

# NEW TOOLBOX

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One of the earliest DVB specifications, the Implementation Guidelines for Video and Audio Coding in Broadcasting Applications based on the MPEG-2 Transport Stream, has recently been revised to add new options. Originally published in 1995 as DVB Blue Book 001, the latest revision of TS 101 154 adds the option of H.264/AVC video as an alternative to the original MPEG-2 video. The range of codecs for audio has also been extended to give a total of four options: MPEG-1 Layer II, AC-3, DTS and HE AAC.

This revision marks a move towards a 'toolbox' approach to audio and video coding. It recognises that we are now in a multi-codec world and that DVB applications require the flexibility to choose the most appropriate tool for the job. The disadvantage of this toolbox approach is that interoperability becomes a more complex issue. If IPR costs could be ignored then there would be an argument for requiring all decoders to support the original MPEG-2 video and MPEG-1 Layer II audio as a guaranteed baseline interoperability point. However, the commercial reality is that the cumulative cost of all of the licence fees (e.g. \$2.50 for the MPEG-2 video decoder) would not be economically viable.

To prevent the DVB toolbox from becoming too cluttered, any new audio or video codec must offer some commercial or technical benefit. Four criteria have been adopted that codecs must meet before they are considered: Significant market demand attested by at least five DVB members from at least two constituencies; Technical performance verified by independent testing; Documented in the public domain by a recognised standards body; and IPR available on fair, reasonable and non-discriminatory terms.

The new H.264/AVC video coding algorithm offers comparable quality at around half the bit-rate needed for MPEG-2 video. This improved coding efficiency is particularly important when considering bit-rate hungry

applications such as HDTV. The specification was published in May 2003 by ITU-T as Recommendation H.264 and by ISO/IEC as 14496-10. Three Profiles define subsets of the syntax and semantics: Baseline Profile, Extended Profile and Main Profile.

The Fidelity Range Extensions Amendment of H.264/AVC, agreed in July 2004, added some additional tools and defined four new Profiles (of which only the first is relevant for broadcasting applications): High Profile, High 10 Profile, High 4:2:2 Profile and High 4:4:4 Profile.

The relationship between High Profile and the original three Profiles, in terms of the major tools from the toolbox that may be used, is illustrated by Figure 1.

For SDTV and HDTV, the most relevant profiles are Main Profile and High Profile. Both of these allow the use of the most powerful variable length coding scheme: Context Adaptive Binary Arithmetic Coding (CABAC). It has been estimated that this gives about 10 to 15 percent saving in bit-rate compared to the simpler alternative of Context Adaptive Variable Length Coding (CAVLC). In addition, the High Profile allows the use of an 8x8 transform and encoder-specified quantisation weighting matrices. It has been estimated that this gives about 10 percent improvement in coding efficiency compared to Main Profile when using progressive HDTV source material.

As a result of these considerations, TS 101 154 requires High Profile



support for HDTV decoders which implement H.264/AVC. Only Main Profile support is required for H.264/AVC SDTV decoders, although High Profile can be used as an option.

So have we now finished with revising the Implementation Guidelines? Far from it! It is a living document that will continue to evolve as the needs of DVB members develop. A further revision with improved PVR support is in the pipeline and two additional codecs have already been identified as having significant market demand: Enhanced AC-3 audio and VC-1 video.

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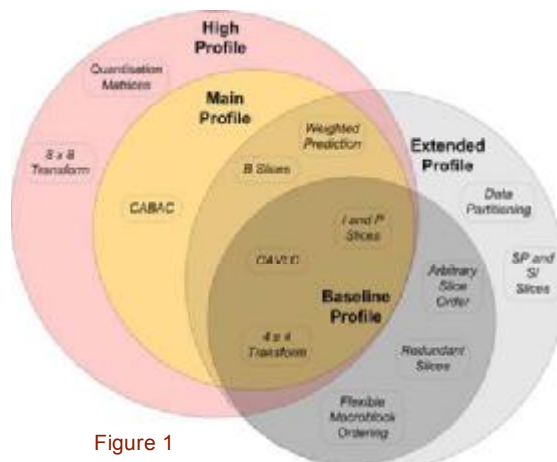


Figure 1