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

Document, AVC-286
June 1992

INTERNATIONAL ORGANISATION FOR STANDARDISATION

ORGANISATION INTERNATIONALE DE NORMALISATION

ISO-IEC/JTC1/SC29/WG11

CODED REPRESENTATION OF PICTURE AND AUDIO INFORMATION

ISO-IEC/JTC1/SC29/WG11
MPEG 92/...

Title: **TM1 piramid coding and compatibility versus simulcast**
Source: **PTT Research, The Netherlands**
Status: **Information**
Groups: **Video**

Introduction

This document describes an experiment to compare the performance of full MPEG1 compatible coding and simulcast using TM1 in the pure field based coding mode. It is important to note that the methods given here to obtain compatibility, can very well be extended to scalability (compatibility can be seen as a special case of scalability), multi-resolution and hierarchical coding. Another important aspect of the methods described is the strong error resilience, due to the nature of hierarchical coding.

The compatible coding scheme is two-layered using a structure which is depicted in figure 1, see also Appendix G of TM1. The lower loop encoder is an MPEG1 encoder processing SIF resolution images at a bit rate of 1.5 Mbits/s. The upper loop encoder is an TM1 pure field based codec (for more information see AVC-285, MPEG92/...) processing CCIR 601 fields at the remaining bit rate of 2.5 Mbits/s. An additional prediction is generated for the TM1 encoder by upsampling the difference signal of the MPEG1 encoder to the appropriate resolution by using a [1/2, 1, 1/2] filter.

The simulcast method codes the CCIR 601 fields with 2.5 Mbits/s in the TM1 pure field based mode.

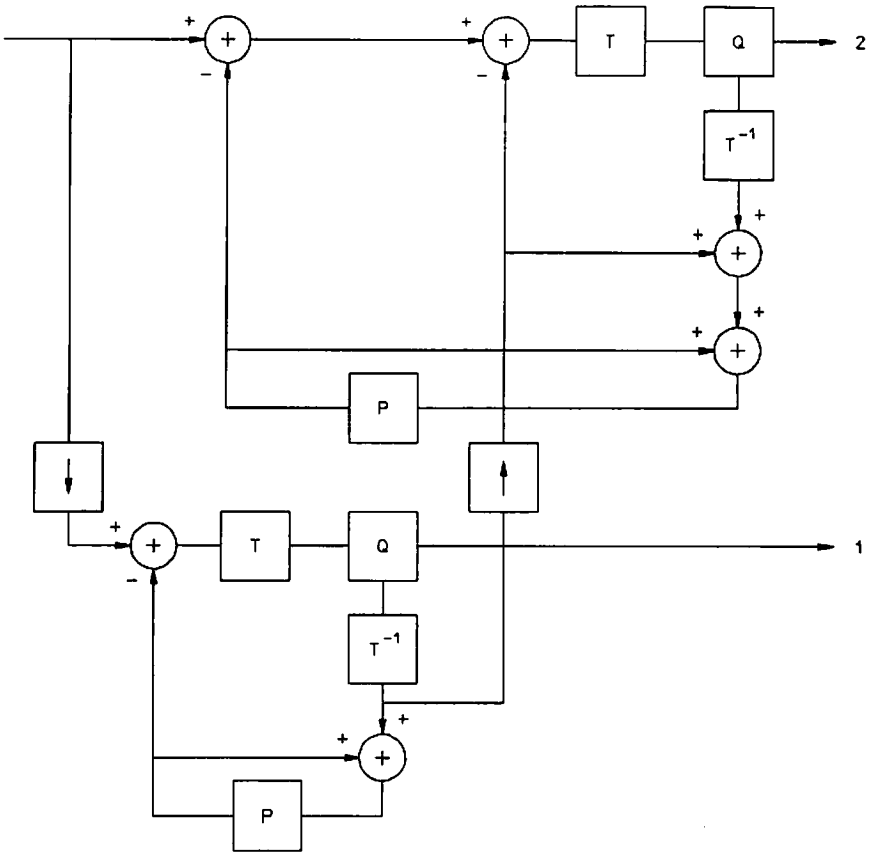

Figure 1: Encoder structure

Encoder

The encoder is a pure field based codec as described in AVC-285 with the following addition:

- The error signal of all odd macroblocks can be predicted by the upsampled error signal of the MPEG1 encoder.

This encoder allows for a large flexibility in resolutions and bit rates. The encoder structure can also be extended to three or more levels of hierarchy or resolutions, see figure 3. While the decoder structure remains relatively simple and only a single decoder prediction loop is necessary to decode the full resolution. In figure 2 the decoder for a two level hierarchy is depicted.

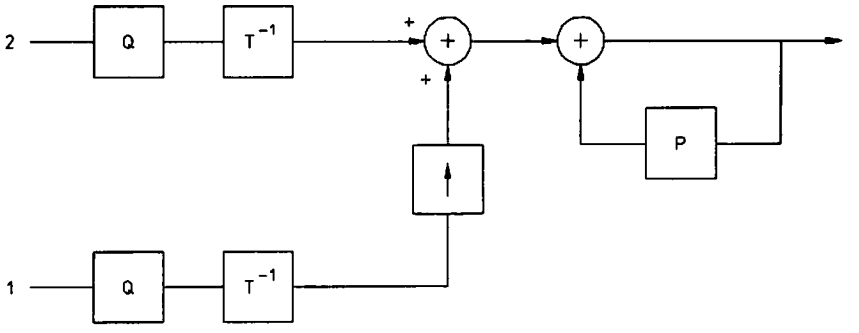

Figure 2: Decoder structure

Results

Simulation results will be shown from D1 tape. Statistical data is available for Table Tennis (table 1) and Flower Garden (table 2). All simulations are performed at 4 Mbits/s. The tables 1a and 2a list the results for the compatible/hierarchical structure where 1.5 Mbits/s is used for the lower resolution, here MPEG1, the remaining 2.5 Mbits/s is used to the higher resolution. The tables 1b and 2b list the results for the simulcast situation, again 1.5 Mbits/s is used for the lower resolution and 2.5 Mbits/s is used for the higher resolution (only the later one is given).

Important is to note that in the hierarchical/compatible coding for Intra pictures about 100% of the lower layer prediction is used for the higher layer, for Predicted pictures this is around 50%-60%, and for Interpolated pictures about 20%.

This results for this particular simulation to a gain of about 0.5 to 0.7 dB in SNR.

Conclusion

A gain in picture quality by using this hierarchical structure is found, which favours hierarchical/compatible coding over simulcast. Apart from a gain in picture quality and full compatibility also the aspects of scalability and strong error resilience make this structure important for the work of VADIS and the standardisation bodies.

MPEG TM1 RNL, Leidschendam 20 Jun 1992

Sequence :
Frames : 124

Item			All	Intra	Predicted	Interpolated
1. RMS for luminance			8.72	8.71	8.64	8.75
2. SNR for luminance			29.32	29.33	29.40	29.29
SNR for chrominance			32.28	31.98	32.07	32.40
SNR for chrominance			33.25	32.99	33.02	33.37
3. Mean value of QP			22.04	16.66	17.34	24.54
4. Non-zero coeffs/cod blck			3.77	3.37	4.40	3.16
5. Zero coeffs/coded block			17.53	14.39	20.10	16.47
6. Intra	Pred	Interp				
M	Fixed	Fixed		0	3	232
B	MC,C	Int NC		0	706	159
T	noMC,C	Int C		0	19	212
Y	MC,noC	For NC		0	41	20
P	Intra	For C		792	23	45
B		Bak NC				57
		Bak C				68
		Intra				0
Compatible prediction			257	791	422	124
7. No. of coded MB			638	792	789	560
No. of coded blocks			1548	4752	2776	655
8. Diff DC			141	11	537	8
9. MBTYPE			2296	1344	3088	2124
Quantiser			1786	2762	2697	1310
MB address			816	792	794	824
No. of bits	Vector data		3391	0	3158	3934
	CBP		2071	0	4107	1578
	EOB		3097	9504	5551	1309
	Coeffs Y		32954	87472	67552	12561
	Coeffs U		2271	7389	5441	386
	Coeffs V		1964	5912	4632	426
	Extra data		864	850	862	866
	Seq. Extra data		13			
	Total		52727	117546	99396	26369

Odd Field

MPEG TM1 RNL, Leidschendam 20 Jun 1992

Sequence :
Frames : 124

Item			All	Intra	Predicted	Interpolated
1. RMS for luminance			8.69	9.07	8.56	8.69
2. SNR for luminance			29.35	28.98	29.48	29.35
SNR for chrominanc			33.52	33.41	33.44	33.57
SNR for chrominanc			34.59	34.59	34.48	34.63
3. Mean value of QP			22.60	18.29	17.44	24.83
4. Non-zero coeffs/cod blck			4.33	5.71	4.44	3.28
5. Zero coeffs/coded block			20.09	23.11	21.00	16.64
6. Intra	Pred	Interp				
M	Fixed	Fixed		0	0	207
B	MC,C	Int NC		749	746	205
T	noMC,C	Int C		5	3	201
Y	MC,noC	For NC		30	42	19
P	Intra	For C		9	0	27
B		Bak NC				61
		Bak C				72
		Intra				0
7. No. of coded MB			655	792	792	585
No. of coded blocks			1232	2606	2524	559
8. Diff DC			37	341	15	5
9. MBTYPE			3283	3102	3840	3096
Quantiser			1730	2785	2714	1217
MB address			814	792	792	825
No. of bits	Vector data		3821	3116	2920	4256
	CBP		2289	3751	4056	1424
	EOB		2463	5212	5048	1117
	Coeffs Y		32025	89096	66453	11354
	Coeffs U		1034	2380	2646	244
	Coeffs V		796	1520	1939	266
	Extra data		801	796	796	804
	Seq. Extra data		0			
	Total		49055	112550	91205	24603

Even Field

MPEG TM1 RNL, Leidschendam 20 Jun 1992

Sequence :
Frames : 124

Item			All	Intra	Predicted	Interpolated
1. RMS for luminance			9.81	8.92	9.24	10.14
2. SNR for luminance			28.30	29.12	28.82	28.01
SNR for chrominance			31.54	31.97	31.48	31.51
SNR for chrominance			32.35	32.82	32.30	32.31
3. Mean value of QP			9.97	8.97	7.60	11.01
4. Non-zero coeffs/cod blck			8.22	17.35	7.87	4.02
5. Zero coeffs/coded block			23.56	17.53	26.38	23.67
6. Intra	Pred	Interp				
M	Fixed	Fixed		0	0	70
B	MC,C	Int NC		0	379	38
T	noMC,C	Int C		0	5	170
Y	MC,noC	For NC		0	5	6
P	Intra	For C		396	6	36
B		Bak NC				14
		Bak C				62
		Intra				0
7. No. of coded MB			349	396	396	326
No. of coded blocks			1064	2376	1728	637
8. Diff DC			1606	17357	261	2
9. MBTYPE			1396	691	1539	1437
Quantiser			1200	1476	1397	1089
MB address			408	396	396	413
No. of bits	Vector data		1708	0	1618	1972
	CBP		1438	0	2157	1359
	EOB		2128	4752	3456	1273
	Coeffs Y		45234	183368	72022	16577
	Coeffs U		3828	24445	5217	537
	Coeffs V		3517	22003	4881	521
	Extra data		684	684	684	684
	Seq. Extra data		0			
	Total		61609	237876	93433	25932

MPEG1

Table 1a: Calendar MPEG1 Compatible

MPEG TM1 RNL, Leidschendam 20 Jun 1992

Sequence :
Frames : 124

Item			All	Intra	Predicted	Interpolated
1.	RMS for luminance		9.40	8.78	9.53	9.43
2.	SNR for luminance		28.67	29.26	28.55	28.64
	SNR for chrominance		31.92	32.11	31.58	32.02
	SNR for chrominance		32.89	33.15	32.58	32.98
3.	Mean value of QP		27.16	23.12	20.81	30.10
4.	Non-zero coeffs/cod blck		6.30	10.79	4.67	3.37
5.	Zero coeffs/coded block		16.67	14.29	19.01	15.41
6.	Intra	Pred	Interp			
	M	Fixed	Fixed	0	1	258
	B	MC,C	Int MC	0	682	178
	T	noMC,C	Int C	0	11	156
	Y	MC,noC	For MC	0	73	28
	P	Intra	For C	792	25	37
	E		Bak MC			77
			Bak C			57
			Intra			0
	Compatible prediction			0	0	0	0
7.	No. of coded MB			621	792	791	534
	No. of coded blocks			1331	4752	2392	471
8.	Diff DC			3149	32946	859	17
9.	MBTYPE			2190	1383	3167	1929
	Quantiser			1629	2955	2708	1044
	MB address			807	792	793	815
No.	Vector data			3326	0	3264	3795
of	CBP			1756	0	3868	1193
bits	MOB			2662	9504	4783	942
	Coeffs Y			43750	244024	63304	9492
	Coeffs U			3858	31266	3831	191
	Coeffs V			3508	27761	3474	268
	Extra data			795	788	796	796
	Seq. Extra data			6			
	Total			66288	318472	89987	20465

Odd Field

MPEG TM1 RNL, Leidschendam 20 Jun 1992

Sequence :
Frames : 124

Item			All	Intra	Predicted	Interpolated
1.	RMS for luminance		9.57	9.86	9.54	9.54
2.	SNR for luminance		28.51	28.25	28.54	28.54
	SNR for chrominance		33.20	33.41	33.00	33.24
	SNR for chrominance		34.27	34.61	34.06	34.31
3.	Mean value of QP		27.41	21.60	20.85	30.67
4.	Non-zero coeffs/cod blck		3.85	4.95	3.86	3.02
5.	Zero coeffs/coded block		19.56	23.21	20.18	15.59
6.	Intra	Pred	Interp			
	M	Fixed	Fixed	0	0	214
	B	MC,C	Int MC	713	718	259
	T	noMC,C	Int C	5	3	146
	Y	MC,noC	For MC	65	71	25
	P	Intra	For C	9	0	21
	E		Bak MC			74
			Bak C			53
			Intra			0
7.	No. of coded MB			651	792	792	578
	No. of coded blocks			975	2111	2129	386
8.	Diff DC			37	329	15	5
9.	MBTYPE			3170	3133	3915	2894
	Quantiser			1534	2735	2736	918
	MB address			815	792	792	827
No.	Vector data			3857	3120	2963	4294
of	CBP			1947	3475	3839	1026
bits	MOB			1950	4221	4258	772
	Coeffs Y			23285	65749	50652	7243
	Coeffs U			576	1164	1586	115
	Coeffs V			466	763	1187	153
	Extra data			801	796	796	804
	Seq. Extra data			0			
	Total			38400	85947	72724	19065

Even Field

Table 1b: Calendar Simulcast

MPEG TM1 RNL, Leidschendam
21 Jun
1992

Sequence :
Frames : 124

Item			All	Intra	Predicted	Interpolated
1.	RMS for luminance		5.15	5.05	5.04	5.20
2.	SNR for luminance		33.89	34.06	34.08	33.80
	SNR for chrominance		37.88	38.00	37.65	37.94
	SNR for chrominance		38.48	39.02	38.24	38.51
3.	Mean value of QP		12.28	9.09	9.80	13.64
4.	Non-zero coeffs/cod blck		3.31	3.02	3.83	2.77
5.	Zero coeffs/coded block		14.65	12.39	16.92	13.18
6.	Intra	Pred	Interp			
	M	Fixed	Fixed	0	14	180
	B	MC,C	Int MC	0	409	174
	T	noMC,C	Int C	0	260	180
	Y	MC,noC	For MC	0	28	41
	P	Intra	For C	792	82	42
	E		Bak MC			80
			Bak C			94
			Intra			1
	Compatible prediction			349	791	545	216
7.	No. of coded MB			669	792	778	612
	No. of coded blocks			1582	4752	2838	602
8.	Diff DC			130	7	473	17
9.	MBTYPE			2057	1073	2398	2060
	Quantiser			1061	1405	1464	863
	MB address			809	792	800	815
No.	Vector data			4532	0	3450	5548
of	CBP			1866	0	3429	1525
bits	EOB			3165	9504	5676	1365
	Coeffs Y			29031	80231	59019	10826
	Coeffs U			1990	5289	5094	373
	Coeffs V			2648	5836	6658	704
	Extra data			864	850	862	866
	Seq. Extra data			13			
	Total			49305	106501	90341	26099

Odd Field

MPEG TM1 RNL, Leidschendam
21 Jun
1992

Sequence :
Frames : 124

Item			All	Intra	Predicted	Interpolated
1.	RMS for luminance		5.18	5.39	5.04	5.20
2.	SNR for luminance		33.85	33.50	34.08	33.81
	SNR for chrominance		38.88	38.95	38.73	38.93
	SNR for chrominance		39.55	39.84	39.40	39.57
3.	Mean value of QP		12.39	10.44	9.72	13.67
4.	Non-zero coeffs/cod blck		4.02	6.12	3.87	2.98
5.	Zero coeffs/coded block		17.83	21.03	18.85	14.43
6.	Intra	Pred	Interp			
	M	Fixed	Fixed	0	5	163
	B	MC,C	Int MC	711	557	184
	T	noMC,C	Int C	5	186	180
	Y	MC,noC	For MC	36	36	35
	P	Intra	For C	39	7	31
	E		Bak MC			78
			Bak C			121
			Intra			1
7.	No. of coded MB			683	792	787	629
	No. of coded blocks			1425	3205	2688	709
8.	Diff DC			195	1260	263	26
9.	MBTYPE			2959	2088	2909	3095
	Quantiser			1061	1384	1416	883
	MB address			806	792	794	812
No.	Vector data			4980	3798	3170	5824
of	CBP			2300	3483	3741	1597
bits	EOB			2851	6411	5375	1419
	Coeffs Y			34411	115559	62883	12761
	Coeffs U			1072	3970	2124	286
	Coeffs V			1586	4856	3047	594
	Extra data			801	796	796	804
	Seq. Extra data			0			
	Total			52827	143137	86255	28075

Even Field

MPEG TM1 RNL, Leidschendam
21 Jun
1992

Sequence :
Frames : 124

Item			All	Intra	Predicted	Interpolated
1.	RMS for luminance		4.84	4.43	4.59	4.99
2.	SNR for luminance		34.43	35.20	34.89	34.16
	SNR for chrominance		38.75	39.19	38.81	38.67
	SNR for chrominance		38.68	39.39	38.90	38.51
3.	Mean value of QP		4.79	4.24	3.76	5.36
4.	Non-zero coeffs/cod blck		8.04	15.94	7.66	4.61
5.	Zero coeffs/coded block		19.14	17.57	21.38	17.63
6.	Intra	Pred	Interp			
	M	Fixed	Fixed	0	8	77
	B	MC,C	Int MC	0	207	48
	T	noMC,C	Int C	0	140	133
	Y	MC,noC	For MC	0	5	7
	P	Intra	For C	396	36	26
	E		Bak MC			24
			Bak C			79
			Intra			1
7.	No. of coded MB			343	396	388	319
	No. of coded blocks			1089	2376	1773	658
8.	Diff DC			1479	12890	1262	30
9.	MBTYPE			1084	541	1145	1134
	Quantiser			608	724	682	564
	MB address			402	396	398	405
No.	Vector data			2330	0	1792	2847
of	CBP			1272	0	1855	1222
bits	EOB			2178	4752	3545	1315
	Coeffs Y			47132	194381	74233	17134
	Coeffs U			2472	13471	3635	558
	Coeffs V			3548	15887	5494	1158
	Extra data			684	684	684	684
	Seq. Extra data			0			
	Total			61780	230897	93529	27090

MPEG

Table 2a: Table Tennis Compatible

MPEG TM1 RNL, Leidschendam 20 Jun 1992

Sequence :
Frames : 124

Item			All	Intra	Predicted	Interpolated
1. RMS for luminance			5.61	5.16	5.62	5.66
2. SNR for luminance			33.15	33.87	33.13	33.07
SNR for chrominance			37.74	38.13	37.60	37.74
SNR for chrominance			38.29	38.98	38.25	38.22
3. Mean value of QP			15.32	12.62	12.28	16.83
4. Non-zero coeffs/cod blck			5.46	9.35	4.15	3.22
5. Zero coeffs/coded block			14.31	14.81	15.14	12.18
6. Intra	Pred	Interp				
M	Fixed	Fixed		0	40	217
B	MC,C	Int MC		0	413	210
T	noMC,C	Int C		0	205	140
Y	MC,noC	For MC		0	52	42
P	Intra	For C		792	82	30
E		Bak MC				89
		Bak C				63
		Intra				1
Compatible prediction			0	0	0	0
7. No. of coded MB			639	792	752	575
No. of coded blocks			1420	4752	2598	528
8. Diff DC			2848	24267	2622	61
9. MBTYPE			1944	1118	2398	1803
Quantiser			1020	1632	1497	758
MB address			792	792	798	789
No. Vector data			4564	0	3661	5518
of CBP			1556	0	3231	1131
bits EOB			2841	9504	5197	1056
Coeffs Y			43091	238827	62548	9477
Coeffs U			2162	14714	2712	270
Coeffs V			2937	17162	4209	548
Extra data			795	788	796	796
Seq. Extra data			6			
Total			61708	284538	87047	22227

Odd Field

MPEG TM1 RNL, Leidschendam 20 Jun 1992

Sequence :
Frames : 124

Item			All	Intra	Predicted	Interpolated
1. RMS for luminance			5.73	5.89	5.64	5.74
2. SNR for luminance			32.97	32.73	33.10	32.96
SNR for chrominance			38.59	38.67	38.45	38.63
SNR for chrominance			39.21	39.49	39.09	39.22
3. Mean value of QP			15.29	12.30	11.88	16.98
4. Non-zero coeffs/cod blck			3.56	6.88	3.36	2.86
5. Zero coeffs/coded block			16.44	18.37	17.21	13.64
6. Intra	Pred	Interp				
M	Fixed	Fixed		0	13	172
B	MC,C	Int MC		694	521	245
T	noMC,C	Int C		5	175	137
Y	MC,noC	For MC		48	76	37
P	Intra	For C		45	7	22
E		Bak MC				95
		Bak C				83
		Intra				1
7. No. of coded MB			675	792	779	620
No. of coded blocks			1146	2892	2239	498
8. Diff DC			210	1413	264	28
9. MBTYPE			2916	2259	3016	2967
Quantiser			998	1560	1485	739
MB address			802	792	795	806
No. Vector data			5095	3716	3282	5966
of CBP			1966	3659	3525	1149
bits EOB			2291	5784	4479	995
Coeffs Y			24721	84636	46280	8534
Coeffs U			679	2630	1318	176
Coeffs V			1037	3423	1982	360
Extra data			801	796	796	804
Seq. Extra data			0			
Total			41309	109255	66957	22497

Even Field

Table 2b: Table Tennis Simulcast

MPEG TM1 RNL, Leidschendam 21 Jun 1992

Sequence :
Frames : 124

Item			All	Intra	Predicted	Interpolated
1.	RMS for luminance		8.41	7.65	8.15	8.61
2.	SNR for luminance		29.63	30.46	29.90	29.43
	SNR for chrominance		31.81	31.91	31.66	31.85
	SNR for chrominance		33.27	33.26	33.07	33.35
3.	Mean value of QP		22.49	15.94	17.47	25.26
4.	Non-zero coeffs/cod blck		2.70	1.86	3.53	2.28
5.	Zero coeffs/coded block		14.41	9.77	15.78	16.11
6.	Intra	Pred	Interp			
M		Fixed	Fixed		0	24	97
B		MC,C	Int MC		0	618	220
T		noMC,C	Int C		0	13	279
Y		MC,noC	For MC		0	58	30
P		Intra	For C		792	79	51
E			Bak MC				45
			Bak C				70
			Intra				0
	Compatible prediction			346	792	485	233
7.	No. of coded MB			722	792	768	695
	No. of coded blocks			1717	4752	2900	863
8.	Diff DC			402	0	1587	7
9.	MBTYPE			2515	1232	2902	2541
	Quantiser			1755	2198	2209	1523
	MB address			821	792	802	832
No.	Vector data			6449	0	4396	8090
of	CBP			2015	0	3087	1880
bits	EOB			3434	9504	5800	1725
	Coeffs Y			28098	48970	58497	13806
	Coeffs U			1911	5231	4660	427
	Coeffs V			1031	3468	2656	90
	Extra data			864	850	862	866
	Seq. Extra data			13			
	Total			50280	73766	87341	33099

Odd Field

MPEG TM1 RNL, Leidschendam 21 Jun 1992

Sequence :
Frames : 124

Item			All	Intra	Predicted	Interpolated
1.	RMS for luminance		8.14	8.30	8.11	8.13
2.	SNR for luminance		29.92	29.75	29.96	29.93
	SNR for chrominance		32.99	32.95	32.82	33.05
	SNR for chrominance		34.63	34.52	34.44	34.71
3.	Mean value of QP		22.98	18.76	17.80	25.51
4.	Non-zero coeffs/cod blck		4.13	5.19	4.88	2.54
5.	Zero coeffs/coded block		19.83	23.68	21.60	15.39
6.	Intra	Pred	Interp			
M		Fixed	Fixed		1	0	121
B		MC,C	Int MC		625	647	292
T		noMC,C	Int C		2	3	232
Y		MC,noC	For MC		158	141	23
P		Intra	For C		6	2	28
E			Bak MC				40
			Bak C				56
			Intra				0
7.	No. of coded MB			712	791	792	671
	No. of coded blocks			1217	2301	2394	627
8.	Diff DC			43	267	68	3
9.	MBTYPE			3429	2848	3615	3437
	Quantiser			1536	2162	2185	1206
	MB address			819	792	792	833
No.	Vector data			7146	4542	4894	8347
of	CBP			1902	2590	2860	1447
bits	EOB			2434	4603	4788	1254
	Coeffs Y			32078	78238	72235	10704
	Coeffs U			739	1567	1675	273
	Coeffs V			253	560	704	41
	Extra data			801	796	796	804
	Seq. Extra data			0			
	Total			51138	98698	94545	28347

Even Field

MPEG TM1 RNL, Leidschendam 21 Jun 1992

Sequence :
Frames : 124

Item			All	Intra	Predicted	Interpolated
1.	RMS for luminance		9.74	8.28	8.90	10.25
2.	SNR for luminance		28.36	29.77	29.14	27.91
	SNR for chrominance		31.16	31.59	31.26	31.07
	SNR for chrominance		33.38	33.53	33.28	33.39
3.	Mean value of QP		9.86	8.40	7.31	11.02
4.	Non-zero coeffs/cod blck		7.57	15.18	8.04	3.85
5.	Zero coeffs/coded block		21.34	14.86	22.58	23.06
6.	Intra	Pred	Interp			
M		Fixed	Fixed		0	3	28
B		MC,C	Int MC		0	338	76
T		noMC,C	Int C		0	7	179
Y		MC,noC	For MC		0	9	9
P		Intra	For C		396	39	34
E			Bak MC				14
			Bak C				56
			Intra				0
7.	No. of coded MB			377	396	393	368
	No. of coded blocks			1128	2376	1733	732
8.	Diff DC			1658	15501	1112	7
9.	MBTYPE			1367	632	1427	1444
	Quantiser			1021	1181	1113	965
	MB address			405	396	398	410
No.	Vector data			3074	0	2207	3814
of	CBP			1236	0	1684	1232
bits	EOB			2256	4752	3466	1463
	Coeffs Y			47123	175032	76001	19048
	Coeffs U			2952	17333	4288	517
	Coeffs V			1379	10709	1529	71
	Extra data			684	684	684	684
	Seq. Extra data			0			
	Total			61566	210780	92863	29718

MPEG1

Table 3a: Flower Garden Compatible

MPEG TM1 RML, Leidschendam
20 Jun
1992

Sequence :
Frames : 124

Item			All	Intra	Predicted	Interpolated
1. RMS for luminance			9.70	8.21	9.58	9.95
2. SNR for luminance			28.39	29.85	28.51	28.18
SNR for chrominance			31.00	31.35	30.82	31.03
SNR for chrominance			32.94	33.07	32.76	32.99
3. Mean value of QP			29.82	24.28	22.25	33.43
4. Non-zero coeffs/cod blck			4.67	8.28	3.86	2.39
5. Zero coeffs/coded block			14.88	12.16	15.26	16.99
6. Intra	Pred	Interp				
M	Fixed	Fixed		0	13	129
B	MC,C	Int NC		0	605	268
T	noMC,C	Int C		0	6	203
Y	MC,noC	For NC		0	65	32
P	Intra	For C		792	103	37
E		Bak NC				54
		Bak C				70
		Intra				0
Compatible prediction			0	0	0	0
7. No. of coded MB			704	792	779	663
No. of coded blocks			1541	4752	2814	629
8. Diff DC			3293	29735	2601	8
9. MBTYPE			2424	1301	3100	2318
Quantiser			1643	2544	2312	1269
MB address			819	792	797	831
No. of bits	Vector data		6435	0	4335	8092
	CBP		1650	0	2819	1429
	EOB		3082	9504	5627	1258
	Coeffs Y		41693	205621	65145	10837
	Coeffs U		2664	19665	3079	227
	Coeffs V		1375	12362	1052	23
	Extra data		795	788	796	796
	Seq. Extra data		6			
	Total		62586	252577	89061	27081

Odd Field

MPEG TM1 RML, Leidschendam
20 Jun
1992

Sequence :
Frames : 124

Item			All	Intra	Predicted	Interpolated
1. RMS for luminance			9.40	9.42	9.51	9.36
2. SNR for luminance			28.67	28.65	28.56	28.71
SNR for chrominance			32.28	32.42	32.05	32.35
SNR for chrominance			34.29	34.31	34.07	34.37
3. Mean value of QP			30.07	23.31	22.67	33.78
4. Non-zero coeffs/cod blck			3.53	4.10	3.93	2.34
5. Zero coeffs/coded block			18.99	22.71	20.21	13.96
6. Intra	Pred	Interp				
M	Fixed	Fixed		0	0	146
B	MC,C	Int NC		605	624	363
T	noMC,C	Int C		3	2	152
Y	MC,noC	For NC		178	163	25
P	Intra	For C		5	2	20
E		Bak NC				45
		Bak C				41
		Intra				0
7. No. of coded MB			696	792	792	646
No. of coded blocks			958	1988	2098	390
8. Diff DC			40	229	73	2
9. MBTYPE			3263	2927	3719	3135
Quantiser			1336	2210	2260	870
MB address			821	792	792	836
No. of bits	Vector data		7237	4553	5025	8434
	CBP		1546	2581	2730	960
	EOB		1917	3976	4195	779
	Coeffs Y		22261	56505	52943	6068
	Coeffs U		420	973	1010	123
	Coeffs V		100	231	286	12
	Extra data		801	796	796	804
	Seq. Extra data		0			
	Total		39703	75543	73757	22021

Even Field

Table 3b: Flower Garden Simulcast