Broadcasting & Multimedia
Multimedia driving broadband ?

Franc Kozamernik

European Broadcasting Union

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European Broadcasting Union - EBU

- The EBU is the largest professional association of public service broadcasters (PSB)

- Founded in 1950. Merged with the Eastern European Broadcasting Organisation (OIRT) in 1993.

- 70 active members in Europe, North Africa and Middle East and further 45 associate members

- Eurovision and Euroradio satellite/terrestrial networks

- Radio and Television programming, legal and technical activities
- Sister Unions: NABA, ABU, ASBU, etc.

Agenda

- Broadcasting today and tomorrow

- Broadcast and Telecom – synergies

- Broadcast and Internet

- Interactive Multimedia Broadcasting

- Video Coding progress

- Broadcast experiences on Broadband
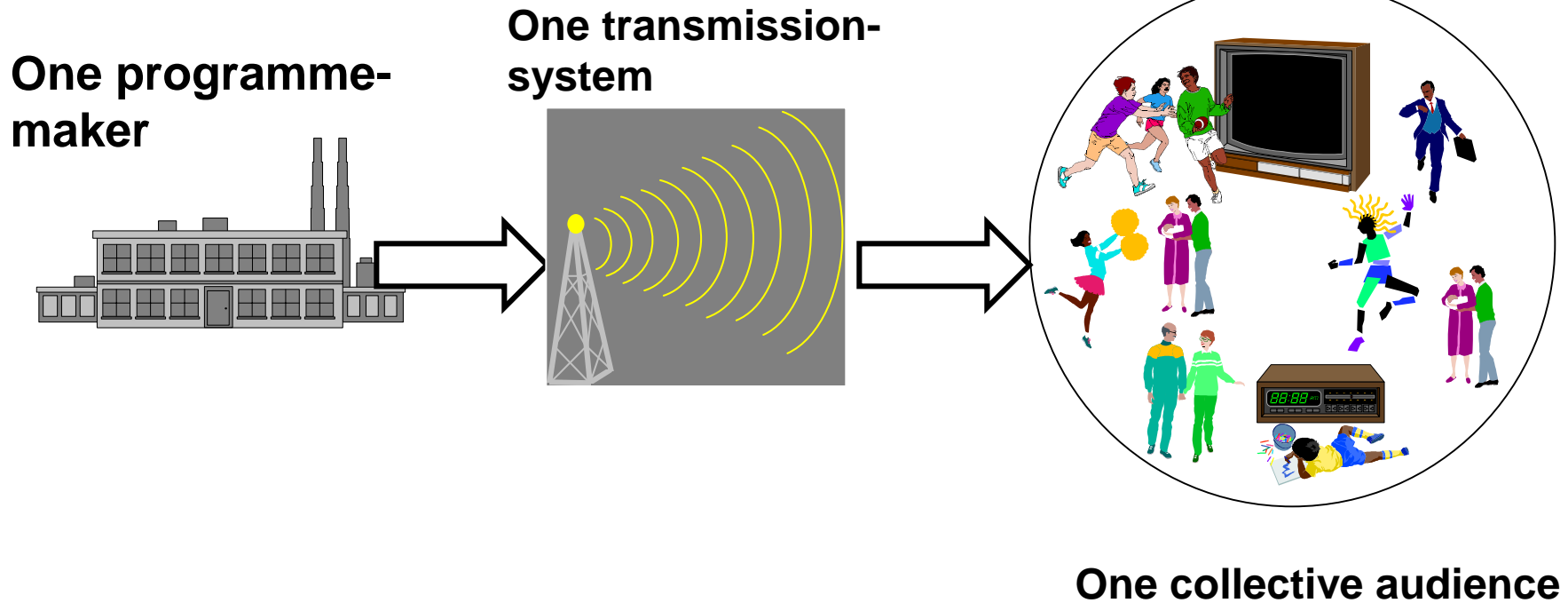
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Broadcasting today

- Sound radio and television are the most important *mass media* and play a major and irreplaceable part in the lives of the people

- *Radio* is simple, ubiquitous, free service, non-expensive receivers, mobile and portable, user-friendly, informative and trusted medium

- *Television* is more sophisticated, used in the home/family, provides entertainment, information and education

- Both radio and TV are in the process of radical changes and move towards digitisation and multimedia

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The good old analogue world
- Broadcasting was very simple and easy

One programme-maker

One transmission-system

One collective audience

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The changing media consumption pattern
## -three methods of choosing content.

- **A**: Programme choice determined by the traditional channel-flow.

- **B**: Choice of programmes using an electronic programme guide (EPG) in a multichannel-flow.

- **C**: Neither channels nor flow: Programmes and services on demand (the Internet).

....

A.   **B.**   **C.**
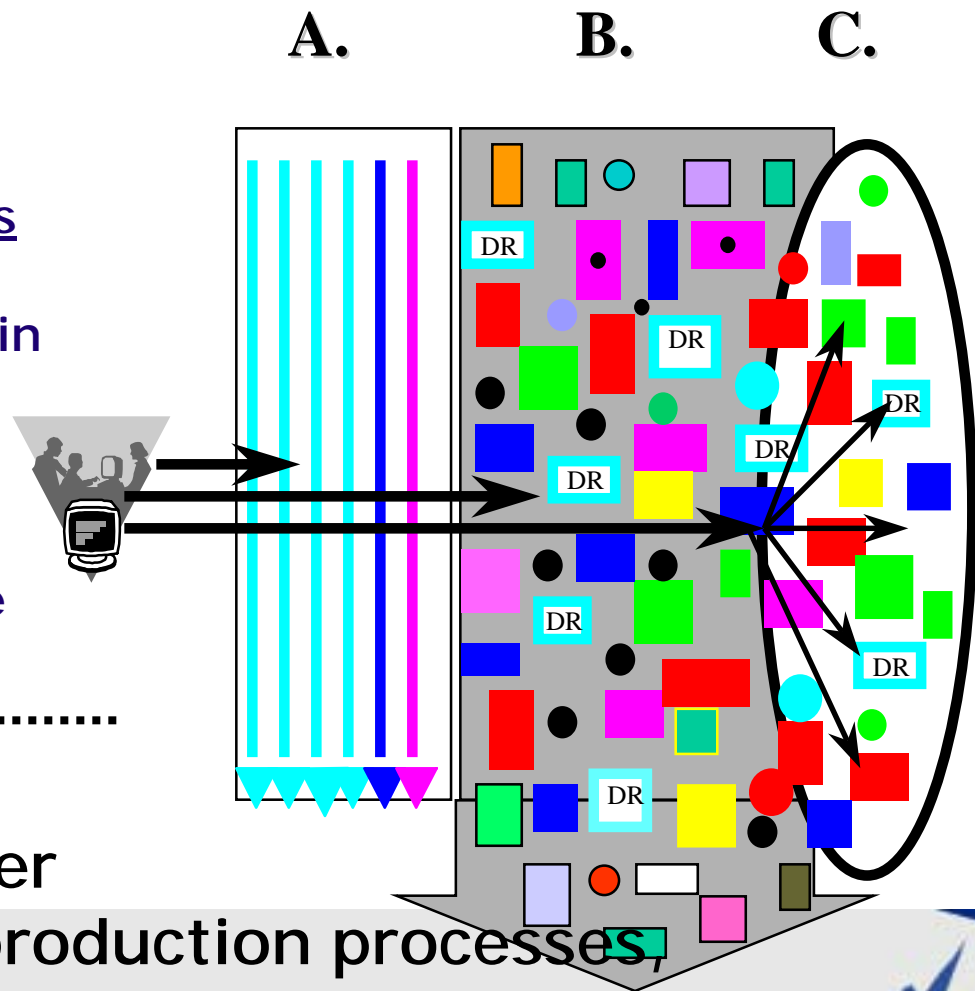
PSBs need to reconsider programming policy, production processes, organisation, and financing.

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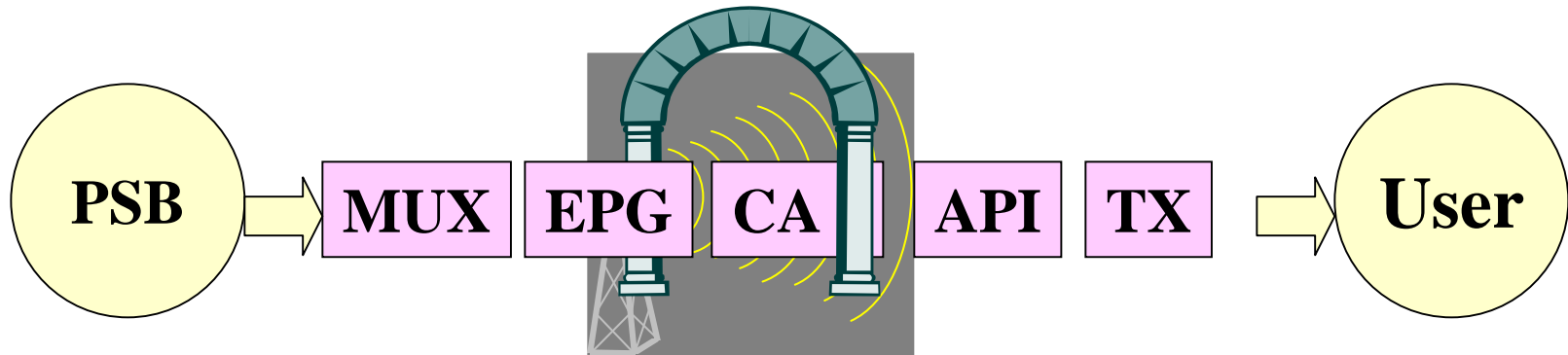
It is in the interest of the Public (and Public Service Broadcasting) to have common standards, open for everybody.

What can PSBs do to promote common, open standards?

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- For how long can PBS provide generalist channels ?
- Will competition-regulation tend to force PBS into niches?

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Content

- The choice of TV services available to the average consumer has increased dramatically, but expenditure on new programmes has not kept pace with this expansion

- Traditional broadcast services (i.e. one-to-many & one-way) will continue to be important because *mass audiences are required* to cover the costs of high quality content production

- Broadcasters are embracing the opportunities offered by multimedia services and applications, including "interactive" and "on-demand" services

- Users will transform themselves from passive consumers to active creators able to choose the content and presentation to their liking

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Broadcast Delivery

- Broadcasters (content providers) are likely to become agnostic about delivery systems

- The existing terrestrial networks will remain attractive because they are almost universally available

- Radio broadcasters can choose from:
  - AM, FM, DAB (Digital Audio Broadcasting), DRM, Internet

- TV broadcasters will choose from:
  - analogue terrestrial, satellite and cable,
  - digital satellite (DVB-S), digital terrestrial (DVB-T), digital cable (DVB-C), digital MMDS (DVB-MC & DVB-MS),
  - Internet and its successors, UMTS, broadband radio services (WLAN etc)

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Broadcasting dilemmas

remain an autonomous system

become integrated with telecoms structures

retain its present off-the-air (mobile) coverage

become an extension to the Internet, including wireless cells

remain a predominantly 'live' medium

evolve into moving content between databases

remain aimed at anybody, respecting user anonymity

evolve into specialised, personalised services

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Broadcasting vs. Telecoms

- **It is important to understand the differences between these separate industries**
  - Telecoms is mainly "one-to-one"
  - Broadcasting is mainly "one-to-many" - All users tuned to a given channel receive the same content

- **From the all-important perspective of users:**
  - Both models will continue to be needed for different types of services and applications
  - Both models have advantages and disadvantages

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Broadcasting vs. Telecoms

- Economists designate free-to-air broadcasting as a "public good" because the marginal cost of extra viewers or listeners is zero

- Telecoms operators get more revenue as the use of their networks increases

- Broadcasters are mainly interested in content
    - delivery technologies are incidental to them

- Telecoms operators are mainly interested in delivery systems
    - content is incidental, but will become more important as the impetus for new services

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Broadcasting vs. Telecoms

- In the past, they have been evolving separately in different directions as two entirely different entities.

- Since last two decades, both industries made significant progress in adopting digital technologies.

- More recently, they embarked into packet-based technologies and the development of multimedia services and applications with the following common features:
  - geographical and time independence,
  - Interactive and on-demand services,
  - better technical quality and increased security

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Relationship

35%

52%

13%

- complementary
- independent
- both
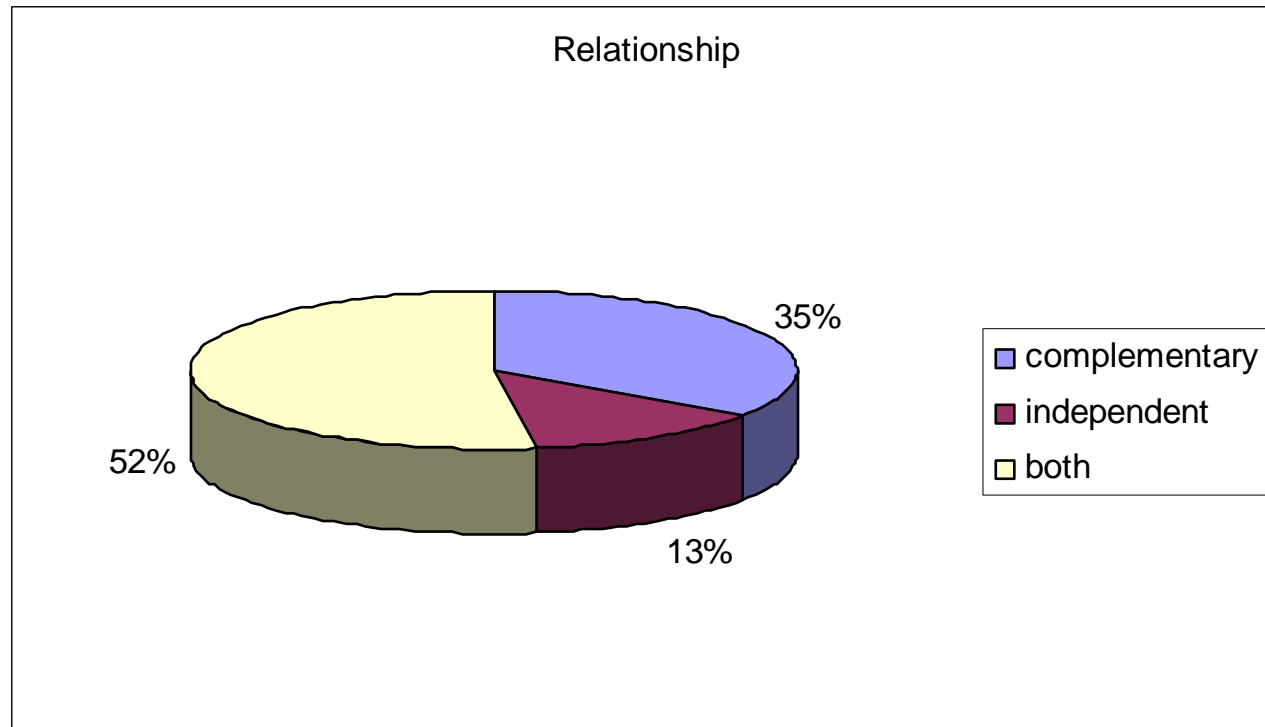
Is Internet an independent or complementary broadcasting medium?

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programme schedules, EPG-like info

streaming of audio and video

local, regional and world news

target audience outside nominal coverage

more detailed/extensive information

company profile: **history, achievements, coverage, statistics on the audience**

email communication with the viewsers and chat rooms

platform for users programme contributions

traffic messages, travel, flights and trains, events, weather, SMS messages, multimedia, webcams

one-stop Internet portal

Interactive games, voting, bids and auctions

e-commerce for books, music, videos

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Largest concurrent web audience

- ARD: ardtour: 30m page views
- ARD/MDR: Report from 11 September 2001
- ARD/WDR: Live streaming events:
    - "Maus-Geburtstag" kids program ,
    - "Eins-Live-Krone" a music award,
    - "Rosenmontagsumzug" main event of the "Kölner Karneval"
- BBC: 11 Sept: 17100 users
- UK-Channel 4: Big Brother 2: 20m
- FTV: May 2001, a TV programme about Loft Story made more than 1 terabyte of video served in two weeks
- VRT: Elections (communal) 80'000
- NO-TV2: 11 Sept terrorist attacks NY News 1'100'000 page views, total 3'200'000 page views
- HU-MTV: Summer Olympic Games 2000: 480000 page views
- CRO-HRT: Croatian contest for Eurosong "Dora 2001" >500 concurrent streams

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Interactive Multimedia Broadcasting

🖉 LEVEL 1: Local interactivity in terminal (e.g. TV Anytime)

🖉 LEVEL 2: One-way return channel

🖉 LEVEL 3: Two-way return channel

DAB or DVB can be used as a transport medium

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LEVEL 1
Personal Video Recorder (PVR)

- **No return link needed**
- **Internal storage device in the user terminal to allow:**
  - TV viewers to "order" a programme to be recorded by a single click during a trailer
  - intelligent agents to record TV programmes that they "think" you might want to watch
  - sophisticated interactive multimedia information services, continuously up-dated and available instantly to consumers
  - linear programmes to be consumed in a non-linear manner (e.g. a news bulletin)
 - automatic indexing of recorded programmes
- **TV Anytime Project**

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LEVEL 1
Personal Video Recorder (PVR)

- Unlike tape-based VCRs, hard disks can record and replay at the same time:
    - you can record a "live" programme but if the telephone rings, you can press "pause"
    - you can resume watching the programme with full VCR-like controls - allowing you to "rewind" or "fast forward" whilst the programme is still being recorded
    - you can also "skip" the advertisements!
- Disk drives enabling local storage, retrieval and manipulation of audio, video and data are increasing in capacity and falling in price
- Hard disks are now becoming so cheap that they can be used as "intelligent" video recorders (e.g. TiVo)

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LEVEL 2/3 Interaction

Based on DIGISAT model
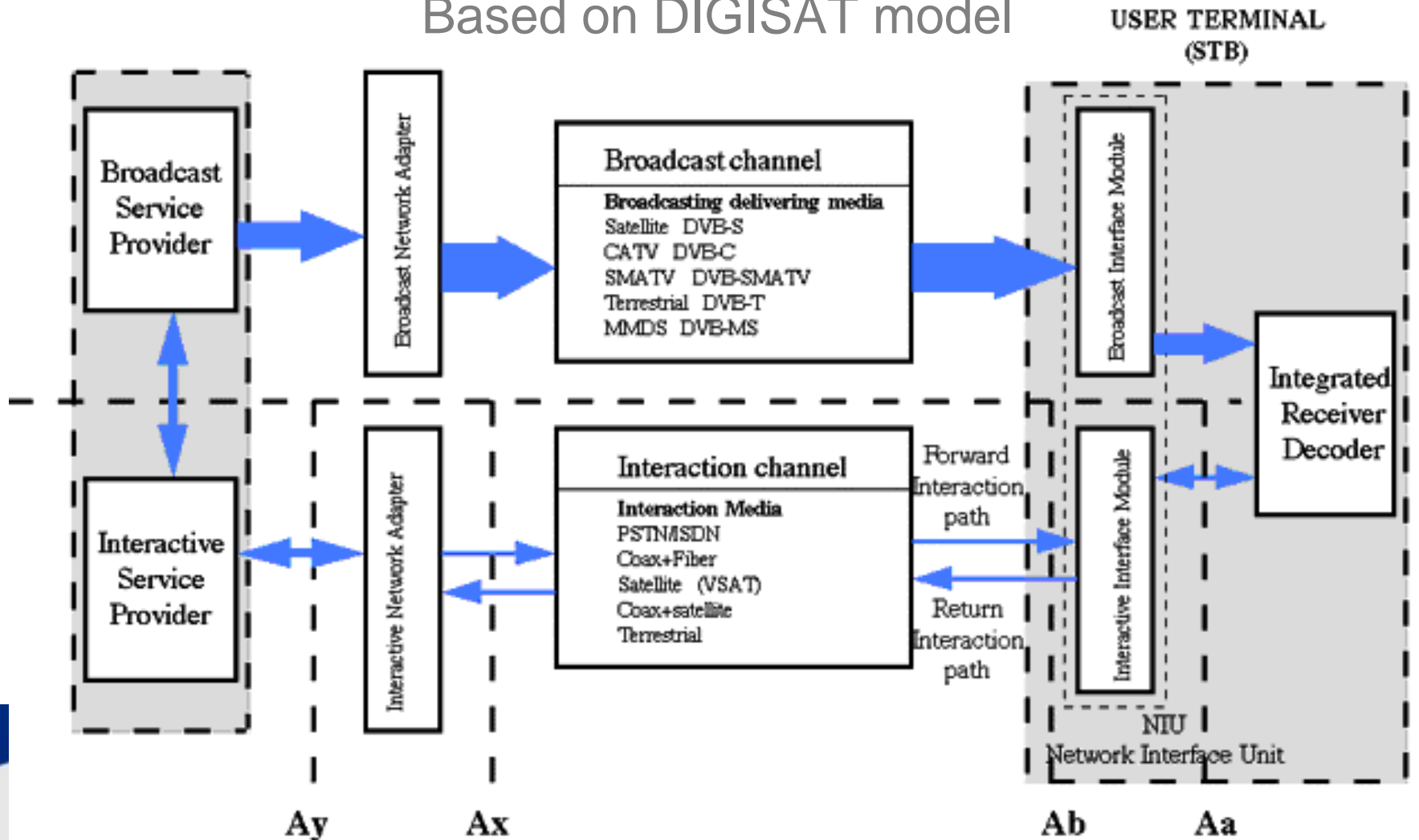
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- **Interactive Multimedia Broadcasting**

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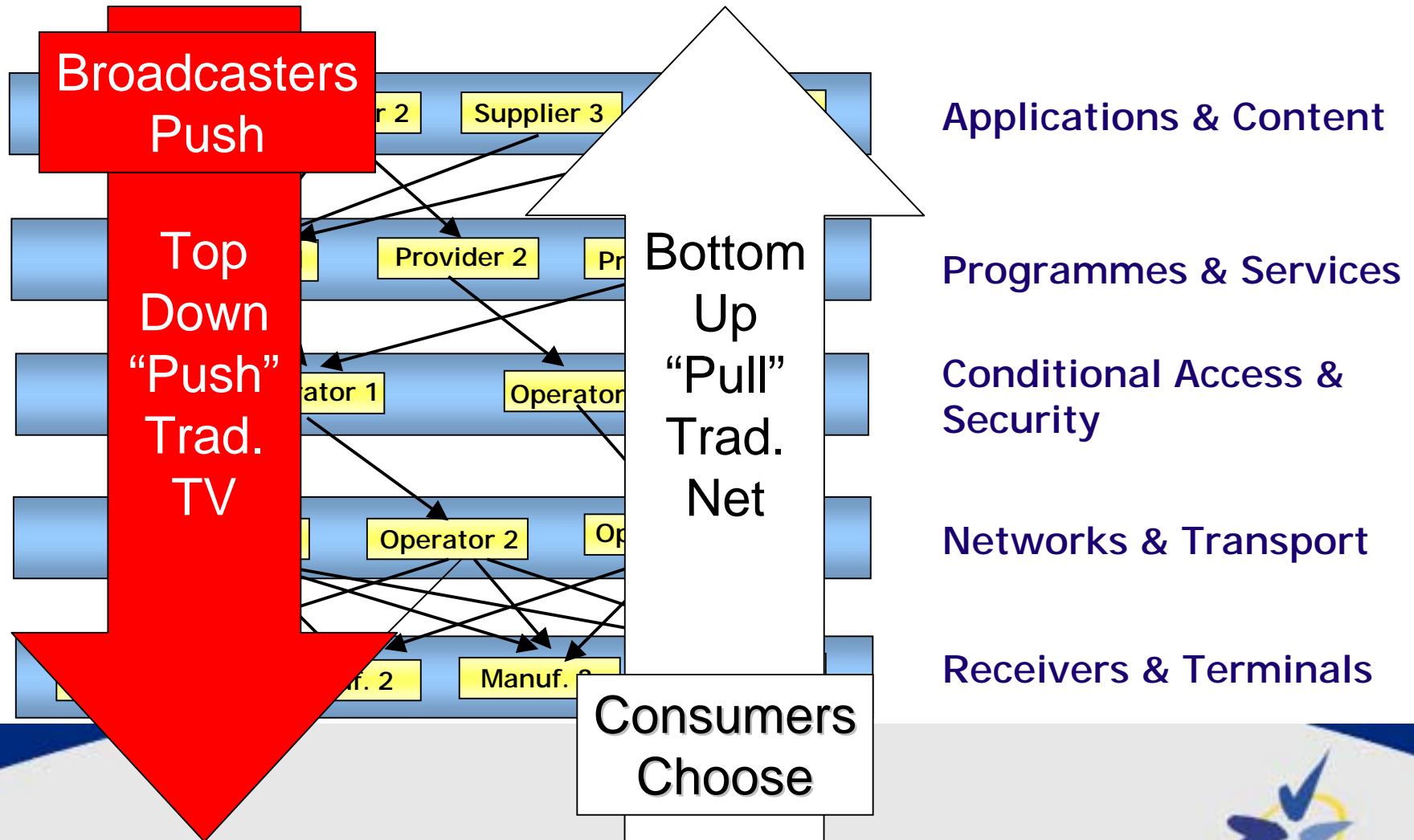- Broadcast experiences on Broadband

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Multimedia Home Platform

- An Application Programme Interface is needed to link the receiver hardware platform with the services and applications
- Today: a number of proprietary middleware APIs: OpenTV, MediaHighWay, MHEG-5, MetaNova, Liberate, ATVEF
  - Fragmentation of the ITV market: small audiences
  - Incompatible proprietary solutions: costly receivers
  - High production/operational costs: low revenues, slow market take-up
- MHP has been standardised by ETSI to unify all different approaches and establish a horizontal market:

  Ideally, ONE set-top box for ALL ITV applications

MHP Model: Verical businesses in a Horizontal Market

Broadcasters Push

Top Down "Push" Trad. TV

Supplier 3

Provider 2

Operator 1   Operator

Operator 2   Op

Manuf. 2   Manuf. 2

Bottom Up "Pull" Trad. Net

Consumers Choose

Applications & Content

Programmes & Services

Conditional Access & Security

Networks & Transport

Receivers & Terminals

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Technical Extensions, MHP2.0

Building on MHP 1.1, add the following ...
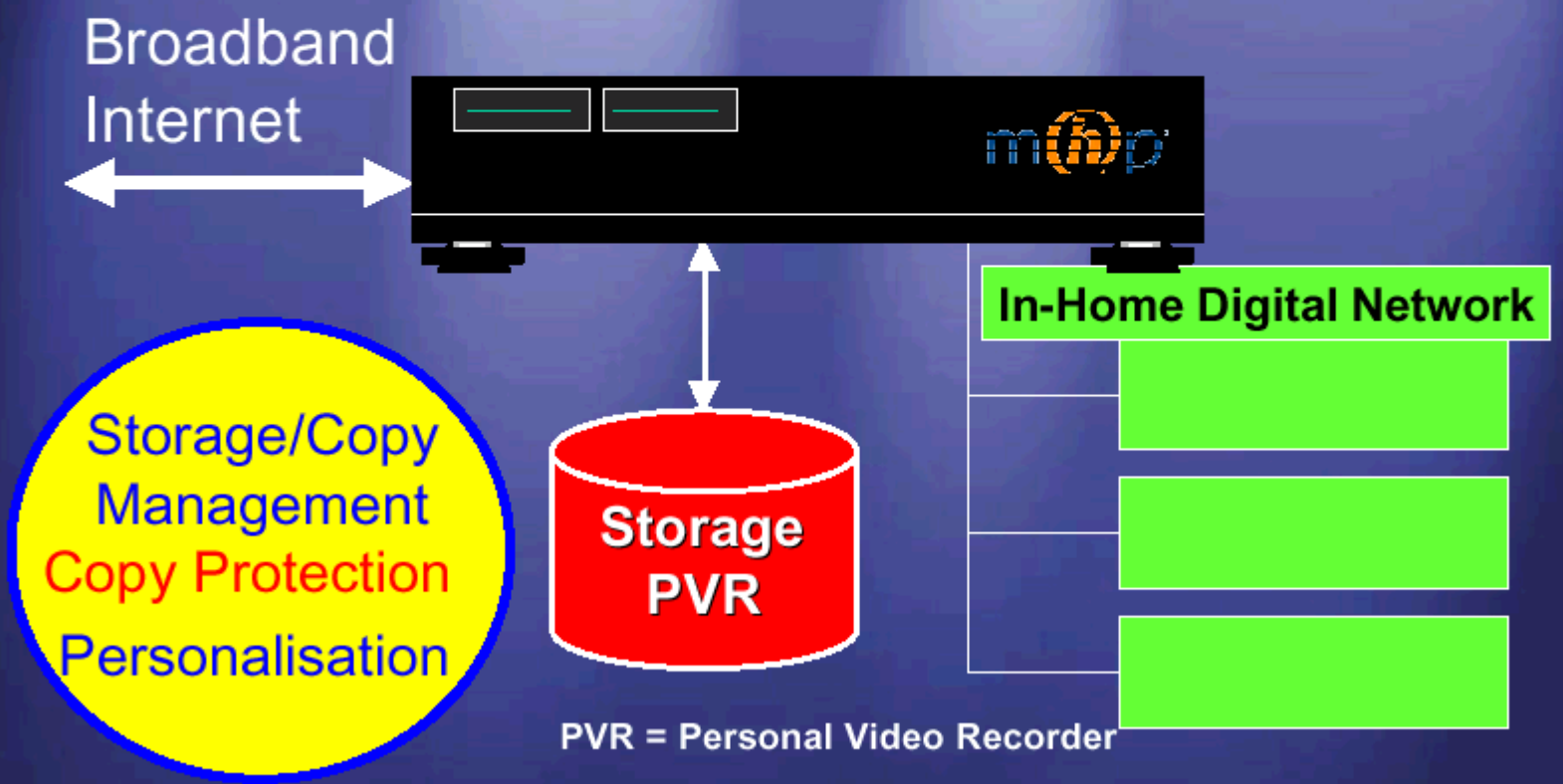
Broadband Internet

Storage/Copy Management
Copy Protection
Personalisation

Storage PVR

In-Home Digital Network

PVR = Personal Video Recorder

MHP Cable Workshop, Munich, 30-01-02

Luetteke 31

Multimedia Home Platform

RTL EPG

IP services on TV

- As there is a significant percentage of the public that do not have PCs, IP-based interactive TV platform is underway:

- Content authoring tools
  - Service providers will create content at low cost
  - Content will be rendered in a consistent and robust manner on all user terminals
  - Taking into account the limitations of TV displays

- A set of TV browser profiles
  - Implemented in all TV set-top boxes
  - Enable the delivery in a uniform manner

MHP Services - Examples

- Home shopping
- Home banking
- SuperTeletext
- EPG
- Information channels
- Special events
- Games
- Polling and voting
- Chatting
- E-mail
- Internet access
- Governmental services
- Medical advice
- Embedded video streaming

- Navigation and zapping
- Near video-on-demand
- 'Tell me more' button
- Targeted advertisment
- News and sport
- Weather
- Mobile office
- E-learning
- Interactive training
- Travel information
- Traffic information
- Handicap support

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MPEG-4

- **MPEG-4 is very powerful standard**
  - organized in 10 parts (Part 1 through Part 10)
  - scalable
  - sophisticated multimedia features
    - very efficient at low bit rates
    - object oriented: scene composition
    - Complex but additional costs in receivers is justified

- **MPEG-4 is about streaming *and* broadcasting**
  - interoperable services
  - suitable for personalised services
  - "gateway" from IT industry to CE devices

MHP versus MPEG-4

- MHP allows rich applications for iTV
- MPEG-4 allows rich media types, which MHP does not cover
- Putting the two together makes sense
- MPEG-4 solves is more than just a video codec
  - Audio
  - Speech
  - Media Synthesis
  - 2D graphics
  - 3D graphics
  - Scene composition
- H264 is MPEG4 Level 10!

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Example MPEG-4 Application

- ## MPEG-4 object oriented technology

- ## Audience attractor for Pay TV
    - ### background
        - video : soccer stadium
        - audio : ambient sound in stadium
    - ### foreground
        - video   : the football
        - audio   : commentary voice

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Target advertising

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Video codecs tested

- Commercially available, real-time, non-standardised video codecs for IP-streaming

- Phase 1
  - Windows Media 8
  - Quicktime MPEG-4
  - Dicas MPEG-4
  - Real 8.5
  - Sorenson 3

- Phase 2 (not only products but also emerging algorithms)
  - MPEG-2, MPEG-4, H.264

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Encoding parameters – Phase 1

#	Type of channel	Nominal bitrate	Net bitrate	Audio	Video	Framerates and Formats	
		[kbps]	[kbps]	[kbps]	[kbps]	QCIF (176 x 144)	CIF (352 x 288)
1	Modem/PSTN	56	40±10%	8 mono	32±10%	6,25	
2	Dual ISDN	128	100±10%	20 mono	80±10%	12,5	6,25
3	DSL/Cable 1	256	200±10%	32 stereo music	168±10%	25	12,5
4	DSL/Cable 2	500	400±10%	48 stereo music	352±10%	25	25
5	DSL/Cable 3	700	560±10%	64 stereo music	500±10%		25
6	Cable 1	1400	1160±10%	128 stereo	1032±10%		25
8	Reference					AVI RGB 24 @ 18 Mbps	AVI RGB 24 @ 68 Mbps

Constant Bit-rate Encoding (CBR)

Keyframe distance: 1 s

Buffer-size: 3000 ms

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Resolution

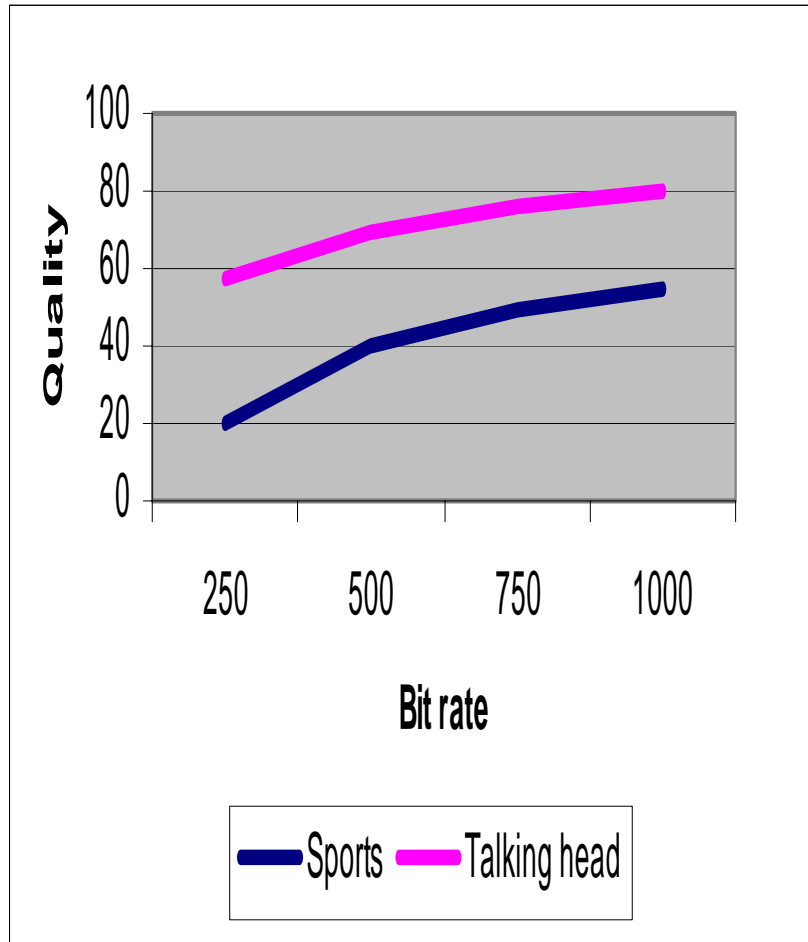## CIF
352 x 288

QCIF
176 x 144

256 kbit/s

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Categories of Applications for video over IP

Application Category	Typical bit-rate	Typical Implementation
QCIF	50 to 200 kbit/s	UMTS phone, PDA
CIF	0.25 to 1 Mbit/s	PC screen, mobile receiver
SDTV	1 to 4 Mbit/s	Set-top box Integrated TV
HDTV	5 to 20 Mbit/s	Plasma screen, projection TV

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Contents

700 kbit/s

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QCIF vs. CIF
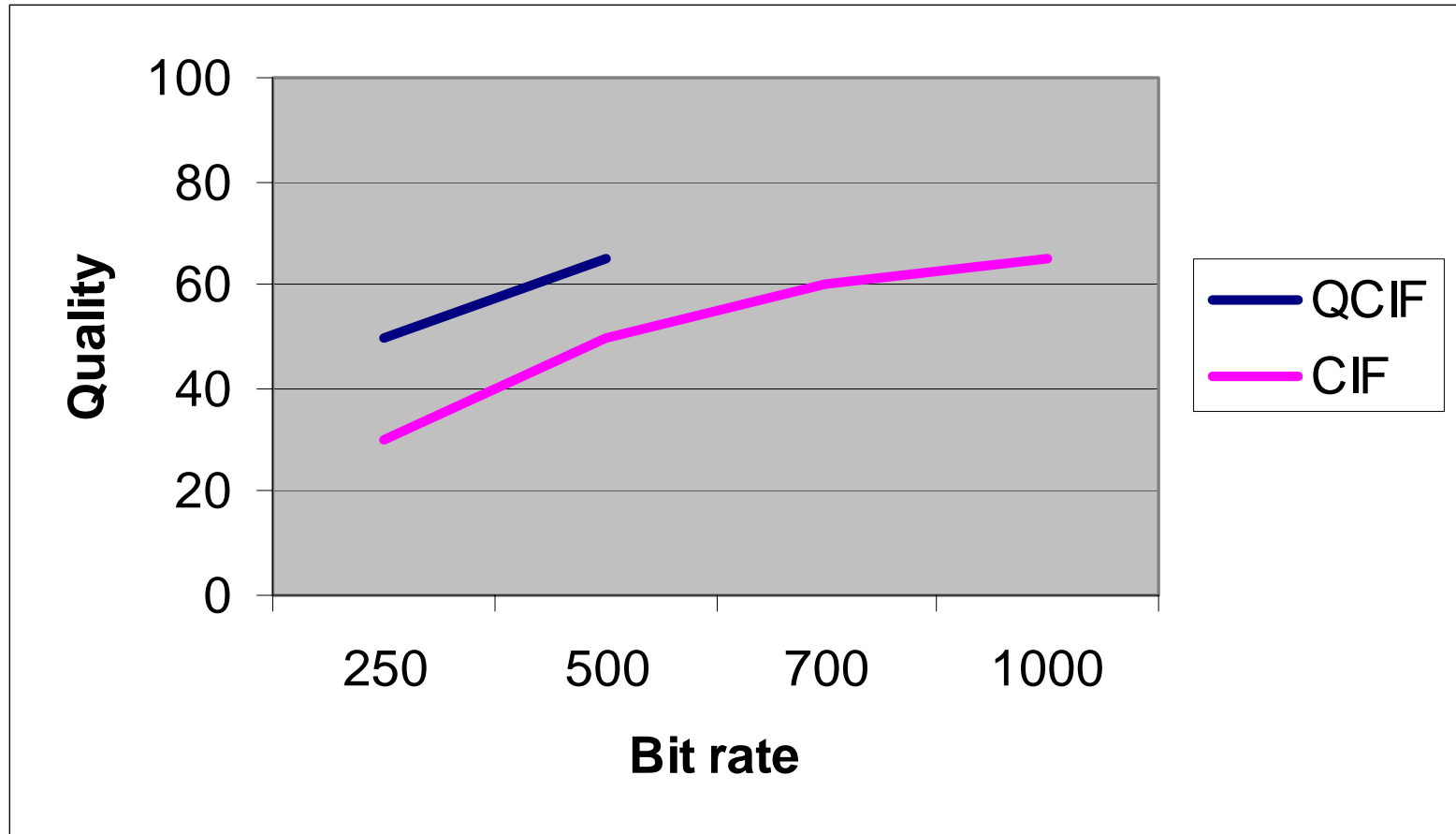
H.264 Video Coding

- H.264 is developed by joint video team (JVT) ITU / MPEG
    - in ITU: H.264
    - in MPEG-4: part 10: AVC
  - efficient video compression
  - not compatible with current MPEG-2/-4 video used in DVB
- Video coding layer is based on hybrid video coding and similar to other standards but with important differences
- New key aspects of H.264 are:
    - Enhanced motion compensation
    - Small blocks for transform coding
    - Improved de-blocking filter
    - Enhanced entropy coding

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Test Set Results for Streaming Application

Codec	Average rate savings relative to:		
	MPEG-4 ASP	H.263 HLP	MPEG-2
H.264/AVC	39%	49%	64%
MPEG-4 ASP	-	17%	43%
H.263 HLP	-	-	31%

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Canal Plus ADSL experiences

Rodolphe Belmer, Canal+ Director of marketing and strategy:

- Canal+ distributes their premium channel via all platforms subject to economics, signal security and quality of reception: Satellite, ADSL, GPRS, UMTS and Digital Terrestrial Television

- Canal+ tested VOD via ADSL from 1991 to selected homes in Monaco

- Canal+ found no economically viable argument for ADSL TV

- However ADSL TV could be useful in densely populated areas where installing a dish may be of a problem

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Canal Plus ADSL experiences

Canal+ listed the following problems:

- An ADSL DSLAM can multicast about 25 channels, which is too limited – « the same as DTT but more expensive »

- A maximum of 150 subscribers that can be linked to DSLAM, costing €150'000, a massive €1000 per subscriber

- Problems with encryption

- The cost of the ADSL set-top box is around four times the cost of the equivalent satellite decoder

- The cost of bandwidth is around €20 per month and subscriber; satellite: €2 while carrying 150 channels

- These costs may come down over the coming 12 to 18 months

Sesam TV in Monaco

- **VOD-only, no live TV**
- **6 month commercial trial**
- **Monaco Telecom, Alcatel and Movie System (France)**
- **Cost: €5 per movie**
- **Subscription: €20/month - 5 films**
- **Subscription: €52/month illimited**
- **Two compression formats**
    - **MPEG 2 at 3.5 Mbit/s**
    - **Windows Media 9 at 1.5 Mbit/s**

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TF1 – « DREAM TV »

- Live television services – No VOD
- TF1 with LDCOM operator
- 25 channels (general and thematical) on TV display plus Internet connection on PC
- 3 channels from France Television: France 2, 3 and 5
- Bandwidth per channel: 3 Mbit/s MPEG-2
- Trial with 200 users in Paris
- A « freebox » STB is given for free

- PCCAD project: France Telecom in Lyon

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Thank you

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