

CCITT SGXV
Working Party XV/4
Specialists Group on Coding for Visual Telephony

Doc. #531

Source : Netherlands.
Title : Simulations RM8

Enclosed you will find the simulation results of Reference Model 8

This document contains the results of RM8-coding, according to the changes to document 446 [1] as described in [2], [3] with a bitrate of 64kbit/s (59.4kbit/s).

The proceeding pages reveal:

- The statistics of RM7 and RM8
- The graphs of the signal to noise ratio of
 - RM7 (Y)
 - RM8 (Y)

The results are given for:

CLAIRE
MISS AMERICA
SWING
SALESMAN
BLUE JACKET

An accompanying tape is produced to verify subjectively the results.

Conclusion :

- For the adopted sequences a negligible difference in SNR is observed.
- The mean value of the step size has decreased for all sequences.
- The ratio between bits for coefficients and bits for overhead bits decreased.
- Due to the new buffer regulation, there are no forced to fixed macro blocks in the swing and the Blue Jacket sequences any more. The buffer shows a more stable behaviour.
- The subjective picture quality shows no significant improvement over RM7, except for the disappearance of the forced to fixed blocks in the Swing and Blue Jacket sequences.

References

- [1] *Description Reference Model 7*,
CCITT SGXV/1 doc 446
Source : The Netherlands
- [2] *RM8 and action points*,
CCITT SGXV/1 Oslo meeting march 1989 TD10
- [3] *Clarification on flexible hardware specification and RM8*,
CCITT SGXV/1 doc 500
Source : Chairman

Sequence : Claire

Number of tracks for statistics : 78

Temporal resolution : 10 Hz

		RM7		RM8		
Item		15th pict.	mean seq	15th pict.	mean seq	
1. RMS for luminance		3.211	3.245	3.152	3.191	
2. SNR for luminance		37.998	37.918	38.159	38.064	
SNR for chrominance(U)		39.813	39.611	40.036	39.727	
SNR for chrominance(V)		42.466	42.543	42.491	42.506	
3. Mean value of step size		17.833	19.603	17.167	18.750	
4. Mean value of the number of non-zero coefficients		2.721	2.918	2.761	2.870	
5. Mean value of the number of zero-coefficients		5.939	5.724	5.797	5.706	
6. Block type of Macro	Fixed	258	273	250	272	
	Coded	97	64	92	58	
	Coded MC	38	52	34	48	
	Fixed MC	3	8	9	9	
	Intra	0	0	0	0	
	Coded + Q	0	0	8	5	
	Coded MC + Q	0	0	3	4	
	Intra + Q	0	0	0	0	
7. Block type of Y	Fixed	1275	1248	1250	1246	
	Coded MC	145	97	150	95	
	Fixed MC	107	133	92	133	
	Coded	57	106	92	110	
	Intra	0	0	0	0	
8. Block type of UV	Fixed	698	662	684	659	
	Coded MC	12	11	16	11	
	Fixed MC	16	23	18	24	
	Coded	66	96	74	98	
	Intra	0	0	0	0	
9. Number of bits	Macro attributes		957	831	1208	1092
	End of block		824	756	552	527
	Motion vectors		188	362	253	365
	Coefficients	Y	3841	3757	3730	3675
		U	113	152	108	151
		V	80	69	90	69
		Total	4034	3978	3928	3895
	Total		6003	5927	5941	5879

Bits for first frame	23902	33784
Number of forced to fixed mb's	0	0
Bits stuffed due to buffer underflow	0	0

Sequence : Miss America

Number of tracks for statistics : 49

Temporal resolution : 10 Hz

		RM7		RM8	
Item		15th pict.	mean seq	15th pict.	mean seq
1.	RMS for luminance	3.013	3.160	3.000	3.115
2.	SNR for luminance	38.551	38.141	38.587	38.266
	SNR for chrominance(U)	39.107	38.822	39.156	38.779
	SNR for chrominance(V)	39.886	39.361	40.100	39.451
3.	Mean value of step size	16.667	18.742	15.833	17.786
4.	Mean value of the number of non-zero coefficients	2.193	2.002	2.059	1.949
5.	Mean value of the number of zero-coefficients	3.017	2.936	2.935	2.836
6.	Block type of Macro				
	Fixed	235	206	216	202
	Coded	105	93	116	91
	Coded MC	48	74	40	70
	Fixed MC	8	23	10	24
	Intra	0	0	0	0
	Coded + Q	0	0	9	5
	Coded MC + Q	0	0	5	4
	Intra + Q	0	0	0	0
7.	Block type of Y				
	Fixed	1262	1111	1258	1111
	Coded MC	98	84	106	81
	Fixed MC	106	129	99	130
	Coded	118	259	121	261
	Intra	0	0	0	0
8.	Block type of UV				
	Fixed	611	537	589	527
	Coded MC	69	61	93	69
	Fixed MC	27	46	25	46
	Coded	85	148	85	149
	Intra	0	0	0	0
9.	Number of bits				
	Macro attributes	1173	1274	1573	1633
	End of block	972	1023	646	653
	Motion vectors	282	598	311	599
	Coefficients	Y	2830	2443	2703
		U	289	265	372
		V	175	306	237
		Total	3294	3014	3312
	Total	5721	5909	5842	5861

Bits for first frame	20775	30645
Number of forced to fixed mb's	0	0
Bits stuffed due to buffer underflow	0	0

Statistics Reference Model 8

PTT Research Neher Laboratories
Visual Communications Research
Date : 19 - 4 - 1989

Sequence : Swing

Number of tracks for statistics : 124

Temporal resolution : 10 Hz

		RM7		RM8		
Item		15th pict.	mean seq	15th pict.	mean seq	
1. RMS for luminance		5.117	4.428	5.314	4.485	
2. SNR for luminance		33.951	35.412	33.623	35.201	
SNR for chrominance(U)		35.857	38.264	35.696	37.586	
SNR for chrominance(V)		36.418	38.968	36.245	38.189	
3. Mean value of step size		15.333	22.327	15.500	14.706	
4. Mean value of the number of non-zero coefficients		1.832	3.056	2.060	2.168	
5. Mean value of the number of zero-coefficients		18.528	21.277	18.556	18.970	
6. Block type of Macro	Fixed	227	306	255	259	
	Coded	168	82	132	119	
	Coded MC	1	5	0	5	
	Fixed MC	0	2	0	1	
	Intra	0	1	0	1	
	Coded + Q	0	0	9	11	
	Coded MC + Q	0	0	0	0	
	Intra + Q	0	0	0	0	
7. Block type of Y	Fixed	1310	1399	1398	1366	
	Coded MC	270	156	186	190	
	Fixed MC	2	12	0	12	
	Coded	2	14	0	12	
	Intra	0	4	0	4	
8. Block type of UV	Fixed	747	747	726	748	
	Coded MC	43	30	66	29	
	Fixed MC	1	5	0	5	
	Coded	1	8	0	7	
	Intra	0	2	0	2	
9. Number of bits	Macro attributes		1219	665	1253	1199
	End of block		1044	612	504	485
	Motion vectors		5	57	0	54
	Coefficients	Y	4302	3936	3319	3596
		U	228	423	445	332
		V	243	269	273	218
		Total	4773	4628	4037	4146
	Total		7041	5962	5794	5884

Bits for first frame	69397	79218
Number of forced to fixed mb's	288	0
Bits stuffed due to buffer underflow	0	0

Sequence : Salesman

Number of tracks for statistics : 74

Temporal resolution : 10 Hz

		RM7		RM8	
Item		15th pict.	mean seq	15th pict.	mean seq
1.	RMS for luminance	7.301	6.953	7.369	7.003
2.	SNR for luminance	30.863	31.306	30.783	31.245
	SNR for chrominance(U)	38.667	39.034	38.509	38.827
	SNR for chrominance(V)	39.004	39.372	38.946	39.247
3.	Mean value of step size	28.000	27.574	28.000	27.180
4.	Mean value of the number of non-zero coefficients	2.653	2.533	2.521	2.482
5.	Mean value of the number of zero-coefficients	8.478	8.032	7.659	7.706
6.	Block type of Macro				
	Fixed	247	258	260	255
	Coded	88	88	62	82
	Coded MC	40	40	44	38
	Fixed MC	17	8	13	8
	Intra	4	2	3	2
	Coded + Q	0	0	10	9
	Coded MC + Q	0	0	4	2
	Intra + Q	0	0	0	0
7.	Block type of Y				
	Fixed	1206	1240	1210	1238
	Coded MC	134	142	118	142
	Fixed MC	104	98	118	100
	Coded	124	94	126	94
	Intra	16	10	12	9
8.	Block type of UV				
	Fixed	660	681	654	681
	Coded MC	10	10	10	10
	Fixed MC	3	5	7	4
	Coded	111	91	115	93
	Intra	8	5	6	5
9.	Number of bits				
	Macro attributes	1042	956	1287	1265
	End of block	828	796	542	540
	Motion vectors	352	329	371	328
	Coefficients	Y	4025	3807	3828
		U	28	44	39
		V	54	38	51
		Total	4107	3889	3918
	Total	6329	5970	6118	5885

Bits for first frame	39878	49697
Number of forced to fixed mb's	0	0
Bits stuffed due to buffer underflow	0	0

Sequence : Blue Jacket

Number of tracks for statistics : 74

Temporal resolution : 10 Hz

		RM7		RM8		
Item		15th pict.	mean seq	15th pict.	mean seq	
1. RMS for luminance		5.108	5.465	4.637	5.037	
2. SNR for luminance		33.966	33.390	34.805	34.103	
SNR for chrominance(U)		40.186	39.931	40.525	40.229	
SNR for chrominance(V)		38.931	38.633	39.147	38.832	
3. Mean value of step size		29.667	29.009	17.833	21.944	
4. Mean value of the number of non-zero coefficients		4.732	4.740	3.567	3.594	
5. Mean value of the number of zero-coefficients		8.339	9.355	8.935	8.664	
6. Block type of Macro	Fixed	337	311	288	288	
	Coded	31	59	75	74	
	Coded MC	22	19	17	19	
	Fixed MC	6	5	4	3	
	Intra	0	1	0	0	
	Coded + Q	0	0	12	8	
	Coded MC + Q	0	0	0	2	
	Intra + Q	0	0	0	0	
7. Block type of Y	Fixed	1420	1376	1384	1348	
	Coded MC	52	107	116	136	
	Fixed MC	54	50	53	54	
	Coded	58	48	31	43	
	Intra	0	3	0	3	
8. Block type of UV	Fixed	736	726	721	723	
	Coded MC	0	15	29	20	
	Fixed MC	6	9	17	9	
	Coded	50	40	25	40	
	Intra	0	1	0	1	
9. Number of bits	Macro attributes		371	595	957	952
	End of block		316	523	430	444
	Motion vectors		180	154	131	150
	Coefficients	Y	2881	4448	4020	4152
		U	7	93	135	72
		V	25	146	162	108
		Total	2913	4687	4317	4332
	Total		3780	5959	5835	5878

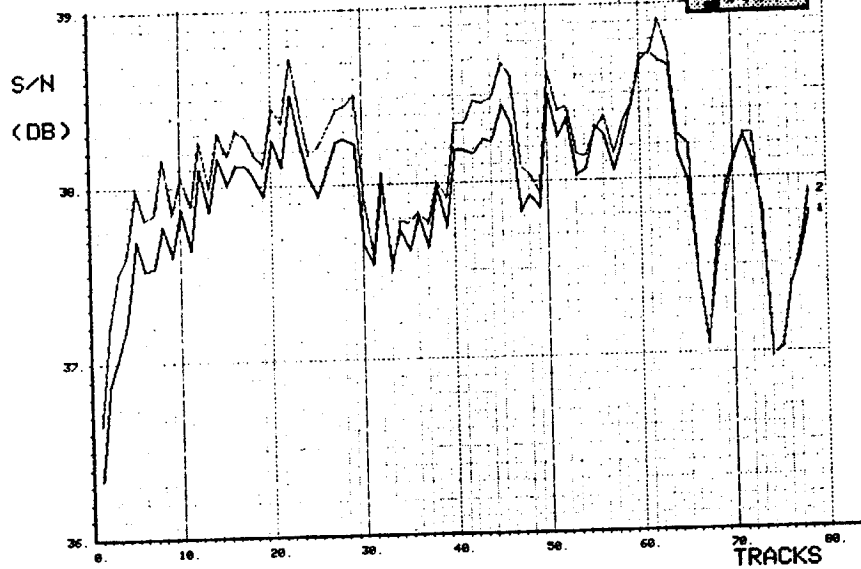
Bits for first frame	30013	39835
Number of forced to fixed mb's	296	0
Bits stuffed due to buffer underflow	0	0

CLAIRE

1 - R77
2 - R78

19-4-69

pit/research

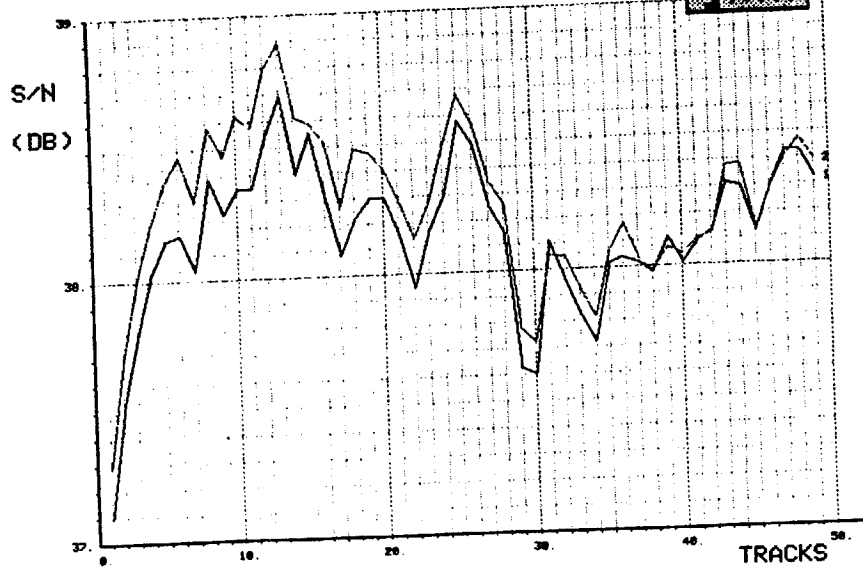


MISS AMERICA

1 - R77
2 - R78

19-4-69

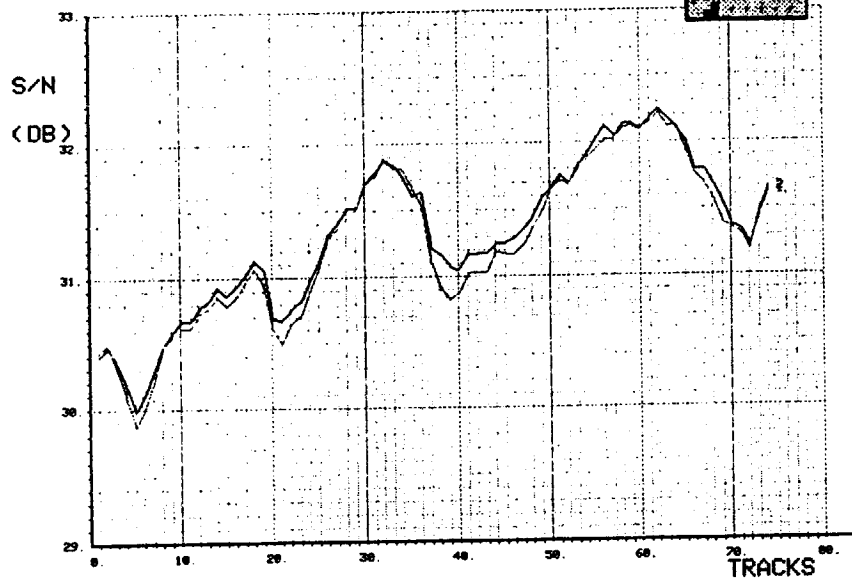
pit/research



SALESMAN

1 - R17
2 - R16

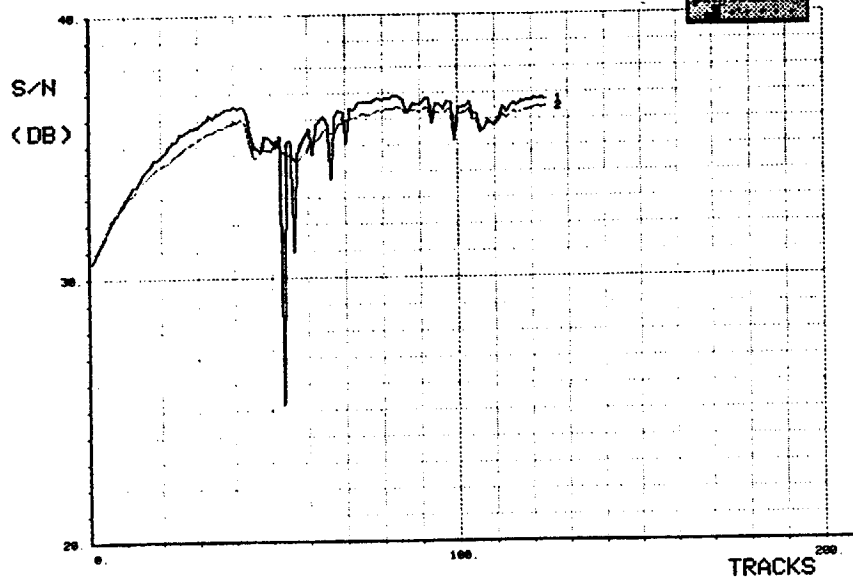
19-4-89



SWING

1 - R17
2 - R16

19-4-89



BLUE JACKET

1 - RND
2 - RNB

13-4-89

pit research

