

HDTV Options in DVB Systems

Is there life after MPEG-2 ?

Ken McCann
ZetaCast



Who is ZetaCast?

Independent technology consultancy company

- Specialising in digital TV

ZetaCast directors have each over 15 years experience of digital TV, including

- Leading development of the world's first broadcast-quality MPEG-1 decoder
- Leading design team for the world's first real-time MPEG-2 encoding system
- System integration and project management for digital terrestrial, cable and satellite systems

Overview of the Presentation

Role of DVB in A/V Coding

DVB “Toolbox” Philosophy

A/V Coding for Broadcast Applications

HDTV Deployments in DVB World

Activities supporting HDTV in Europe



Role of DVB in A/V coding

DVB evaluates audio and video coding algorithms published by relevant standardisation bodies against commercial requirements

- Selects appropriate trade-off between compression efficiency and implementation cost
- DVB does NOT develop coding algorithms itself!

A/V codecs are accepted by DVB for inclusion in its specifications based on technical or commercial benefit

- Addition of features, functionality, quality, coding efficiency or market reach beyond that offered by the existing set of DVB supported codecs

One Size Fits All ?

10 years ago DVB had a one-codec approach

- MPEG-2 video
- MPEG-1 Layer II audio

A single codec no longer meets the market needs of all DVB applications

- Technology has advanced
 - Advanced A/V compression algorithms give significant improvement in coding efficiency
 - Move towards programmable decoders
- DVB now addresses a broader range of markets
 - Different codecs are significant in different markets

Multi-Codec World

In addressing the multi-codec world, DVB had to balance two contradictory requirements

- Provide optimum solution for each DVB application
- Maximise commonality between DVB applications

Solution is to adopt a “toolbox” approach

- Applications can use most appropriate tool from the toolbox
- Common generic toolbox for all DVB applications

If IPR costs could have been ignored, it would have been useful to set a baseline functionality for all decoders

- MPEG-2 video and MPEG-1 Layer II audio

Not commercially viable due to IPR costs

- No mandatory codec support required

The DVB Toolbox Approach

TS-based
Broadcasting

Direct IP
Applications

TS-based
Contribution



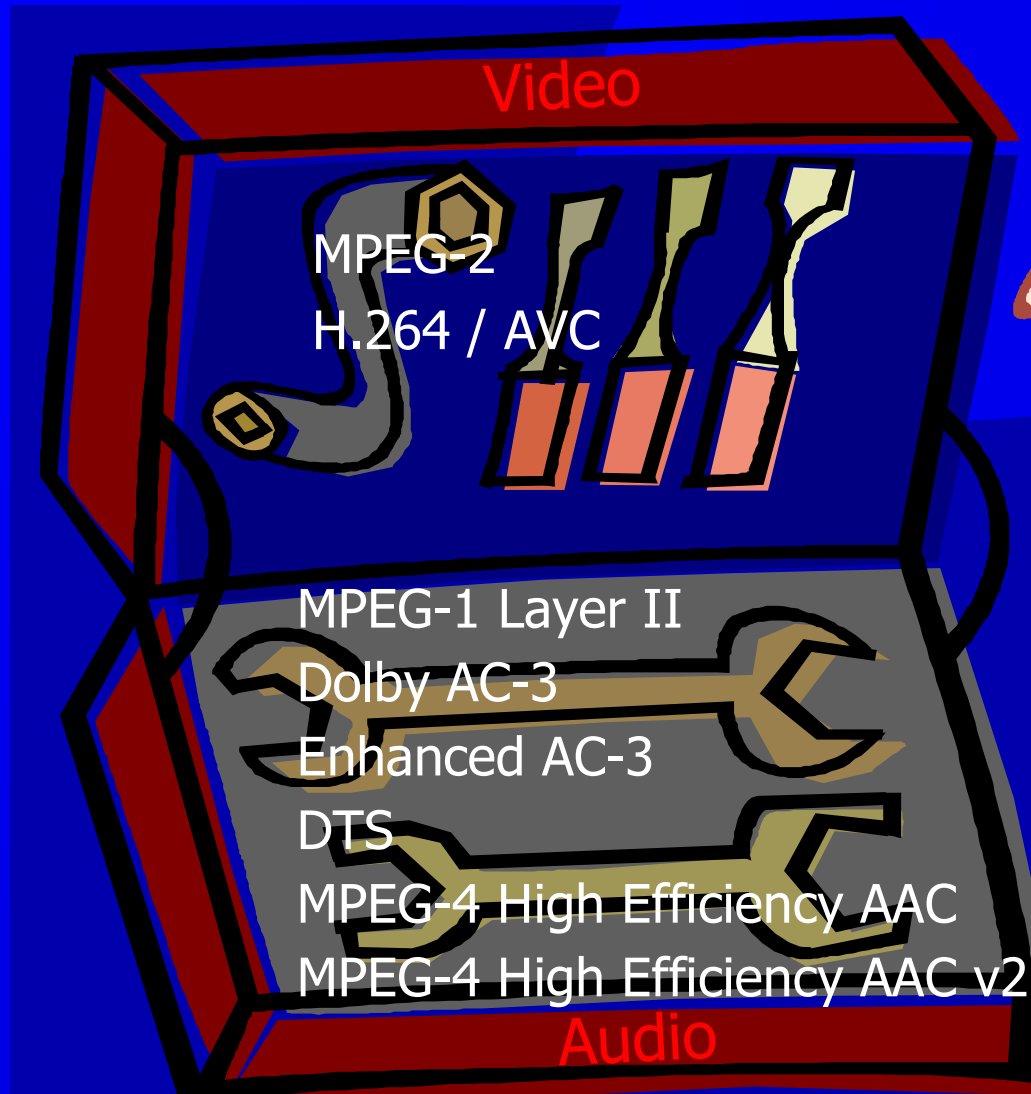
Criteria for Inclusion in DVB Toolbox

1. Significant market demand demonstrated, based on:
 - Support from at least 5 DVB members from 2 constituencies
 - Evidence that a complete value chain will be in place
 - e.g. content provider, network operator and device manufacturer
2. Published by one of the international standardisation bodies recognised by DVB
 - e.g. ISO/IEC, ETSI, ITU-T, SMPTE
3. IPR available under fair, reasonable and non-discriminatory terms
4. Performance verified by:
 - A testing process conducted by a competent independent body
 - Results of such tests that demonstrate that the codec meets acceptable thresholds in terms of any claimed technical benefits

Toolbox for TS-based Broadcasting

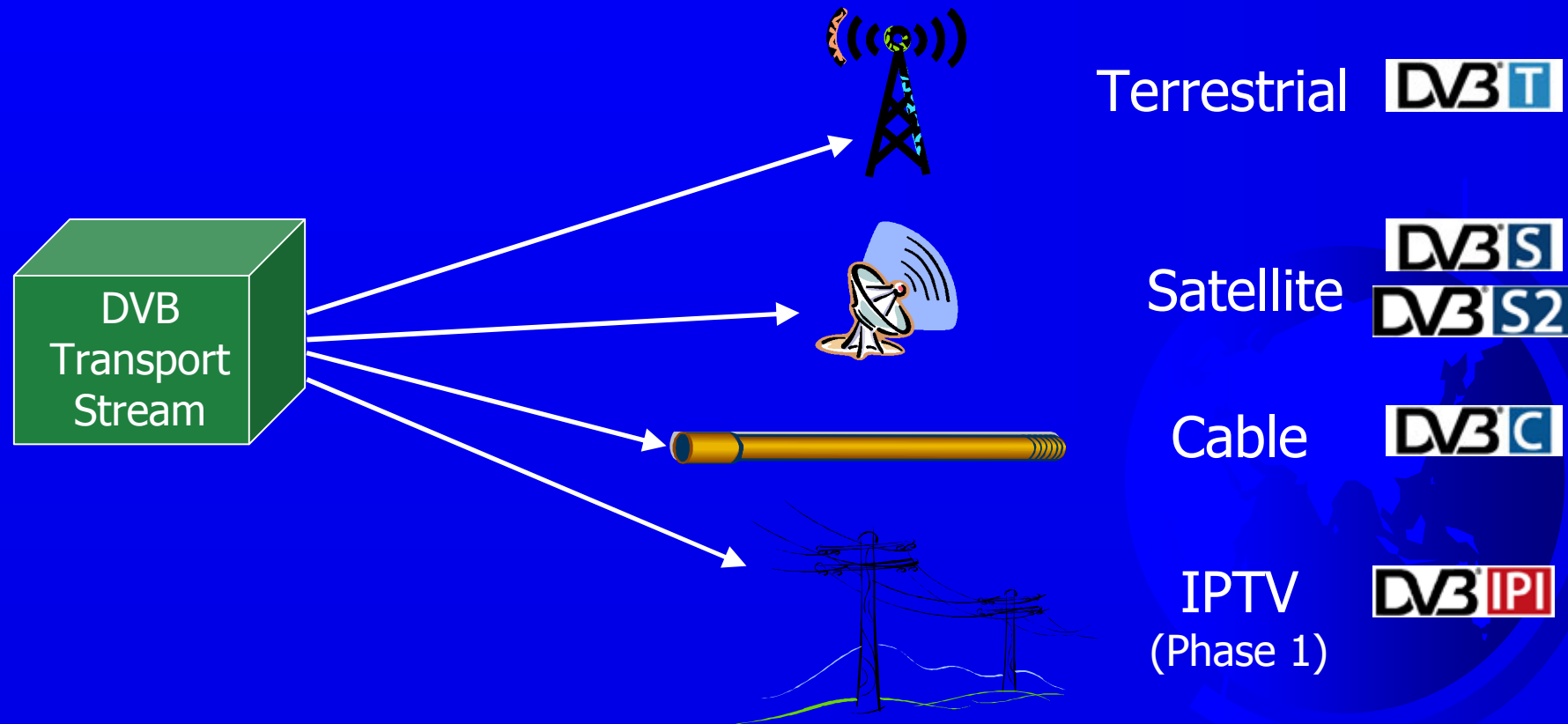


A/V Codecs in TS 101 154



DVB Generic Baseband Specifications

Baseband specifications are generic, channel coding and modulation is specific to the delivery medium



Channel Coding and Modulation

Satellite:

- DVB-S2 incorporates new tools
 - Improved FEC using Low Density Parity Check (LDPC)
- DVB-S2 gives about 30% increase in bit-rate compared to DVB-S

Cable:

- 256QAM mode of DVB-C has become more practical to implement
- gives 33% increase in bit-rate compared to 64QAM mode

Launch of HDTV can be combined with advanced compression and improved modulation on satellite and cable

- About 3 times more efficient use of bandwidth
- Almost compensates for increased bandwidth required for HDTV



HDTV via Terrestrial

HDTV in the DVB World was first launched in Australia in 1998 using terrestrial transmission

- DVB-T transmission
- MPEG-2 video coding

In Europe, main focus has been on multi-channel SDTV

- No MPEG-2 legacy problem with HDTV
- HDTV would use advanced compression coding

Spectrum is key limiting factor for terrestrial HDTV

- Major deployment of HDTV likely to wait until after analogue switch-off
 - Competition for released spectrum from other uses

HDTV via Satellite

Satellite delivery will lead the way in the launch of HDTV in Europe

Major European satellite broadcasters have announced HDTV services for late 2005 or early 2006

- Germany: Premiere
- France: Canal+ and TPS
- UK: BSkyB

All plan to use a “second generation” DVB satellite system

- DVB-S2 transmission
- H.264/AVC video compression coding



HDTV via Cable

Cable is not far behind satellite

Major European cable operators have plans to launch HDTV services in 2006

- Germany: Premiere
- Netherlands: UPC

Most are likely to use a “second generation” DVB cable system

- 256 QAM mode of DVB-C
- Advanced video encoding



HDTV via IPTV

DVB IPTV specifications are developed in two phases:

- Phase 1 uses MPEG Transport Stream on top of IP
- Phase 2 uses IP protocols directly

Several major European telcos have performed trials of HDTV services based on DVB IPTV Phase 1

- France: France Telecom
- UK: NTL

IPTV services are likely to use advanced delivery and coding technology

- ADSL2+ or VDSL
- Advanced video encoding



Activities Supporting HDTV in Europe

European High Definition Forum

- Launched in July 2006 to help coordinate the various national HDTV fora

Industry-led initiative that involves all stakeholders in the value chain

- Jointly administered by the Digital Interoperability Forum (DIF) and European Broadcasting Union (EBU)
- Works by sharing knowledge and reaching voluntary consensus
- Does not impose solutions



EICTA "HD Ready" Display Label



At least 720 line native resolution

- Widescreen format

Accepts both 720p and 1080i formats

- 1280x720 at 50Hz and 60Hz frame rates (progressive)
- 1920x1080 at 25Hz and 30Hz frame rates (interlaced)

Analogue and digital inputs

- Analogue YPbPr
- Digital DVI or HDMI
 - HDCP content protection

EICTA "HDTV" Receiver Label



Modulation and Channel Coding:

- Terrestrial: DVB-T
- or Satellite: DVB-S and DVB-S2
- or Cable: DVB-C including 256 QAM

Decoding:

- H.264/AVC and MPEG-2 video
- Enhanced AC-3 and MPEG-1 Layer II audio

Outputs compatible with "HD Ready" Displays

- Analogue YPbPr
- or Digital DVI (with HDCP)
- or HDMI (with HDCP)



Conclusions

DVB standards have supported HDTV since 1998

- but apart from Australia the DVB World has been slow to embrace HDTV

Satellite will lead HDTV delivery in Europe with a “second generation” broadcast system

- Cable is not far behind, followed by IPTV
- Terrestrial is likely to be the last and most problematic

Content is King

- 2006 Football World Cup will be a major driver for HDTV

