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Title :

VIDEO MULTIPLEX CODING

INTRODUCTION

The Japanese proposal as given in the paper faxed this summer by Mr MUKAWA may be considered as a good basis for the video multiplex structure. The following principles should be observed :

- GBSC should be reduced to 16 bits (see contribution # 147)
- PSC should be a BSC followed by an impossible GN
- The extension mecanism should be the same for the Picture Header and the GOB Header, ie three SI bits possibly followed by three words of a predetermined length (8 or 16 bits)
- Picture attributes which are anyhow present in the GB Header need not be transmitted in the Picture Header
- On/off mechanisms should be avoided

In the next pages, a rewording of § 2.2 of the Hardware Specification is proposed.

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2.2. VIDEO MULTIPLEX ARRANGEMENT

2.2.1. Picture Header

Configuration of the codes is shown in Figure 2.2. All PSCs are transmitted. Two successive PSCs indicate the intervening picture has been dropped.

PSC	BS	TR	TYPE1	SI	GPMV	SPARE1	SPARE2
21	6	3	7	3	8/16	8	8

←----------40 bits----------→
←----------n * 8 bits----------→

*Comment: For easier hardware implementation, the bit length of PSC is a multiple of 8 bits so the shifter circuits which shift the data on a bit-by-bit basis is not necessary. N equals 5. The length of PSC does not change, since all the information is fixed length codes except when spare information is inserted.

(1) Picture Start Code (PSC)

Unique word of 21 bits (value: 00000000 00000001 xxxxx)
xxxxx is a forbidden GN value (ie 0 or 19 to 31)

(2) Buffer State (BS)

Coder buffer fullness information expressed in the unit of 1 Kbit. The value is sampled at the time of the top of the frame. (Six bits, MSB first)

(3) Temporal Reference (TR)

Temporal reference is a 3 bit number representing the time sequence, in Common Intermediate Format picture periods, of a particular picture. MSB first.

(4)Type information (TYPE1)

Split-screen indicator. (1) on. (0) off.
Document camera. (1) on. (0) off.
5 bits spare for further study.

.../...

(5) Spare bit insertion information (SI)

The 3 bit code indicates PGMV, SPARE1, SPARE2 insertion. When one of those bits is set to 1, the corresponding information (eg PGMV, SPARE1, SPARE2) is inserted in the right order before the first GB Header.

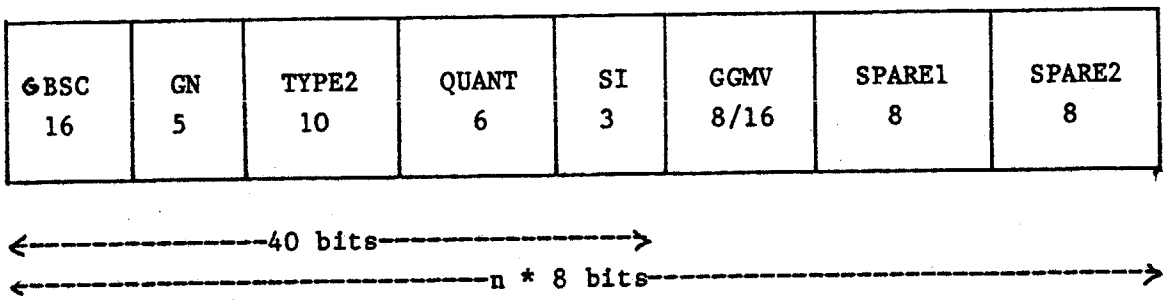
(6) Picture Global Motion Vector (PGMV)

(7) Spare information (SPARE1, SPARE2)

For future use, spare bits are reserved. Definition of the spare information needs further study.

2.2.2. Group of Block Header

GBSC 16	GN 5	TYPE2 10	QUANT 6	SI 3	GGMV 8/16	SPARE1 8	SPARE2 8



*Comment: The bit length from GBSC to SI is 8*N and is not changed. Integer number N is 5. See comment of 2.2.1.

Each GOB consists of two block-lines of Y signal each with 8 lines by 352 pels and a block line of Cr and Cb each with 8 lines by 176 pels. See Figure .

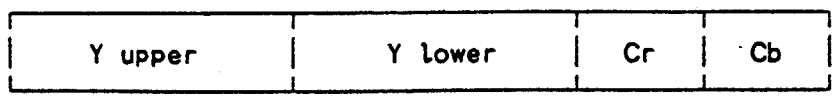


Figure A group of blocks

All GBSCs are transmitted.

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(1) Group of Block Start Code (GBSC)

Unique code of 16 bits (value: 00000000 00000001)

(2) Group Number (GN)

The group number is a five bit number representing the vertical spatial position, in units of groups, of the current group of block. MSB first. For the first GOB, GN = 1 or (00001). For the last GOB, GN = 18 or (10010).

(3) Type Information (TYPE2)

Intraframe mode. (1) all blocks transmitted thereafter are intraframe coded.

MC use. (1) Motion compensation is used and Motion Vectors may be transmitted when needed. (0) MV are set to 0 for the duration of the GB.

Filter in the loop. (0) No filter is used. (1) The next bit indicates whether the filter is derived from the MV or needs side information.

Filter origin. (0) Derived from MV. (1) Described at the block level.

6 bits spare for further study.

(4) Quantiser type information (QUANT)

First bit indicates an insertion of the information. When the first bits is 1, the quantizer type is not defined in the GOB attribute, but defined in the lower attribute. When the bit is 0, consecutive 3 bit code indicates the quantizer type as GOB attribute.

(5) Spare bit insertion information (SI)

The 3 bit code indicates GGMV, SPARE1, SPARE2 insertion. When one of those bits is set to 1, the corresponding information (eg GGMV, SPARE1, SPARE2) is inserted in the right order before the first Block Header.

(6) Group-of-Blocks Global Motion Vector (GGMV)

(7) Spare information (SPARE1, SPARE2)

.../...

2.2.3. Block Data Alignment

BA	TYPE3	QUANT	CLASS	DMV	TCOEFF	EOB	LAST

Comment : Data are coded using VLC. The used VLCs require further study. Some of the elements may be dropped depending on higher layer attributes.

(1) Block Address information (BA)

(2) Block Type information (TYPE3)

The contents of this elements depend on the GB attributes. See table 2.1;

(3) Quantiser type (QUANT)

(4) Classification Index (CLASS)

(5) Motion Vector Information (DMV)

(6) Transform Coefficient data (TCOEFF)

(7) EOB marker (EOB)

(8) Last coefficient data (LAST)

.../...

TABLE 2.1. TYPE3 CONDITIONAL CONTENTS

TYPE2	TYPE OF BLOCK	CODED /NOT	INTRA /INTER	MC /NO MC	DMV=0 DMV#0	FILTER SIDE INFO	MV
1XXX	Intra	-	1	-	-	-	-
000X	NoMC+NoFilter	-	x	0	-	-	-
001X	NoMC+Filter+Side info	-	x	0	-	x	-
010X	MC+NoFilter	x	x	1	x	-	x
0110	MC+Filter from MV	x	x	1	x	-	x
0111	MC+Filter+Side info	x	x	1	x	x	x

Note: x = 0 or 1 - = Not used

1xxx Lum/Chrom TYPE3 = Empty

000x Lum/Chrom TYPE3 = Intra
Inter

001x Lum/Chrom TYPE3 = Intra
Inter + No filter
Inter + Filter + Coded
Inter + Filter + Uncoded

010x Luminance TYPE3 = Intra
Inter
MC + Coded + DMV=0
MC + Coded + DMV#0
MC + Uncoded + DMV=0
MC + Uncoded + DMV#0

Chrominance TYPE3 = Intra
Inter

.../...

0110	Luminance	TYPE3 =	Intra
			Inter + No filter
			MC + Coded + Filter + DMV=0
			MC + Coded + Filter + DMV#0
			MC + Uncoded + Filter + DMV=0
			MC + Uncoded + Filter + DMV#0
	Chrominance	TYPE3 =	Intra
			Inter
0111	Luminance	TYPE3 =	Intra
			Inter+ No filter
			Inter + Filter
			Inter + Filter + Uncoded
			MC + Coded + No filter + DMV=0
			MC + Coded + No filter + DMV#0
			MC + Coded + Filter + DMV=0
			MC + Coded + Filter + DMV#0
			MC + Uncoded + No filter + DMV=0
			MC + Uncoded + No filter + DMV#0
			MC + Uncoded + Filter + DMV=0
			MC + Uncoded + Filter + DMV#0
	Chrominance	TYPE3 =	Intra
			Inter + No filter
			Inter + Filter
			Inter + Uncoded + Filter