CCITT SGXV
Working Party XV/1
Specialist Group on Coding
for Visual Telephony

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Title: GBSC EMULATION IN FLEXIBLE HARDWARE

The initial VLCs agreed in Oslo for Flexible Hardware have been checked from a GBSC emulation point of view. It was found that GBSC can be emulated in some cases.

In order to do the checking the most critical code words were selected, i.e. those with many zeroes in the beginning or end of the code words. Below is the list:

MBA (macro block addressing)

Stuff	0000 0001 111	7 zeroes at beginning
25	0000 0100 000	5 zeroes at end

TYPE3 (macro block attribute)

intra,qua,cof	0000 001	6 zeroes at beginning
all	...1	0 zeroes at end

QUANT (quantiser choise)

1	0000 1	4 zeroes at beginning
16	1000 0	4 zeroes at end

MVD (motion vector data)

-16/16 etc.	0000 001x xxx	6 zeroes at beginning
12/-20	0000 0100 000	5 zeroes at end

CBP (coded block pattern)

60	000	3 zeroes
7	1110 0000	5 zeroes at end

2D VLC

(0,12) etc.	0000 0000 1xxx xx	8 zeroes at beginning
(0,8) etc.	0000 0001 xxxx x	7 zeroes at beginning
(13,1)	0010 0000 0	6 zeroes at end

20 bit FLC - ESCAPE+RUN+LEVEL

any	0000 01 RRRRRR LLLL LLLL	5 zeroes at beginning
R,-64	0000 01 RRRRRR 1100 0000	6 zeroes at end

Intra DC

1	0000 0001	7 zeroes at beginning
192	1100 0000	6 zeroes at end

EOB (end of block)

eob	10	1 zero at end

Emulation of GBSC

By combining code words from the above list the critical cases were found. The following picture, GOB and macro-block layers were assumed:

Picture layer:

PSC	TR	TYPE1	PEI1	PARITY	PEI2	PSPARE	GOB data
20	5	13	1	0/8	1	0/16	

GOB layer:

GBSC	GN	TYPE2	QUANT1	GEI	GSPARE	MB data
16	4	6	5	1	0/16	

Macro block layer:

MBA	TYPE3	QUANT2	MVD	CBP	Block data

PSC/GBSC: 0000 0000 0000 0001 xxxx

The following cases emulate the GBSC:

PEI2=1 PSPARE=GBSC

GEI=1 GSPARE=GBSC

GEI=1 GSPARE=xxxx xxxx 0000 0000 MBA=Stuff

GEI=1 GSPARE=x000 0000 0000 0000 MBA=anything

QUANT2=16 CBP=60 2D-VLC=(0,12) -> 10000 000 000000001xxxxx (15)

MVD=12 CBP=60 2D-VLC=(0,12) -> 00000100000 000 000000001xxxxx (16)

MVD=12 CBP=60 2D-VLC=(0,8) -> 00000100000 000 00000001xxxxx (15)

Spare bits set to '1' in Picture and GOB layer are taken into account. If these redundant bits are removed, a new study will be necessary.

Conclusions.

The probability to emulate start codes is non-zero, but we think it is sufficiently low.

Other cases may occur due to future modifications of the video multiplex.