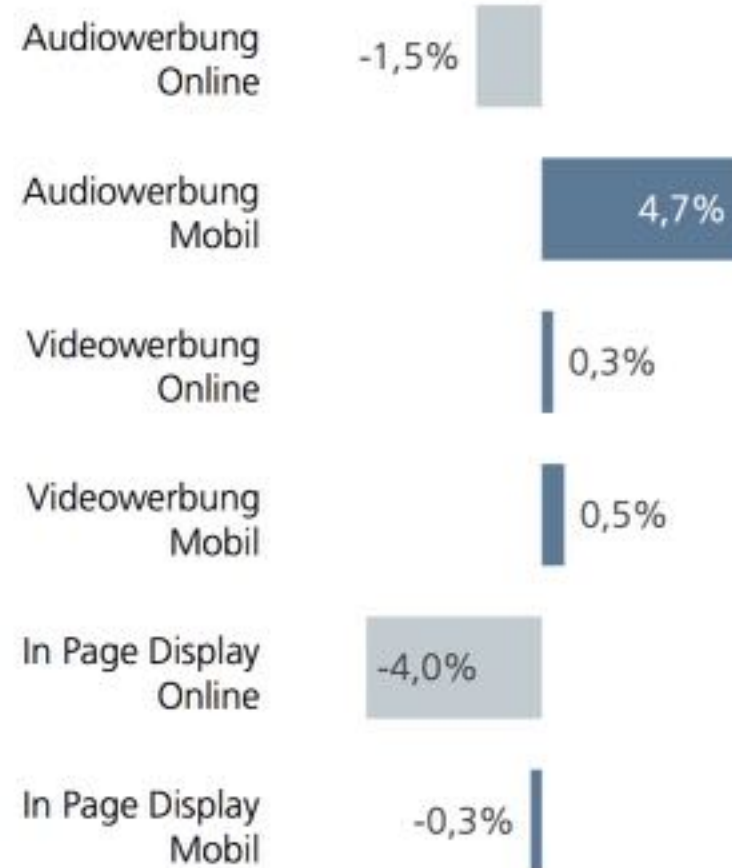
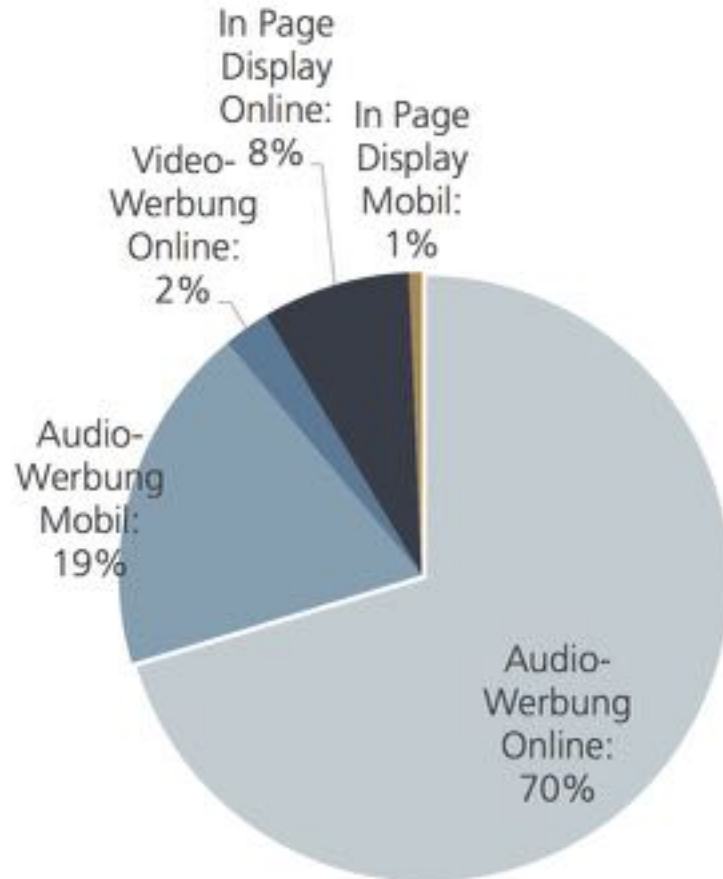
Marktwachstum Online-Audio-Werbemarkt (brutto) 2014-2016 in Mio. Euro in Deutschland

Quelle: Webradiomonitor 2015

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

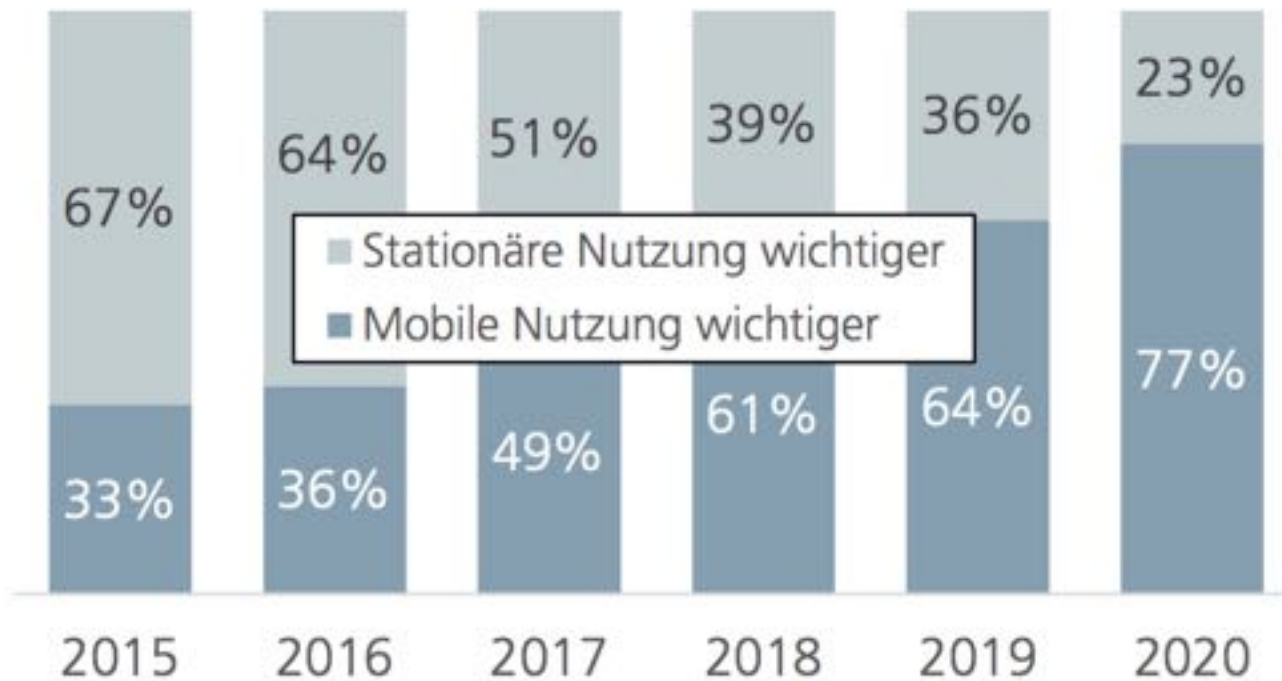


Quelle: Webradiomonitor 2014,
Basis: Angaben von Online-Audio-Anbietern mit Werbung im Umfeld des Angebots, n=121

Eine Studie im Auftrag der [LMU](#) und des [BVDW](#)

Trend: Mobile Usage of Web Radio

Erwartete Entwicklung stationärer vs. mobiler Nutzung von Online-Audio-Angeboten bis 2020



Quelle: Webradiomonitor 2015, n=415 befragte Online-Audio-Anbieter

Web Radio / Music Shop Integration 2004

The screenshot displays the Antenne Bayern website, which integrates a web radio player and a music shop. The left sidebar features the 'Webradio Antenne Bayern' logo, navigation links for 'Antenne Bayern' and 'Rockantenne', and a 'powered by TISCAU' logo. The main content area shows the current broadcast information: 'Aktuelle Sendung: Extra' and 'Aktueller Titel: ANASTACIA, SICK AND TIRED'. A music player is visible with the text 'Playing 65Kbps 4:34 / Live' and a news snippet: 'News: Frankfurter Polizei-Vize zu Geldstrafe verurteilt...'. The right sidebar contains a 'Music Shop' section with a search bar, a 'Schnellsuche' button, and a list of categories including 'Rock & Pop Hits', 'Pop Angebote', 'Jazz Hits', 'Klassik Hits', 'DVD Hits', and 'Video Hits'. Below this is a 'Service' section with links for 'Warenkorb', 'Kontakt', and 'AGB'. The main content area on the right shows search results for 'ANASTACIA, SICK AND TIRED', including a search bar, a 'Seite drucken' button, and a table of results.

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
 powered by TISCAU

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 9 10

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



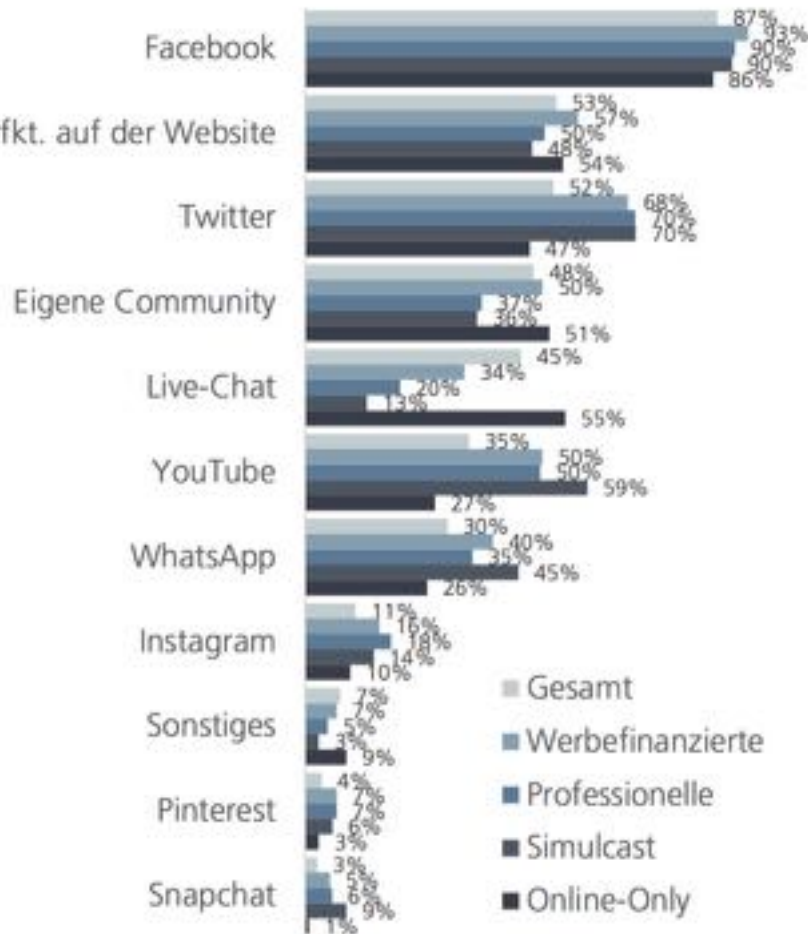
Web Radio / Music Shop Integration 2015



Full text search in amazon.de music downloads

Trend: Social Radio

Platforms used for interaction with listeners



Welche Interaktionsplattformen werden zukünftig an Bedeutung gewinnen? 2015



Quelle: Webradiomonitor 2015, Quelle: Webradiomonitor 2015, n=310 befragte Online-Audio-, n=134 Werbefinanzierte/n=105 professionelle Anbieter (haupt- oder nebenberuflich)/ n=69 UKW/DAB+-Simulcast-Anbieter/n=241 Online-Only-Anbieter

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
- Hybrid broadband radio



Current research project (Bavaria, LMU MDS):

- Integration broadcast/IP distribution
- Integration of media sources
- Personalization of media stream

11 Web Radio, Web TV and IPTV

11.1 Internet Radio

11.2 Internet TV

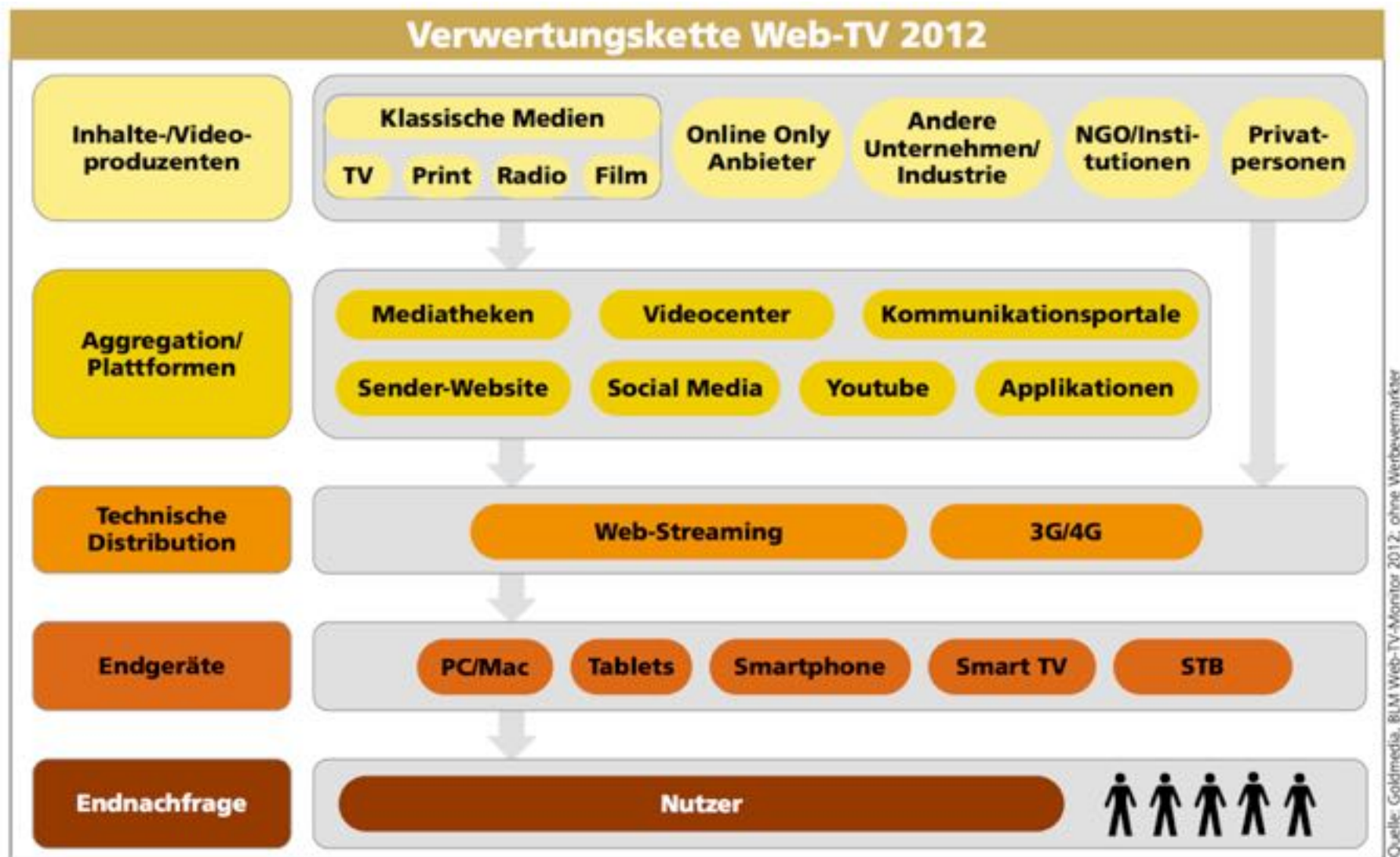
11.3 Interactive TV: Dream or Reality?

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

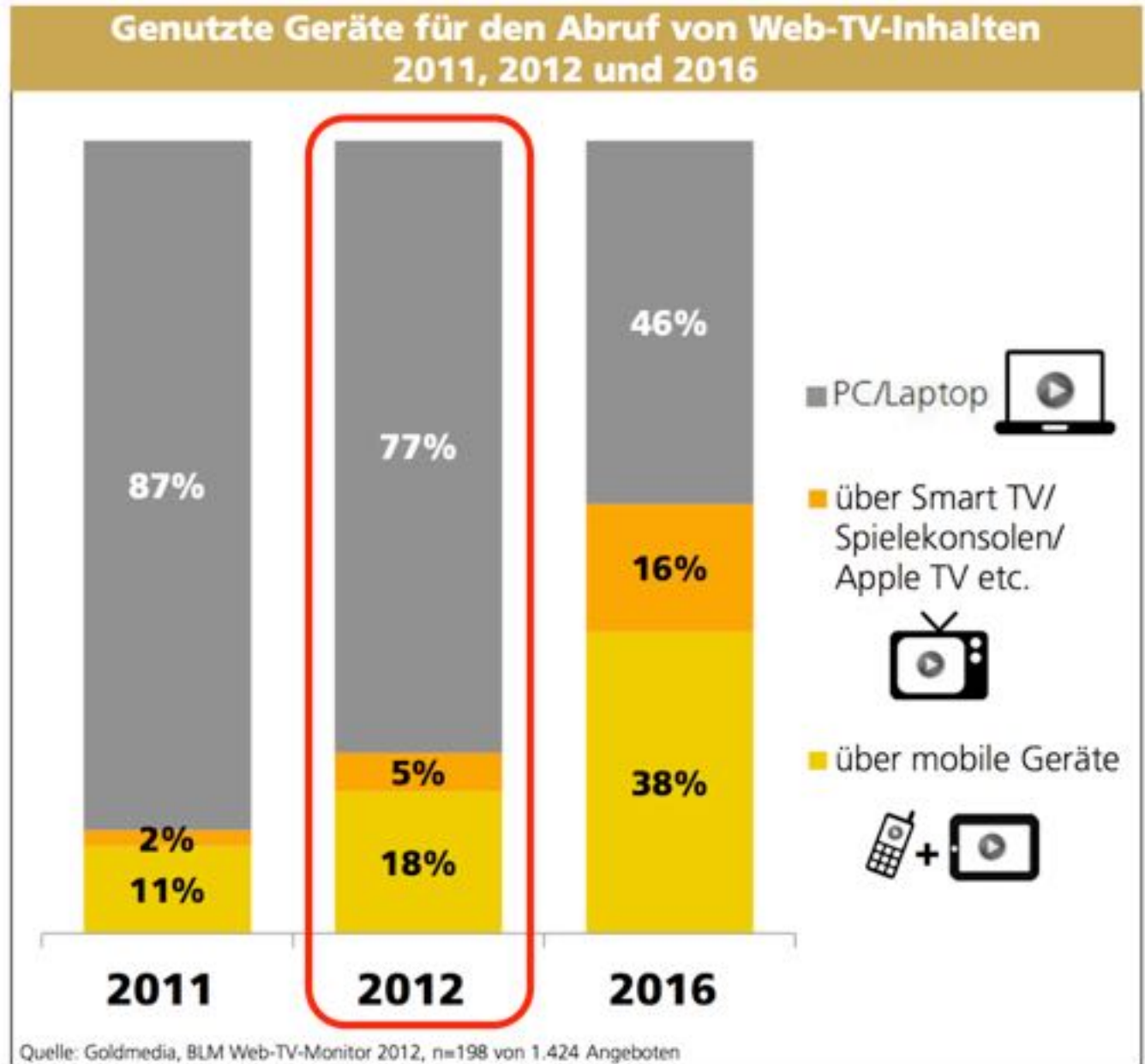
www.webtvmonitor.de
only until 2012!



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)

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 Resiprolity - Jetzt kostenlos!
 • 6% mit BMW SparInvest. 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 | **MEISTGESEHEN**

- 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
- 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 götig war Mohammed noch nie

VIDEOS
Plötzlich in der ersten Reihe Sarkozy erntet Spott für Drängelei beim Schweigemarsch
14.01.15 – 01:09 min

11 Web Radio, Web TV and IPTV

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11.3 Interactive TV: Dream or Reality?

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 programs

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 programs:
 - Players, team history, medal counts, ...
- Customized information in news programs:
 - News tickers, headlines, travel news customized for individual viewer (selected by set top box)

Screenshot from Interactive Version of Baywatch

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

See behind the scenes photos of filming at sea.

Alaska Airlines

DIVE BOAT

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.

BAYWATCH INTERACTIVE EXIT HELP WEB

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™
™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

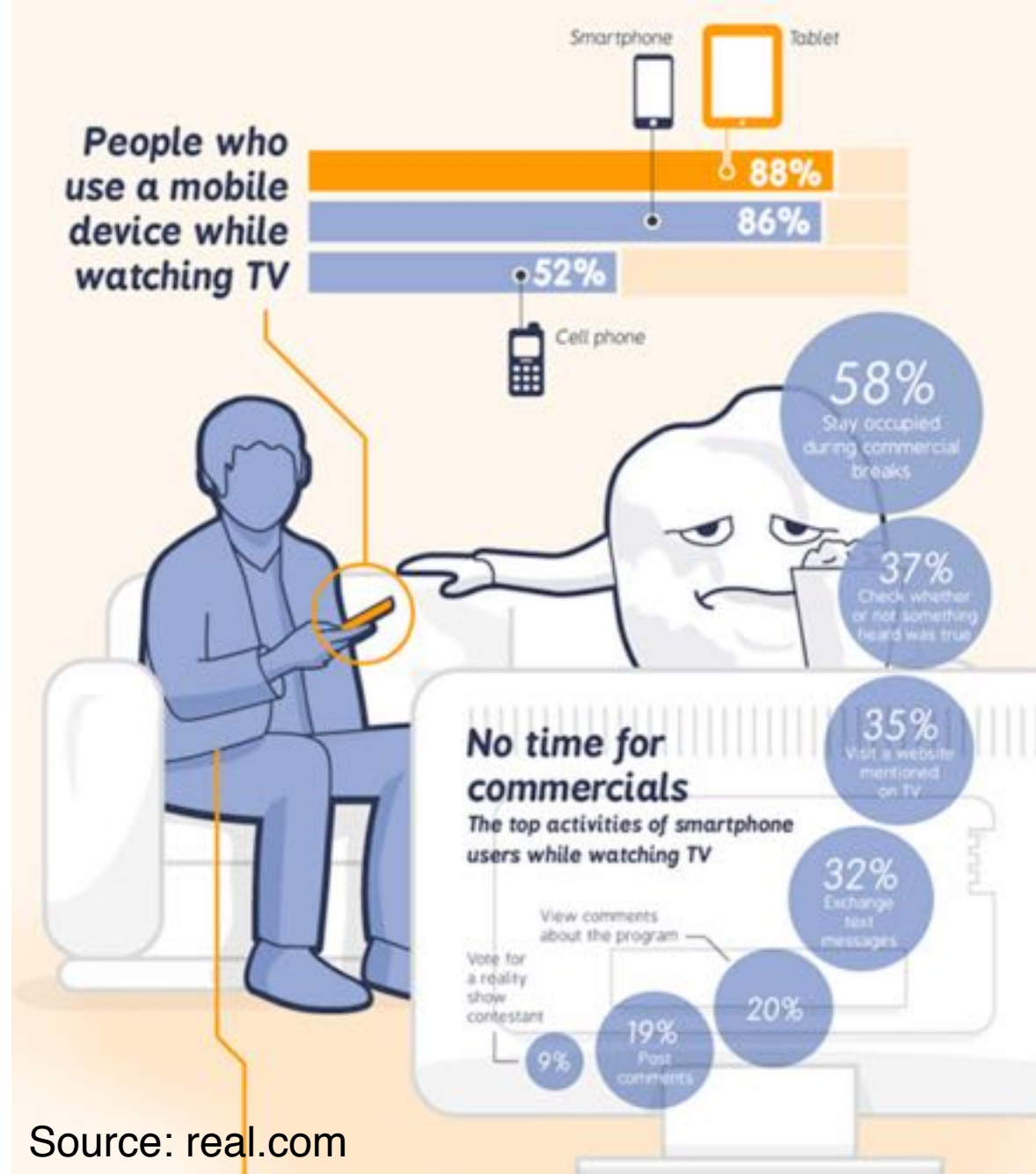
“Second Screen” Usage



“Lean forward”

“Lean back”

Image: ljclgroup.com



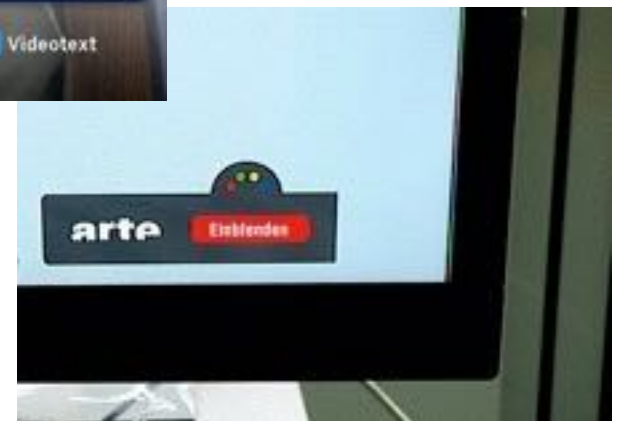
Source: real.com

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 connected to Broadband Internet



HbbTV Service Examples: Menus



“Red button” on Remote Control for start/termination

HbbTV Service Examples: Mediatheken



HbbTV Service Examples: Data Presentation

The screenshot displays the BR BayernTEXT HbbTV service interface. The main content area is titled "Wetter" and shows the date "Donnerstag, 29.09.2011 | 16:26" and the weather forecast "Vierorts sonnig, Höchstwerte 18 bis 26 Grad." Below this is a map of Bavaria divided into regions: Unterfranken, Oberfranken, Mittelfranken, Oberpfalz, Niederbayern, Schwaben, and Oberbayern. Each region has a weather icon and a temperature value. 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", "Bio-wetter", and "Reisewetter". Below the navigation bar, there are four icons with labels: "Ein | Ausblenden", "Lesezeichen", "Hauptmenu", and "BR Start".

HbbTV System Overview

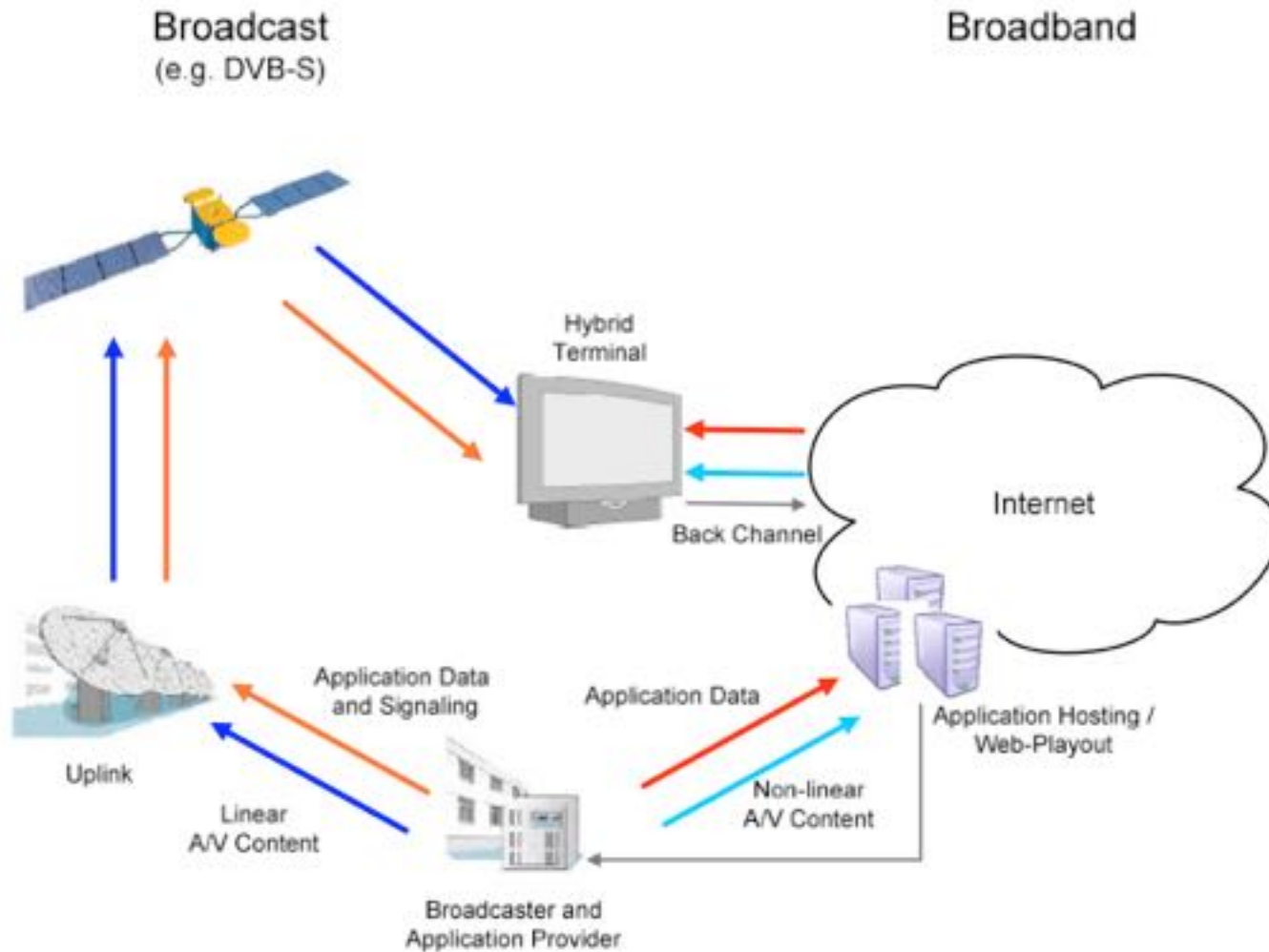
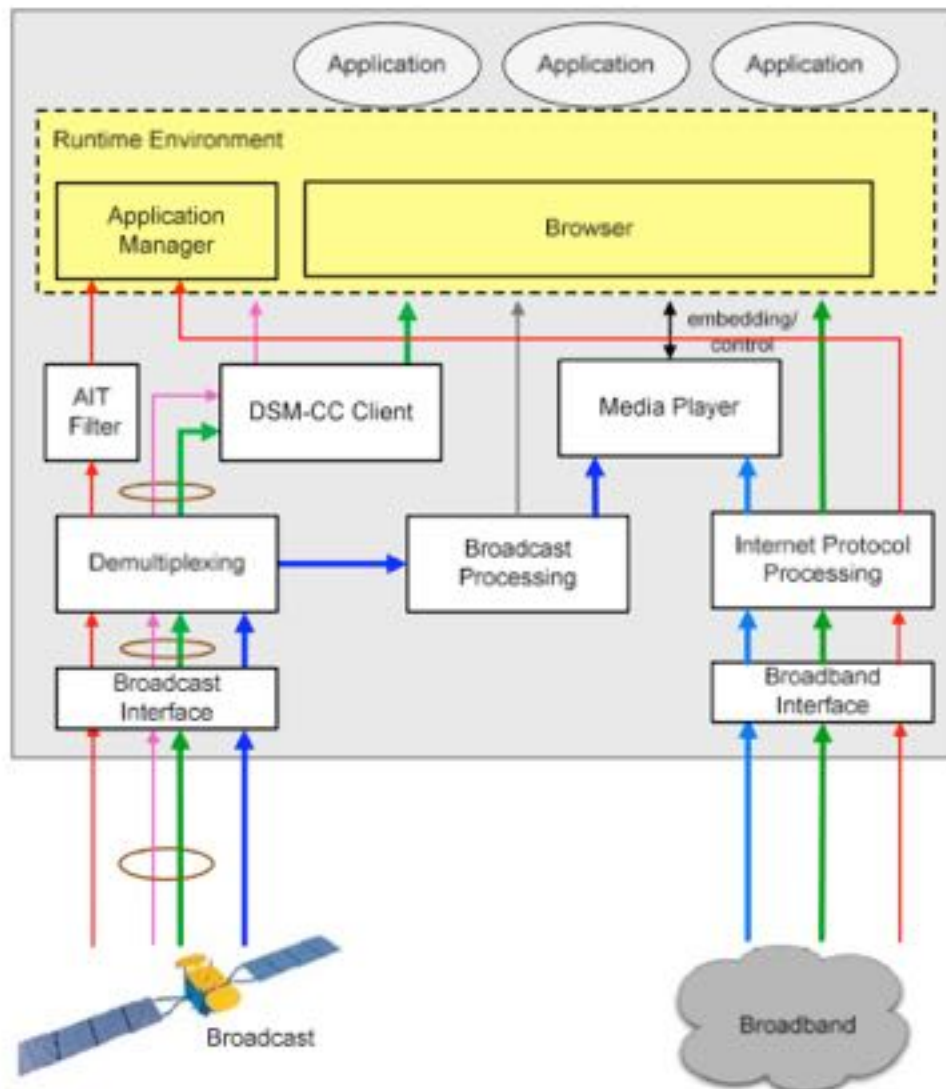
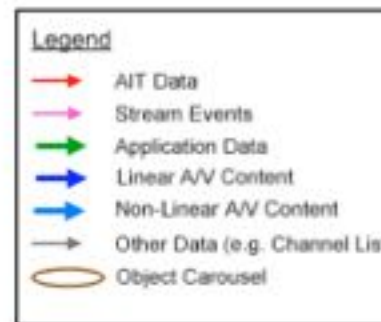


Figure 1: System Overview

HbbTV Terminal Functional Architecture

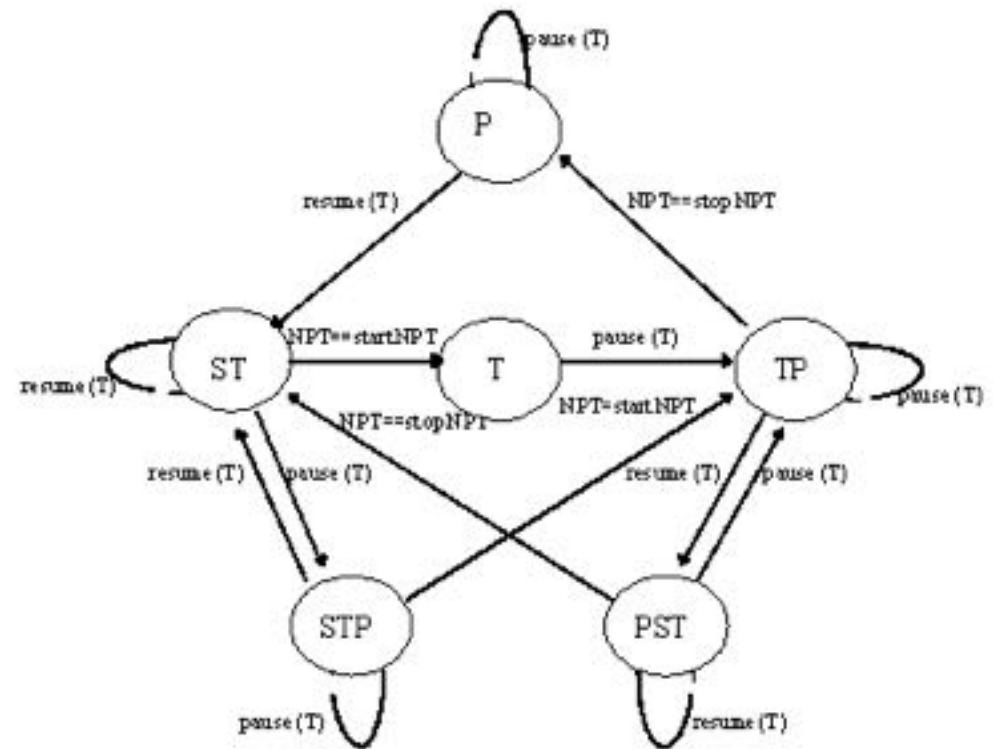


AIT = Application Information Table
 DSM-CC = Digital Storage Media –
 Command and Control



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 (1.5)

- 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

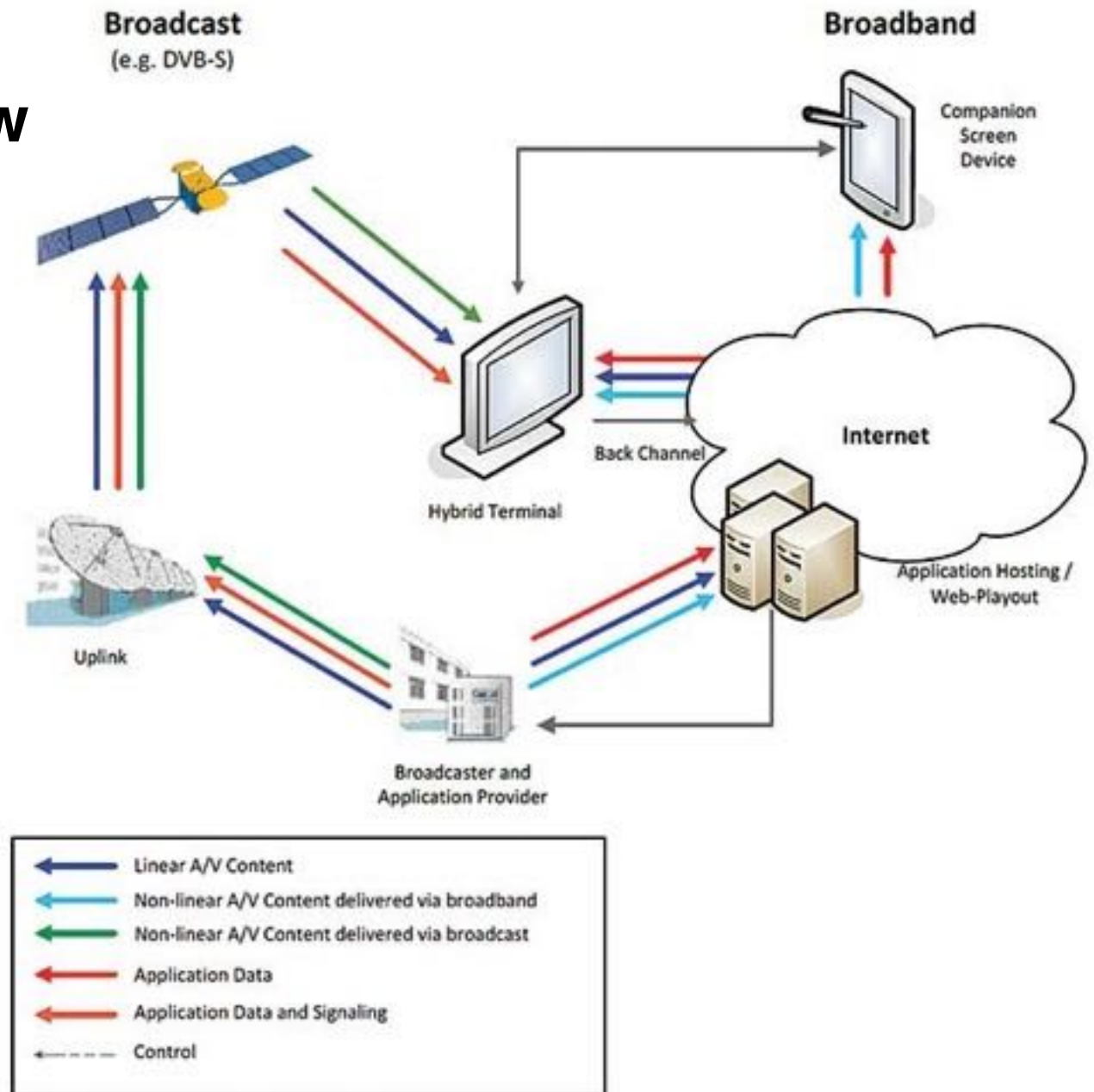
HbbTV 2.0

- HbbTV 2.0 standard:
 - Published February 2015
 - To be implemented in large scale from 2016 on
 - Increasing interest from outside Europe (in particular ATSC 3.0 in U.S.)
- New features:
 - Strong support for HTML5 and related technologies (CSS3, DOM Level 3, Canvas 2D, Web Sockets, Web Workers, Web Storage)
 - Support for HEVC video (in particular Ultra-HD content)
 - Companion screen app launching (both ways) and synchronization
 - Improved support for ad insertion in VOD
 - Improved support for MPEG DASH
 - Multi-stream synchronization (e.g. foreign soundtrack on companion device)
 - Exploitation of innovative user input devices (e.g. wands)

Sources: <http://www.hbbtv.org>

<http://www.streamingmediaglobal.com/Articles/ReadArticle.aspx?ArticleID=107751>

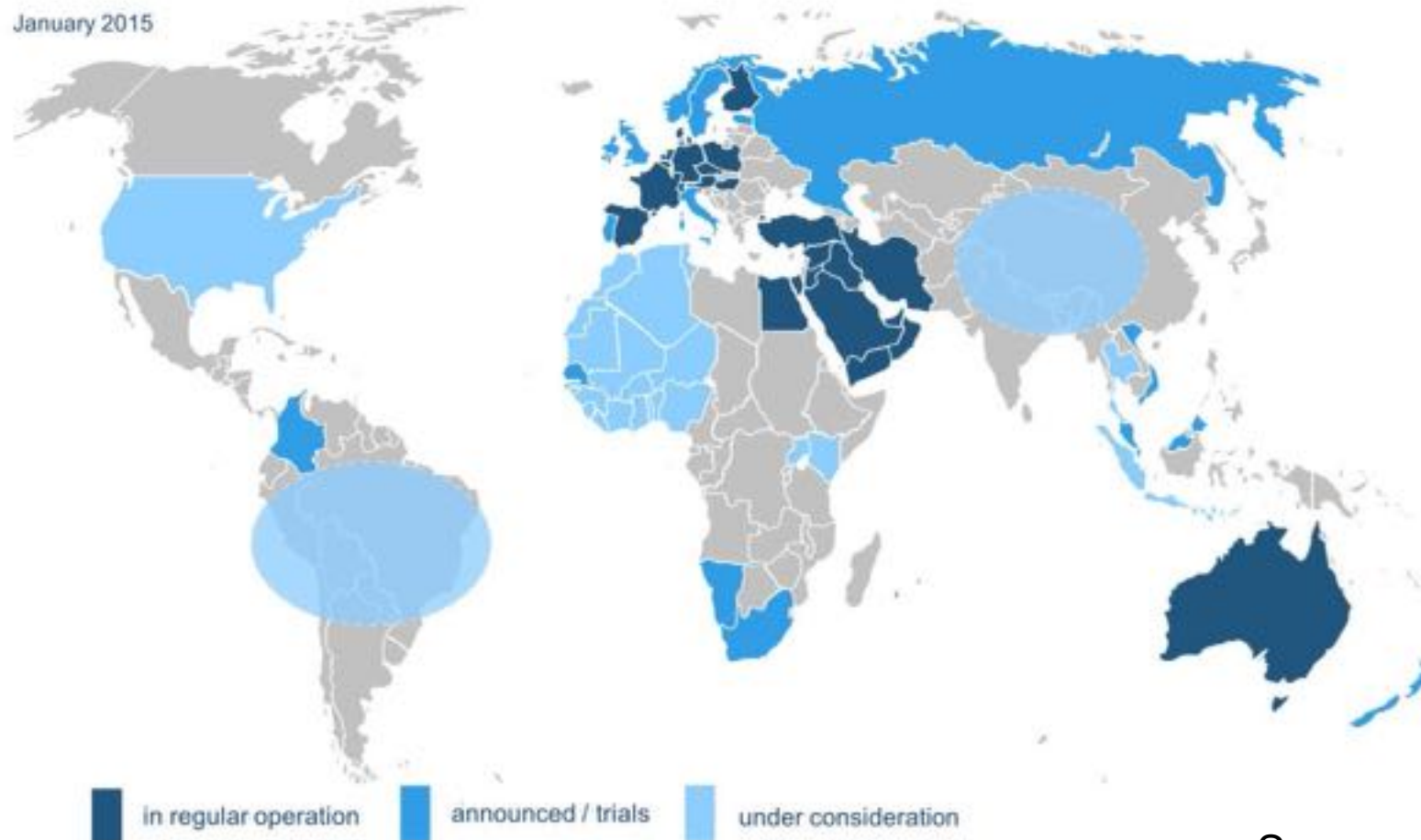
HbbTV 2.0 System Overview



HbbTV World Wide Usage

HbbTV World Wide Deployments

January 2015



Source: hbbtnv.org

Smart TVs: Connected TV Sets

- Scalability issues requires co-operation of various organizations
 - Example: Soccer World Championship 2014
 - Semi Final Germany-Brazil: 646,000 simultaneous live streams
 - Partnering between ARD and Akamai
- Consequence: Usage data (Akamai Media Analytics) transferred to U.S.

Speziell für die Optimierung der Videoqualität und Erreichbarkeit der Videos/Audios auf www.ardmediathek.de werden nicht-personenbezogene Daten in Form von Video-Startzeit, technisch verursachte Unterbrechungen und Ladezeiten, empfangene Qualität und Netzwerkinformationen Ihres Internetanbieters an Auswertungsserver der Firma Akamai (www.akamai.com) gesendet.

ardmediathek.de

Families are being warned that modern televisions are recording their conversations and could transmit the messages to "third parties".

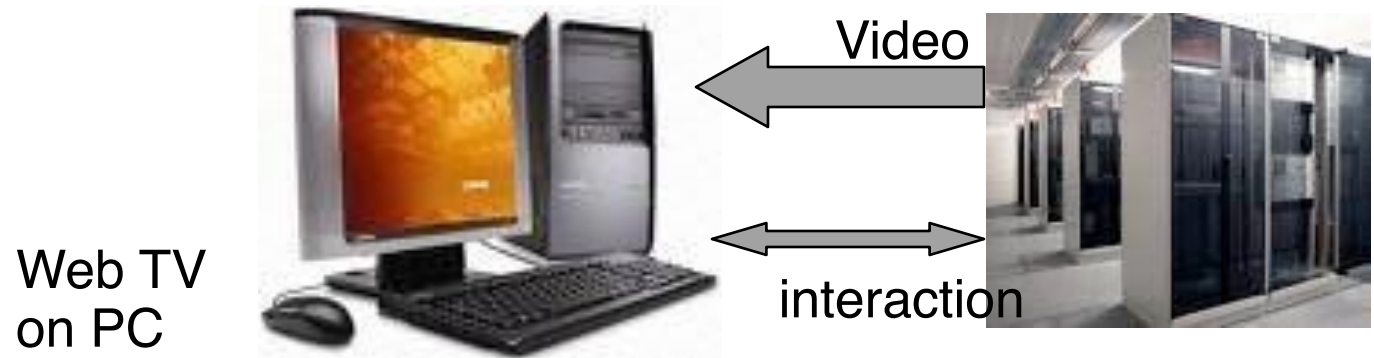
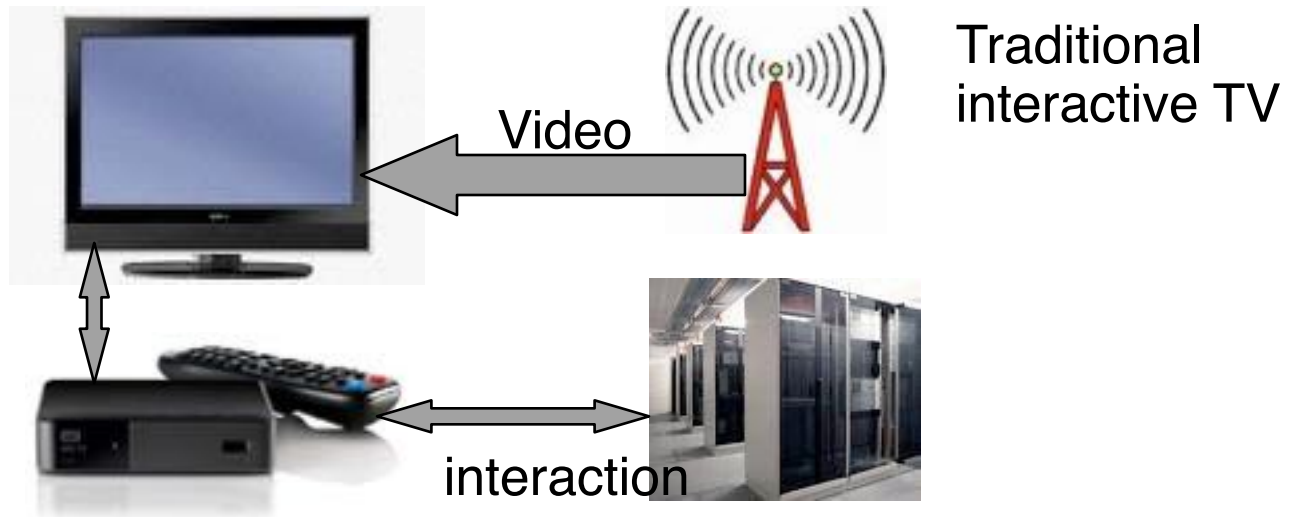
The Telegraph, February 2015

Sources:

<http://mebucom.de/news-detail/distribution/akamai-loesungen-fuer-ard-und-zdf.html>

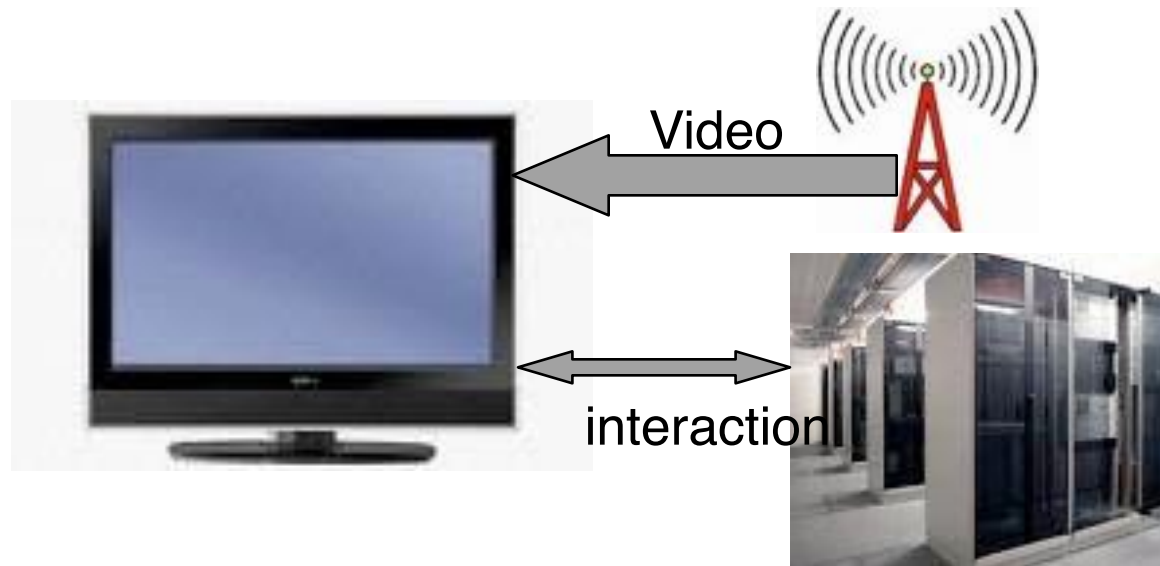
<http://www.telegraph.co.uk/news/shopping-and-consumer-news/11399677/Samsung-SmartTV-customers-warned-personal-conversations-may-be-recorded.html>

Summary: Traditional TV, Web TV and IPTV (1)

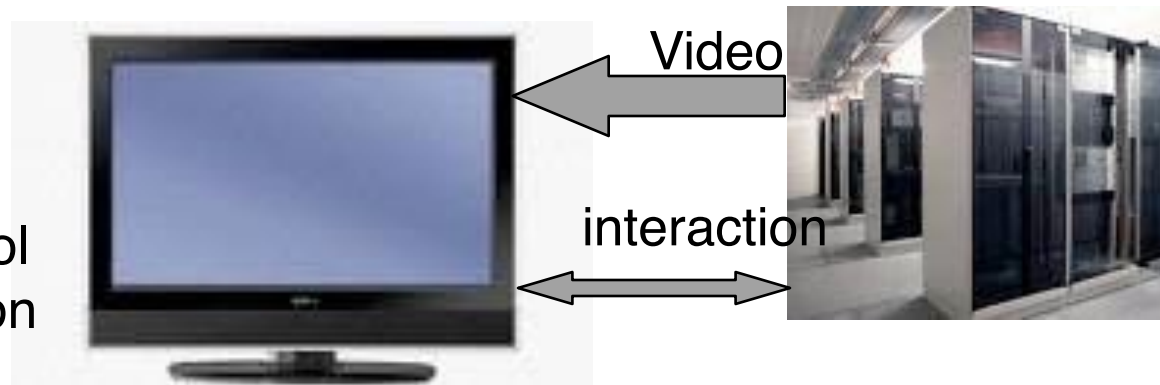


Summary: Traditional TV, Web TV and IPTV (2)

SmartTV,
HbbTV



IPTV =
Internet Protocol
Based Television



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

Add-On: Media Streaming in Home Networks

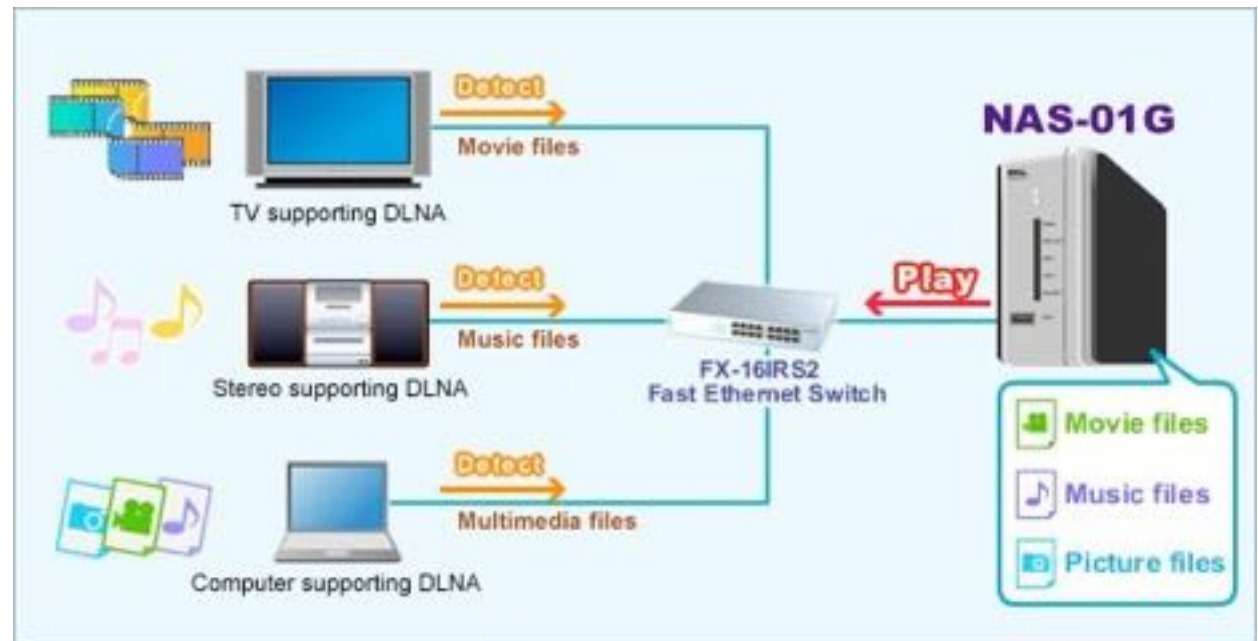
- Streaming solutions for the home network:
 - Streaming audio, video and images from server to clients (e.g. TV set)
 - Streaming audio and video from CE devices
 - » e.g. TV program from TV tuner to mobile devices
- Dominating standard:
DLNA
(Digital Living Network Alliance)
 - based on Universal
Plug and Play (UPnP)
- DLNA 2.0
certification widely
used



DLNA: Streaming Protocols and Media Formats

- Streaming:
 - HTTP 1.1 streaming over TCP as standard method
 - RTP streaming optional
- Media formats (DLNA 2.0):
 - JPEG, LPCM, MPEG-2 as standard formats
 - Other formats optional: MP3, AAC, MPEG4, ...

- DLNA 3.0 (2015):
More media formats
- DLNA 4.0 (2016)
in preparation



planex.net