CCITT SGXV
Working Party XV/1
Experts Group for ATM Video Coding

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SOURCE : Japan
TITLE : Comparison between compatible and non-compatible coding
PURPOSE : Information

1. Introduction

Compatibility between H.26X and existing standards (i.e., H.261 and/or MPEG1) is regarded as one of the most important issue in developing H.26X. However, it would be necessary to clarify the difference between compatible coding and non-compatible coding with regard to their coding performances. In this document, comparison results by computer simulation based on a hierarchical coding scheme is described. The scheme is designed considering similarity among coding algorithms in each hierarchy and independence of picture format which is not yet defined.

2. Coding scheme

Figure 1 shows the encoder block diagram of the coding scheme used in computer simulation. The basic structure of the scheme is the Hierarchical Laplacian Pyramid Coding (HLPC), with each stage similar to existing standard coding algorithm. The scheme consists of three stages. Encoder 1 is fully compatible with existing standards. Encoder 2 is the additional stage, which encodes the difference between source odd field pictures and locally decoded pictures from encoder 1. Encoder 2 is very similar to encoder 1 except for the format and resolution of the source input signals. Encoder 3 encodes even field pictures. In order to improve coding efficiency, odd field pictures locally decoded by encoder 1 and 2 are used in prediction together with previously decoded even field pictures. Each stage produces its bitstream independently and the three bitstreams are multiplexed in one bitstream. Following three coding modes are available in the scheme by controlling each encoders.

- Downward compatible mode
  Encoder 2 and 3 are off. (R2=R3=0)
- Upward compatible mode
  All encoders are on.
- Non-compatible mode

Encoder 1 is off. (R1=0)

3. Computer simulation results

Table 1 shows the simulation results of the scheme in each coding mode. In this simulation, MPEG1(SIF) is used as encoder 1. Accoding to the results, maximum improvement in SNR by non-compatible coding is about 1.1dB when the total bit rate is 4Mb/s and 1.2dB when it is 9Mb/s. The reproduced picture will be demonstrated by VCR at the meeting.

4. Conclusion

A hierarchical coding scheme is introduced and coding performance of a compatible coding and a non-conpatible coding based on the scheme were evaluated through computer simulation.

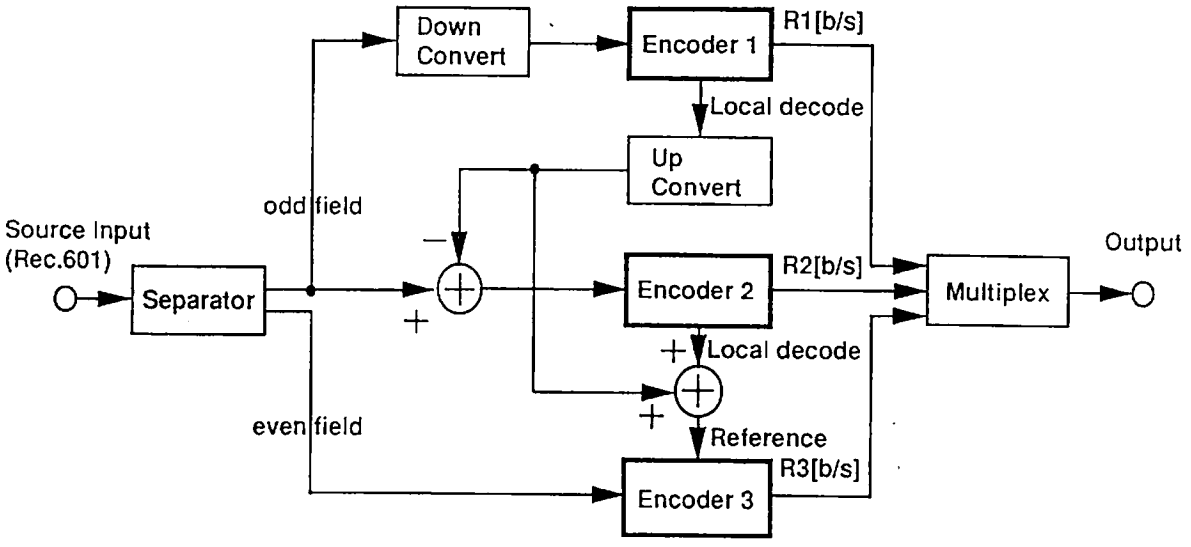

Fig.1 : Encoder block diagram of HLPC

Table 1 : Coding performance

Sequence name	S/N				
	Bit rate (R1/R2/R3)				
	Compatible coding			Non-compatible coding	
	1.5/0/0	1.5/1.5/1	1.5/4.5/3	0/3/1	0/6/3
Flower Garden					
ODD (Y)	27.6	29.4	32.7	30.5	33.9
(Cb)	30.6	32.5	35.6	32.8	35.9
(Cr)	32.4	33.3	36.2	33.8	36.4
EVEN (Y)	–	26.6	31.3	26.7	31.4
(Cb)	–	31.0	33.6	31.1	33.6
(Cr)	–	32.8	34.7	33.1	34.6
Popple					
ODD (Y)	32.1	–	34.4	–	34.7
(Cb)	32.6	–	36.7	–	37.5
(Cr)	33.0	–	37.0	–	37.7
EVEN (Y)	–	–	34.6	–	34.7
(Cb)	–	–	37.2	–	37.3
(Cr)	–	–	37.4	–	37.6
Football					
ODD (Y)	29.4	31.4	34.7	32.4	35.4
(Cb)	33.7	35.1	37.7	35.9	38.1
(Cr)	35.6	36.3	38.7	37.0	39.0
EVEN (Y)	–	31.0	34.8	31.1	34.6
(Cb)	–	35.1	37.8	35.7	38.0
(Cr)	–	36.3	38.6	36.9	38.8

Appendix-1

VCR demonstration

1. Flower garden 4 Mbps
   - Non-compatible coding
   - Compatible coding

2. Flower garden 9 Mbps
   - Non-compatible coding
   - Compatible coding

3. Popple 9 Mbps
   - Non-compatible coding
   - Compatible coding

4. Football 4 Mbps
   - Non-compatible coding
   - Compatible coding

5. Football 9 Mbps
   - Non-compatible coding
   - Compatible coding