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SOURCE : JAPAN
TITLE : Undefined items in compatibility coding
PURPOSE : Discussion

1.Introduction

The algorithm of embedded compatibility coding is converging to the algorithm with the prediction from lower resolution picture layer (lower layer). However, some items are left undefined. In order to complete the embedded compatibility coding algorithm, the following items must be discussed.

- o Upsampling filters to generate a higher resolution picture.
- o The selection of lower layer picture when picture rates are different between higher layer and lower layer. (Including the case of picture dropping)
- o Multiplexing method of the layers.

2.Discussion

2.1 Upsampling filter

Upsampling filters must be defined for all combination of higher layer and lower layer. Especially, the filter which converts CIF format to CCIR601/525 format must be defined. Examples of the combinations and filters are shown in Table 1. Other items to be discussed are described :

- o The filters applied across the MB boundary (8x8 for luminance in lower layer)?.
- o What value is assumed for the pixel out of the picture range.

2.2 Selection of lower layer picture

The procedure to select the lower layer picture used for prediction must be defined. The procedure should be applied even in the case which the picture rates are different between the two layers. One of the good solution is to use "the latest picture for prediction". Examples of this solution are illustrated in Fig.1 and 2. Another solution is to send "temporal reference of lower layer picture" in picture header of higher layer picture. This method is effective for Multi-channel transmission (see 2.3).

2.3 Multiplexing

Some examples of multiplexing the two layers are shown in Fig.3. In order to display all received pictures at a decoder, the bit stream for lower layer picture must be transmitted before the corresponding higher layer pictures. In single channel transmission, it is obvious. However,it is not ensured in multi-channel transmission. Discussion about the mechanism which guarantees the delay between the two channels needed.

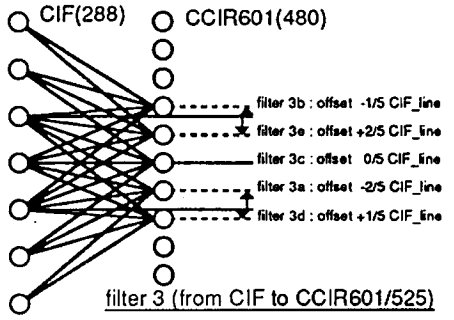
3.Conclusion

The items mentioned above must be discussed and defined.

Table 1 Interpolation filters for each compatibility systems

Lower layer	Higher Layer	Horizontal filter	Vertical filter	Temporal filter
CIF	CCIR601/525	filter 1 or 2	filter 3 or 4	-
	CCIR601/625	filter 1 or 2	filter 1 or 2	field repetition
SIF	CCIR601	filter 1 or 2	filter 1 or 2	-
CCIR601	HDTV	further study		

filter1(MPEG TM2 Table 3.5)	-12	0	140	256	140	0	-12	//256
filter2(MPEG TM2 Appendix G)			1/2	1	1/2			
filter3a (for 5n+2nd CCIR_line)	-49	131	197	-56	33			//256
filter3b (for 5n+4th CCIR_line)	-27	60	241	-40	22			//256
filter3c (for 5n+1st CCIR_line)	0	0	256	0	0			//256
filter3d (for 5n+3rd CCIR_line)	22	-40	241	60	-27			//256
filter3e (for 5n+5th CCIR_line)	33	-56	197	131	-49			//256
filter4a (for 5n+2nd CCIR_line)	6	10	0					//16
filter4b (for 5n+4th CCIR_line)	3	13	0					//16
filter4c (for 5n+1st CCIR_line)	0	16	0					//16
filter4d (for 5n+3rd CCIR_line)	0	13	3					//16
filter4e (for 5n+5th CCIR_line)	0	10	6					//16 n=0,1,2,3,....



filter 3 (from CIF to CCIR601/525)

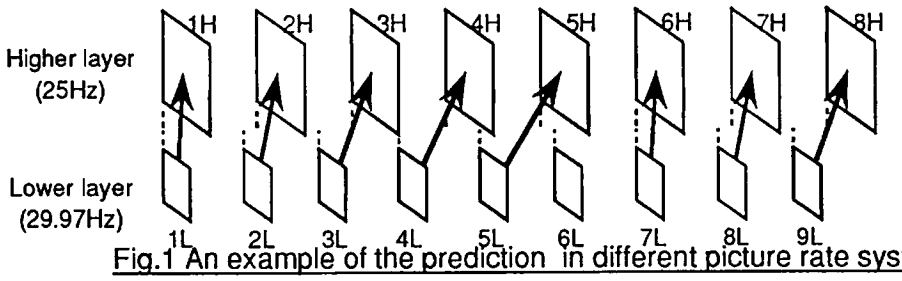


Fig.1 An example of the prediction in different picture rate system

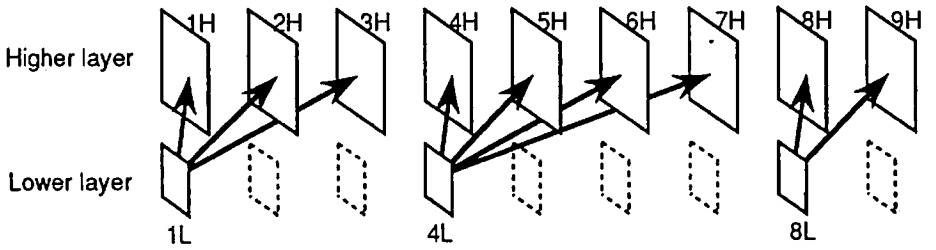


Fig.2 An example of the prediction with picture dropping

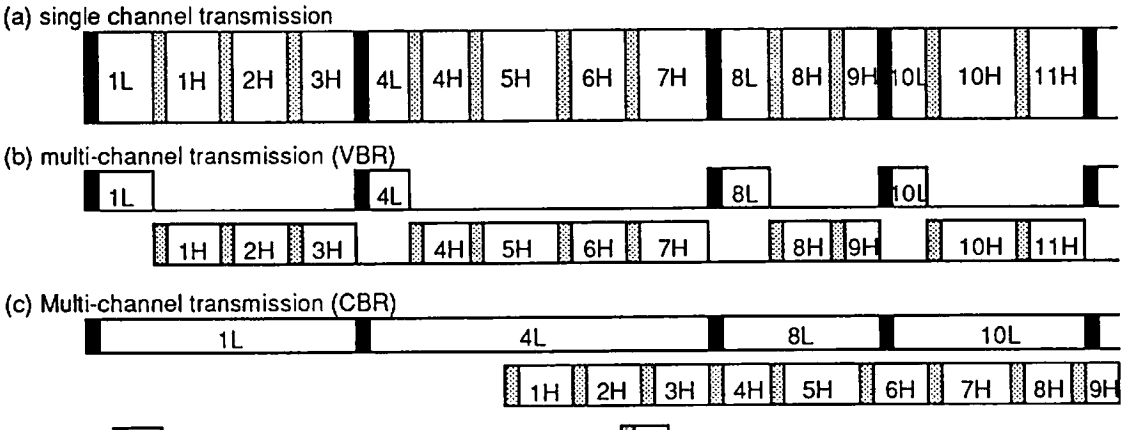


Fig.3 Multiplexing of the two layers (examples for Fig.2)