SOURCE   : UK
TITLE   : Layered coding for compatibility
PURPOSE   : Information

Layered Coding

Layered coding can be used to achieve compatibility between MPEG-1 and MPEG-2. The principle is to use the MPEG-1 coded pictures as a prediction for the MPEG-2 pictures. The MPEG bitstream then contains an embedded MPEG-1 bitstream.

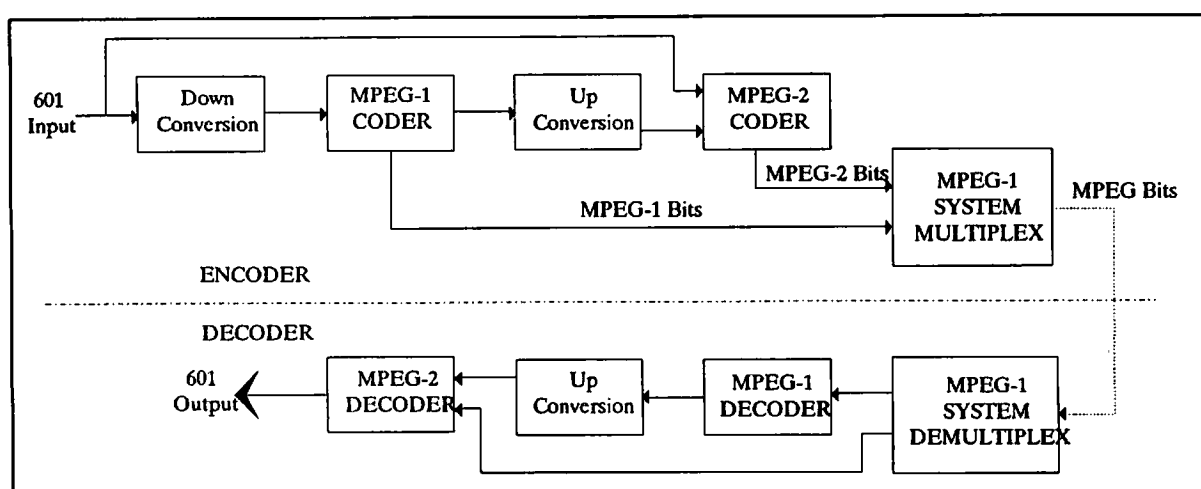The outline block diagram of figure 1 shows an encoder and decoder using the layered coding approach.

Figure 1: Encoder and decoder of a compatible coding scheme.

The MPEG-1 bitstream is derived in the normal way by down conversion of the CCIR601 picture to an SIF sized picture. This is termed a "pel split". The SIF picture is then coded using the MPEG-1 algorithm.

For the MPEG-2 pictures firstly the coded SIF pictures from the MPEG-1 layer are up converted to CCIR601 picture size. This would have to be standardized. The coding in the second layer is on a field by field basis. For each field there are three possible prediction modes, MPEG-1, previous field, and previous frame.

If the MPEG-1 prediction mode is turned off (ie. set the MPEG-1 prediction to zero) then the coding scheme becomes a single layered coding scheme.

The full MPEG bistream is produced by multiplexing together the MPEG-1 bitstream and the MPEG-2 bitstream using the MPEG-1 system multiplex.

The scheme also has the flexibility to maintain H.261 compatibility. The base layer can be 288 lines 30 pictures per second, which is coded with H.261, whilst the second layer is 576 lines 25Hz or 480 lines 59.97Hz.

Results

Preliminary results have been obtained from such a coding scheme for the sequences Flower Garden and Mobile and Calendar. These were coded at total bitrates of 4 and 9 Mbits/s. The split between the two layers for the bitrates was 1.15Mbits/s for the MPEG-1 coding and the remainder was available to the MPEG-2 coding (ie. 2.85 or 7.85Mbits/s). Table 1 gives a summary of the overall SNRs obtained for the coded sequences.

Table 1: Overall SNR for the MPEG-2 coded sequences.

Sequence	Bit rate	SNR		
		Y	U	V
Flower Garden	4 Mbits/s	27.64db	30.55db	32.15db
	9 Mbits/s	31.81db	33.53db	34.24db
Mobile & Calendar	4 Mbits/s	26.69db	30.42db	31.88db
	9 Mbits/s	30.65db	33.20db	34.51db

This work is in conjunction with CNET, SIEMENS and NTUA who are all considering 'pel split' for compatible coding.