EBU **TECHNICAL**

# Broadcast Requirements on Internet Content Distribution

**Joint EBU-OCEAN Workshop**

**EBU HQ, Geneva, 7 September 2010**

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**European Broadcasting Union**

*Open Internet has become an important delivery mechanism for both linear and non-linear media, and is likely to become even more important in the future*

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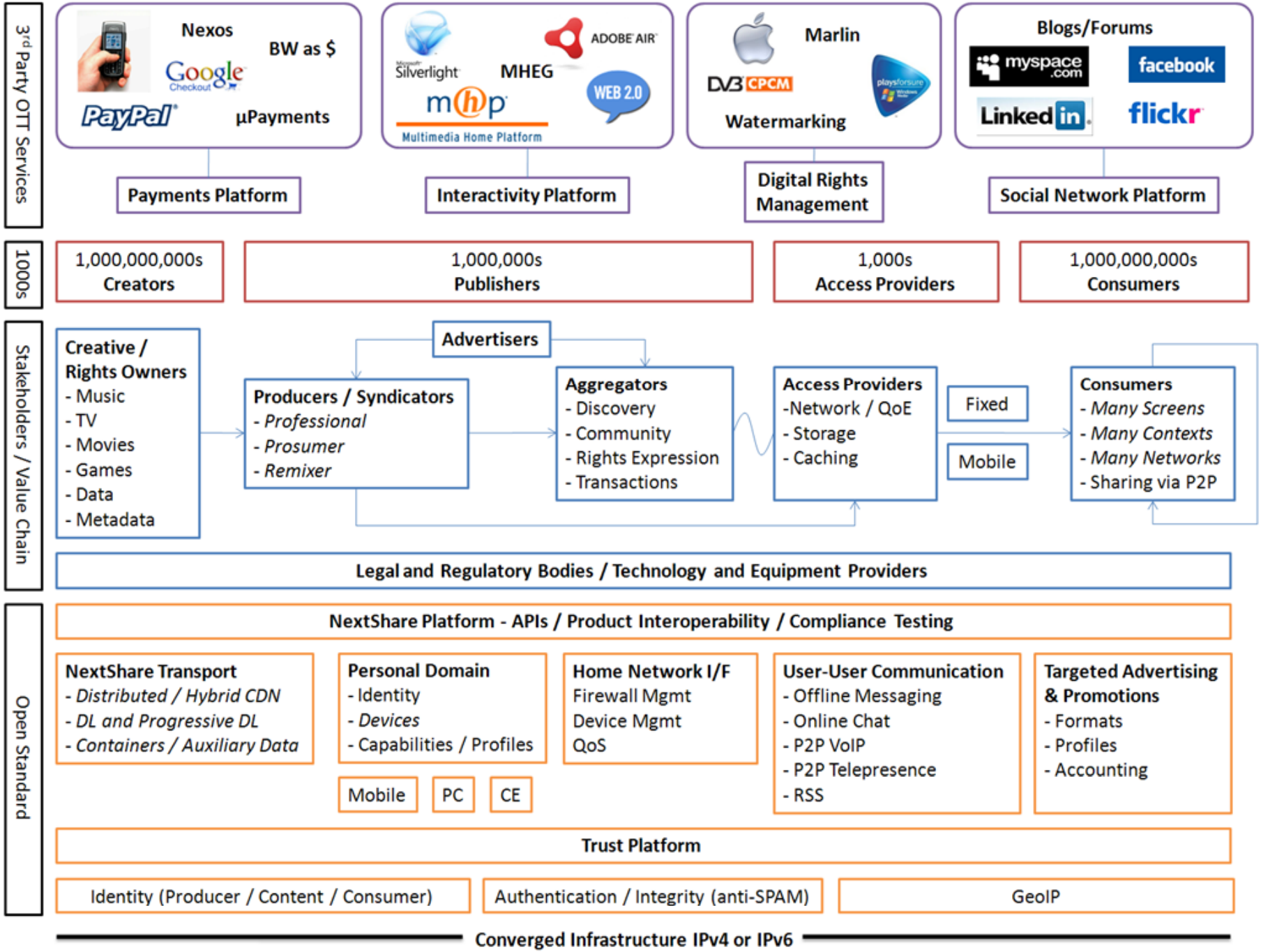
# Some key questions that broadcasters often ask (unordered)

- What is the relationship between traditional broadcasting and the internet
- Will Internet disrupt the existing revenue streams
- Who pays for the internet services
- Who pays what to whom
- Who is the « owner » of the end-user
- Who manages the content
- How to protect content
- What type of content is the most suitable for the Internet
- What type of video (and audio) quality viewers can expect
- Is the Internet suitable to carry high-quality television services (e.g. HDTV, 3DTV)
- Which codecs and browsers to focus on
- How will users find and search for the content
- How the content will be delivered with scale and performance
- Which production, distribution and consumption platform(s) will be used
- What is acceptable cost for content delivery
- Which end devices should we target

**And finally, how about the net neutrality???**

# Media Delivery Ecosystem



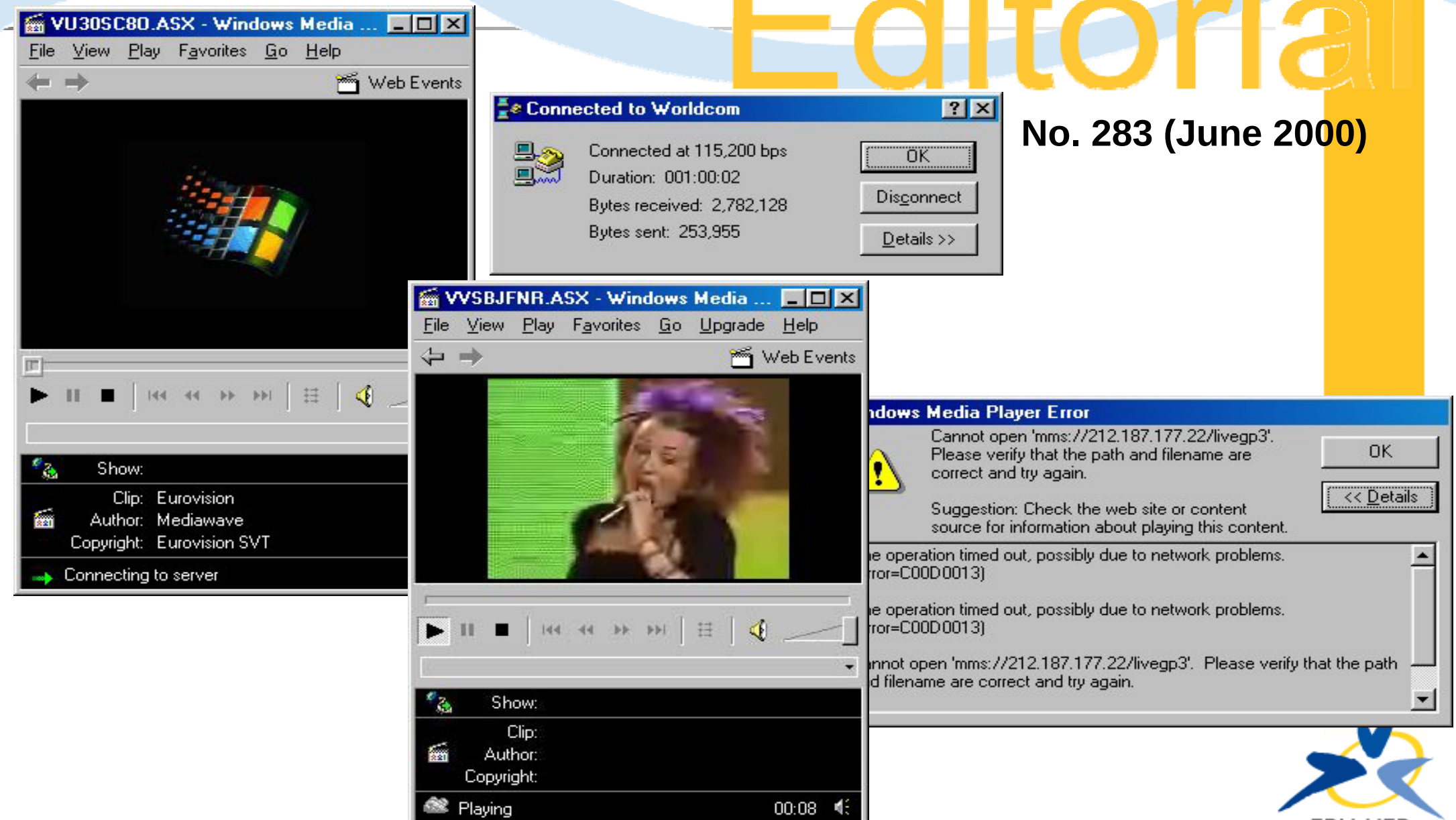



Courtesy: Pioneer

# EBU Technical Review

# Editorial

No. 283 (June 2000)

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# Internet TV today

YouTube: user generated content

iTunes: buy/rent your episode

AppleTV: set-top box for TV

BitTorrent – open source P2P file sharing

Hulu: TV series for free

BBC iPlayer: catch-up TV

Netflix - streaming movies

Facebook – social networking

Twitter – short messages

# Advantages of Internet compared to Broadcasting

**The Internet has open architecture**

**The internet follows the end-to-end principle:**

- It does not mind what is communicated between the network ends.
- What enters the net, goes out.

**Allows entry of new players, new users, new applications and new systems**

- Some existing players are bracing themselves to adjust to new internet environments
- Some existing apps and services take a new shape for optimum performance in the internet

**The Internet is a place of permanent changes and these changes are likely to continue.**

**Allows continuous design, redesign and configuration of systems**

**This creates continuous tensions among players and battle over market power**

# Internet challenges

**Recently, the Internet has become a mass phenomenon and takes the load which it has never been designed for.**

**Content has become an interesting market and content providers started to earn money.**

- Network providers remained focused on network (bandwidth) provision only

**The use of audiovisual on-demand and live services grew rapidly**

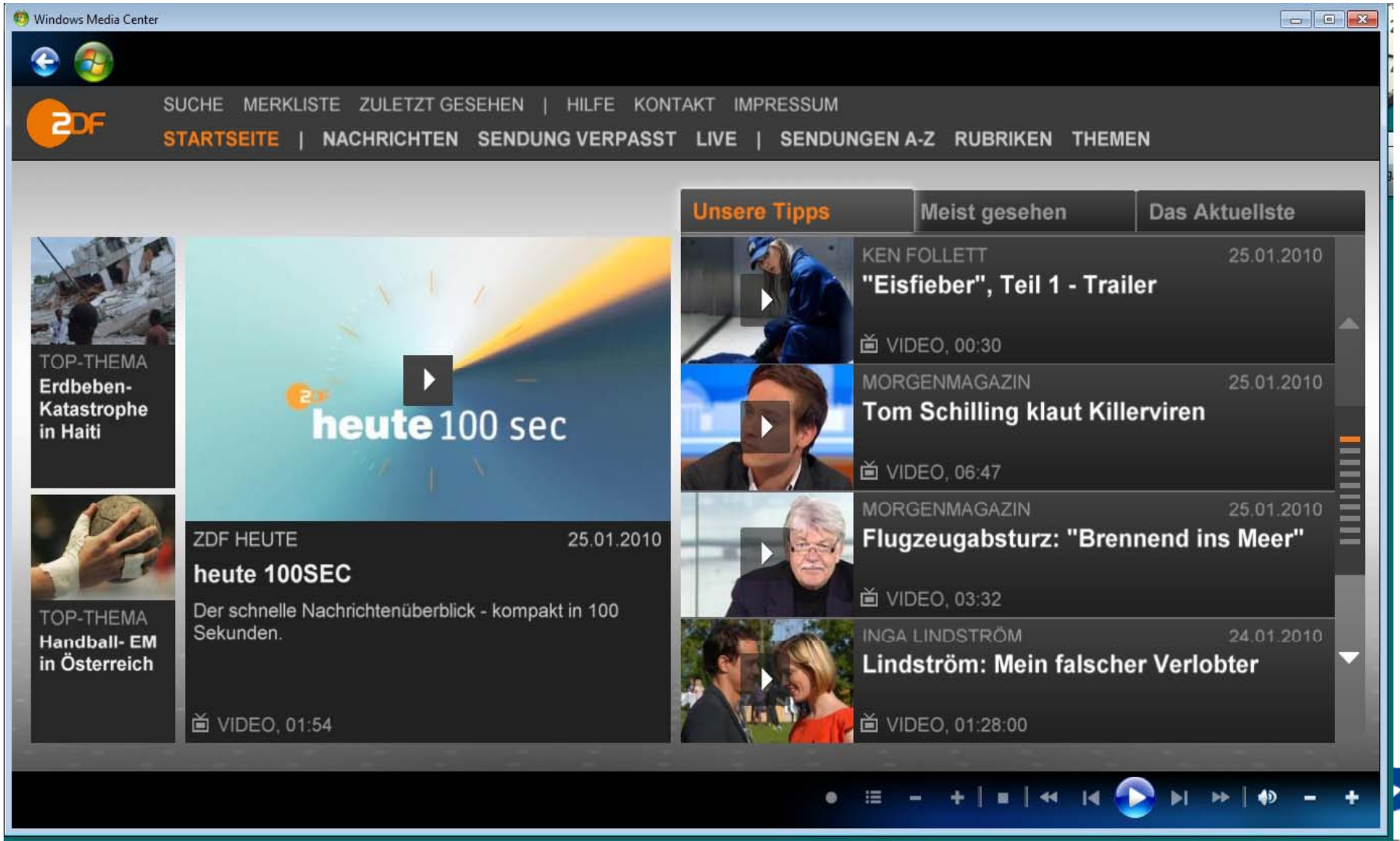
- Network providers faced capacity and quality challenges

**AV apps and services (like audio, video, voice, television, radio) brought new technical challenges which were not critical for previous simple data apps/services**

- Latency
- Start-off time
- Jitter
- Bandwidth
- Flash crowds
- Number of simultaneous users

**As a result of these new developments, the very end-to-end principle has been questioned.**

# ZDF Mediathek



Pubblicità

Grazie a
22.787.9

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RAI SELEZIONA
GIORNALISTI
PROFESSIONI
PER LE REDAZIONI REG

Richiec
la SMA
di Tivù

# Slutt for MGPjr utenfor Norge

For vinneren i MGPjr lørdag er Oslo Spektrum siste stopp. Det blir ingen nordisk finale.


NRK NETT-TV

Hjerte til hjerte - Spelet
Linn med storslagen spel. Eller?

Ungkarsprinse

Prisen for å d

Derrick 9:13

Koht på jobbe

## Aktualno

EP 2013 v Sloveniji: Na potezi je vlada

RSS Kaj je RSS?

### Juri: Med protestniki tudi ultradesničarji

Seja odbora DZ-ja o študentskih protestih: 31 ovadenih, med njimi 15 mladoletnikov, 3. september 2010 ob 10:41

Policisti do zdaj niso potrdili, da bi šlo za organizirano skupino, ki bi izvajala kazniva dejanja. Gre za posameznike, zatrjuje Janko Goršek.

50

- SDS: Za nasilje kriva Fronta prekrcev
- Juri: Eno skupino protestnikov se želi kriminalizirati

## Novice

UREDI RSS

### Foto: Zrušil se je del zidu in odnesel še del ceste

3. september 2010 ob 08:57

V Ljubljani se je ponoči porušil del zidu ob gradbišču na Frankopanski ulici. Takoj nato se je zrušil še del vozišča, zato so policisti kraj zavarovali in delno zaprli Gubčevo ulico.

13

Pakistanski bogataši preusmerili vodni tok, da bi rešili svoj pridelek

1

## Šport

UREDI RSS

### Grkom se je maščevala preračunljivost

3. september 2010 ob 08:50

Razburljiv zadnji krog predtekmovanja na SP-ju v košarki je postregel z nekaterimi poslasticami že v osmini finala. V oči "padeta" predvsem dva sosedska dvoboja in zgornja četrtina tabele.

60

Foto: Za zadovolj(e)ne obraze skrbijo Rdeče lisičke

17

Septembra Slovenija statistično

Dodaj vsebine na stran

Radio Televizija English

## Priporočamo

SP v košarki

- Naj avto
- Vse digi
- Igra

## Vreme

# Some Broadcasters' requirements for Internet distribution

**Reliable and secure content delivery**

No glitches, no interruptions, reasonable latency, firewall traversal

Automatic adaptation to time-varying network conditions, changing number of end users and multiplicity of different end devices

**Live streaming and on-demand**

PVR support, integrated content protection, integration with advertising and analytics, media navigation (trick mode, start anywhere)

**Range of quality levels** – including HD quality

HDTV and multichannel audio as well as SDTV and FM-quality

Comprehensive metadata

**Low cost of infrastructure, operation and end devices**

**Large number of concurrent users**

Millions of users at the same time, high burstable capacity – resistance to „flash crowds"

**Open and standardised system**

Facilitates to rollout horizontal markets

**Availability across a range of networks and end devices**

Various physical infrastructures and a range of CE devices

# Content-related issues

**Media Multi-platform Production**

- End-to-End Digital Production Workflow: a highly-efficient file-based workflow from ingest to play-out using MXF (Material eXchange Format)
- Non-linear editing, video servers  replaced VTRs
- MXF includes several profiles: which subset is most suitable for Internet ?
- Ancillary data and services: subtitles, captions, timecode, audio descriptions
- Metadata models

**Codec issues**

- Multitude of different audio and video codecs
- Recent MPEG LA  announcement that  no license fee applies to H.264

**Quality evaluation issues**

- Broadcasters use rigorous subjective evaluation methodologies, ITU BT.500 and EBU SAMVIQ

**Legal/regulatory issues:**

- Content integrity
- Privacy protection and user behaviour data protection

# Adaptive HTTP Streaming

- It acts like streaming but is based on HTTP progressive download
  - A long series of very small progressive downloads
- 4 approaches: Microsoft, Adobe, Apple, Move Networks
- Low entry barriers:
  - Compatibility with existing HTTP network infrastructure such as CDNs
  - No firewall, NAT, RTSP interoperability issues
- Smoothly adjusts the content quality to the changing network conditions and the device processing power
- Client does not need to download more than it actually consumes
- Fast start up – starts with low Q and increasing Q, as buffer fills up
- Provides better Q, as it uses the whole available bandwidth
  - Non-adaptive streaming forces the client to select a fixed bitrate below the available bandwidth
- Should be very easy to standardise (see Open IPTV Forum, 3GPP, MPEG):
  - Choose the format of segments: MPEG-2 Transport Stream or MP4-F
  - Define a client manifest

# Adaptive Media Delivery Options

| | RTP Streaming | HTTP Progressive download | HTTP Adaptive Streaming |
|---|---|---|---|
| Codec/Player | H.264, SVC, Flash | H.264, SVC, Flash | H.264, SVC, Flash |
| Quality of Service | Depending on BW and performance | Often poor user experience | Depending on BW and performance |
| Adaptive Bitrate | Yes | No | Yes |
| Publishing Workflow | Simple | Simple | Packaging + Manifest |
| Content protection | Flash Access DRM, Marlin | Flash Access DRM, Marlin | Flash Access DRM, Marlin |
| Live Support | Yes | No | Yes |
| Live Latency | <1s | n/a | <30s |
| Synchronous Communications | Yes | No | n/a |
| Logging | Server side | No | Client side |
| Cacheable | No | Yes | Yes |

# Hybrid Broadcast Broadband (HBB)

**HBB provides a combination of two paths between the service provider and the end user:**

- A one-way path: Broadcast
- A two-way Broadband (Internet)

**Broadcast networks, as used in HBB, provide:**

- excellent scalability (e.g. several millions of concurrent users),
- ability to cope with flash crowds (i.e. sudden bursts in traffic), and
- excellent service reliability and high bandwidth (bit rate)

**These issues are a major problem of today's IPTV or Internet TV.**

**Most services are managed by broadcasters:**

- On-demand catch-up television programmes
- Browser-based digital Teletext
- Advanced access services (signing, multi-lingual commentaries, captions, subtitles)
- Multiple camera angles, embedded picture-in-picture
- Information widgets user-adjustable on a TV display
- Targeted advertising

# Multitude of HBB TV proposals

**There are several HBB or connected TV platforms and standards available in Europe, including :**

- Vendor-specific solutions: Samsung, Sony, Panasonic, Philips
- Yahoo! widgets
- Canvas and HbbTV,
- Capablue Connected,
- TV Everywhere in the US, etc

**Critical issue 1: a Content (not Service) Discovery Platform**

It should enable viewers to search for video on any device, as well as receive intelligent recommendations that enable them to discover programming that is genuinely relevant to their viewing habits or interests

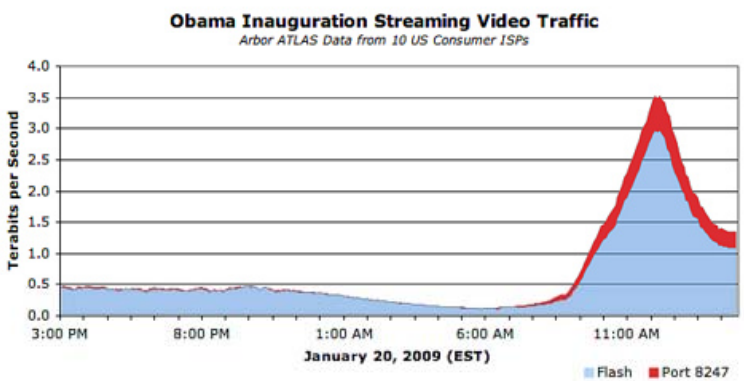
**Critical issue 2: Broad consumer programme choice**

Based on existing product development and the short-term availability of receiver products using existing supply channels

# Peer-to-Peer Delivery

**P2P has come a long way from initially illegal file sharing services to commercially viable, large scale, mass market distribution overlay networks.**

## Example: Octoshape




- 7.8 Million Live Sessions
- 3.78 Million Hours Of Live Streaming Video
- 1 hour 34 Minute Average Unique User Time
- Viewed in More Than 200 Countries

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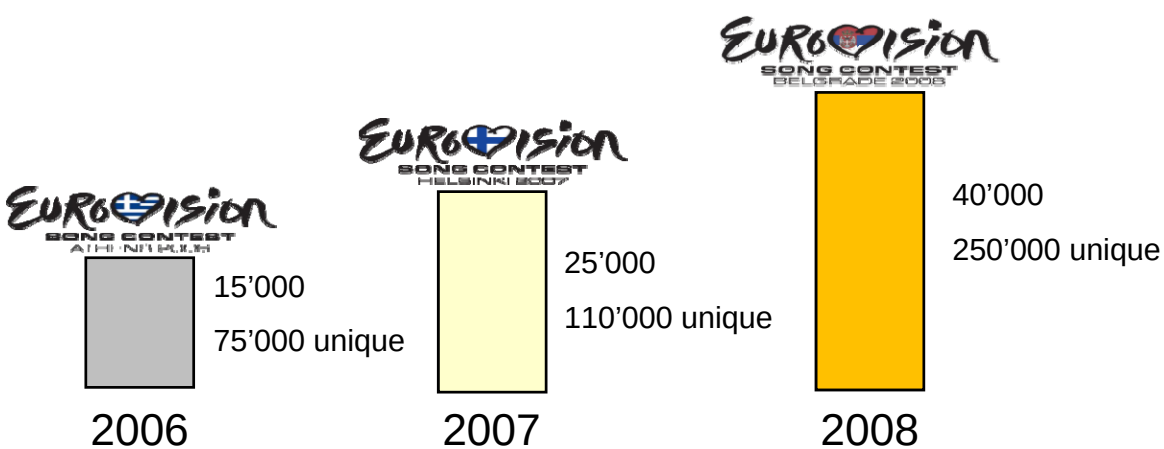

# Main P2P challenges

**Today, pure P2P systems are most successful at low bit rates – lower than upstream capacity (such as live radio/audio-only streaming)**

**Due to asymmetricity of today's broadband networks, HQ TV streaming (around 1 Mbit/s) is more challenging and require addition infrastructure/software mechanisms**

- Dedicated super peers
- Temporarily assigned peers (hyper peers)
- Edge caching  servers
- Complementary CDNs

**P2P is an efficient system for *local*, close area services**

**P2P is less suitable for *inter-domain* services involving two or more different ISPs, especially if the broadband network is star based (example: the Netherlands, the UK, etc). In this case traffic goes via a backbone linking two domains which makes P2P less efficient than unicast.**

**A future option: a combination of P2P and CDN.**

# And how about the future?

**There are many uncertainties about the suitability and commercial success of media delivery services over the open internet .**

**Not a single technical solution will prevail on the market.**

**We believe that the technologies that combine openness, simplicity, low complexity and cost, reliability of service and a potential for carrying HD/3D services will ultimately win.**

**We also believe that the Internet has already reached a level of maturity commensurate with the traditional delivery media.**

**The Internet has become a valid and valuable media distribution system.**