

STEREOSCOPIC TELEVISION MPEG-2 MULTI-VIEW PROFILE

(1998)

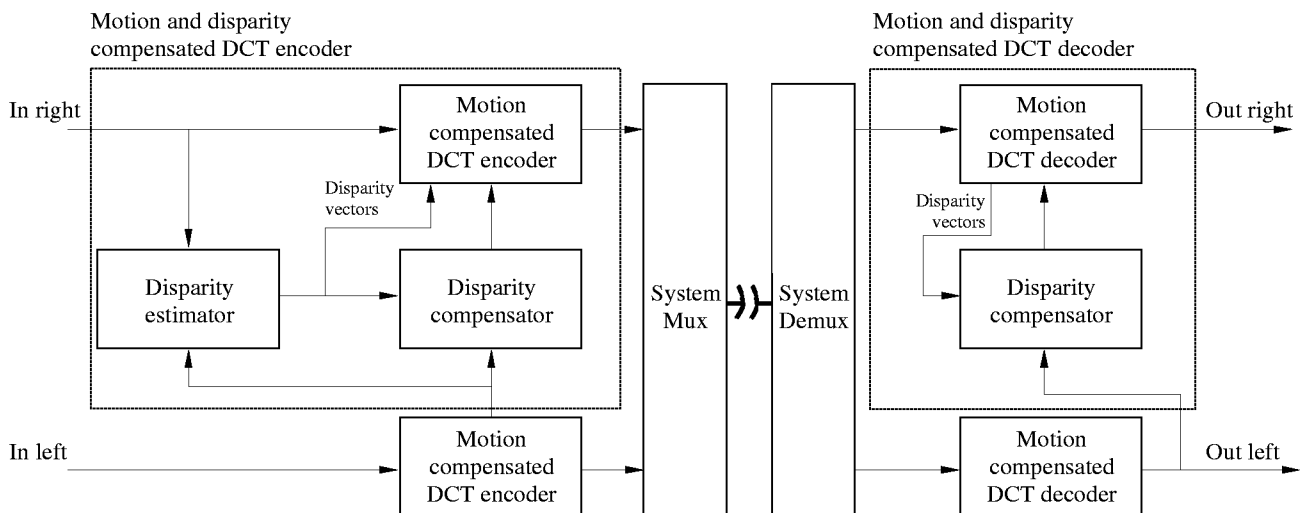
1 Overview of MPEG-2 multi-view profile (MVP)

The extension of the MPEG-2 video standard (ITU-T Recommendation H.262 | ISO/CEI 13818-2: Information technology – Generic coding of moving pictures and associated audio information: Video) for multi-view applications (e.g. used for stereoscopic video) has been promoted to a final International Standard at the ISO/IEC JTC 1/SC 29/WG 11 meeting in September 1996 (Amendment 3, WG 11 N1366) the multi-view profile (MVP) is envisioned to be a profile appropriate for applications that require multiple viewpoints within the context the MPEG-2 video standard. MVP supports stereoscopic pictures as its source images for a wide range of picture resolution and quality as requested by the applications to be used.

1.1 Coding scheme for MVP

A block diagram of the codec reference model for the MVP is shown in Fig. 1. Its main features are a monoscopic coding in its base layer for compatibility and a hybrid prediction of motion and disparity for compression efficiency. Temporal scalability tools are used for coding an enhancement layer.

FIGURE 1
The codec reference model for the MVP



DCT : discret cosine transform

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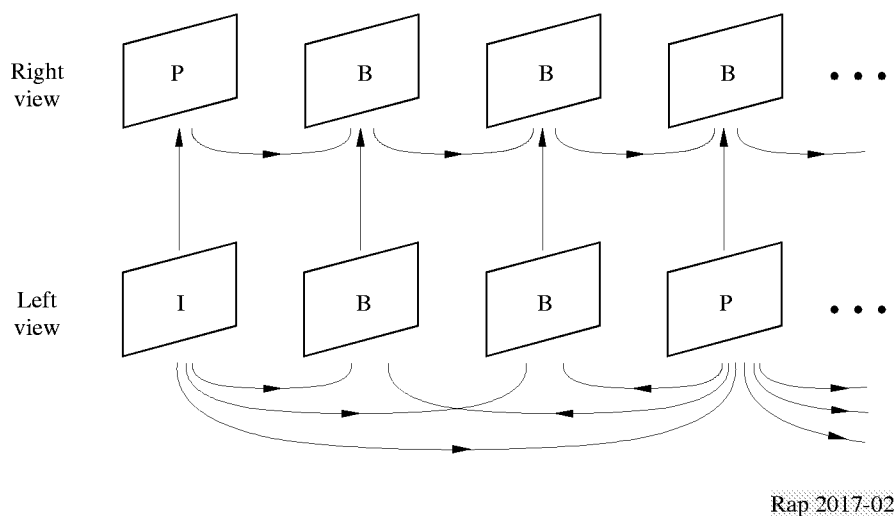
A configuration of prediction modes are shown in Fig. 2. A monoscopic coding with the same tools as main profile (MP), including the ISO/IEC 11172-2 Standard is applied to the base layer. A base layer of MVP is assigned to a left view and an enhancement layer is assigned to a right view. An enhancement layer is coded using temporal scalability tools and a hybrid prediction of motions and disparity can be utilized in the enhanced layer. It foresees higher compression of the right view of stereoscopic video by exploiting the similarity between the left and right views.

MVP, one of the scalable profiles in terms of multiple viewpoint layers, has the same type of compatibility features; other scalable profiles have such compatibility with MP. For example:

- decoders compliant to MVP at a certain level are capable of decoding the bitstreams compliant to MP at the corresponding level (i.e. forward compatibility)
- decoders compliant to MP at a certain level are capable of decoding the bitstream in the base layer of MVP (i.e. backward compatibility).

FIGURE 2

Prediction configuration example with $M = 3$ coding of left-view, right-view frame picture coded using disparity prediction with respect to left-view and motion prediction with respect to itself



1.2 Parameter values for MVP

The levels for the MVP are high, high-1440, main and low. Temporal scalability involves two layers, a base layer and an enhancement layer. Both the enhancement and base layers have the same spatial resolution at the same frame rate. Tables 1 to 4 present bounds on sampling rates, luminance pel rates, bit rates and buffer sizes for the MVP.

TABLE 1

Upper bounds for sampling density

Level	Spatial resolution layer		Profile
			Multiview
High	Enhancement (right view)	Samples/line Lines/frame Frames/s	1 920 1152 60
	Lower (left view)	Samples/line Lines/frame Frames/s	1 920 1152 60
High-1440	Enhancement (right view)	Samples/line Lines/frame Frames/s	1 440 1152 60
	Lower (left view)	Samples/line Lines/frame Frames/s	1 440 1152 60
Main	Enhancement (right view)	Samples/line Lines/frame Frames/s	720 576 30
	Lower (left view)	Samples/line Lines/frame Frames/s	720 576 30
Low	Enhancement (right view)	Samples/line Lines/frame Frames/s	352 288 30
	Lower (left view)	Samples/line Lines/frame Frames/s	352 288 30

TABLE 2

Upper bounds for luminance sample rate (samples/s)

Level	Spatial resolution layer	Profile
		Multiview
High	Enhancement (right view)	62 668 800
	Lower (left view)	62 668 800
High-1440	Enhancement (right view)	47 001 600
	Lower (left view)	47 001 600
Main	Enhancement (right view)	10 368 000
	Lower (left view)	10 368 000
Low	Enhancement (right view)	3 041 280
	Lower (left view)	3 041 280

TABLE 3

Upper bounds for bit rates (Mbit/s)

Level	Profile
	Multiview
High	130 both layers
	80 base layer
High-1440	100 both layers
	60 base layer
Main	25 both layers
	15 base layer
Low	8 both layers
	4 base layer

TABLE 4

Buffer size requirements (bits)

Level	Layer	Profile
		Multiview
High	Enhancement	15 898 480
	Base	9 787 248
High-1440	Enhancement	12 222 464
	Base	7 340 032
Main	Enhancement	3 047 424
	Base	1 835 008
Low	Enhancement	950 272
	Base	475 136

1.3 Camera parameter extension

An extension for camera information has been introduced in MVP. The extension specifies the height of image device, the focal length, the F-number, the vertical angle of the field of view, the position and the direction of the camera, and upper direction of the camera.