Multimedia im Netz

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Vorbemerkung: Deutsch und Englisch

- Viele Materialien sind nur in englischer Sprache verfügbar
  - ...oder in besserer Qualität/Aktualität
- Wissenschaftliches Arbeiten ist international
  - Die Wissenschaftssprache ist englisch
  - Austausch von Materialien zwischen Lehre und Forschung in deutscher Sprache ist schwierig
  - Viele Begriffe sind in englischer Sprache geprägt und schwer zu übersetzen
- Konsequenz:
  - Lehrmaterialien in englischer Sprache!
  - Unterricht in deutscher Sprache.

Organisatorisches

- Zielgruppe:
  - Studiengänge Informatik, Medienformatik, Kunst und Multimedia, Nebenfach Informatik
  - Fortgeschrittenes Studium (ab ca. 5. Semester)
- Empfehlenswerte Vorkenntnisse:
  - Digitale Medien
  - Rechnernetze und Verteilte Systeme
- Einbringung als Studienleistung:
  - Diplom Medieninformatik und Informatik: 3V+2Ü SWS für mündl. Prüfung
  - Bachelor Medieninformatik und Informatik: Vertiefendes Thema (6 Credits)
  - Bachelor Kunst und Multimedia: Pflichtveranstaltung (6 Credits)
  - Nebenfach Informatik: 3V+2Ü SWS für mündl. Prüfung
- 3 SWS Vorlesung = 3 x 45 Min = 135 Min je Termin:
  - Vorschlag: eine Pause nach ca. 60 Minuten
  - Alternativ zwei Pausen

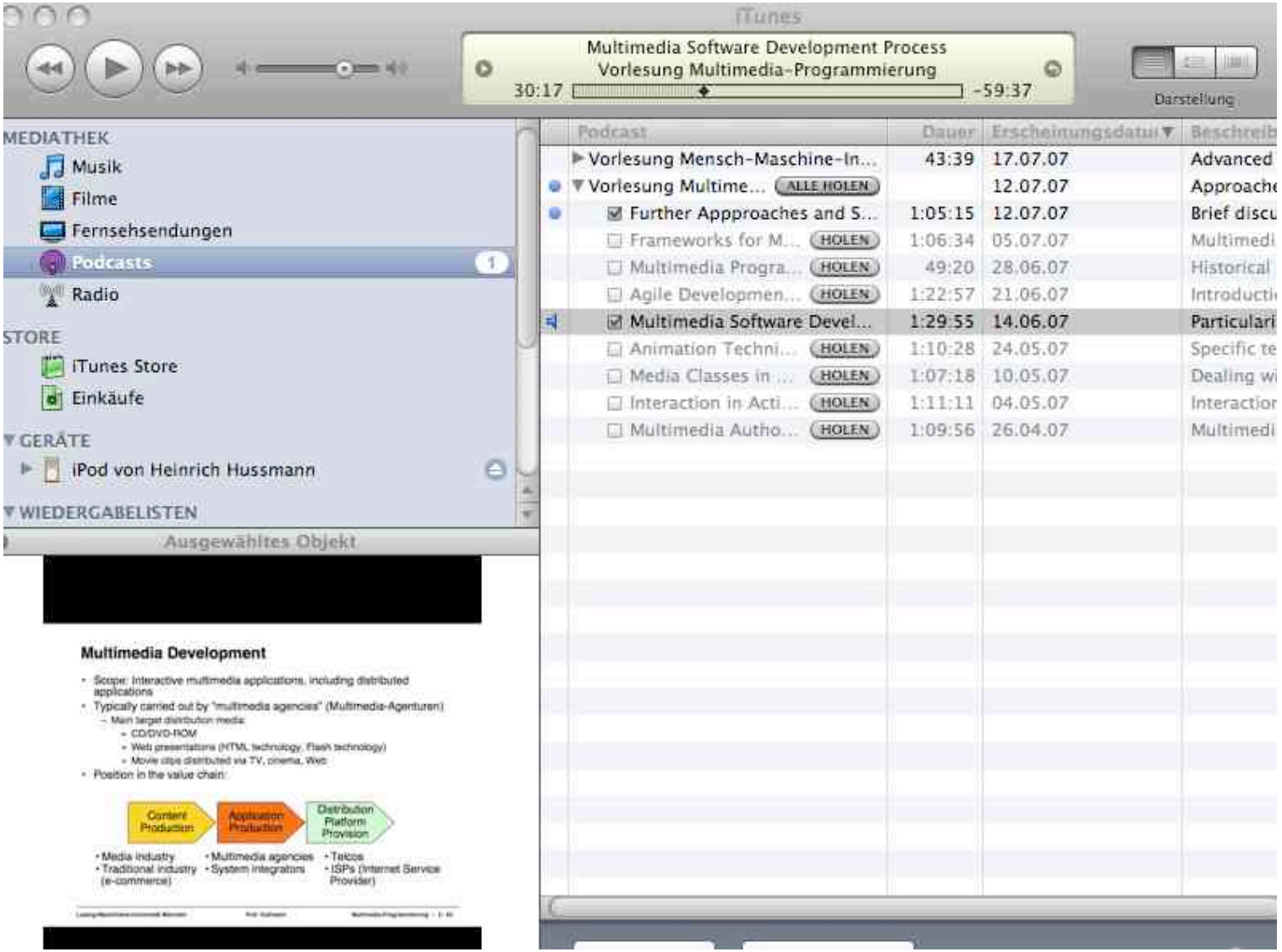
Übung

- Anmeldung über UniWorx
  - Anmeldung zu den einzelnen Übungsgruppen ab 22.10.09 (heute) 14 Uhr
- „Normale“ Übungen und pro Übungsblatt eine Tutorübung für Programmierfragen
- Übungsblätter
  - in Einzelabgabe (später auch Gruppenarbeit)
  - Bewertungsschema: „Nicht Bestanden“ - „Bestanden“ - „Sehr Gut“
  - Notenbonus für die Klausur
- Klausur
  - Benotung für Bachelor und Schein für Diplom Studenten
  - Inhaltlich basierend auf Vorlesung und Übung

Web-Ressourcen

- Folien-Handouts im PDF-Format
  - **Vor** der Vorlesung verfügbar (spätestens Dienstag abend)
  - Adobe Acrobat Reader (kostenlos) benötigt
- Podcast
  - Audio-Mitschnitt der Vorlesung
  - **Nach** der Vorlesung verfügbar
  - Abonnierbar in Apple iTunes (kostenlos, für Windows und Mac)
  - Abspielbar auch mit QuickTime Player und auf iPods
  - **Coveranzeige einschalten!**
    - » Dann werden Folieninhalte synchron angezeigt

Screenshot aus iTunes



Multimedia in the (Inter)net

- Multimedia:
  - Combination of several (perception) media
  - For the purposes of this lecture:
    - » Combination of *time-independent* and *time-dependent* media, in particular usage of audio and video
    - » Interactivity
- "The Net":
  - In the past: Various telecommunication networks (phone, data, cable TV, …)
  - Nowadays and in the near future: Internet as integrating technology for various networking technologies
  - In the future: "next generation networks" – probably derived from Internet
    - » Higher bandwidth, mobile access
- Multimedia in the Net:
  - Interactive services involving a complex combination of perception media, with physically distributed service components
  - Service components: Software and/or hardware subsystems

What we will cover – and what not

- This lecture does ***not*** cover:
  - Detailed information on networking technologies and protocols (see Networking lectures)

- The focus of the lecture is on:
  - *Application*-level design of networked multimedia systems
  - Content-related base technologies (as a supplement to network-related base technologies)
  - Limited background information on selected network-related base technologies

- The tutorials for this lecture focus on:
  - Practical experience in constructing multimedia services for the Internet
  - Basic techniques for networkes media (streaming)
  - Programming languages: Java, PHP

Outline

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

1 Introduction and Motivation


Google Buys YouTube
October 9, 2006
Pete Cashmore
Google YouTube™
YouTube
Broadcast Yourself™
lmu
Startseite
Videos
Kanäle
LMU Sommerfest München 2009
charivari TV
0:26 / 3:38
★★★★★ 1 Bewertungen
673 Aufrufe
Loyola Marymount University
(Weitere Informationen)
http://muenchenvideo.de/
URL
http://www.youtube.com/watch?v=4PF5dhw6J0w
Einbetten
<object width="560" height="340"><param name="m
Mehr von: MuenchenVideo
Ähnliche Videos
Why Choose LMU?
1.771 Aufrufe
LMUAdmission
4:14
Bayerisch ist sexy mit Ninja Wagner (35)
5.910 Aufrufe
MuenchenVideo
2:52
LMU Audimax
13.607 Aufrufe
stoiber666

SPIEGEL ONLINE NETZWELT

NACHRICHTEN | VIDEOS | ENGLISH | FORUM | SPIEGEL DIGITAL | ABOS

Home | Politik | Wirtschaft | Panorama | Sport | Kultur | **Netzwelt** | Wissenschaft

Nachrichten > Netzwelt > Netzkultur

11. Oktober 2006 Druckversion | Versenden | Leserbrief

MILLIARDEN-DEAL MIT YOUTUBE

"Wir haben einen fairen Preis bezahlt"

Googles Nordeuropa-Chef Philipp Schindler ist von YouTube begeistert. Im Interview mit SPIEGEL ONLINE erklärt er, warum er den Kaufpreis von 1,65 Milliarden Dollar für fair hält, was Google mit gleich zwei Videoplattformen anfangen will - und was deutsche Manager am Netz noch nicht begriffen haben.

1,65 Milliarden Dollar für ein Unternehmen, das

- keinen Gewinn macht
- ca. ein Jahr alt ist

Spiegel-Online Interview Schindler 2006, Auszüge

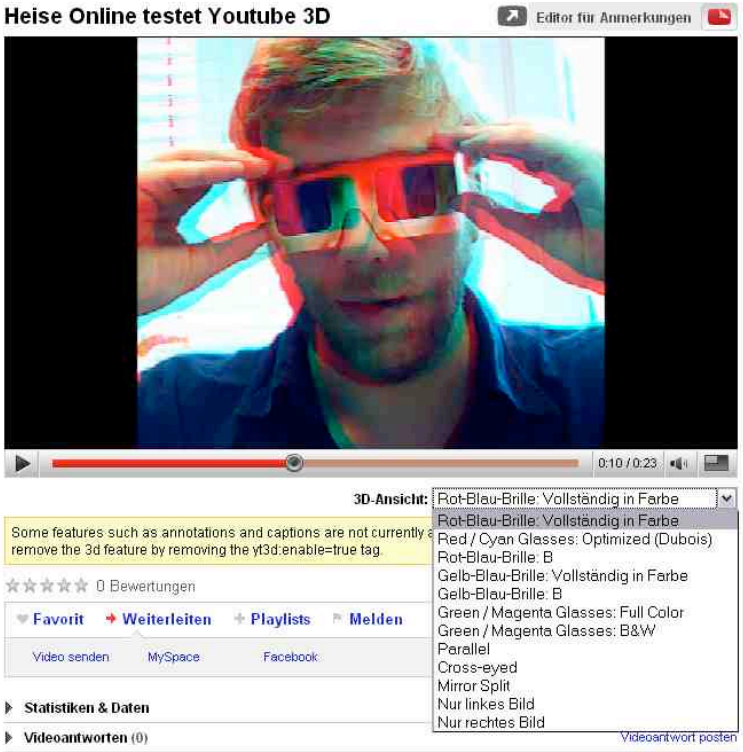
- Wir wissen, dass die nächste Evolutionsstufe des Internets auf einer audiovisuellen Basis aufbauen wird.
- Und wir glauben, dass wir, wenn wir das mit unseren Stärken kombinieren - nämlich hochvolumig automatisierte Werbesysteme zu betreiben - einen absolut intelligenten Schritt machen.
- Für uns hat das Wahren der Urheberrechte von Inhalte-Anbietern höchste Priorität.
- So werden bereits heute automatisierte Systeme getestet, die erkennen sollen, ob Inhalte urheberrechtlich geschützt sind - daran wird mit Hochdruck gearbeitet.
- Spiegel-Frage: Die Werbung über Suchworte funktioniert mit Text - wenn ich nach "Handschuh" suche und dann "Handschuh"-Anzeigen gezeigt bekomme, ist das sicher sinnvoll. Wie soll das mit Videos gehen, in denen etwa ein junges Mädchen von ihrem Liebeskummer erzählt?

YouTube 2006 / 2009

- Pressemeldung 11.10.2009:
  - **„YouTube: Über 1 Milliarde Videoabrufe pro Tag“**
- Situation 2006:
  - Downloads: 100 000 000 Videos pro Tag
  - Uploads: 65 000 Clips pro Tag
- Situation 2009:
  - Downloads: 1 000 000 000 Videos pro Tag
- Numerische Steigerung:
  - Faktor 10 in 3 Jahren
- Steigerung des Markenwerts:
  - 2006: Relativ unbekannte Randmarke
  - 2009:
    - » Zentraler Bestandteil der (Jugend-)Kultur, u.a. für Musikkonsum
    - » Einsatz zur Archivierung erhaltenswerter Kulturgüter

Adavanced Internet Video 2009

- High definition video:
  - Cheap amateur video cameras record in 720p quality (1280 x 720 px)
  - Several video portals compete for HD content
    - » YouTube, Facebook, Sevenload, Vimeo, Veoh, Dailymotion, ...
- Convergence of computer and TV set for playing net-based video
  - YouTube XL:
    Special format with simple interface
    (for TV set)
- 3D Video:
  - Search for "yt3d:enable=true“ in YouTube ...



1 Introduction and Motivation

Term: Multimedia Service

- *Service:* In the context of this lecture, always a telecommunication service, i.e. an offer to users for satisfying communication demands in a physically separated situation.

- *Multimedia service:* [A telecommunication service] that handles several types of media in a synchronized way from the user's point of view. A multimedia service may involve multiple parties, multiple connections, and the addition or deletion of resources and users within a single communication session.

  ITU-T Recommendation F.700 "Framework recommendation for audiovisual multimedia services"

Terms: Party, End System etc.

- *Party:* An organisation or a human being involved in the offer and use of a multimedia service
- *Service Provider:* An organisation which offers some part or the whole of a multimedia service
- *End system:* A physical device which is connected to the network and takes part in a multimedia service by exchanging information with other end systems over the network
- *Terminal:* An end system which is directly operated by a human user

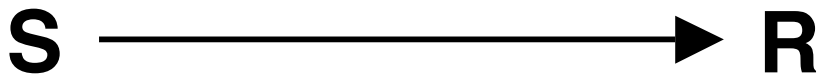
  Common term in the traditional telecommunication world: Customer Premises Equipment (CPE)
- *Server:* An end system which is operated by a service provider as a part of the service offering. Usually designed to interact with many terminals at the same time.

Terms: Content, Content Provider

- *Content:* Information which is of interest to at least one of the communicating parties. In the case of multimedia services: mostly audio-visual information in digitized form. Often content is associated with copyright restrictions for its distribution.
  - Examples: Live video source of a sports event, recorded piece of music in MP3 format
- *Content Provider:* An organization which takes responsibility for the provision of content for a multimedia service. In the presence of copyright restrictions, and when timeliness of content is an issue, appropriate *content management* can be a major concern for the content provider.
  - Examples: TV broadcast stations, movie distribution companies, news agencies

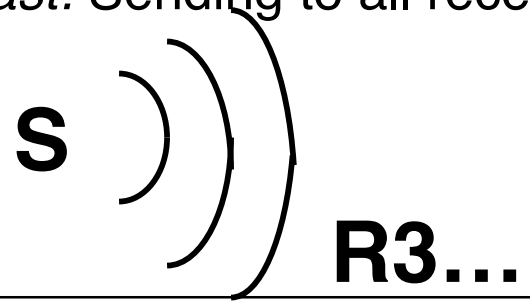
Terms: Unicast, Multicast, Broadcast

Unicast: Sending to one single receiver



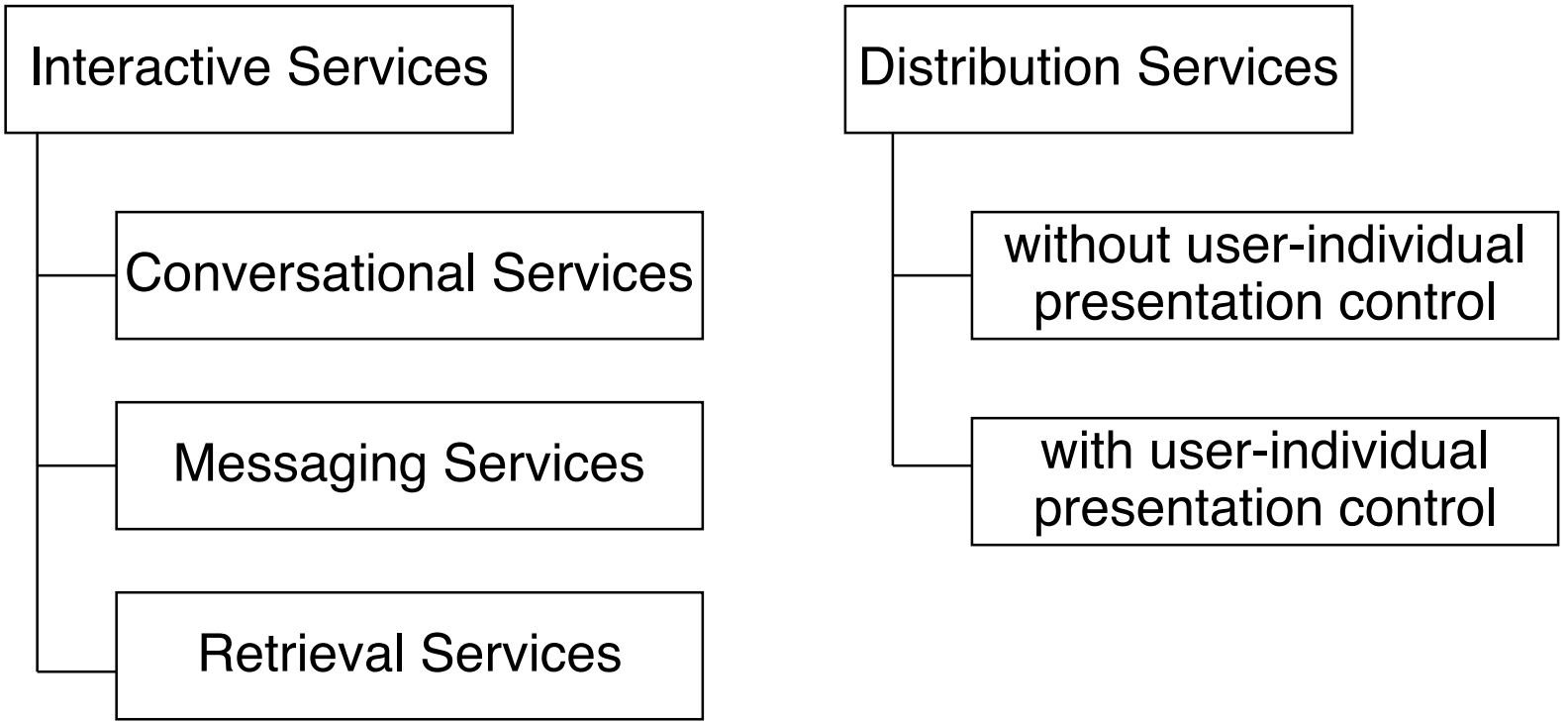
Multicast: Sending to several selected receivers

Broadcast: Sending to all receivers



A Classification of Multimedia Services

- According to ITU-T recommendation I.211 “B-ISDN Service Aspects”



Interactive: Conversational, Messaging, Retrieval

- Conversational Services:
  - Multimedia information exchanged between terminals in synchronous style (reception temporally coupled with sending)
  - Source of multimedia information: terminal
  - May use intermediate servers or may be realized on terminals only
- Messaging Services:
  - Multimedia information exchanged between terminals in an asynchronous style (reception temporally decoupled from sending)
  - Source of multimedia information: terminal
  - Servers involved for intermediate storage of messages
- Retrieval Services:
  - Multimedia information available on servers for download or streaming
  - Source of multimedia information often external (from content providers)
  - Usually a star-shaped configuration: One server provides content to many terminals
  - Recent development: Communities sharing content

Content Delivery: Quality of Service

- Content Delivery can be performed in varying *Quality of Service (QoS)* depending on the capabilities of the underlying network technology
  - Bandwidth, delay, jitter
  - Buffer sizes
- Mainly relevant for conversational, retrieval and distribution services
- Live-Content Service:
  - Source information (e.g. from cameras) transmitted with minimal latency
- Buffered-Content Service:
  - Source information (e.g. from cameras) transmitted with latency acceptable for a human end-user
  - Higher latency possible in retrieval services than conversational services
- Stored-Content Service:
  - Source information (from an arbitrary source) downloaded completely from storage before consumption, no consideration of the temporal relationship between content creation and consumption

Non-Interactive: Distribution

- Without user-individual presentation control:
  - Simple broadcast (or multicast) of information
  - Replacement of other distribution media (e.g. radio) by digital networks
- With user-individual presentation control:
  - Limited interactivity realized by broadcast/multicast
  - Example: “Near Video-on-Demand”
    - » Staggered broadcast of multiple transmissions of the same content (see e.g. Sky Select in Germany)
    - » User can switch between transmission instances
  - Time-shifted recording enables additional interactivity (pause/resume)

Sky Select
on Humax iPDR-9800
(www.sky.de)

Network Classes: Single Technology vs. Internet

- Single-Technology Network
  - Usually run by a single network operator and interworking with other networks of the same technology
  - Traditional telecommunication networks: POTS, ISDN, X.25, SDH, ...
  - Advanced multi-service telecommunication networks:
    - » Broadband ISDN (B-ISDN): ATM technology

- Inter-Network:
  - Virtual overlay network across various technologies
  - Most famous: IP-based global inter-network = The Internet

Other Network Classifications

- Fixed vs. wireless network
- Personal-area, local-area, metropolitan-area, wide-area network
- Data communication, speech communication, multi-service network
- Public network vs. private network

End System Classification

- General purpose end system
  - PC, PDA (Personal Digital Assistant)
- Special purpose end system
  - Mobile phone
  - IP telephone
  - Set Top Box (STB)
  - Game console
  - Mobile music player
  - Embedded display (e.g. in cars)
  - IP radio? IP TV set?
- Hybrid end system
  - E.g. smartphone (phone, camera, music player, browser, ...)

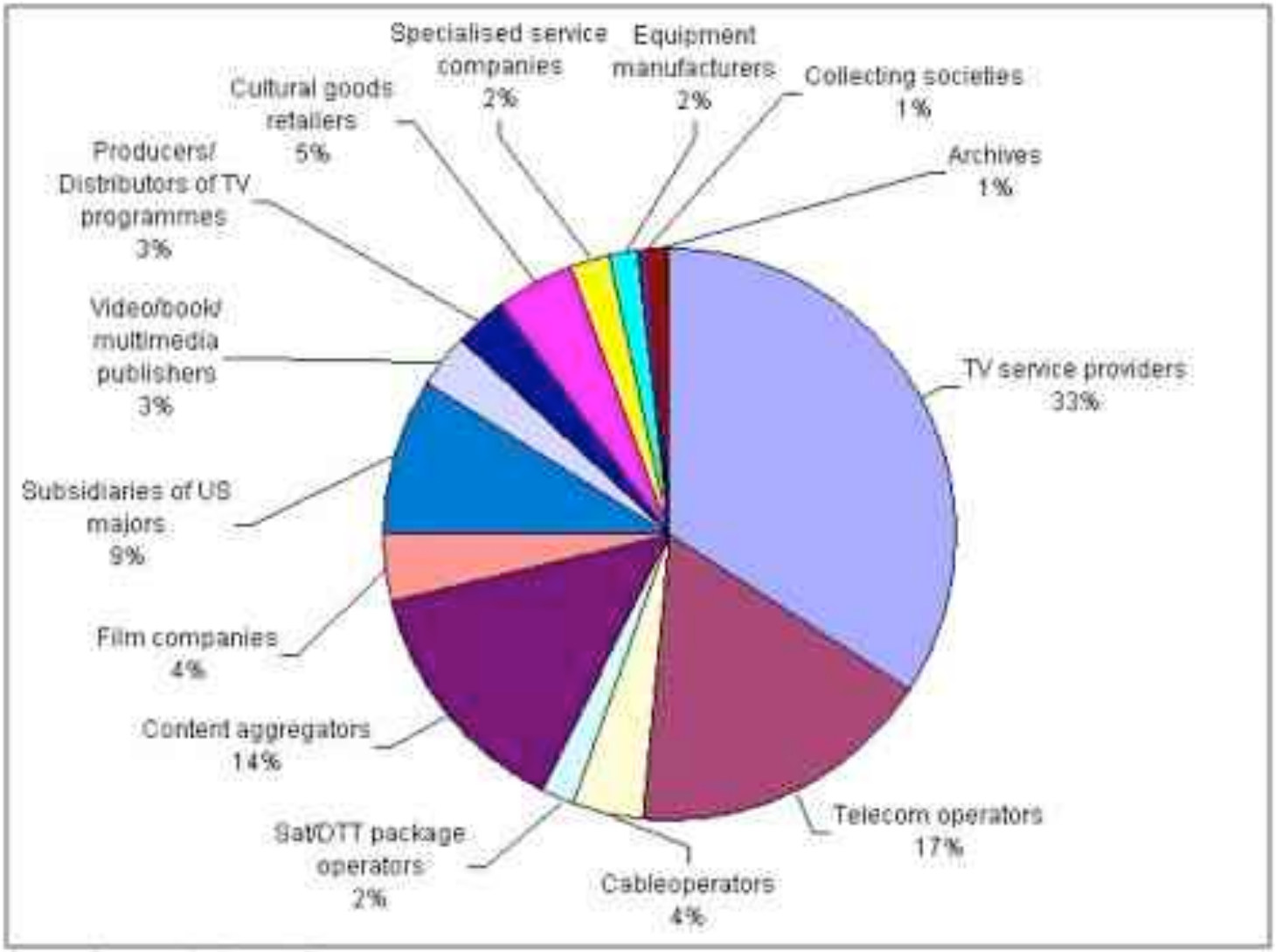
- Services may address a single class of end systems or several groups

1 Introduction and Motivation

“History” of Networked Multimedia

- **1964**: AT&T introduces Picturephone at the World's Fair, New York
- **1983**: Internet: Standard networking protocol (TCP/IP) is adopted by all ARPANET users.
- **1984:** ITU-T recommendation I.120 about ISDN
- **1986:** ITU defines ATM as the basis for Broadband ISDN
- **1986**: PictureTel's $80,000 VC system, $100 per hour lines
- **1990**: CCITT standard H.320 for ISDN conferencing
- **1991:** US National Science Foundation lifts ban on commerce on the Internet
- **1990-1997:** Experimental multimedia services over Broadband ISDN (ATM)
- **1991**: The World Wide Web makes its debut on the Internet.
- **1992**: World's first MBone audio cast (vat), 23rd IETF, San Diego
- **1993**: CU-SeeMe v0.40 for Macintosh (with multipoint conferencing)
- **1995:** RealAudio brings streaming audio to Web users. Streaming video soon follows.
- **1996:** VocalTec Internet phone
- **1999**: Napster debuts, allowing users to download (and share) their favorite MP3s
- **2000:** Voice over IP (VoIP) accounts for 3% of the total voice traffic in US
- **2001:** Apple iTunes, the first successful commercial online store for digital music files
- **2003:** Apple iChat AV (video conferencing), AOL AIM with video support
- **2004:** Broad use of Voice over IP with the popular software *Skype*
- **2005:** YouTube video exchange Web site
- **2008:** Around 700 Video on Demand services available in Europe

Video on Demand in Europe 2008



Source: European Audiovisual Observatory

Advanced Multimedia Services for Residential Users

Feldversuch

München

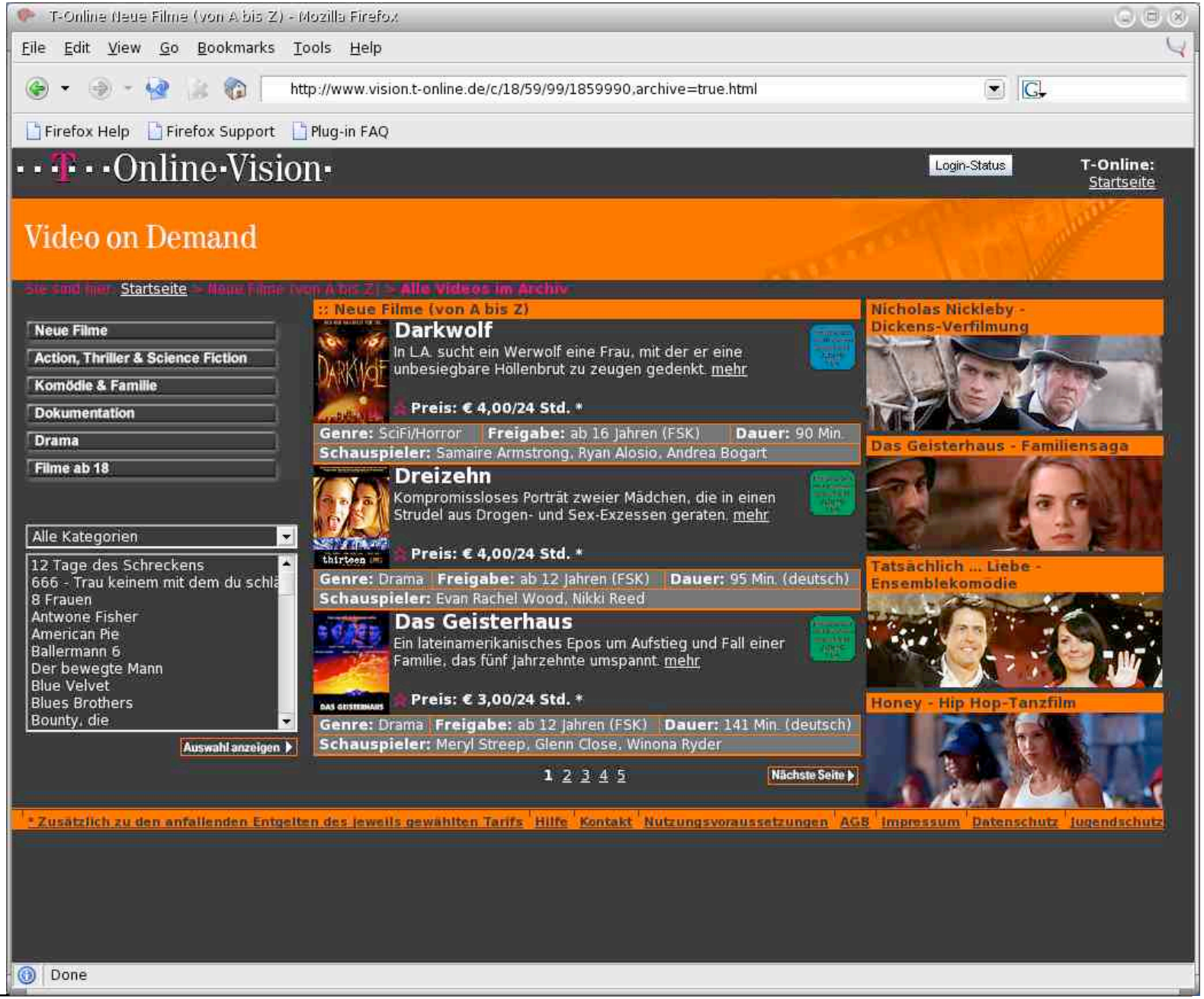
Mai-Juli 1996

Video-on-Demand

ATM over TV cable network

Video
on
Demand

2004



Video
on
Demand

2009

Convergence of Networks and Services

- Migration of originally single-technology services towards IP-based Internetworks
  - E.g. GPRS and EDGE service for GSM networks
  - E.g. IP services over DSL
  - Single-technology services only relevant for QoS reasons
- Integration of network technologies
  - Multiple interfaces (e.g. on a laptop) for media access:
    - » USB to player, USB to storage, CD/DVD, Ethernet, WLAN, ...
  - High-level services bridge across the various ways of network access
    - » E.g. music download service
    - » Complex issue: Synchronization among used devices (e.g. computers and portable music players)
- Final goal: User perceives service as *ubiquitous*, and does not have to care about access technologies