CCITT SG XV
Working Party XV/1
Experts Group on ATM Video Coding

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INTERNATIONAL ORGANISATION FOR STANDARDIZATION
ORGANISATION INTERNATIONALE DE NORMALISATION
ISO-IEC/JTC1/SC29/WG11
CODING OF MOVING PICTURES AND ASSOCIATED AUDIO

ISO-IEC/JTC1/SC29/WG11
MPEG 93/ 106

Source: FRANCE TELECOM - CNET
Title: Experiment on spatio-temporal weighted H261/MPEG2 compatibility with base layer at 128, 384 kbit/s.
Purpose: information

Introduction:

Simulations were performed on compatibility Exp (1b) with H261 based layer with typical videophone and videoconference applications bit rates: 128 and 384 kbit/s and one or two dropped frames (12.5 and 8.33 Hz).

Experiment conditions:

Guidelines: number of layers: 2

H261 lower layer	MPEG2 upper layer
128 kbit/s	1920 kbit/s
384 kbit/s	1664 kbit/s

Coding parameters and standards:

MPEG2 layer:
M=1,N=∝
Frame pictures 25 Hz
Frame/Field MC

H261layer:
0, 1, 2 dropped frames
-> 25, 12.5, 8.33 Hz

Experiment details:

Refering to MPEG2/701 and concerning pictures from base layer used for spatial compatibility, a simple line shifting is applied on SIF odd fields to obtain SIF even fields (no MC).
The spatial weight table is:

w1	w2
1	0
3/4	1/4
3/4	1/2
1/2	1/2

When frames are skipped in the based layer, the upconverted compatible picture is simply duplicated until a new frame is coded (no interpolating technic).

Results:

Simulations were carried out on SUSIE sequence which is the most typical of a videophone communication. However, some overflow occurs at 128 kbit/s when rapid motion, thus decreasing the efficiency of the the compatible scheme.

The attached graphs plot the SNR of the luminance signal for the simulcast mode and the compatible mode for various bit rates and frame frequency in the H261 based layer.

The average luminance gain versus simulcast is respectively:

MPEG2 bit-rate	simulcast	compatible scheme with 128 kbit/s H261 8.33Hz / 12.5Hz / 25Hz
1920 kbit/s	38.95 dB	/ +0.03dB / +0.06dB / +0.10dB

MPEG2 bit-rate	simulcast	compatible scheme with 384 kbit/s H261 8.33Hz / 12.5Hz / 25Hz
1664 kbit/s	38.22 dB	/ +0.33dB / +0.45dB / +0.61dB

The following tables give the distribution of the compatible MB types and weight flags.

Results for Predicted pictures						
120 frames	H261 128kbit/s			H261 384kbit/s		
based layer frequency	8.33	12.5	25	8.33	12.5	25
mc_cbp_comp	87	89	88	130	140	145
mc_comp	23	23	21	81	85	74
nmc_cbp_comp	58	61	58	64	72	74
mc_cbp_quant_comp	91	98	100	178	220	285
nmc_cbp_quant_comp	85	99	97	107	127	135
fix_comp	14	14	11	33	32	22
flags WT0	12	12	10	39	45	55
flags WT1	236	245	218	435	488	492
flags WT2	50	57	64	86	104	131
flags WT3	60	70	82	34	38	58
% compatible MBs	22.6	24.2	23.6	37.5	42.6	46.5

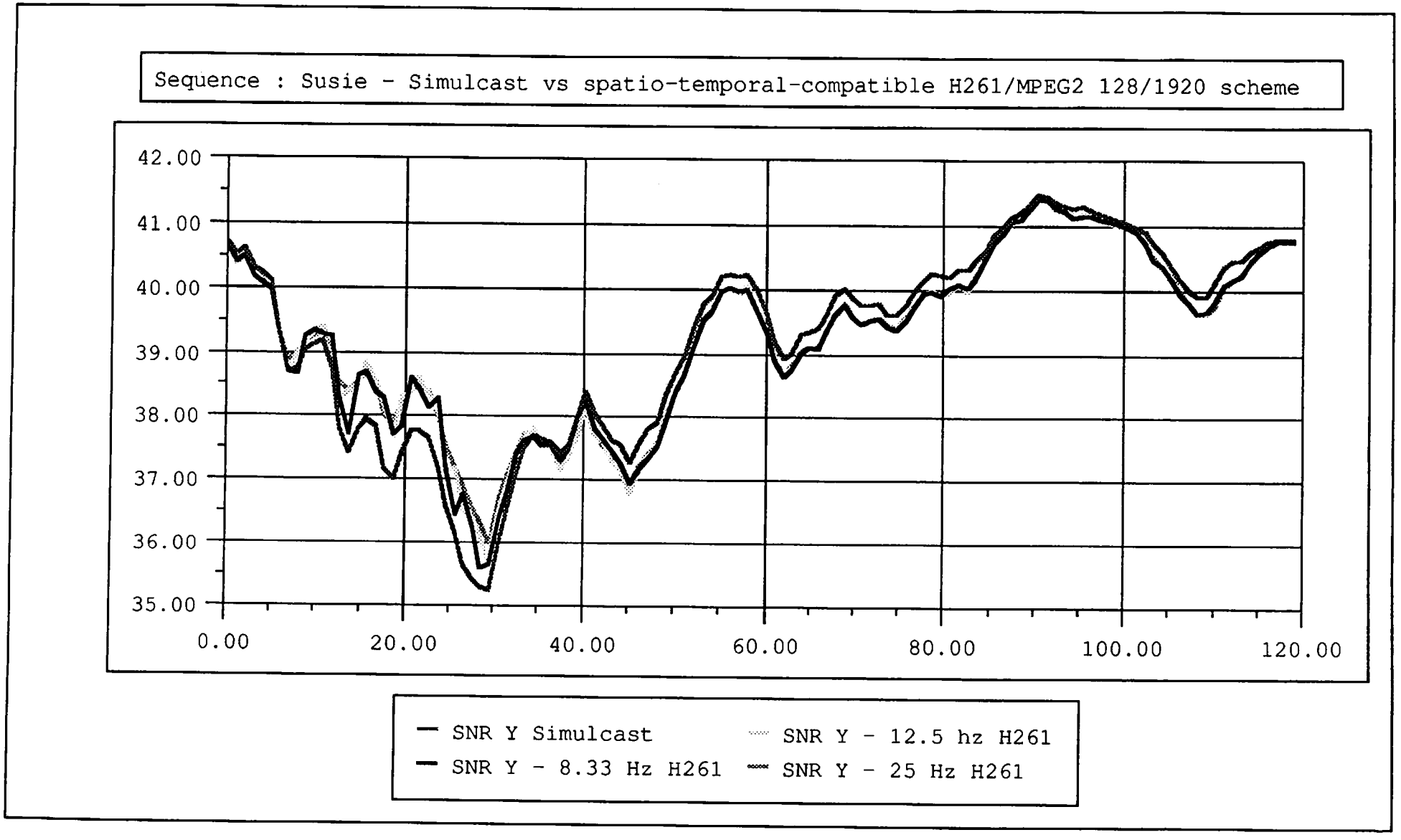
0.75 0.45

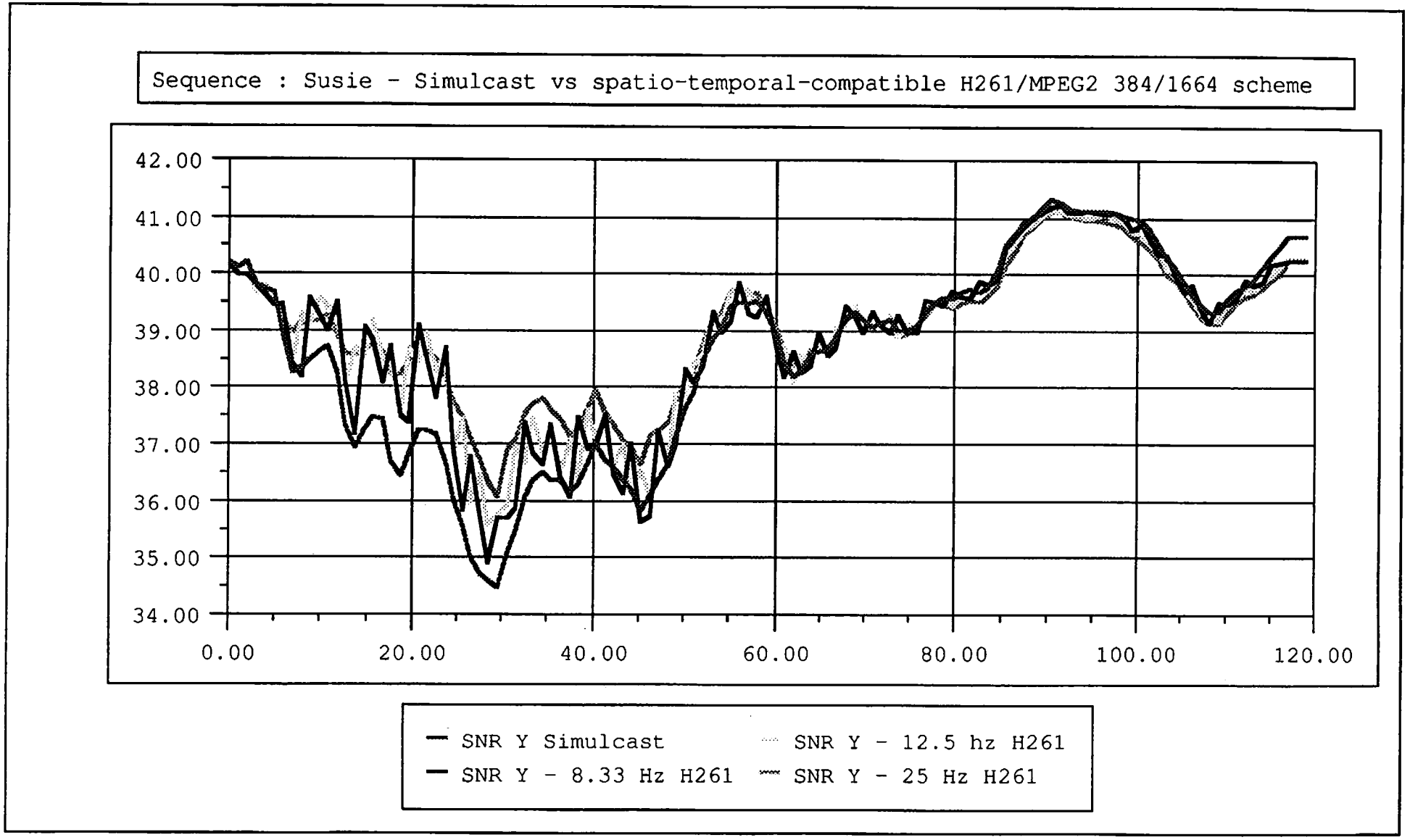
Conclusion:

The compatible scheme does'nt give signifiant improvement versus simulcast when based layer is 128 kbit/s.

With a 384 kbit/s based layer, simulations show a maximum gain of compatible scheme over simulcast when no dropped frames.

25Hz


Sequence : Susie - Simulcast vs spatio-temporal-compatible H261/MPEG2 128/1920 scheme
42.00
41.00
40.00
39.00
38.00
37.00
36.00
35.00
0.00
20.00
40.00
60.00
80.00
100.00
120.00
SNR Y Simulcast
SNR Y - 12.5 hz H261
SNR Y - 8.33 Hz H261
SNR Y - 25 Hz H261


Sequence : Susie - Simulcast vs spatio-temporal-compatible H261/MPEG2 384/1664 scheme
42.00
41.00
40.00
39.00
38.00
37.00
36.00
35.00
34.00
0.00
20.00
40.00
60.00
80.00
100.00
120.00
SNR Y Simulcast
SNR Y - 12.5 hz H261
SNR Y - 8.33 Hz H261
SNR Y - 25 Hz H261