

Outline

1. Introduction and Motivation
 2. Media on the Web
 3. Interactive Web Applications
 4. Communities, the Web, and Multimedia
 5. Digital Rights Management
 6. Cryptographic Techniques
 7. Multimedia Content Description
 8. Streaming Architectures
 9. Web Radio, Web TV and IPTV
 10. Electronic Books and Magazines
 11. Multimedia Content Production and Management
 12. Multimedia Conferencing
 13. Signaling Protocols for
Multimedia Communication
 14. Visions and Outlook
- Part I:
Web Technologies
for Interactive MM
- Part II:
Content-Oriented
Base Technologies
- Part III:
Multimedia
Distribution
Services
- Part IV:
Conversational
Multimedia Services

9 Web Radio, Web TV and IPTV

9.1 Web Radio

9.2 Web TV

9.3 IPTV

Literature:

Chris Priestman: Web Radio, Focal Press 2002

A British Radio Pioneer, 1924

John Reith, *Broadcasting over Britain*, 1924

Later Director General of 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?

- Web radio is about *live audio streams*
 - Which may be composed from archives!
 - Which may be made accessible in archives as well!
- Audio content is delivered to large audience, in identical form for all listeners
 - No individual streams, 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 is improving rapidly
- 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
- 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 organisations, 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:
 - Weird technical configurations, computer as playback device?
 - Introducing new hardware is difficult
 - » Must seamlessly integrate with existing devices
 - » ...or be completely stand-alone and innovative

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
- General problem:
 - Streaming is power-intensive
 - Device receiving and processing the audio signal from Internet preferably runs on mains electricity
- Trend since 2010: Broad range of products



Kerbango's Internet Radio



SonicBox device



Logitech Squeezebox



DNT IP2go

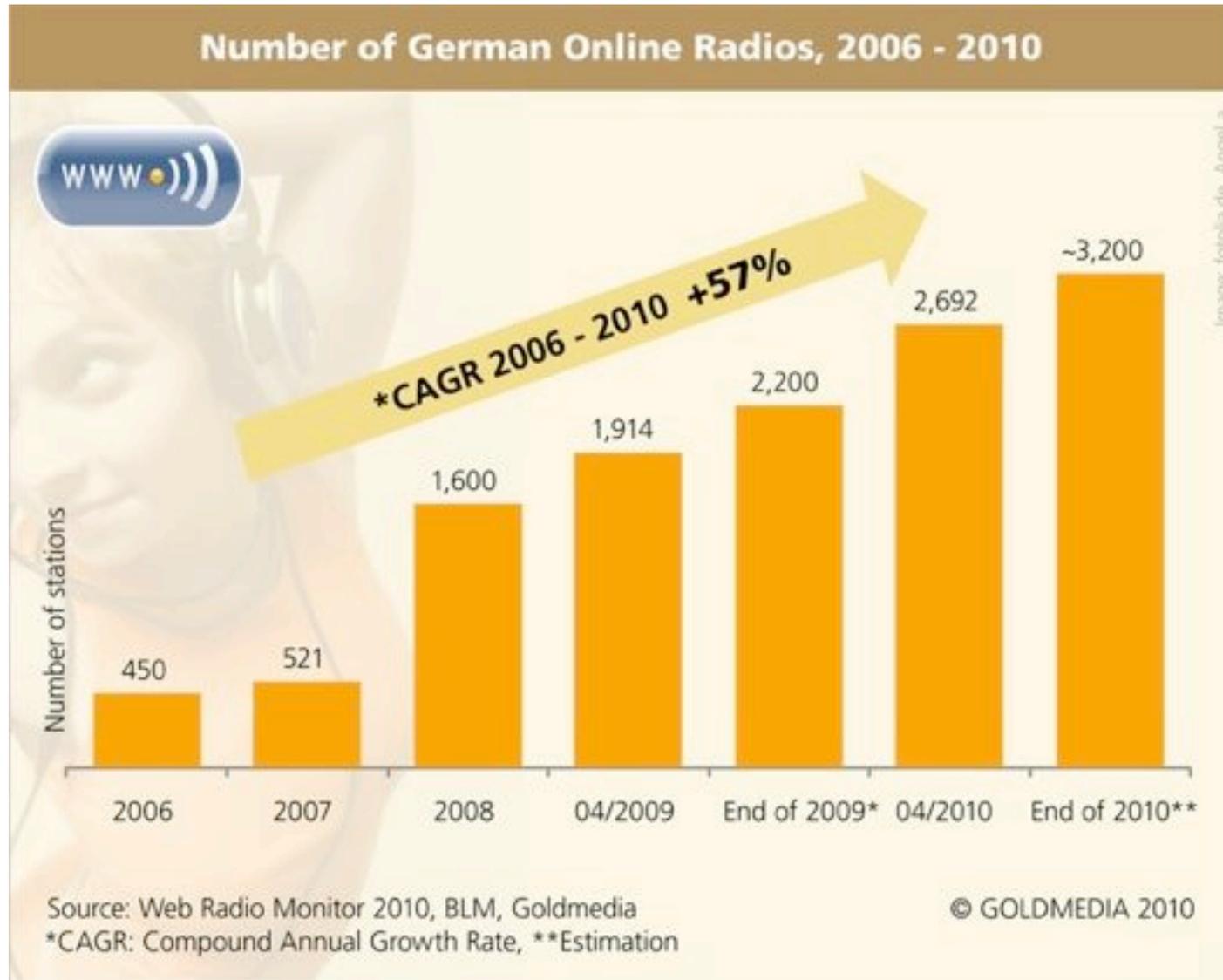


DNT IPmicro

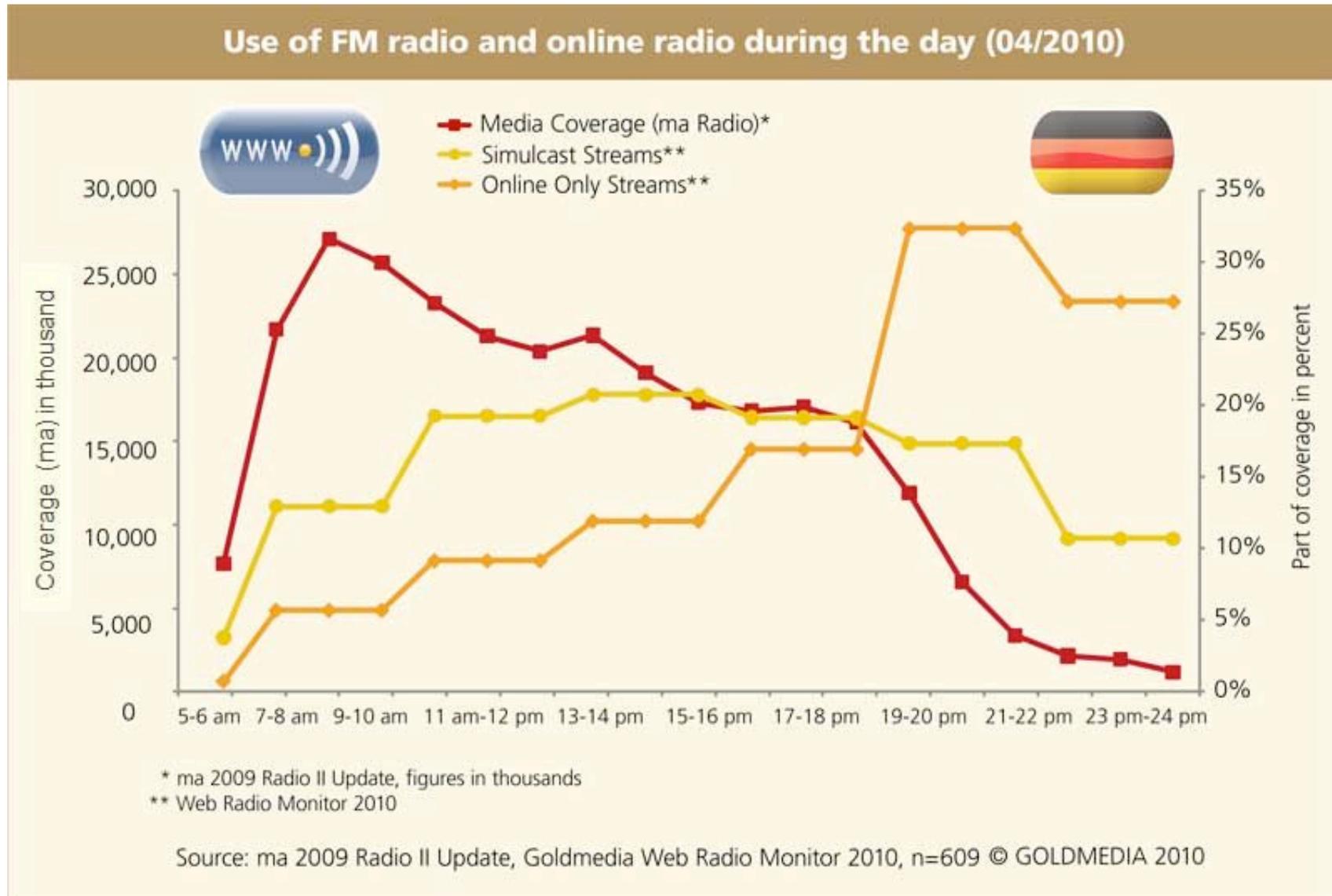


Sagem My Web
Tuner 500

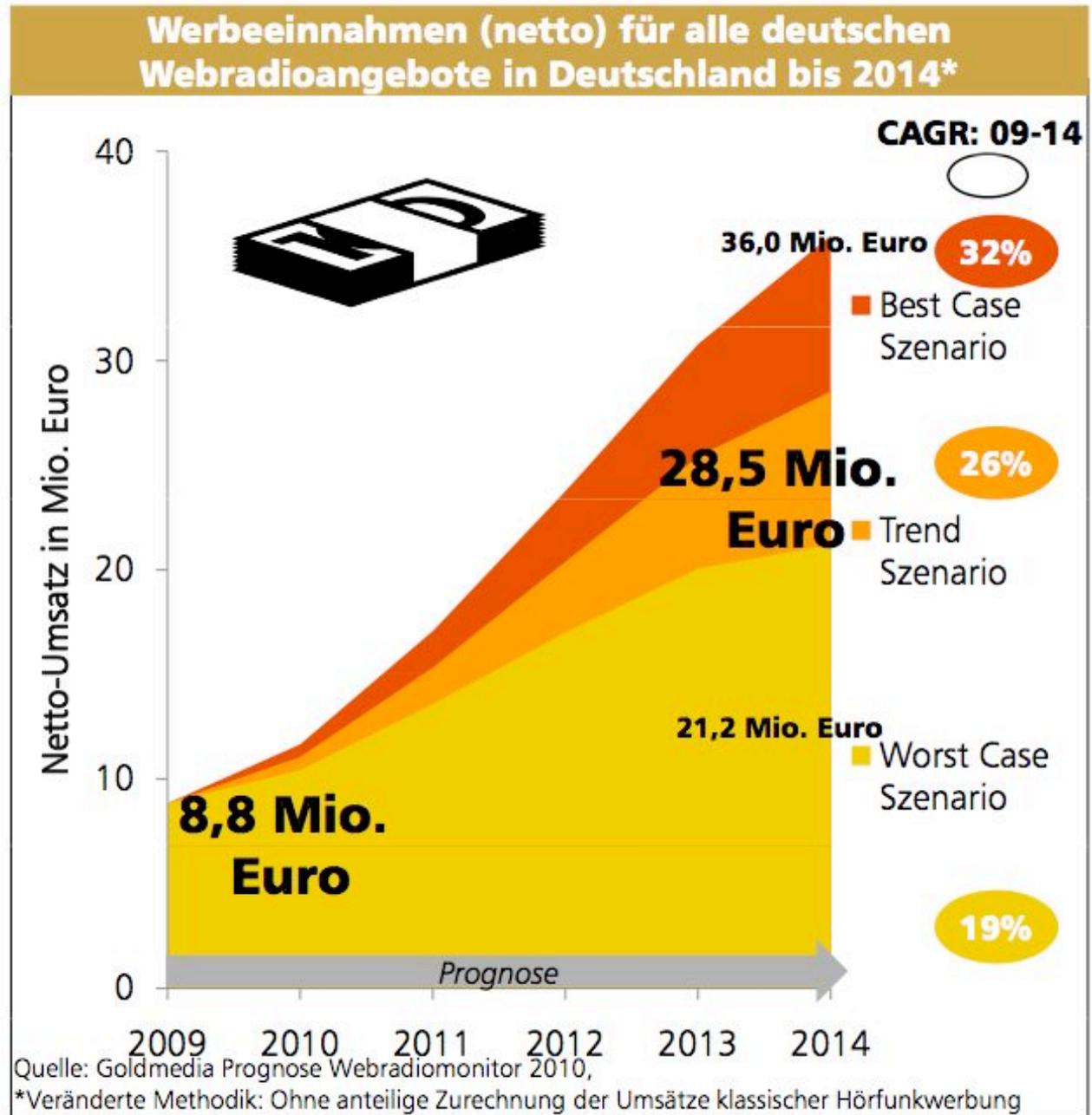
Internet Radio Market (1)



Internet Radio Market (2)



Internet Radio Market (3)



Copyright and Web Radio

- Fundamental problem #1:
 - Traditional radio (terrestrial, cable) receivable only within clear location limits
 - » Partially also true for satellite transmission
 - Web radio in general receivable globally
 - » Anything receivable in U.S. is subject to U.S. legislation!
- Fundamental problem #2:
 - Replication of digital content is very easy
 - Capturing Web radio streams
- Web radio stations are extremely “visible” - simple to trace!
- Example: U.S. DMCA (Digital Millennium Copyright Act) rules
 - Limits how often playlisted tracks can be repeated within 3 hours
 - Limits on the number of complete tracks from the same album played in proximity
 - Limits on pre-announcement of coming-up tracks
 - ... Targeted at fundamental problem #2

Example: Clearchannel Stations

- Radio program was simulcasted on Internet
- Speakers of advertisements went to court
 - Special fees for higher audience numbers than agreed on
- Technical response:
 - Different versions for Internet and local radio broadcast
 - Advertisements are automatically adapted
 - » On locally broadcasted program: As before, with local significance
 - » On Internet: Advertisements are replaced with globally valid advertisements
- Problems:
 - Technically and in administration view: difficult
 - Adaptation to global standards may annoy listeners from local community

Example: Pandora



Dear Pandora Visitor,

We are deeply, deeply sorry to say that due to licensing constraints, we can no longer allow access to Pandora for listeners located outside of the U.S. We will continue to work diligently to realize the vision of a truly global Pandora, but for the time being we are required to restrict its use. We are very sad to have to do this, but there is no other alternative.

We believe that you are in **Germany** (your IP address appears to be **84.** . If you believe we have made a mistake, we apologize and ask that you please contact us at pandora-support@pandora.com

Radio and Visual Information

- **Traditional radio** is a medium for the ears only
 - Most adequate interaction forms are also based on audio
 - » Telephone participation of listeners
 - Additional information may be shown visually (e.g. RDS)
- **Web radio** can be used as hybrid audio/visual medium
 - On PC, Smartphone, TV set, ...
 - Interaction is greatly eased by using visual information
 - Spectrum of intensity of visual information
 - » Sender logo only
 - » Subtitles with additional information
 - » Additional text (information, interaction)
 - » (Still) Pictures
 - » Video
- Selection of additional information vs. proper two-way interaction

Sophisticated Interaction Forms for Web Radio

- *Interaction highly integrated with programme*
- Interactive playlists
 - “Wunschkonzert” (musical request programme)
 - » Individual requests or democratic voting
 - » Automatic overall optimization of playlists
 - Requests may be sent in via Web, email, SMS, ...
- Upload of music and speech contributions
- Interactive games
 - e.g. Guessing of title, artist, ...
- Web radio enables *automatic interaction forms*
 - Little or no manual interaction on sender side
 - Is this still “radio”? Don’t we expect a live moderator?
- Integration with e-commerce offers

Web Radio / Music Shop Integration 2004

Webradioantenne 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

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 2007 (1)

ANTENNE BAYERN
ROCK ANTENNE

WebCam
23:32:57

AKTUELLE SENDUNG
 >> **Florian Weiß**
 ANTENNE BAYERN am
 Abend

AKTUELLER TITEL
 >> **Cat Stevens alias
 Yusuf**
 Heaven Where True
 Love Goes

Bitte wählen Sie einen Player:
 Multicasting Info

>> **MEDIA PLAYER**
 STEREO

>> **MP3 STREAM**
 MONO

Stargalerie

Download

CD-Shop

Songsuche

musicload ▶

Start Musik Hörbuch Video

Charts / Specials / Playlists / Neuheiten / Preishits / Nonstop

Startseite
 Musik
 Hörbuch
 Musikvideo
 Musicload Nonstop

Anzeige: 1 bis 2 von 2
 >> als Liste anzeigen

An Other Cup
YUSUF
Yusuf (Cat Stevens):
 An Other Cup
 Middy / Heaven / Where true love
 goes / Maybe there's a world / One d
 at a time / ...
 Artikel am Lager **EUR 14,99**

CD

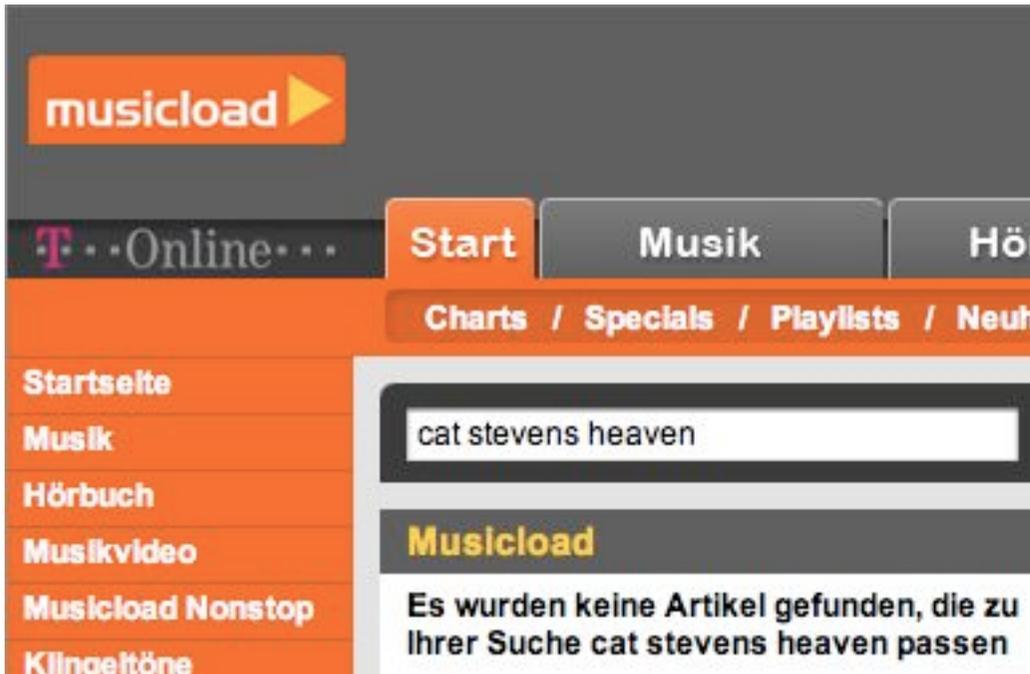
Details bestellen merken
 Preis inkl. MwSt, ggf. zzgl. Versandkosten (Details hier)

Search bar: Cat Stevens Alias Yusuf Heaven Where T Titel/Interpret

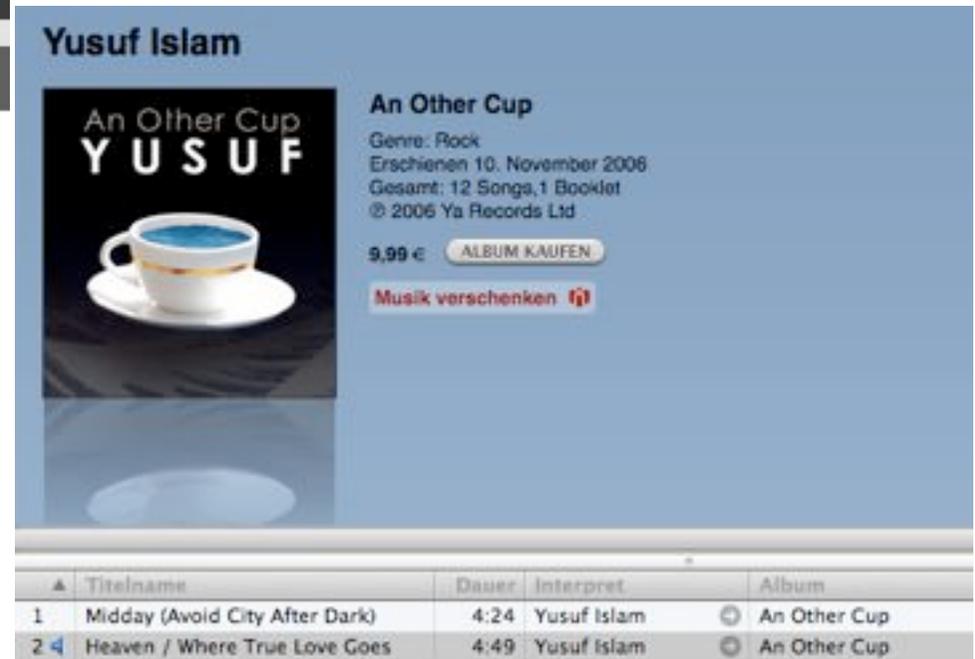
Musicload Allgemeine Hilfe Hilfe zu 'Suche'

Bitte geben Sie als Suchbegriff nicht mehr als 50 Zeichen ein.

Web Radio / Music Shop Integration 2007 (2)



musicload



iTunes

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 kb/s
€ 1.29





Titel: min
Genre:

Titelliste

Titel	Interpret	Format	Preis	Aktionen
1.			min	

Vision of a “Killer Application”?

- The “I want this” button on the car radio
 - On the road, the button is simply pressed when interesting music plays
 - Later, online and in the music store:
 - » Selected music is offered for (selective) buying
 - “I want this” buttons on other devices?
 - » PDA, mobile phone?
- General requirement:
 - Automatic networking of various devices
- Possible path to solution:
 - Integration of music player and mobile telephone
 - Integration of “nomadic” devices into car user interfaces

10 Web Radio, Web TV and IPTV

10.1 Web Radio

10.2 Web TV

10.3 IPTV

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

Web Radio and Web TV

- In principle, the same questions as for Web radio:
 - Bandwidth problems
 - » much higher requirements
 - Separate medium or simulcast of existing medium
 - Live stream or download
 - Adequate end system
- Quality differentiation
 - Live stream with limited resolution compared to main program
- Possible end systems for Web TV:
 - Computer
 - TV set
 - PDA, mobile phone
 - Special mobile devices (e.g. combined with DVD player)
 - » As seen with DVB-T
- Interactivity of TV programs?

Web TV Simulcast

- Many streams available
E.g. de.wwiTV.com lists 110 TV streams only for Germany

n-tv 2004

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

Web TV Simulcast – Seven Years Later

12.01.2011 12:48 Uhr

n-tv.de

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

Videos **n-tv Live** Sendungen Teletext TV-Programm Bilderserien Bilder des Tages Gute Nachricht des Tages

n-tv.de Startseite » Mediathek » Livestream

LIVESTREAM

News Spezial
Gewalt im Stadion

n-tv 12:49

SDax 5.202 +0,2% ▲ DAX Commerzbank 5,53 +3,2% Daimler 55,23 +0,5%

TOP VIDEOS **DAS NEUESTE** **MEISTGESEHEN**

- Teure Staatsanleihen
Portugal braucht ein Wunder
12.01.11 01:10 min
- Indien und Südkorea bestellen
Airbus hat Nase vorn
12.01.11 01:00 min
- Klingelnde Kassen
Douglas will weiter wachsen
12.01.11 01:04 min
- Geldanlage-Check
Robert Haselsteiner, Interhyp AG
11.01.11 02:38 min

NACHRICHTEN **WIRTSCHAFT** **SPORT** **WETTER**

Web TV as Business Model

Nutzen Sie unsere kostenlose Callback-Funktion! [follow me!](#)

TV1.EU Produkte Services Technologien Unternehmen Kunden Partner Deutsch

Willkommen bei TV1.EU – Europas führendem Unternehmen für Online Video Technologie.

Der One-Minute Pitch
Erfahren Sie in 60 Sekunden was TV1.EU auszeichnet.

Show-it PLUS™
So einfach haben Sie Fotos, Videos und Audiofiles noch nie publiziert.

Erfolgreich mit Web TV
Schnell und kosteneffizient Zielgruppen erreichen.

Europas führende Plattform
Der one-stop-shop für Online Video basierte Geschäftsmodelle.

One Minute Pitch
Internet World 2009

Neueste Meldungen: Neue Ski-Saison, neues Web-TV. Ski amadé setzt auf Show-it PLUS von TV1.EU [RSS abonnieren](#)

Source: tv1.eu

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 programme 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

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

BAYWATCH INTERACTIVE EXIT HELP WEB

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

DIVE BOAT

See behind the scenes photos of filming at sea.

The screenshot displays two panels of an interactive interface. The left panel features a photograph of a woman in a yellow top attending to a patient in a hospital bed, a CT scan image of a brain, and a text box with medical details. The right panel shows a scene from the show with three people on a boat, a photo of a dive boat, and a text box describing a plot point. Both panels include the 'Alaska Airlines' logo and a vertical navigation menu on the right side.

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

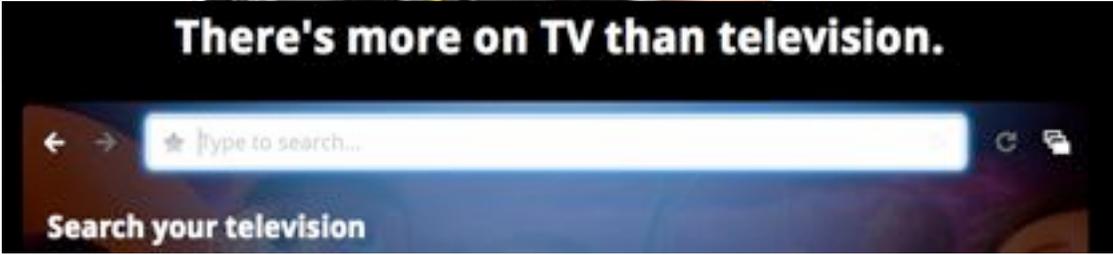
Success Stories of Interactive TV?

- 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

Interactive TV 2011?

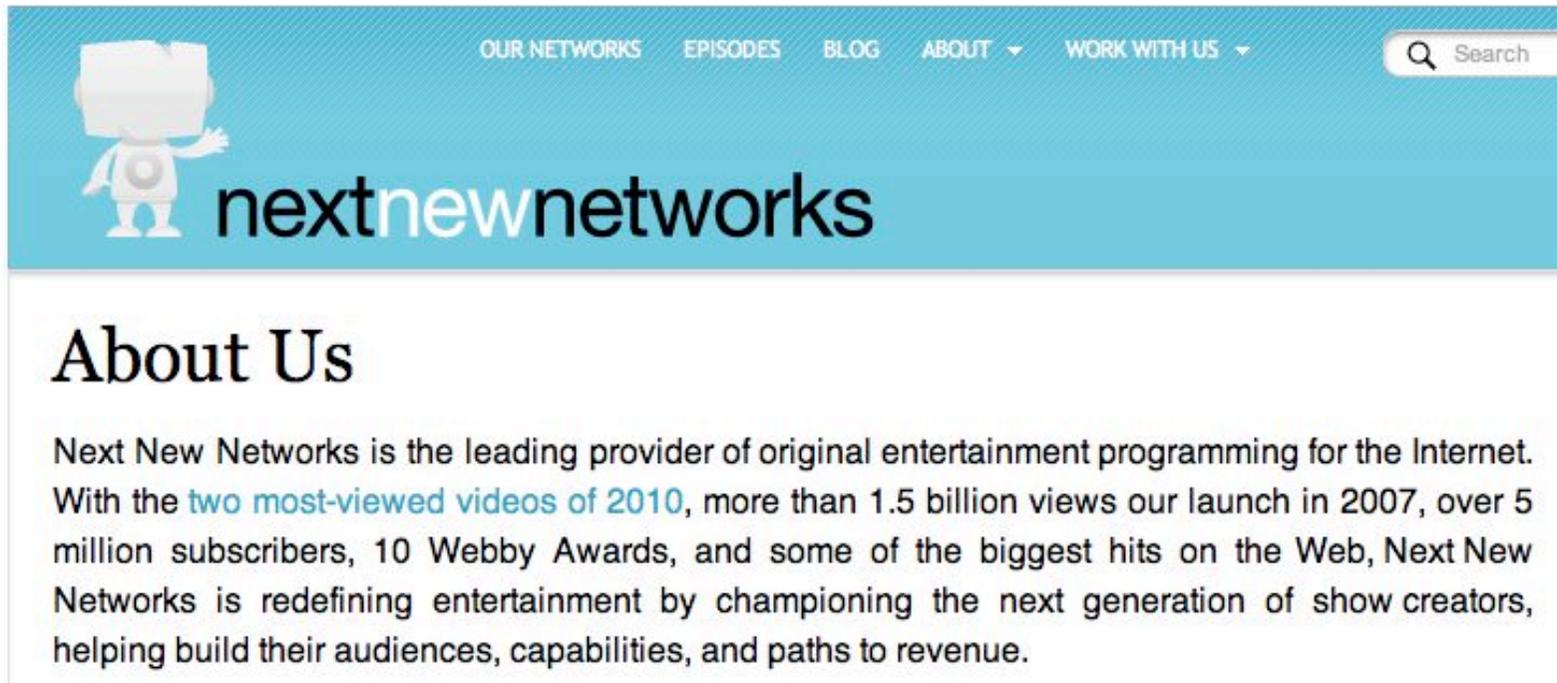


With **Logitech Revue**, you can watch what you want wherever it comes from—the Web or TV—on your HDTV.



Trends in Web TV 2011

- Integration of multimedia content sources:
 - Web content as TV channel (Web in the TV)
 - Production of video material for online-only distribution (TV in the Web)
- Hardware/user interface integration between computer and TV set still not fully satisfying



The image shows a screenshot of the Next New Networks website. The header is a light blue bar with a white robot icon on the left. To the right of the icon is the text 'nextnewnetworks' in a lowercase, sans-serif font. Further right in the header are navigation links: 'OUR NETWORKS', 'EPISODES', 'BLOG', 'ABOUT' (with a dropdown arrow), and 'WORK WITH US' (with a dropdown arrow). On the far right of the header is a search bar with a magnifying glass icon and the text 'Search'. Below the header, the main content area has a white background. The title 'About Us' is written in a large, bold, serif font. Below the title is a paragraph of text: 'Next New Networks is the leading provider of original entertainment programming for the Internet. With the [two most-viewed videos of 2010](#), more than 1.5 billion views our launch in 2007, over 5 million subscribers, 10 Webby Awards, and some of the biggest hits on the Web, Next New Networks is redefining entertainment by championing the next generation of show creators, helping build their audiences, capabilities, and paths to revenue.'

10 Web Radio, Web TV and IPTV

10.1 Web Radio

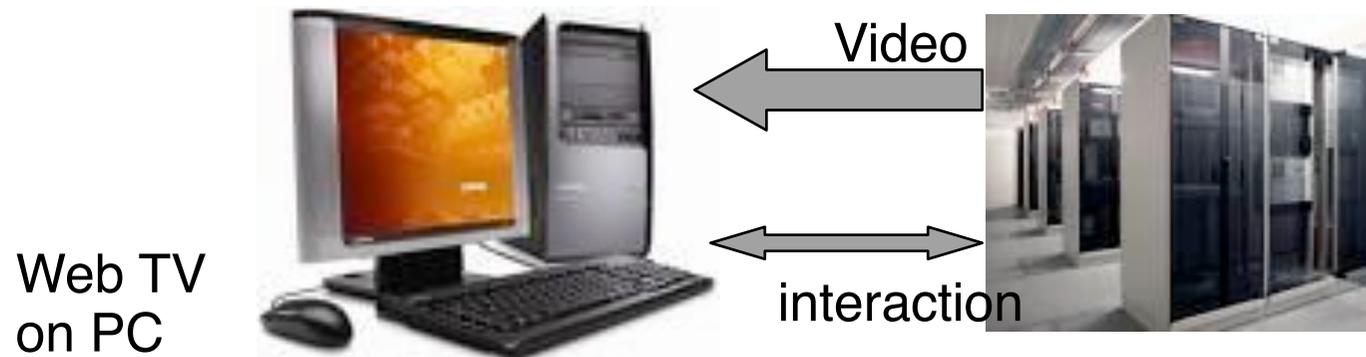
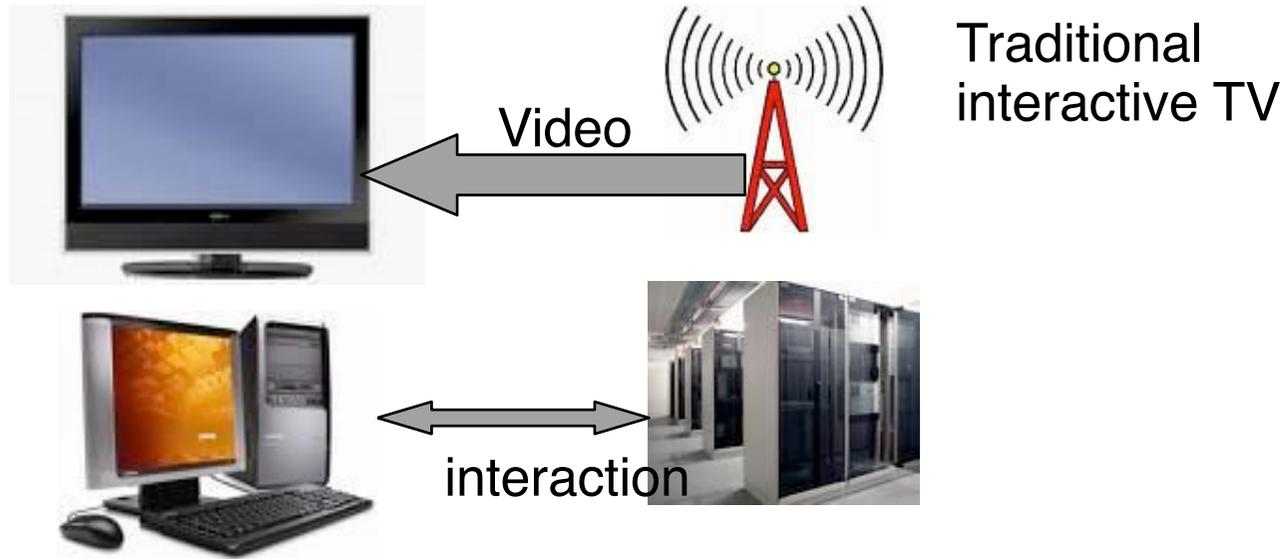
10.2 Web TV

10.3 IPTV

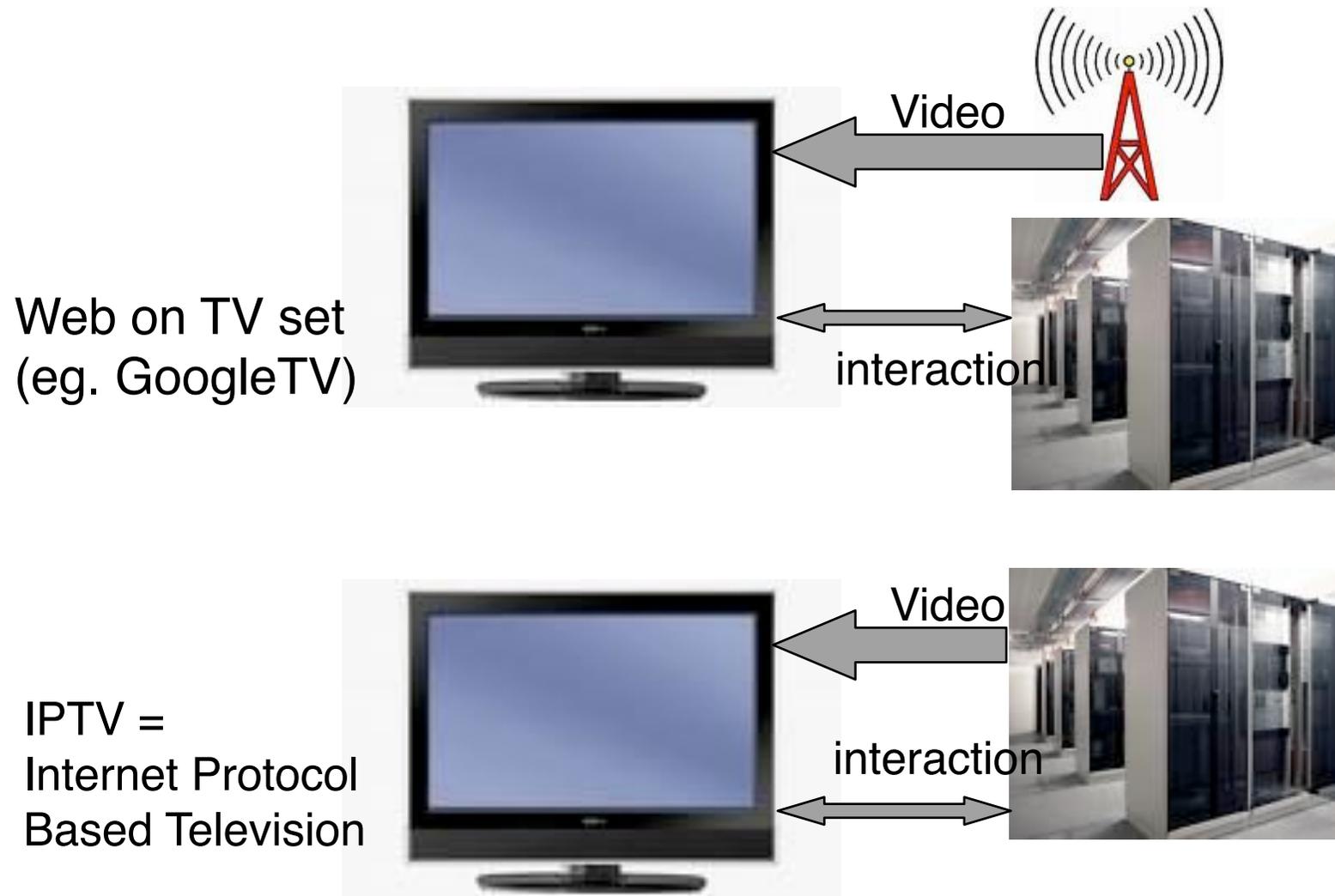
Literature:

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

Traditional TV, Web TV and IPTV (1)



Traditional TV, Web TV and IPTV (2)

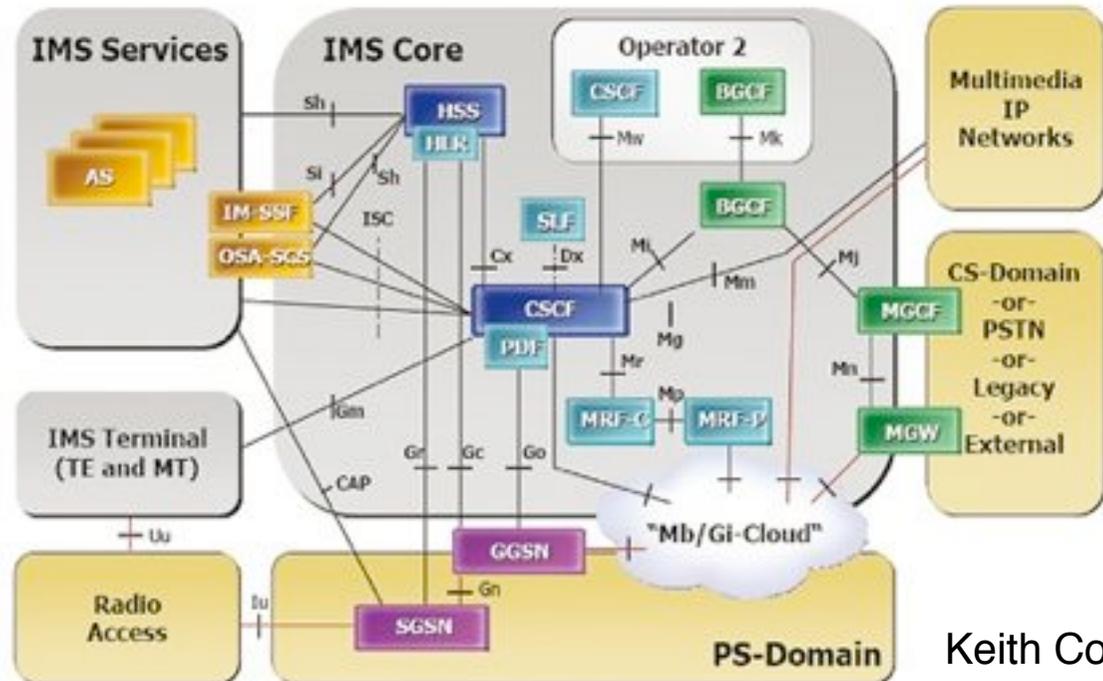


TV programme is carried over Internet, no radio broadcasting or TV cable

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)

Internet Multimedia Subsystem IMS



CSCF = Call Session Control Function
 BGCF = Border Gateway Control Function
 HSS = Home Subscriber Server
 CS = Circuit switched
 PS = Packet switched

Keith Cobler/IMS Magazine

- IMS is an architectural framework from the telecommunication world
 - Original target: Multimedia over wireless networks beyond GSM
 - Generally targeted at fixed/mobile network convergence
- Some companies (e.g. Ericsson) promote IMS as standard for IPTV
 - QoS support in the core network is possible
- IMS architecture is complex (based on "Intelligent Network" architecture)