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Telecommunication Standardization Sector
Study Group 15
Experts Group for ATM Video Coding
(Rapporteur's Group on part of Q.2/15)

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SOURCE : JAPAN
TITLE : PRACTICAL EXAMPLES OF HIERARCHICAL CODING
Purpose : Discussion
Relevant sub-groups: Requirements, Video

One of the key technologies of the NEXT Profile is hierarchical coding where the encoder and decoder deal with multiple bitstreams. Here are listed some examples of practical hierarchical coding with indication of bistream syntax at each layer.

Discussion

- In some cases, even base layer bitstream is not decodable by the Main Profile decoders. Can this be a disadvantage?
- Use of spatial scalability for 4:2:2 Extension has a merit that the base layer bitstream is decodable by the Main Profile decoder, but it needs four bitstreams for the two resolution hierarchical coding which has been required by CCIR (Example 6). An alternative is the use of extension in the macroblock layer syntax of single layer coding.
- A single hardware can cover multiple examples listed here; e.g. H.261 compatible decoder (Example 1) can also decode 2-layer transmission bitstreams (Example 8)? This is related to the definition of Next Profile.

Examples

NP: Next Profile MP: Main Profile HL: High Level ML: Main Level LL: Low Level

1) H.261 backward compatibility

Picture	Syntax	Note
CCIR601 (4:2:0)	NP (sscalable)@ML	
CIF (4:2:0)	H.261	

2) MPEG-1 backward compatibility

Picture	Syntax	Note
CCIR601 (4:2:0)	NP (sscalable)@ML	
SIF (4:2:0)	MPEG-1	

3) 4:2:2 single resolution

Picture	Syntax	Note
CCIR601 (4:2:2)	NP (sscalable; Δ for 4:2:2)@ML	
CCIR601 (4:2:0)	MP@ML	

4) 3 resolution hierarchical for 4:2:0

Picture	Syntax	Note

HDTV (4:2:0)	NP (sscalable)@HL	
CCIR601 (4:2:0)	NP (sscalable)@ML	
SIF (4:2:0)	MP@LL	can be MPEG-1 or H.261

Picture	Syntax	Note
HDTV (4:2:0)	NP (fscalable)@HL	
CCIR601 (4:2:0)	NP (fscalable)@ML	
SIF (4:2:0)	NP (fscalable)@LL	

5) 3 resolution hierarchical for 4:2:2

Picture	Syntax	Note
HDTV (4:2:2)	NP (sscalable, 4:2:2 Extension)@HL	
CCIR601 (4:2:2)	NP (sscalable, 4:2:2 Extension)@ML	
SIF (4:2:2)	NP (4:2:2 Extension)@LL	

Picture	Syntax	Note
HDTV (4:2:2)	NP (fscalable)@HL	
CCIR601 (4:2:2)	NP (fscalable)@ML	
SIF (4:2:2)	NP (fscalable)@LL	

6) 2 resolution hierarchical for 4:2:2

Picture	Syntax	Note
HDTV (4:2:2)	NP (sscalable; Δ for 4:2:2)@HL	D: predicted from C
HDTV (4:2:0)	NP (sscalable)@HL	C: predicted from A
CCIR601 (4:2:2)	NP (sscalable; Δ for 4:2:2)@ML	B: predicted from A
CCIR601 (4:2:0)	MP@ML	A:

7) SNR scalability

Picture	Syntax	Note
CCIR601 (4:2:0)	NP (sscalable, SNR extension)@ML	
CCIR601 (4:2:0)	MP@ML	

Picture	Syntax	Note
CCIR601 (4:2:0)	NP (fscalable)@ML	
CCIR601 (4:2:0)	NP (fscalable)@ML	

8) 2 layer transmission

Picture	Syntax	Note
CCIR601 (4:2:0)	NP (Data partitioning)@ML for low priority channel	
CCIR601 (4:2:0)	NP (Data partitioning)@ML for high priority channel	

9) interlace/progressive

Picture	Syntax	Note
601, 60Hz, p	NP (sscalable)@HL?	
601, 30Hz, i	MP@ML	