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CODING OF MOVING PICTURES AND ASSOCIATED AUDIO

MPEG 91/210

Proposal 12

16 CHANNEL SUBBAND BASED TV CODEC FOR BIT-RATES UP TO 10 MBIT/S

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PREFACE

This document describes the HHI proposal for MPEG II which is based on an image subband decomposition. The document is structured into four main parts: First, the features of the algorithm are listed (see summary of the proposal), second, the algorithm is described in some detail (see proposal document). Third, the hardware evaluation follows (updated version of distributed hardware evaluation paper) and, at last, tables of codes and statistics conclude the document.

CONTENT

1. Introduction

This document describes the HHI proposal for MPEG II which is based on an image subband decomposition. The proposal is mainly intended to be used for bit-rates between 1 and 10 MBit/s, however, due to block-free signal processing different picture formats e.g. TV, EDTV, HDTV are supported. The core of the system works on progressive pictures. Only predictive coding is implemented up to now, however, an interpolative mode can be used. A progressively scanned picture source can feed the system core without any constraints. Figure 1 represents the block diagram of the proposed coder and the decoder.

2. General outline

The main features of the HHI subband proposal are (see also Annex 1)

* full CCIR 601 format
* hybrid subband coding
* frame based coding
* every 10th frame is coded INTRA
* predictive coding
* no interpolative coding mode
* frame based calculation of motion vectors
* full search block matching
* block-size 8 x 8
* 1/2 pel vector accuracy
* motion vector range +-12 pixels, +-12 lines
* subband based intra-inter decision
* no macro-block concept
* local and global bit-rate control
* adaptive quantizing
* different VLCs for coefficient coding

3. Picture format

Full CCIR 601 4:2:2 is supported i.e. 720 pels, 576 lines and 25 frames. All other picture formats i.e. EDTV and HDTV and progressive picture sources are possible.

4. De-/re-interlacing

After de-interlacing, the higher vertical correlation can be exploited in frame-based than in field-based systems. This holds only for non-moving picture areas. In moving areas additional high vertical frequencies can appear after field merging. A conversion between the initial interlaced CCIR 601 signal and the progressive input of the system core is needed. Simple field merging is used in the proposal, although more sophisticated motion compensated techniques will result in better deinterlaced pictures. After decoding the frame, two fields are generated out of one frame in the receiver.

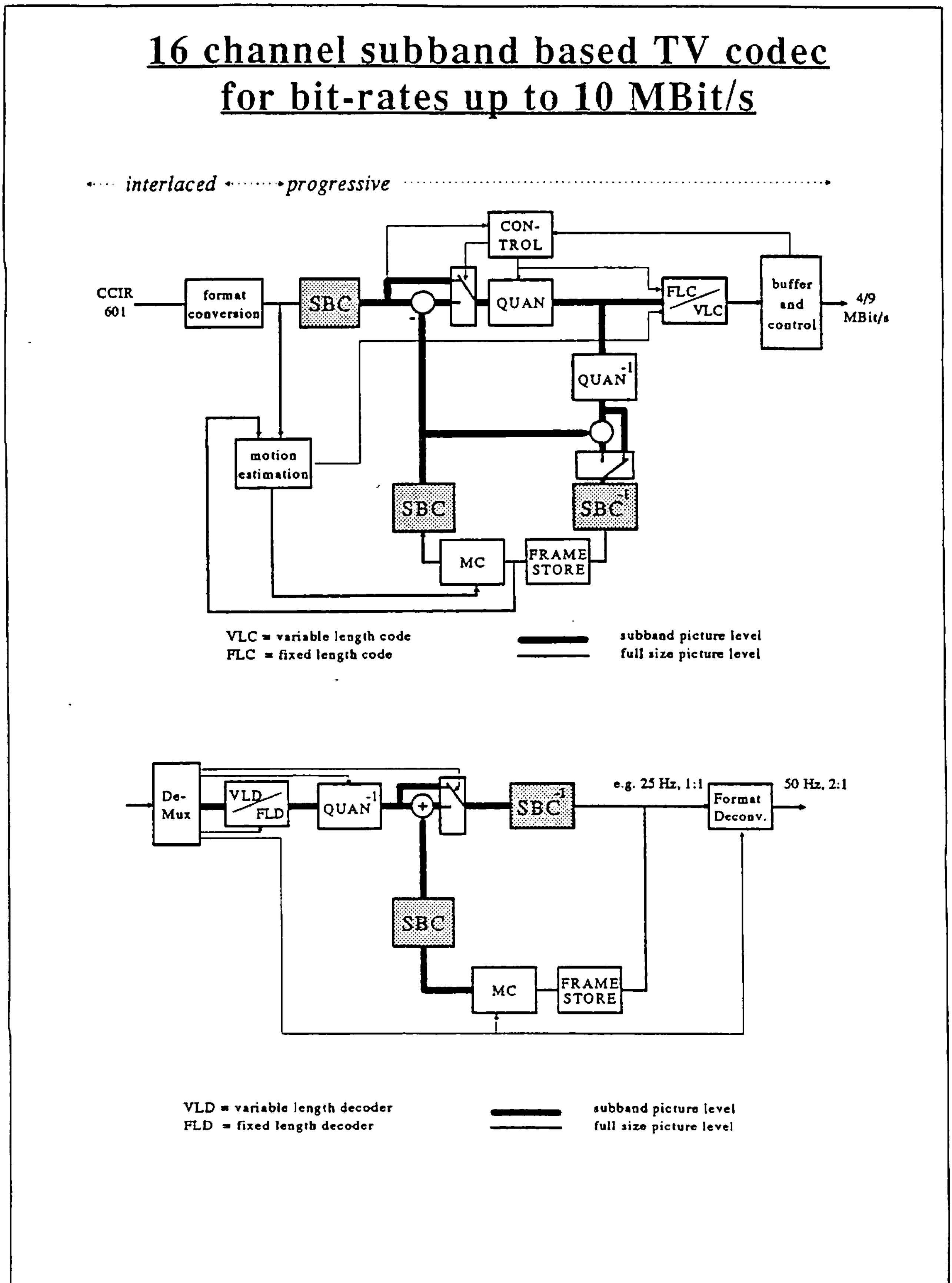


Figure 1: Block diagram of coder and decoder

5. Subband splitting

The core of the system is a regular tree structured subband decomposition into 16 layers or channels. Traditional quadrature-mirror-filters are used for filtering and interpolation. The number of taps used was very short (< 10) because no real advantage could be noticed by using higher order filters. For some reasons the number of 16 subbands may be sufficient. The correlation of the input image has been strongly reduced and further splitting of the higher subbands would only produce quantization errors. Different resolutions and window sizes are supported e.g. CIF, TV, HDTV. The subband clock frequency is small enough (1/16 x 13.5 MHz) to use standard technology in the subband coding part or even programmable solutions. All subbands can be processed with the same clock frequency.

The fundamental idea of subband splitting and coding is to perform some decorrelation of the signal and to apply different quantizers adapted to the statistics of the subband signals and the sensitivity of the human visual system. In the proposal a hierarchical structure with horizontal splitting at the beginning followed by vertical splitting marks the inner core of the system. Each of these channels is split again into four channels by repeating the first step of processing on the smaller sized subband pictures. Figure 2 shows the block-diagram of the core subband splitting with four subbands and the full 16 channel splitting. The inverse splitting is performed in the same way. Polyphase realizations and the symmetry of the quadrature-mirror-filters are exploited to reduce mainly the number of multiplications. Luminance and chrominance are processed with the same filters.

Annex 2 shows the filter coefficients and the frequency responses for the filters in use.

6. Subband prediction

The temporal correlation is reduced by motion compensated coding of all subbands. After subband quantization the full input frame format is reconstructed in the encoder. This signal is used for motion compensation. The motion vectors that point from the input image to the last decoded reconstructed image (which has been stored in the frame memory) are calculated. Then, the prediction image is decomposed into 16 subbands. The subsequent intra/inter switching is very flexible and could be adapted to each subband. With that, high frequent moving artifacts can be avoided. A trade-off between resolution and quantization errors is inherent in the system.

7. Motion estimation

Motion vectors are calculated on blocks of 8 x 8 pixels within a frame. First, the search is done on integer pel accuracy using the absolute difference value between two blocks for optimization. Then, a half pel accuracy vector is calculated from the neighbourhood. The maximum search range is +-12.5 pixels and +-12.5 lines. There are no subband specific techniques used for motion estimation. However, the block nature of motion estimation does not fit well the block-overlapping subband filtering of the predicted image. There are some techniques under discussion to avoid block structures in the predicted image. They have not been implemented for the Kurihama tests.

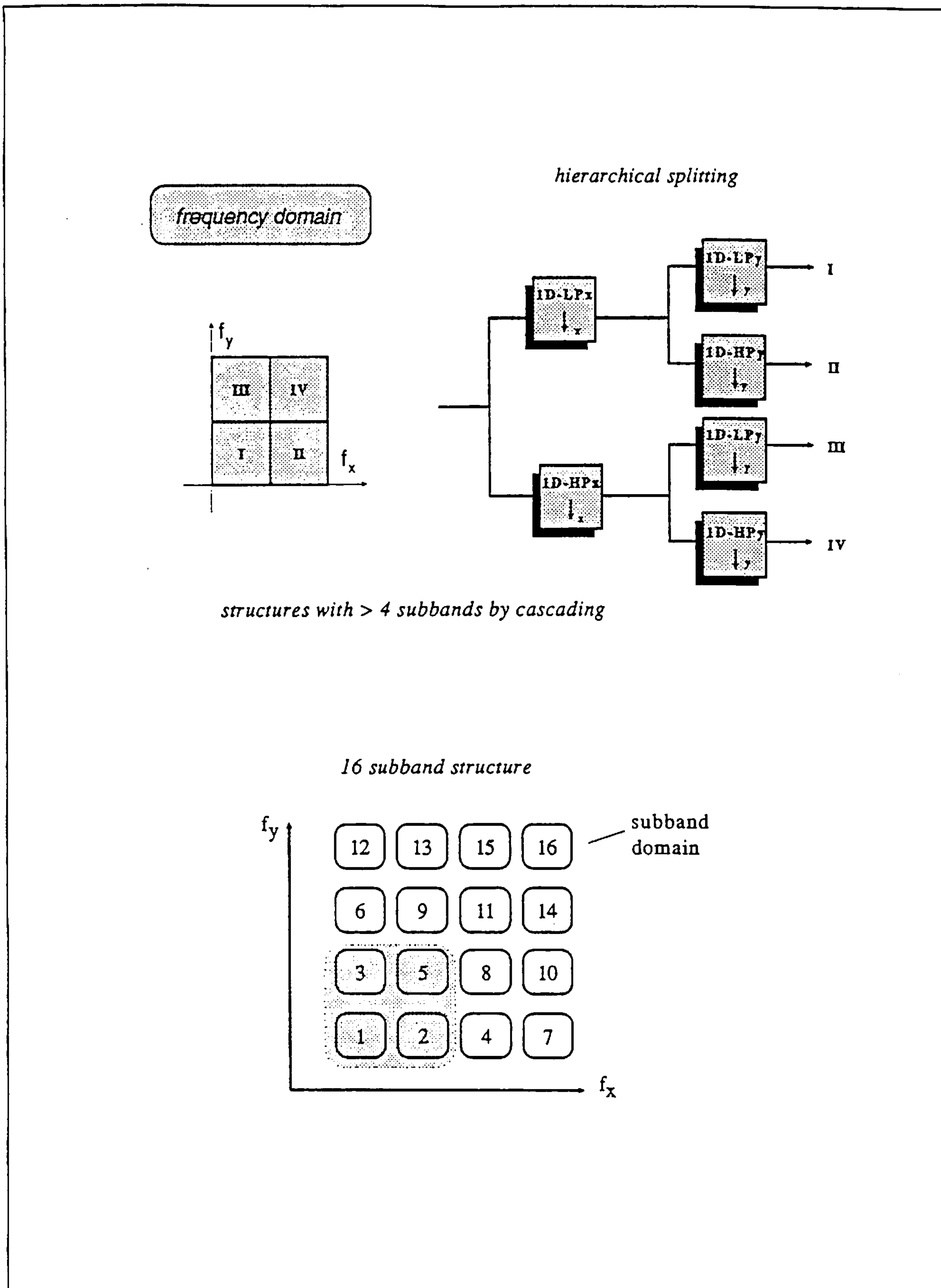


Figure 2: Core of subband splitting and full 16 channel splitting

8. Group of pictures (GOP)

A GOP consists of 10 pictures. A picture consists of one luminance and one chrominance field for each colour component, respectively. All even chrominance fields are skipped and not used for coding. The first picture is entirely INTRA coded. The remaining 9 inter pictures are both intra and inter coded.

9. Subband coding

Subbands are coded nearly individually. First, 4 x 4 pels within each subband are processed in the same way. These pels are quantized using a linear quantizer from a set of 32 available quantizers. There are different parameters which control the quantizer selection:

* picture mode (e.g. intra, inter, luminance, chrominance)
* frequency weighting
* global buffer control
* local buffer control
* pre-analyis of the input subbands

Usually, the finest quantizer is selected at the beginning of a 4 x 4 pel area in the subband. If the bit account increases more than a given threshold, coarser quantizers are taken. Threshold values of 5% (4 MBit/s) and 10% (9 MBit/s) have been implemented. All 16 subbands are processed in the same way. Then, a sequence of 256 pels (4 x 4 pels in 16 subbands) is scanned and entropy coded. The available quantizers cover the whole range of necessary step-sizes.

10. Scanning

Scanning is used to generate a so called string of 256 pels:

* pel domain scanning
* subband domain scanning

The scanning path for pel domain scanning depends on the spatial frequencies of the subbands. Actually, diagonal, horizontal and vertical scanning of 4 x 4 pels are used (see figure 3). Diagonal scanning is used for the lowest and highest subbands. Horizontal and vertical scanning is used for subbands with vertical and horizontal frequencies, respectively.

Subband domain scanning is performed with a zig-zag like scanning pattern adapted to a 4 x 4 array of 16 subbands. However, due to the field merged frame to be processed, some modifications have been included. High vertical frequencies have higher energy concentration in moving areas because of vertical aliasing. Therefore, the priority of these subbands related to scanning is increased. This procedure holds only for the luminance signal. Both chrominance signals have not been field merged and the unmodified zig-zag pattern can be used. If 4:2:2 processing is needed, luminance and chrominance become similar.

The scanning paths are given in figure 3 and figure 4.

11. Entropy coding

In a high-frequency subband, one can easily recognize two kinds of regions:

*	regions with zeros	-->	low activity
*	regions with non-zero values	-->	high activity

These two kinds of regions have their proper signal statistics, and therefore, the bit rate in each region is compressed with an appropriate code. Therefore, a two-state coding algorithm is proposed, with states that reflect the two kinds of regions:

* zero-state for coding regions with zeros
* non-zero state for regions with non-zero amplitudes

The possible messages that have to be coded in each region of the states are:

* in the non-zero-state:
  pel amplitude = 0, +1, -1, +2, -2, ..., +255, -255
* in the zero-state:
  EOB (end of block), zero run length = 0, 1, 2, ..., 255

The state transitions of the entropy coding system take place under the following conditions:

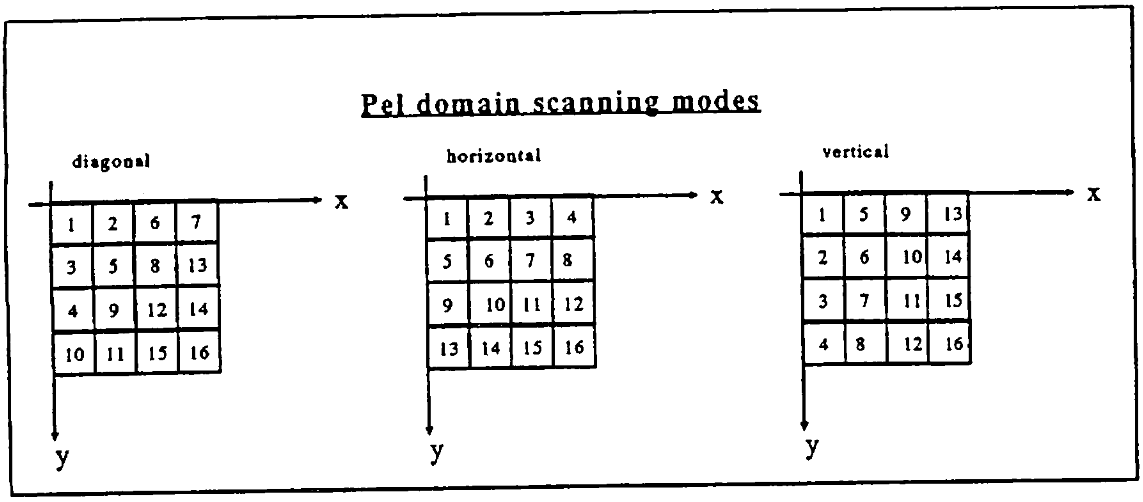
* from zero-state to non-zero-state:
  after the tranmission of a zero run length
  (i.e. a non-zero value ends a zero run)
* from non-zero-state to zero-state:
  after the transmission of a zero amplitude

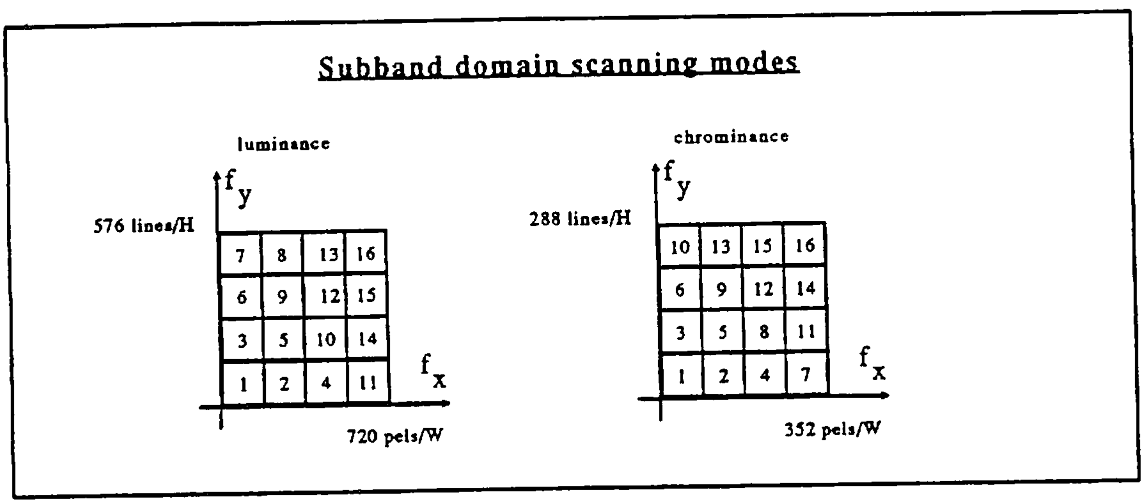
These transitions do not require the transmission of any overhead information. This entropy coding algorithm requires two VLC codebooks:

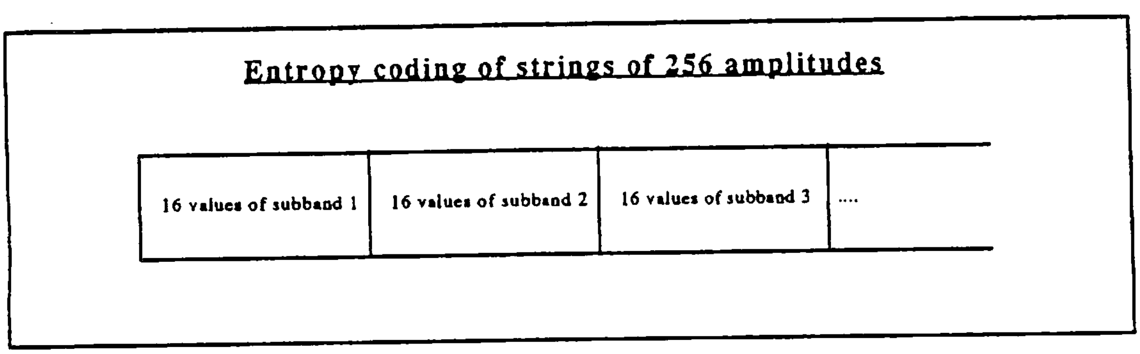
* one for amplitudes in the non-zero-state
* one for zero run length and EOB in the zero-state

For an improved performance, both VLC-codebooks should be optimized for each subband. In the case of 16-band subband coding, a lot of subbands have similar signal statistics, so that not 2*16 VLC-codebooks have to be optimized. Eight sets of VLC-codebooks are proposed (one "set" is an amplitude codebook and a run-length codebook). As the signal statistics also depends on inter-/intra- frame coding, four sets are available for intra-coding and four for inter-coding.

The subband pels are coded in strings of 256 values, composed by 16 values of each subband as follows (see figure 5). Zero runs can start among the values of one subband, and continue in the next subband of the above string. If different codebooks are foreseen for these subbands, the code word for this run length is taken from the codebook for the subband where the zero run starts. The VLC-codebooks are optimized for Laplacian (non-zero-state) and Poisson (zero-state) probability distributions, with variances measured in a training session. The VLCs have been optimized taken into account a maximum code word length.







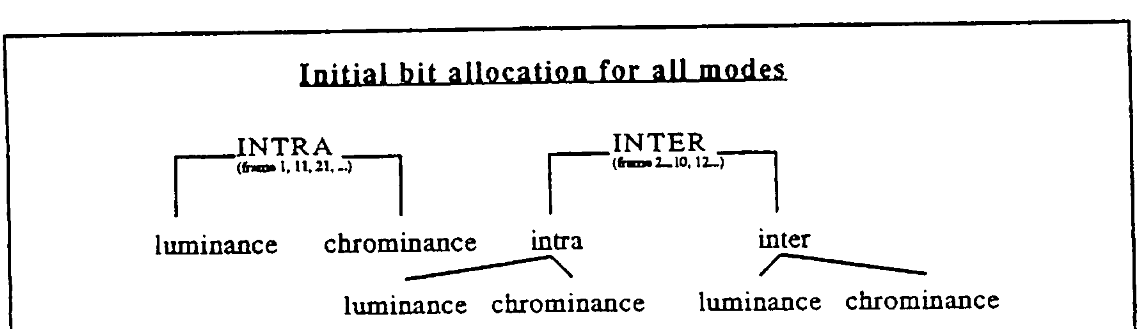


Figure 3: Pel domain scanning   Figure 4: Subband domain scanning
Figure 5: Entropy coding   Figure 6: Initial bit-allocation

The main advantages of this entropy coding are:

* easy implementation
* easy interpretation of its parameters
* adaptable to the statistics of the layers of a coding hierarchy
* bit rate approximates the signal entropy

Annex 3 shows the VLC tables in use. The same tables have been used for 4 and 9 MBit/s.

12. Local and global bit-rate control

Bit per frame control, global and local bit-rate control have been implemented. The distribution of the priorities between the three different control systems is given below:

* global control => highest priority
* bit / frame control => mean priority
* local control => lowest priority

In the following, the notation "local" means 4 x 4 pixels of 16 subbands. Because of the GOP of 10 frames (1 intra and 9 inter images), there are different bit-rates to be processed. The main task of the buffer is to smooth these different rates. The **global bit-rate control** depends on the buffer status. For most of the time (buffer status between 10 and 90 %), the global bit-rate control does not change any coding parameters. To avoid buffer overflow, coarser quantizers are selected in the "emergency case" than tey would normally be by the local bit-rate control. However, the emergency case is mostly avoided due the local control, i.e. global control is only used if all pixels exceed a given number of bits.

The number of bits allocated to one frame and subsequent to one string of 256 amplitudes is initially calculated and recalculated from frame to frame: Gain in intra-images is given to the last three luminance images of a GOP. Gains in chrominance pictures are given to the subsequent luminance inter-pictures. Gain in inter luminance is given to the subsequent inter luminance pictures.

The **local bit-rate control** allocates bits to strings of 256 amplitudes. At the beginning, initial values of bits are calculated for the different picture modes as proposed in figure 6. These values are always recalculated after finishing the coding of the last 256 amplitudes. Gain or loss in bit-rate is spread over the neighbouring **future** strings of 256 amplitudes. However, loss due to too many used bits can only appear in regions where all available quantizers would not decrease the bit account and with that, of course, the quality.

13. Low frequency subband processing

Due to some remaining correlation in the low frequency subband, further signal processing can achieve higher compression. Both, predictive or transform algorithms can be used. However, additional quantization noise should be avoided because of the noise spreading feature of the subband reconstruction. Therefore, reversible or nearly reversible coding of the low frequency subband must be realized. In the proposal a DPCM like procedure is implemented which works in two dimensions on a 4 x 4 block of pels.

14. Intra-inter decision

Generally, all 16 subbands are individually motion compensated, however, the prediction is done on the full size image. In all inter pictures of a GOP, there are some areas which should be coded in an intra mode. There are at least two reasons for that:

* due to object movements i.e. in areas where motion estmation fails and results in a bad prediction image or background of a moving object that could not be predicted

* motion vectors calculated on the full size image produce worse prediction of high-frequency subbands

In summary, it must be locally checked whether intra or inter gives the best coding results. The sum of all 4 x 4 absolute pixel values is taken in each subband and compared to the corresponding sum of the subband prediction error. This calculation is performed 16 times starting from the highest subband and ending at the lowest subband after using a special scanning path. For the first time, the inter mode is decided for a subband, all subsequent lower frequency subbands are decided to be inter. With that, there is only one switch from inter to intra in a picture subband area of 4 x 4. One 4 bit address has to be transmitted to the decoder in fixed bit length format. Statistical evaluation of the inter-intra switching showed that most changes from intra to inter occur in the four highest subbands. In about 50% of the picture areas there is no change i.e. all subbands are processed in the inter mode. Of course, this strongly depends on the signal statistics.

15. Buffer sizes

Buffer sizes of 800000 bits and 1600000 bits for 4 and 9 MBit/s have been used, respectively. An initial buffer value of 25 % has been implemented.

16. Motion vector coding

There are 90 x 72 motion vectors to be transmitted for each frame consisting of luminance and chrominance. Each vector is horizontally predicted using its preceding value. This calculation is performed for each vector component. Variable length coding of difference vectors is done.

The same VLC-code is used for all sequences and bit-rates to be considered for the Kurihama tests.

Annex 5 shows the VLC table in use.

17. Overhead information

Beside all synchronization bits which have not been considered so far, there is some necessary overhead to be transmitted regulary. For 256 pixels which are always taken together, 4 vectors have to be transmitted. Then, a 5 bit address is needed for the quantizer selection in the decoder. Furthermore, a 4 bit address is used to give the decoder the switching address for the inter-intra decision.

18. Post-processing

First, de-interlacing of the luminance frames is performed by reading two fields out of a frame memory. Second, chrominance fields have to be inserted. Simple field repetition is performed so far.

19. Compatibility feature

Compatibility to MPEG I was not seeked for. However, as mentioned in the PPD, there are several possible implementation methods for these compatibilities.

* simulcast and switchable schemes are possible

The codec is mainly intended to be used for TV and higher quality transmission (EDTV, HDTV). For these applications upward and downward compatibility with different resolutions and window sizes is possible.

20. Random access feature

Random access is guaranteed by using the group of picture concept. One out of 10 frames (720 x 576) is entirely coded in INTRA mode. The maximum access time can be approximated as follows by taking the worst case i.e.

* 9 frames plus the delay of the decoder

assuming synchronization of the decoder at the beginning of the first inter-frame within a group of frames. The delay of the decoder can be calculated by summarizing all delays mentioned in the implementation study document. In our proposal a small decoder delay results because no interpolative decoding mode is used. The whole delay for random access is nearly **380 msec.**

21. Coding/decoding delay

The coding/decoding delay is mainly determined by the buffer-size. For the 9 MBit/s coding scheme the buffer-size was 1600000 bit, thus a maximum delay of 178 msec results. Again, the whole delay can be calculated by summarizing all delays of the coder and decoder mentioned in the implementation study document. In our proposal a decoder delay of about 30 msec results. Thus, the total delay is

* 208 msec for 9 MBit/s
* 230 msec for 4 MBit/s

Low coding delay mode implies well-balanced control of the system, hopefully not by using the buffer status as criterion rather than analysing the input image. Subband based coding schemes mostly perform a spectral decomposition of the input image and are well suited to include a signal-adaptive control in order to decrease the buffer size and with that the coding/decoding delay.

22. Statistics

A number of different statistic values have been measured. They are listed in Annex 4. It should be mentioned that the **bits for coding the vectors are included in the bit per frame value of the luminance**.

23. Implementation of Subband Codec

This hardware evaluation document was written as a description of encoder and decoder hardware. The encoder is described in more detail. The decoder circuitry is basically the same. Only the parts that differ from the encoder are described more detailed.

Two aspects have been evaluated: Regarding the topics of the PPD the number of arithmetic operations, memory size, ... as a basis for an estimation of hardware effort was evaluated. Besides that, proposals for the hardware realization have been made and transistor counts as well as chip sizes are given. In most cases these estimates are based on chip realizations at HHI or from other companies and given as a support information. All chip size estimates are made for a 0.8 micron CMOS technology besides the motion compensating predictor (1.2 micron).

This evaluation was made with the goal of a hardware with medium flexibility and high integration scale. Nevertheless the proposal allows the realization of flexible coding systems due to the 16 subband processing scheme. The low data rates in each subband allow parallel sprocessing with more flexible processor architechtures.

24. ENCODER

The block diagram of the encoder is shown in Figure 7. Thin lines are control signals, medium lines are pixel data and the thick black lines indicate the processing of the 16 subbands. The 16 channels are not processed with parallel hardware but in a pixelwise sequential manner like in DCT based schemes. Chrominance is processed in parallel with the luminance with the two components C1/C2 being pel-by-pel multiplexed. The processing rate of the chrominance is half the luminance clock rate according to the 4:2:0 scheme.

Each of the sixteen subband channels forms processing blocks of 4x4 pixels. For all sixteen channels the sequence of these blocks forms a so called STRING of 256 pixels.

The overall system delay can be evaluated by adding the single delays of the complete processing chain. It is found to be not critical which is mainly due to the fact that no interpolative coding is done.

Block1: Field Merging

Function: The two fields of the interlaced video input signal (CCIR 601, 4:2:2) are merged to a progressive frame (4:2:0). One chrominance field is skipped and the two chrominance components are merged by pel-by-pel multiplexing. No motion compensation is performed for field merging.

Input: 720*288*50 (luminance, 13.5 MS/s)
360*288*50 (chrominance, 13.5 MS/s for C1+C2)

Output: 720*576*25 (luminance, 13.5 MS/s)
720*288*25 (chrominance, C1+C2 pel-by-pel multiplexed 6.75 MS/s)

Realization: Asynchronous field buffers with FIFO function and simultaneous Read/Write operations can be used (similar to mPD42270). No address arithmetic is needed only some control clocks for R/W operation. The control signal for this block are generated by the control block 3g as this unit keeps tracks of frames and lines.

Specifications:

Pixel rate (Lum) [MS/s]:	In 13.5; Out 13.5
Pixel rate (Chrom) [MS/s]:	In 13.5; Out 6.75
Word width [bit]:	8
Memory type:	Field buffer chip; FIFO function
" size:	3.33 Mbit for luminance and chrominance
" bandwidth:	324 MBit/s
Chip count:	2-4 memory chips. One 8bit multiplexer
DELAY:	207.936 cycles (about 20 ms)

Advantages: Low chip count, easy control.
Comment: No special features. Any other solution possible.

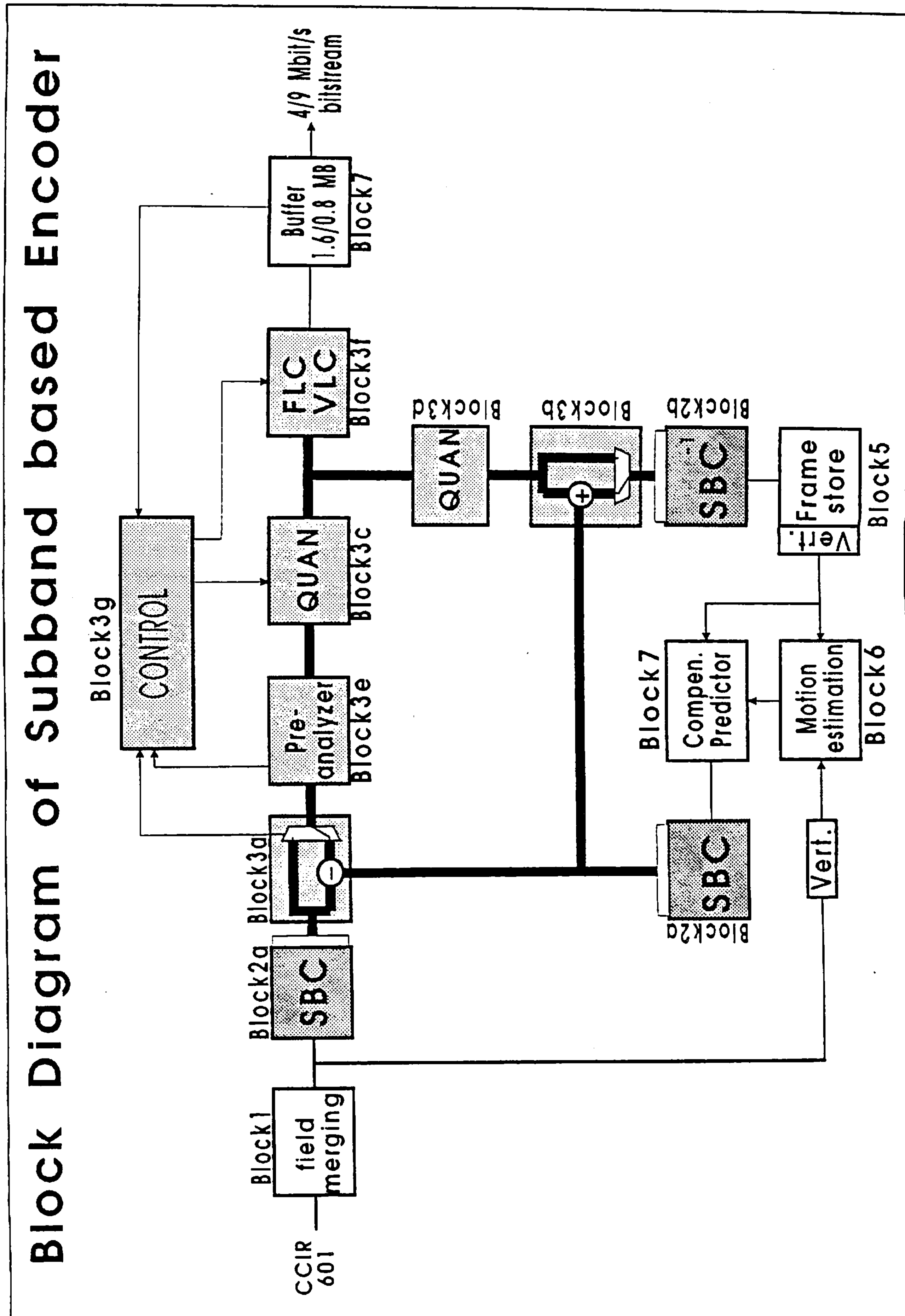


Figure 7: Block diagram of Subband Encoder

25. Subband Splitting Block Diagram (Fig. 8):

The functional block diagram shows the use of different filter hardware blocks in the subband splitting scheme. As the data rate in each section is different, various hardware structures are used to reduce the number of arithmetic operations (mainly multiplications) and to decrease the amount of line delays.

As the field sampling structure is 4:2:0, the chrominance filtering is processed at half of the luminance speed. C1 and C2 are multiplexed pel-by-pel so that for horizontal filtering switchable filters are used, whereas the vertical filter structures don't need to be modified compared to the luminance filter blocks. The chrominance components are processed with the same architecture. The filters for horizontal filtering are switchable for the processing of the two chrominance components.

In Section A and B of Fig. 8 filtering is done with parallel hardware. Low data rates in section C&D allow the use of sequentially operating MAC-structures for filtering.

Luminance filters (horizontal, vertical, analysis and synthesis) are 9 tap filters whereas chrominance needs only 5 tap filters normally. For the sake of regularity in chip design it is useful to process the chrominance signal with the same 9 tap filter type. With the proposed filter moduls, the number of multiplications is reduced by a factor of 4 for horizontal low and high pass filters. For vertical filtering a reduction factor of two is achieved. The coefficient word length is 14 bit (including sign). The data width is reduced to 12 bit at the output of each filter stage but the internal accuracy of the filters is high enough (12*14 multiplication and 20 bit accumulation).

Line delays are shared in the vertical low and high pass filters. As the direct form of the FIR filter is used for vertical filtering the word width for the line delays is reduced to the input data width (12 bit).

Multiplier layout is optimized according to the fact that the coefficents are fixed.

A parallel to serial data formatter and a control block is included at the output of the chip although not drawn in the diagram. This block is extremely important to build 4*4 blocks in each channel and to perform different scanning modes for the latter processing. (4*4 blocks are scanned horizontally, vertically or diagonally. Line delays, multiplexers and a small register set is necessary for this data sorting process.

Two different chip designs for SBC snd SBC^{-1} are necessary.

A second proposal using polyphase filters is shown in the lower half of Fig. 8. The main advantages of the polyphase approach are the reduction of processing speed because the subsampling is done before the filtering. The symmetrical splitting of the HHI proposal allows direct 4band splitting. Row/Column conversion is only needed once and saves memory.

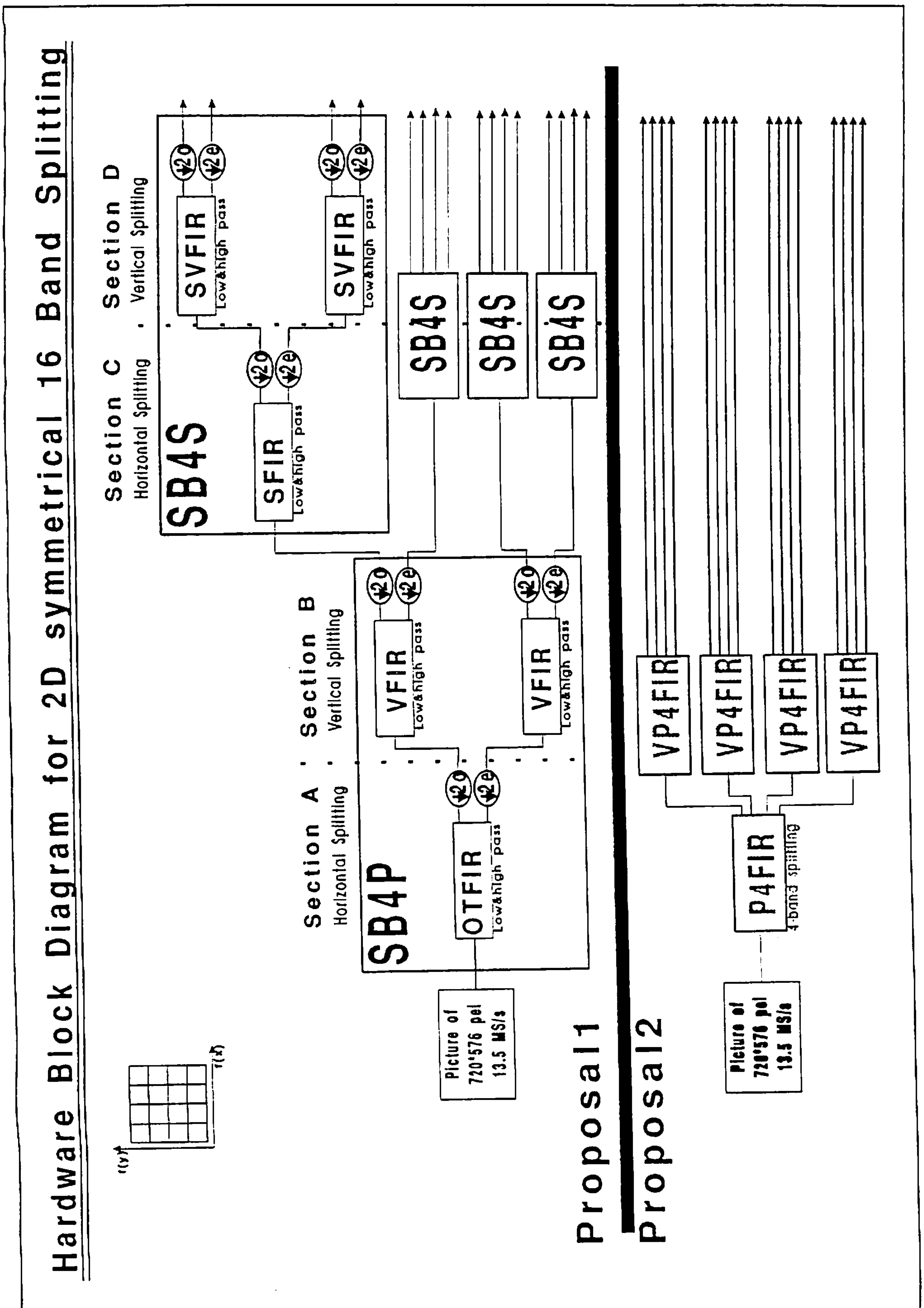


Fig.8: Block diagrams of two alternative subband splitting realizations

Block 2a: Subband Splitting (proposal 1 of Fig. 8)

Function: The input signal is split into sixteen subbands (**channels**) by FIR filtering (see Fig.2).

Input: 8 bit luminance, 13.5 MS/s
8 bit chrominance, 6.75 MS/s C1/C2.
Clock, Sync, ...

Output: 10 bit luminance, 16 * 0.845 MHz, blocks of 4*4 pixel
10 bit chrominance, 16 * 0.422 MHz, blocks of 4*4 pixel

Realization: Full-custom-design VLSI IC. Optimized structures for FIR-filtering are implemented on the chip. Optimized FIR filter structures for each step of the subband decomposition process minimizing delays, number of multiplications or processing speed are used.

In each of the 16 output channels pixels are sorted to form blocks of 4*4 pixel (relating to 16*16 block in the original frame).

The vertical, horizontal or diagonal scanning of the blocks and subbands is done by the output data formatter. 100 kbits of memory and control functions are needed for this process. All 16 subbands are output sequentially to save pins.

Specifications:

Pixel rate (LUM) [MS/s]:	In 13.5 down to 0.42
Pixel rate (Chrom) [MS/s]:	In 6.75 down to 0.21
Word width [bit]:	In 8, 12 bit after each filter bank
Multipl./second; width [bit]:	463 M/s (many fixed multipliers)
Additions/second; width [bit]:	1450 M/s
Memory type:	line delays and FIFOs on chip
" size:	340.000 bit
Transistors:	1.285.000
Chip area:	121 mm^2
Package:	64 pins PLCC
Inputs:	8 bit data, clock, sync
Outputs:	10 bit data, sync
Delay:	5778 cycles (13.5 MHz)

Comment: 80% of chip size is memory size. For the use of tricks see the remarks on key symbols on next page.

Advantages: Regular splitting structure leads to only one fixed data rate for all subbands.

Comments: Polyphase realization of proposal two will **reduce chips size** due to the saving of memory but was not implemented up to now.

Block2b: Subband synthesis

Inverse process of block 2a with similar complexity but different design.

Comments on the key symbols for subband diagram (Fig. 9):

Sample picture: Serves to clearify data sequences. `A0,A1,A2` indicate horizontal scanning whereas `A0,B0,C0, A1,B1,C1 ...` is a typical sequence at the input of a vertical filter.

Subsampling: The downward arrow stands for subsampling, an upward arrow for upsampling. The figure behind denotes the factor for up/down sampling. A letter `e` or `o` is given to specify the phase of subsampling if necessary. Vertical subsampling makes use of FIFOs that are included in the calculations but not drawn in the block diagram.

FIFO: First In First Out, used for delays with asynchronous read/write operations (as necessary with vertical polyphase filters).

DELAY: Synchronous FIFO mostly used for line delay.

DFIR: Direct form FIR filter.

TFIR: Transposed FIR filter structure. Advantageous for longer filters because the N-1 additions are pipelined and so the additions no longer form a timing critical data path.

OTFIR: Optimized Transposed FIR filter structure. The symmetries of the filter coefficients halve the number of multiplications. As the high pass coefficients differ only in sign, no multiplications are needed for the high pass filter what again halves the number of multiplications. As the coefficients are fixed, the design of the multipliers can be very space efficient (half size or smaller depending on coefficient).

SFIR: Sequential FIR filter structure. Low data rates in the latter stages of subband splitting allow the sequential processing of the filter arithmetic. This reduces the number of hardware mutlipliers to one per filter. Low and high pass coefficient symmetries can be utilized (see above).

PFIR: Polyphase realization of FIR filter. This structure is advantageous if the input data rate is too high, as the subsampling is done before the filtering. This reduces processing speed requirements by a factor of two. The standard FIR filter is broken into two parts of half complexity plus one adder and subtractor to achieve the low and high pass results.

VFIR: Vertical FIR filter structure. The direct form structure is proposed for vertical filtering as the cost expensive line delays can be shared between the low pass and high pass. No additional multipliers are necessary for the high pass filter due to coefficient symmetries.

SVFIR: Sequential Vertical FIR filter structure. When data rates are low, the vertical filter can be implemented using a sequential MAC structure. Only one multiplier and two accumulators are needed for efficient implementation of the low and high pass. The outputs of the line delays for vertical filtering are multiplexed at the input of the multiplier. The pel-by-pel multiplexing of the two chrominance components allows the use of exactly the same structure without any additional switchings in the filter for the processing of the two chrominance components as in vertical filtering: pixel A0,B0,C0, ... belong to chrominance component C1 and pixel A1,B1,C1, ... belong to chrominance component C2.

P4FIR, VP4FIR: Fourband DCT-based polyphase realization of FIR filters. This structure allows further reduction of speed and memory effort but has not been implemented yet.

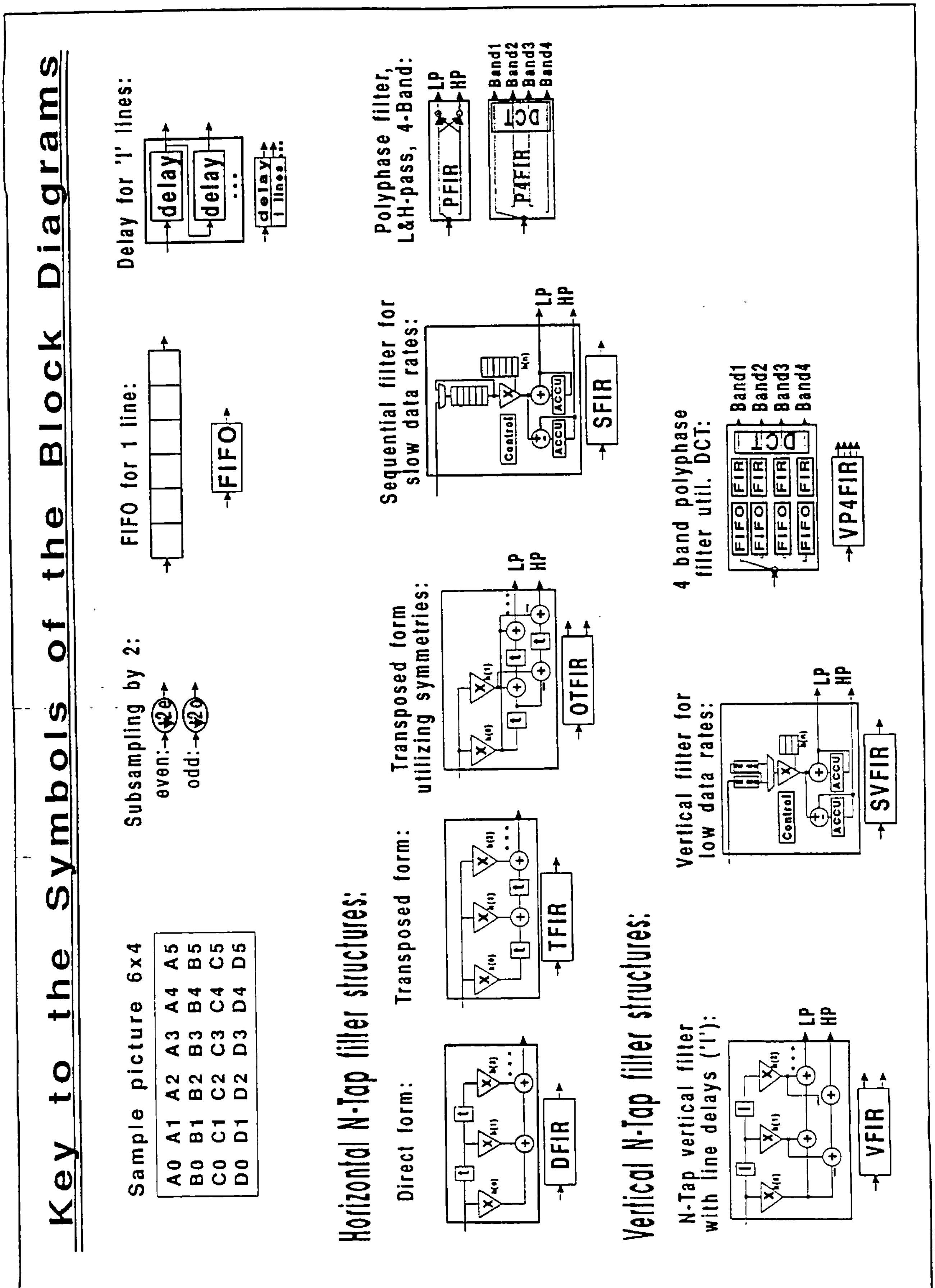


Fig.9: Key symbol table for subband block diagram

Block 3a: Intra/inter decision and multiplexing

Function: Depending whether the sum of absolut values in a 4*4 block of the original input is greater than the sum of absolute values of the pixelwise difference of original input and predicted input the inter mode or the intra mode is chosen.

Sixteen 4*4 blocks form a so called STRING of 256 pixel in which the intra/inter switching is performed only once. Only one four bit code per string must be generated as overhead information.

The 4-Mbit mode uses wheighting of the high frequency subbands. Wheighting can be added at this block using a multiplier with a register set for weighting factor. Cost is about 0.6 mm^2

Input: 10 bit luminance, 13.5 MS/s
10 bit chrominance, 6.75 MS/s

Output: 11 bit luminance,
11 bit chrominance,

Realization: Part of the BLOCK3 full-custom-design chip. Two adders, a comparator, a multiplexer and short FIFOs are needed.

Specifications:

Pixel rate (LUM) [MS/s]:	In 13.5
Pixel rate (Chrom) [MS/s]:	In 6.75
Word width [bit]:	In 10, Out 11
Additions/second; width [bit]:	40.5 M/s; 10 bit
Transistors:	2500
Chip area:	0.45 mm^2
Delay:	17 cycles (13.5 MHz)

Block 3b: Intra/Inter mode multiplexing

Function: This multiplexer is controlled by the block 3a intra/inter decision (via CONTROL) with the appropriate delay (related to the data). Predicted frame pixels are added in inter mode. Realization is close to block 3a and the but with half complexity.

Input: 11 bit luminance, 13.5 MS/s
11 bit chrominance, 6.75 MS/s
Output: 12 bit luminance,
12 bit chrominance,
Realization: Part of the BLOCK3 full custom design chip.
Specifications:

Additions/second; width [bit]:	20.25 M/s; 11 bit
Transistors:	400
Chip area:	0.1 mm^2
Delay:	1 cycle (13.5 MHz)

Block 3c: Quantization

Function: Adaptive linear quantization in all channels. For inter/intra coding and luminance/chrominance 96 fixed coefficient sets (each set containing 1 coefficient for each subband) are used. Easy selection of different quantization factors by inter/intra decision and buffer control. Quantization factor sets may change only for complete 4*4 blocks within a 256 pixel string. Quantizer control is done depending on preanalyzer output and buffer level (see block Preanlayzer). Quantization factors are in the range of 1 to 1/127

Input: 11 bit luminance, 13.5 MS/s; 11 bit chrominance, 6.75 MS/s
Output: 8 bit luminance; 8 bit chrominance,
Realization: Part of the BLOCK3 full custom design chip. Linear quantization can easily be performed by two multipliers (lum/chrom).
Specifications:

Pixel rate (LUM) [MS/s]:	In 13.5
Pixel rate (Chrom) [MS/s]:	In 6.75
Word width [bit]:	In 11, Out 8
Multipl./second; width [bit]:	20.25 M/s ; 11*7
Table sizes:	3*32*16*7= 10.752 bit coefficients
Table lookups:	0.1 M/s
Transistors:	70.000
Chip area:	6 mm^2
Delay:	2 cycles (13.5 MHz)

Advantages: Linear Quantization reduces table sizes, as only some multiplication factors need to be stored.

Block 3d: Quantization^{-1}

Function: Inverse process to block 3c.
Input: 11 bit luminance, 13.5 MS/s; 11 bit chrominance, 6.75 MS/s
Output: 8 bit luminance; 8 bit chrominance,
Realization: All parameters similar to Quantizer.

Block 3e: Preanalyzer

Function: Blocks of 4*4 pels are analyzed to find an appropriate quantizer. Preanalysis counts the number of values above and below a threshold as an estimate of VLC and RLC output. The comparison with 32 threshold values is done in parallel. The result of this analysis together with the buffer level information determines the quantizer set used. A five bit overhead information is generated for a string of 256 bits.
Input: 11 bit luminance, 13.5 MS/s; 11 bit chrominance, 6.75 MS/s
Output: 8 bit luminance; 8 bit chrominance,
Realization: Part of the BLOCK3 full custom design chip. 64 parallel counters and adders are used
Specifications:

Pixel rate (LUM) [MS/s]:	In 13.5
Pixel rate (Chrom) [MS/s]:	In 6.75
Word width [bit]:	11
Additions/second; width [bit]:	1200 M/s ; 10
Transistors:	25.000
Chip area:	3.5 mm^2
Delay:	20 cycles (13.5 MHz)

Advantages: This block is only used in encoder.

Block 3f: Coder (FLC, VLC, RLC)

Function: Entropie coding is done with an 1-dimensional Huffman code with a maximum code length of 16 bit. Entropie coding is applied to pixel data and motion vectors. The coding is done across a string (256 pixel) starting with the lowest subband. The function of FLC, VLC and RLC are quite well known and not further described. Basically 8 different "tables" (inter/intra * 4 frequency zones) are used.

Input: 8 bit luminance, 13.5 MS/s; 8 bit chrominance, 6.75 MS/s C1/C2
Output: bitstream

Realization: Part of the BLOCK3 full custom design chip. Table sizes are drastically reduced using a special structure for the Huffman code (sorted). The complexity values given below are based on the VLC/RLC codec currently under design at HHI. As this chip is a Gate-Array design, transistor complexity is based on a gate equivalent of 4. Optimization can be done with full-custom. The decoder is much less complex!

Specifications:

Pixel rate (LUM) [MS/s]:	In 13.5 down to 0.42
Pixel rate (Chrom) [MS/s]:	In 6.75 down to 0.21
Logic gates:	9000 gates
Table memory type:	18.592 gates registers
Table sizes:	8*300 + 8*32 = 2656 bits
Transistors:	110.000 (gate equivalent = 4)
Chip area:	10 mm^2
Delay:	4 cycles (13.5 MHz)

Advantages: Simple decoder.

Block 3g: Control

Function: CONTROL is needed for managing the overhead information (4bit subband address of intra/inter switching, 5bit address for quantizer, motion vectors ...). Overhead information is inserted to the data stream in the FLC/VLC block.

CONTROL sums the number of bits generated by the VLC per string and updates the thresholds for quantization. Gain or loss is propagated and shared for the next 16 strings and from predicted frame to predicted frame as well as from inter frame to next inter frame.

CONTROL counts frames and lines and thereby generates some sync signals (for field merging and SBC too)

Control keeps track of delays inherent to some processing units and propagates conrol information adequately.

Control contains FIFOs to resort the top-down string (high pass to low pass) of 256 pixels to a bottom-up string (low pass to high pass) before coding.

Input:several values and control signals, microprocessor interface
Output: control signals mainly plus some data

Realization: Part of the BLOCK3 full custom design chip. CONTROL was not evaluated in detail but it is arithmetically uncritical. A hard wired control hardware could be designed or a processor could be used for control operations. The microprocessor solution would lead to a more flexible implementation that could also provide downloading of quantization coefficients and VLC codes.

Specifications:

Transistors:	100.000
Chip area:	6-7 mm^2
Delay:	---

Block 4: Coded data buffer

Function: Well known.
Input: packed bit stream
Output: constant data rate 4/9Mbit/s

Realization: Available FIFO chips.
Specifications:

buffer size:	1.6 Mbit (9Mbit/s); 0.8 Mbit (4Mbit/s)
Delay:	140 ms (encoder+decoder buffer)

Blocks 5-7: Motion estimation/compensation

Function: Motion estimation and motion compensated prediction. There parameters for motion estimation in our scheme are quite typical and hardware effort is not evaluated to detailed:

Motion estimation is performed between between original and decoded frame. Reference block size is 8*8, search area size is 24*24. Full search block matching is performed to find a motion vector. A half pel accurate vector is calculated in the direct neighbourhood of pel vector.

Realization: The hardware effort estimated for block 6 is based on Thomson's STI3220 which can be modified for subpel calculation. Motion compensation (block 7) is based on another Thomson developement which was presented on the "Fourth International Workshop of HDTV and beyond" in Torino (Italy) in september of this year. The parameters of these chips are given on the next pages.

Block 5: Frame store and vertical scanning block

Function: Delay of one frame minus the delay that occured in the processing chain. The same memories as for the field merging can be used. At the output of the the frame store (component `Vert` in Fig. 7) 3 blocks with a delay of 8 lines are added. The first block converts from horizontal to vertical scanning and the other two blocks with 8 line delays are necessary to feed the motion compensating predictor with the search area pixel. The search area memory on that chip is thereby continuously updated

Input: 8 bit luminance, 13.5 MS/s
8 bit chrominance, 6.75 MS/s C1/C2
Output: 3*8 bit luminance, 8 vertically scanned pixels
3*8 bit chrominance, 8 vertically scanned pixels
Realization: Asynchronous field buffers (see block 1, field merging). One row column conversion module plus 2 delays for 8 lines each. This module can be build with line delays.
Specifications:

Pixel rate (LUM) [MS/s]:	In 13.5
Pixel rate (Chrom) [MS/s]:	In 6.75
Word width [bit]:	8
Memory type:	Field buffer chip; FIFO function
" size:	3.33 Mbit for luminance&chrominance
" bandwidth:	324 MBit/s
Chip count:	2-4 memory chips.
DELAY:	40ms minus delay of processing chain
Memory type:	Three * 8 line delay.
" size:	276.480 bit
" bandwidth:	324 MBit/s
Chip area:	55 mm^2.

Advantages: The vertically scanned lines suite to both, the motion estimation chip and the motion compensating predictor.
Comments: Evaluation was based on Thomson chips. Other chips may require a different memory configuration.

Block 6: Motion estimation

Function: See above description of blocks 5-7.
Input:8 bit luminance, 13.5 MS/s
Output: subpel motion vector, block energy, vector distortions
Realization: 0.8 microns, 3 metal layer CMOS. Full-custom-design for the integer pixel unit; Standard cells, compiled datapaths and RAMs for the controller and the half pixel unit.
Specifications:

Pixel rate (LUM) [MS/s]:	In 13.5
Inputs:	1 for ref. block, 4 for search area scanning column by column
Internal freqency:	27 MHz
Delay:	64 cycles from the last pixel of reference block and the output referring to 13.5 MHz pixel rate.
Transistors:	776.000
Chip area:	125 mm^2
Power dissipation:	3 Watts
Package:	80 pins ceramic

Fig. 10: Diagram of motion estimation chip

Block7: Motion compensation

Function: See above description of blocks 5-7.
Input:8 bit luminance, 13.5 MS/s
8 bit chrominance, 6.75 MS/s C1/C2 pel-by-pel
Output: Predicted block
Realization: Full-custom-design (1.2 microns, Thomson HCMOS3)
Specifications:

Pixel rate (LUM) [MS/s]:	In 13.5
Inputs:	1 for ref. block, 4 for search area scanning column by column
Outputs:	Predicted data block horizontally scanned
Internal freqency:	27 MHz
Delay:	64 cycles from the last pixel of reference block and the output referring to 13.5 MHz pixel rate.
Transistors:	120.000
Chip area:	49 mm^2 (1.2 micron!)
Package:	68 PLCC

26. Decoder

The decoder contains mostly blocks that are known from the encoder. Only differences are pointed out in the subsequent text.

In the decoder the following blocks could be integrated on one chip: Blocks 2a, 2b, 2c, 3b, 6 and the the line memories of the block called `VERT`. SBC and the inverse process is estimated to need 2-4 chips. Frame store, coded data buffer and the re-interlacing module will be based on available memory chips.

Block1: Buffer Inverse and similar to encoder
Block2a: FLD/VLD
Function: Variable length and fiexed length decoding.
Input:bitstream
Output: 8 bit luminance, 13.5 MS/s; 8 bit chrominance, 6.75 MS/s C1/C2 and additional information for control.
Realization: Part of the BLOCK2 chip of decoder. Table sizes are again drastically reduced compared to encoder. The complexity values given below are based on the VLC/RLC codec currently under design at HHI.

Specifications:

Logic gates:	6000 gates
Table memory type:	registers
Table sizes:	120*8 = 960 bits (registers)
Transistors:	40.000 (gate equivalent = 4)
Chip area:	5 mm^2
Delay:	9 cycles (13.5 MHz)

Block 2b: Control. Similar to encoder but less complex
Block 2c: Inverse quantization. Similar to encoder same complexity
Block 2d: Inter/intra switch. Similar to encoder same complexity
Block 3a/b: Subband analysis and synthesis. Similar to encoder same complexity.
Block4: Re-interlacing
Function: The reinterlacing an chrominance demultiplexing can be performed with field buffers like they where used for field merging. 4:2:0 to 4:2:2 is done by field repetition.
Block 5: Frame store and vertical scanning module: Identical with encoder.
Block 6: Motion compensation. The chip used for motion compensated prediction in the encoder can be used here too.

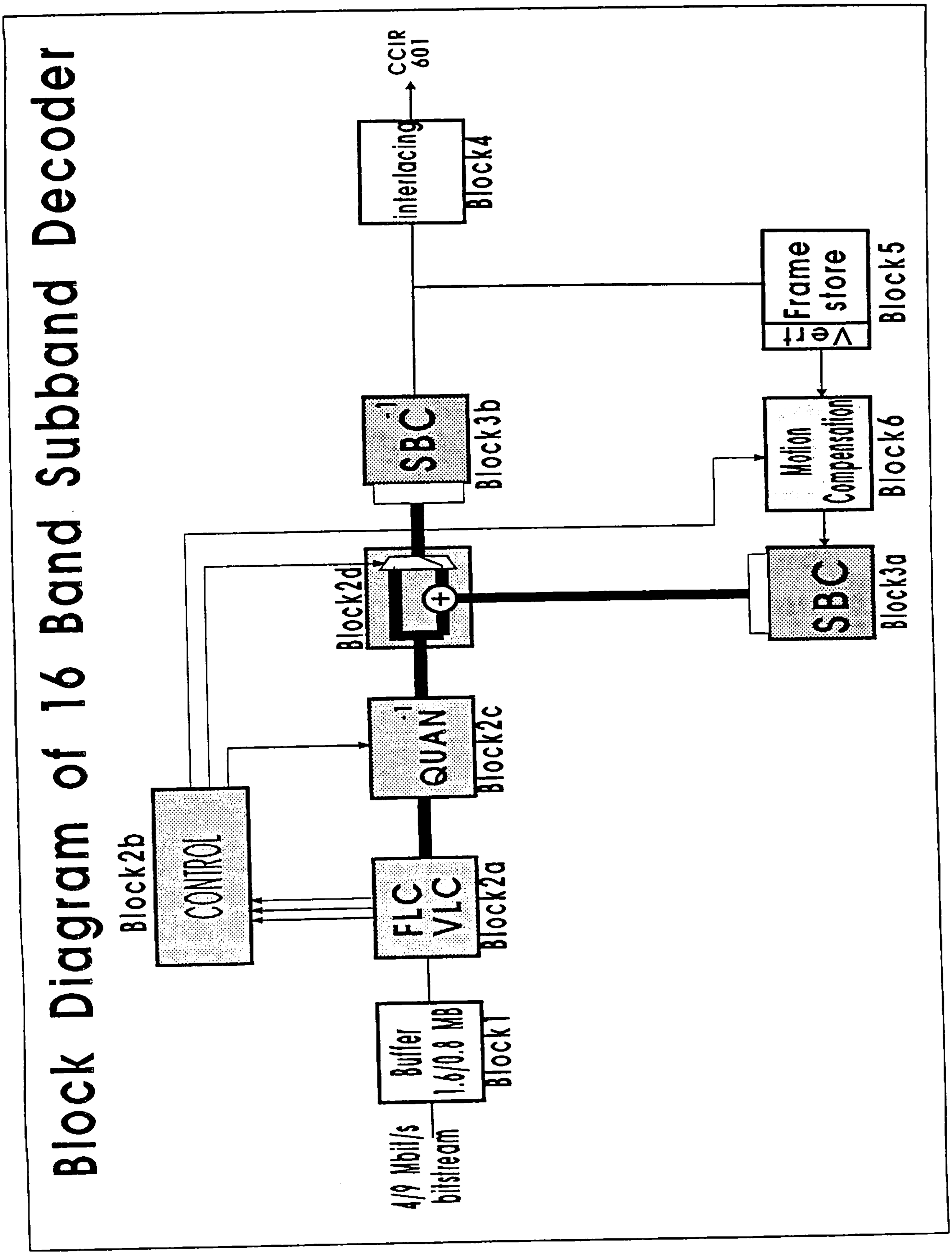


Figure 11: Decoder block diagram

ANNEX 1

Summary specification of 16 channel subband based TV codec for bit-rates up to 10 MBit/s

This proposal is submitted by *G. Schamel, Heinrich-Hertz-Institut für Nachrichtentechnik Berlin GmbH* and has been developed in the framework of the European VADIS/COST collaboration.

Video input/output:

4:2:2 level of CCIR Recommendation 601, 8 bit resolution

Picture format:

720 x 288 x 50
352 x 288 x 50

Signal preprocessing:

deinterlacing by field merging
4:2:2 to 4:2:0 using field skipping

Coding: General features:

flexibility to adapt to other standards
graceful degradation possible, not implemented
scalable bitstream possible, not implemented
supports different picture sizes and spatial resolutions
high flexibility in bit rates

Modes:

no interpolative coding
only predictive coding
frame based coding
nearly independant coding of luminance and chrominance
10 frames refresh cycle, i.e. intraframe coding in frame 1, 11, 21, 31, ...
mixed intra/inter-frame coding in all non-intra frames

Subband processing:

regular 16 channel splitting
separable filtering and subsampling
short (< 10 taps) tap filters for luminance and chrominance

filtering realized in polyphase structure to minimize memory and arithmetics
realization of subband splitting with DCT chip is feasible

Lowpass processing:

redundancy reduction in the lowpass signal by processing a 4x4 pixel domain

Subband weighting:

due to out-of-loop subband splitting, weighting of subband signals is realized in 4 MBit/s version

Pixel scanning:

blocks of 4x4 pixels are scanned
diagonal pixel scanning in the lowpass
vertical pixel scanning of horizontal frequencies
horizontal pixel scanning of vertical frequencies
diagonal scanning of remaining frequencies

Subband scanning:

zig-zag like subband scanning
vertical motion aliasing due to field merging is considered

Prediction and motion compensation:

predictive coding similar to hybrid DCT
subband reconstruction in the loop
subband splitting in the loop
prediction on full picture size
blocks of 8x8 pixels according to interframe mode are processed, a reference block is taken from the position of the current block by application of a displacement vector

Motion estimation:

motion vector calculation between original and decoded image
motion vector calculation within two field merged frames
block size is 8x8
search area is -12 ... +12 in both directions
full search block matching
half-pel vectors are calculated from the initial pel vector
median filter postprocessing of vectors

Intra/inter decision:

one decision for 16x16 pixels of the full picture

one decision for all 16 subbands, i.e. one address has to be transmitted (4 bit fixed word length)
sum of 4x4 absolute pixel values is calculated within each (!) subband and compared to the corresponding value of the prediction
decision process starts at highest subband

Quantization:

linear quantizers
all subband pixels are quantized with a step size of the quantizer depending both globally on the spatial frequencies and locally on the buffer status
32 different quantizers to be selected for intra/inter/luminance/chrominance

Variable length coding:

VLCs and RLCs to encode both quantized subband pixel values and motion vectors
different code tables for intra-inter
different code tables for luminance and chrominace
4 code tables for 16 subbands
run lengths of zero amplitueds across subbands

Buffer memory capacity:

1600000 bits (9MBit/s)
800000 bits (4 MBit/s)

Buffer control:

buffer is mainly for smoothing intraframe bits
buffer overflow is avoided by multiplying step-size of quantizers with integer value
buffer underflow is avoided by selecting finer quantizers (out of the available set)

Local bit rate control:

local bit rate can change within given limits (5%-10%)
local gain in bit rate is spread over the future image area within an image
global gain (at end of an image) is given to next image
chrominance gain is given to next luminance image
global gain in intra mode is spread over last three inter-lum-images of group of frames

Motion vector processing:

horizontal prediction of each vector component and VLC coding of each component
subpel vectors are processed in the same way

Overhead information:

4 motion vectors (VLC) for 16x16 pixels within the picture
1 x 5 bit FLC address of selected quantizer
1 x 4 bit FLC address of subband for intra-inter switching

Signal postprocessing:

reinterlacing by subsequent displaying two fields from the frame store
4:2:0 to 4:2:2 using field repitition

Some additional features

4:2:2 is possible
50 Hz progressive mode is possible
improved de- and re-interlace techniques will improve performance of coding
different picture sizes and resolutions are easy to be implemented
scene adaptive coding is possible
separate predictive subband coding is possible and saves hardware

ANNEX 2

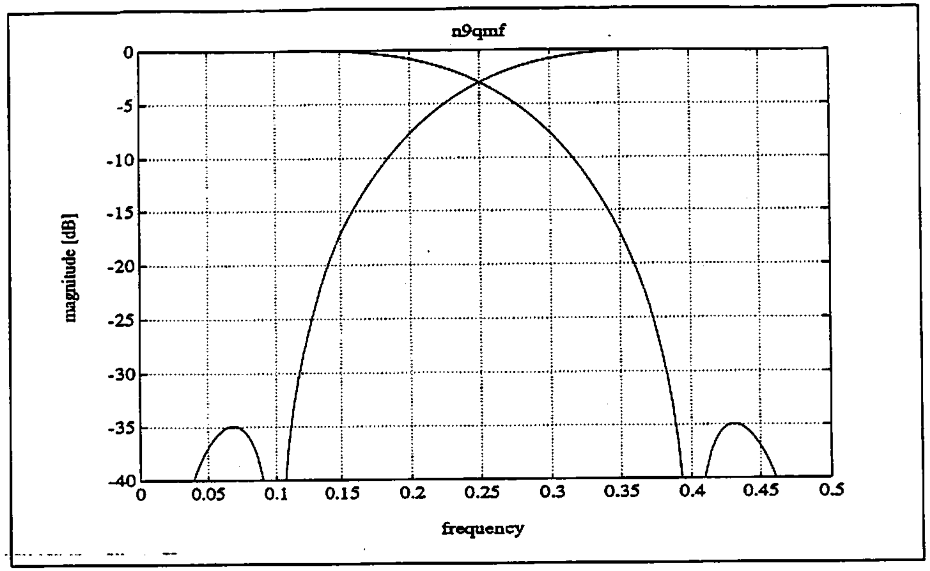


Figure 7: Frequency response of 9 tap quadrtur-mirror low- and highpass filter

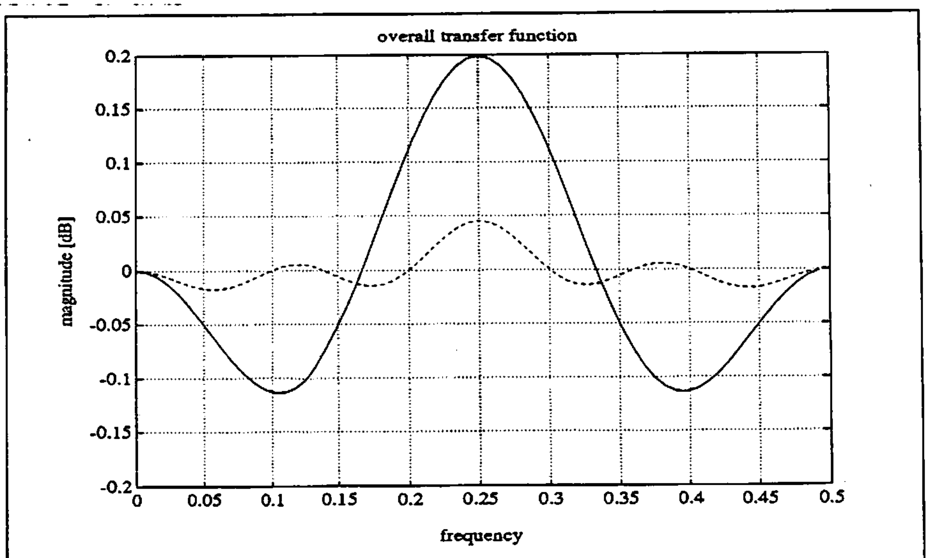


Figure 8: Overall transfer function

Coefficients of QMF lowpass

.01995
-.04271
-.05224
.29271
.56458
.29271
-.05224
-.04271
.01995

ANNEX 3

VLC for motion vectors

no.	probability	word length	event	code
1	0.42626542	1	0.0	0
2	0.12373457	3	0.5	LOL
3	0.10648765	4	-0.5	LLLL
4	0.02785494	5	-1.0	LOOLO
5	0.02483642	5	1.0	LOOOL
6	0.01441420	6	-1.5	LOOLLL
7	0.01278235	7	-2.0	LLLOLLL
8	0.01174383	7	1.5	LLLOLOO
9	0.01158951	7	2.0	LLLOOLL
10	0.00981481	7	-3.0	LLOLLOL
11	0.00868827	7	3.0	LLOLOLL
12	0.00811728	7	-4.0	LLOOLLO
13	0.00770062	7	-5.0	LLOOLOO
14	0.00757716	7	-2.5	LLOOOLO
15	0.00746914	7	4.0	LLOOOOL
16	0.00704790	7	2.5	LOOLLOL
17	0.00677469	7	5.0	LOOOOLO
18	0.00631173	8	-6.0	LLLOLLOL
19	0.00594136	8	-7.0	LLLOLOLO
20	0.00581790	8	6.0	LLLOOLOL
21	0.00570988	8	-3.5	LLLOOOLL
22	0.00546358	8	3.5	LLLOOOLO
23	0.00550926	8	-8.0	LLLOOOOO
24	0.00533951	8	7.0	LLOLLLLL
25	0.00529321	8	8.0	LLOLLLLO
26	0.00503086	8	9.0	LLOLLLOO
27	0.00466049	8	4.5	LLOLLOOO
28	0.00455247	8	-4.5	LLOLOLLO
29	0.00438272	8	-9.0	LLOLOLOO
30	0.00427469	8	5.5	LLOLOOOO
31	0.00398605	8	-5.5	LLOOLOLL
32	0.00395062	8	-6.5	LLOOLOLO
33	0.00384259	8	10.0	LLOOOLLL
34	0.00373457	8	-7.5	LLOOOOOL
35	0.00361111	8	6.5	LLOOOOOO
36	0.00348765	8	-10.0	LOOLLOOL
37	0.00344136	8	11.0	LOOOOLLL
38	0.00333333	8	-8.5	LOOOOLLO
39	0.00316358	8	9.5	LOOOOOOL
40	0.00314815	8	8.5	LOOOOOOO
41	0.00311728	9	7.5	LLLOLLOOL
42	0.00296296	9	-11.0	LLLOLOLLO
43	0.00290864	9	-12.0	LLLOOOOLL
44	0.00273148	9	12.0	LLLOOOOLO
45	0.00254630	9	13.0	LLOLLLOLO
46	0.00229938	9	-14.0	LLOLLOOLO
47	0.00229938	9	-9.5	LLOLOLLLL
48	0.00228395	9	14.0	LLOLOLLLO
49	0.00225309	9	-13.0	LLOLOLOLO
50	0.00220679	9	-10.5	LLOLOOOLL
51	0.00214506	9	10.5	LLOLOOOLO
52	0.00211420	9	11.5	LLOOLLLLO
53	0.00205247	9	-11.5	LLOOLLLOL
54	0.00172840	9	15.0	LOOLLOOOL
55	0.00168210	9	12.5	LOOOOOLLL
56	0.00160494	9	16.0	LOOOOOLOL
57	0.00158951	9	-15.0	LOOOOOLOO
58	0.00151235	10	13.5	LLLOLOLLLL
59	0.00148062	10	-16.0	LLLOOLOOLO
60	0.00140432	10	17.0	LLLOOLOOOO
61	0.00140432	10	12.5	LLLOOLOOOL
62	0.00126543	10	14.5	LLOLLLOLLO
63	0.00120370	10	-13.5	LLOLLOOLLO
64	0.00115741	10	18.0	LLOLOLOLLL
65	0.00111111	10	-19.0	LLOLOLOLLO
66	0.00104938	10	-17.0	LLOOLLLLLO
67	0.00098765	10	16.5	LLOOLLLOOO
68	0.00098765	10	-14.5	LLOOOLLOLL
69	0.00081049	10	15.5	LLOOOLLOOL
70	0.00087963	10	-15.5	LLOOOLLOOO
71	0.00083333	10	-18.0	LOOOOOLLOL
72	0.00077160	11	19.0	LLLOLLOOOLO
73	0.00077160	11	-16.5	LLLOLLOOOOL
74	0.00075617	11	-20.0	LLLOLLOOOOO
75	0.00075617	11	-21.0	LLLOLOLLLOL
76	0.00074074	11	20.0	LLLOOLOOLLL
77	0.00066358	11	-17.5	LLOLLLOLLLO
78	0.00060185	11	17.5	LLOLLOOLLLO
79	0.00052469	11	-18.5	LLOOLLLLLLO
80	0.00049383	11	21.0	LLOOOLLOLOL
81	0.00043210	11	-22.0	LOOLLOOOOLO
82	0.00043210	11	18.5	LOOLLOOOOOL
83	0.00041667	11	23.0	LOOLLOOOOOO
84	0.00041667	11	-20.5	LOOOOOLLOOL
85	0.00038580	11	19.5	LOOOOOLLOOO
86	0.00038580	12	-24.0	LLLOLLOOOLLO
87	0.00038580	12	-23.0	LLLOLLOOOLLL
88	0.00037037	12	-19.5	LLLOLOLLLOOO
89	0.00037037	12	-25.0	LLLOOLOOLLOL
90	0.00033951	12	21.5	LLOLLLOLLLLL
91	0.00032407	12	22.0	LLOLLLOLLLLO
92	0.00030864	12	20.5	LLOLLOOLLLLO
93	0.00029321	12	-23.5	LLOOLLLLLLLL
94	0.00026235	12	22.5	LLOOLLLOOLLL
95	0.00024691	12	26.0	LLOOLLLOOLOO
96	0.00024691	12	24.0	LLOOLLLOOLOL
97	0.00024691	12	-22.5	LLOOOLLOLOOL
98	0.00023148	12	-26.0	LLOOOLLOLOOO
99	0.00018519	13	23.5	LLLOLOLLLOOLO
100	0.00018519	13	-25.5	LLLOOLOOLLOOL
101	0.00016975	13	-21.5	LLLOOLOOLLOOO
102	0.00013889	13	25.0	LLOOLLLLLLLOL
103	0.00012346	13	-26.5	LLOOLLLOOLLOO
104	0.00010802	13	30.0	LOOLLOOOOLLLO
105	0.00010802	13	26.5	LOOLLOOOOOLLL
106	0.00010802	13	-24.5	LOOLLOOOOOLLO
107	0.00010802	13	-27.0	LOOLLOOOOOLOL
108	0.00010802	14	24.5	LLLOLOLLLOOLLL
109	0.00007716	14	-29.0	LLOLLOOLLLLLLO
110	0.00007716	14	-27.5	LLOLLOOLLLLLLL
111	0.00007716	14	-28.0	LLOLLOOLLLLLOO
112	0.00007716	14	25.5	LLOLLOOLLLLLOL
113	0.00006173	14	28.0	LLOOLLLLLLLOOO
114	0.00006173	14	27.5	LLOOLLLOOLLOLO
115	0.00006173	14	27.0	LLOOLLLOOLLOLL
116	0.00004630	15	-28.5	LLLOLOLLLOOLLOL
117	0.00003086	15	29.0	LLOOLLLLLLLOOLO
118	0.00001543	16	-29.5	LLLOLOLLLOOLLOOO
119	0.00001543	16	28.5	LLLOLOLLLOOLLOOL
120	0.00001543	16	-30.0	LLOOLLLLLLLLOOLLO
121	0.00001543	16	29.5	LLOOLLLLLLLLOOLLL

HC= 3.7930 H= 3.7507

HC= 3.7930 H= 3.7507

ANNEX 4

MOBILE & CALENDAR 4 MBit/s

frame 1:	26.45 dB for L	33.77 dB for C1	31.34 dB for C2
frame 2:	26.19 dB for L	34.00 dB for C1	31.74 dB for C2
frame 3:	25.89 dB for L	33.87 dB for C1	31.63 dB for C2
frame 4:	25.66 dB for L	33.68 dB for C1	31.48 dB for C2
frame 5:	25.42 dB for L	33.41 dB for C1	31.25 dB for C2
frame 6:	25.16 dB for L	33.18 dB for C1	31.09 dB for C2
frame 7:	25.03 dB for L	33.00 dB for C1	30.97 dB for C2
frame 8:	24.72 dB for L	32.80 dB for C1	30.87 dB for C2
frame 9:	24.55 dB for L	32.61 dB for C1	30.81 dB for C2
frame 10:	24.52 dB for L	32.57 dB for C1	30.85 dB for C2
frame 11:	26.21 dB for L	33.90 dB for C1	31.65 dB for C2
frame 12:	25.85 dB for L	34.13 dB for C1	31.79 dB for C2
frame 13:	25.12 dB for L	33.91 dB for C1	31.70 dB for C2
frame 14:	24.94 dB for L	33.75 dB for C1	31.62 dB for C2
frame 15:	25.28 dB for L	33.84 dB for C1	31.72 dB for C2
frame 16:	24.78 dB for L	33.74 dB for C1	31.58 dB for C2
frame 17:	24.52 dB for L	33.53 dB for C1	31.46 dB for C2
frame 18:	24.46 dB for L	33.35 dB for C1	31.36 dB for C2
frame 19:	24.19 dB for L	33.08 dB for C1	31.17 dB for C2
frame 20:	24.02 dB for L	32.92 dB for C1	31.05 dB for C2
frame 21:	25.72 dB for L	33.94 dB for C1	31.63 dB for C2
frame 22:	25.84 dB for L	34.15 dB for C1	31.72 dB for C2
frame 23:	25.71 dB for L	34.04 dB for C1	31.62 dB for C2
frame 24:	25.19 dB for L	33.76 dB for C1	31.51 dB for C2
frame 25:	24.61 dB for L	33.37 dB for C1	31.26 dB for C2
frame 26:	24.42 dB for L	33.15 dB for C1	31.17 dB for C2
frame 27:	24.29 dB for L	32.91 dB for C1	30.99 dB for C2
frame 28:	24.15 dB for L	32.61 dB for C1	30.81 dB for C2
frame 29:	24.12 dB for L	32.48 dB for C1	30.70 dB for C2
frame 30:	24.25 dB for L	32.33 dB for C1	30.56 dB for C2
frame 31:	25.78 dB for L	33.73 dB for C1	31.47 dB for C2
frame 32:	25.94 dB for L	33.88 dB for C1	31.59 dB for C2
frame 33:	25.54 dB for L	33.72 dB for C1	31.48 dB for C2
frame 34:	25.05 dB for L	33.40 dB for C1	31.35 dB for C2
frame 35:	26.01 dB for L	33.78 dB for C1	31.65 dB for C2
frame 36:	26.34 dB for L	33.75 dB for C1	31.57 dB for C2
frame 37:	26.69 dB for L	33.66 dB for C1	31.48 dB for C2
frame 38:	26.80 dB for L	33.49 dB for C1	31.35 dB for C2
frame 39:	27.02 dB for L	33.32 dB for C1	31.30 dB for C2
frame 40:	27.59 dB for L	33.22 dB for C1	31.24 dB for C2
frame 41:	26.98 dB for L	33.59 dB for C1	31.37 dB for C2
frame 42:	27.40 dB for L	33.75 dB for C1	31.50 dB for C2
frame 43:	28.06 dB for L	33.59 dB for C1	31.48 dB for C2
frame 44:	27.94 dB for L	33.48 dB for C1	31.40 dB for C2
frame 45:	27.45 dB for L	33.36 dB for C1	31.31 dB for C2
frame 46:	26.99 dB for L	33.20 dB for C1	31.17 dB for C2
frame 47:	26.61 dB for L	33.07 dB for C1	31.04 dB for C2
frame 48:	26.27 dB for L	32.92 dB for C1	30.89 dB for C2
frame 49:	25.91 dB for L	32.81 dB for C1	30.83 dB for C2
frame 50:	25.39 dB for L	32.71 dB for C1	30.73 dB for C2
frame 51:	26.20 dB for L	33.57 dB for C1	31.17 dB for C2
frame 52:	25.72 dB for L	33.65 dB for C1	31.28 dB for C2
frame 53:	25.11 dB for L	33.34 dB for C1	31.11 dB for C2
frame 54:	24.52 dB for L	33.02 dB for C1	30.88 dB for C2
frame 55:	24.21 dB for L	32.66 dB for C1	30.65 dB for C2
frame 56:	24.15 dB for L	32.46 dB for C1	30.50 dB for C2
frame 57:	24.24 dB for L	32.16 dB for C1	30.32 dB for C2
frame 58:	24.35 dB for L	32.03 dB for C1	30.20 dB for C2
frame 59:	24.54 dB for L	31.98 dB for C1	30.11 dB for C2
frame 60:	24.68 dB for L	31.97 dB for C1	30.12 dB for C2
frame 61:	26.32 dB for L	33.37 dB for C1	31.03 dB for C2
frame 62:	25.78 dB for L	33.46 dB for C1	31.12 dB for C2
frame 63:	25.00 dB for L	33.20 dB for C1	30.93 dB for C2
frame 64:	24.61 dB for L	32.92 dB for C1	30.77 dB for C2
frame 65:	24.40 dB for L	32.68 dB for C1	30.63 dB for C2
frame 66:	24.19 dB for L	32.45 dB for C1	30.51 dB for C2
frame 67:	24.01 dB for L	32.28 dB for C1	30.33 dB for C2
frame 68:	24.03 dB for L	32.15 dB for C1	30.23 dB for C2
frame 69:	24.13 dB for L	31.99 dB for C1	30.12 dB for C2
frame 70:	24.11 dB for L	32.06 dB for C1	30.12 dB for C2
frame 71:	26.00 dB for L	33.29 dB for C1	30.86 dB for C2
frame 72:	25.50 dB for L	33.31 dB for C1	30.93 dB for C2
frame 73:	24.97 dB for L	33.09 dB for C1	30.76 dB for C2
frame 74:	24.74 dB for L	32.83 dB for C1	30.61 dB for C2
frame 75:	24.56 dB for L	32.59 dB for C1	30.52 dB for C2
frame 76:	24.28 dB for L	32.43 dB for C1	30.38 dB for C2
frame 77:	24.19 dB for L	32.24 dB for C1	30.28 dB for C2
frame 78:	24.12 dB for L	32.14 dB for C1	30.20 dB for C2
frame 79:	24.16 dB for L	31.98 dB for C1	30.15 dB for C2
frame 80:	24.12 dB for L	31.95 dB for C1	30.10 dB for C2
frame 81:	26.06 dB for L	33.17 dB for C1	30.89 dB for C2
frame 82:	25.95 dB for L	33.16 dB for C1	30.93 dB for C2
frame 83:	26.30 dB for L	32.97 dB for C1	30.87 dB for C2
frame 84:	26.33 dB for L	32.68 dB for C1	30.73 dB for C2
frame 85:	26.43 dB for L	32.58 dB for C1	30.63 dB for C2
frame 86:	26.43 dB for L	32.49 dB for C1	30.58 dB for C2
frame 87:	26.47 dB for L	32.35 dB for C1	30.48 dB for C2
frame 88:	26.44 dB for L	32.29 dB for C1	30.44 dB for C2
frame 89:	26.76 dB for L	32.23 dB for C1	30.42 dB for C2
frame 90:	26.67 dB for L	32.21 dB for C1	30.39 dB for C2
frame 91:	26.72 dB for L	33.24 dB for C1	31.30 dB for C2
frame 92:	27.25 dB for L	33.30 dB for C1	31.39 dB for C2
frame 93:	27.47 dB for L	33.09 dB for C1	31.26 dB for C2
frame 94:	27.71 dB for L	32.95 dB for C1	31.11 dB for C2
frame 95:	27.91 dB for L	32.84 dB for C1	30.98 dB for C2
frame 96:	28.04 dB for L	32.65 dB for C1	30.91 dB for C2
frame 97:	27.77 dB for L	32.55 dB for C1	30.79 dB for C2
frame 98:	27.59 dB for L	32.41 dB for C1	30.67 dB for C2
frame 99:	27.21 dB for L	32.36 dB for C1	30.63 dB for C2
frame 100:	26.55 dB for L	32.26 dB for C1	30.51 dB for C2
frame 101:	26.33 dB for L	33.23 dB for C1	31.18 dB for C2
frame 102:	26.57 dB for L	33.21 dB for C1	31.19 dB for C2
frame 103:	26.01 dB for L	33.00 dB for C1	31.01 dB for C2
frame 104:	25.54 dB for L	32.75 dB for C1	30.83 dB for C2
frame 105:	25.11 dB for L	32.53 dB for C1	30.65 dB for C2
frame 106:	24.71 dB for L	32.30 dB for C1	30.45 dB for C2
frame 107:	24.52 dB for L	32.15 dB for C1	30.27 dB for C2
frame 108:	24.39 dB for L	32.02 dB for C1	30.15 dB for C2
frame 109:	24.32 dB for L	31.95 dB for C1	30.11 dB for C2
frame 110:	24.10 dB for L	31.90 dB for C1	29.99 dB for C2
frame 111:	26.11 dB for L	33.02 dB for C1	31.07 dB for C2
frame 112:	25.90 dB for L	33.01 dB for C1	31.02 dB for C2
frame 113:	25.00 dB for L	32.60 dB for C1	30.75 dB for C2
frame 114:	24.56 dB for L	32.44 dB for C1	30.48 dB for C2
frame 115:	24.68 dB for L	32.33 dB for C1	30.41 dB for C2
frame 116:	25.07 dB for L	32.24 dB for C1	30.29 dB for C2
frame 117:	25.44 dB for L	32.19 dB for C1	30.21 dB for C2
frame 118:	25.62 dB for L	32.06 dB for C1	30.16 dB for C2
frame 119:	26.20 dB for L	31.98 dB for C1	30.14 dB for C2
frame 120:	26.52 dB for L	31.99 dB for C1	30.14 dB for C2
frame 121:	26.41 dB for L	32.93 dB for C1	30.81 dB for C2
frame 122:	26.70 dB for L	32.99 dB for C1	30.88 dB for C2
frame 123:	26.51 dB for L	32.87 dB for C1	30.79 dB for C2
frame 124:	26.39 dB for L	32.67 dB for C1	30.65 dB for C2

Motion vector coding

frame	1:	0 bits for coding vectors
frame	2:	14747 bits for coding vectors
frame	3:	14790 bits for coding vectors
frame	4:	14723 bits for coding vectors
frame	5:	14761 bits for coding vectors
frame	6:	14596 bits for coding vectors
frame	7:	14613 bits for coding vectors
frame	8:	14665 bits for coding vectors
frame	9:	14815 bits for coding vectors
frame	10:	15037 bits for coding vectors
frame	11:	0 bits for coding vectors
frame	12:	15187 bits for coding vectors
frame	13:	14877 bits for coding vectors
frame	14:	15131 bits for coding vectors
frame	15:	15227 bits for coding vectors
frame	16:	15030 bits for coding vectors
frame	17:	14696 bits for coding vectors
frame	18:	14604 bits for coding vectors
frame	19:	15144 bits for coding vectors
frame	20:	15283 bits for coding vectors
frame	21:	0 bits for coding vectors
frame	22:	14901 bits for coding vectors
frame	23:	15275 bits for coding vectors
frame	24:	14456 bits for coding vectors
frame	25:	14092 bits for coding vectors
frame	26:	14498 bits for coding vectors
frame	27:	14725 bits for coding vectors
frame	28:	14940 bits for coding vectors
frame	29:	14827 bits for coding vectors
frame	30:	15092 bits for coding vectors
frame	31:	0 bits for coding vectors
frame	32:	14485 bits for coding vectors
frame	33:	13843 bits for coding vectors
frame	34:	14274 bits for coding vectors
frame	35:	14712 bits for coding vectors
frame	36:	14648 bits for coding vectors
frame	37:	14725 bits for coding vectors
frame	38:	14540 bits for coding vectors
frame	39:	14349 bits for coding vectors
frame	40:	14376 bits for coding vectors
frame	41:	0 bits for coding vectors
frame	42:	14424 bits for coding vectors
frame	43:	14558 bits for coding vectors
frame	44:	14449 bits for coding vectors
frame	45:	14351 bits for coding vectors
frame	46:	14648 bits for coding vectors
frame	47:	14599 bits for coding vectors
frame	48:	14900 bits for coding vectors
frame	49:	14851 bits for coding vectors
frame	50:	14412 bits for coding vectors
frame	51:	0 bits for coding vectors
frame	52:	14449 bits for coding vectors
frame	53:	14693 bits for coding vectors
frame	54:	14897 bits for coding vectors
frame	55:	14909 bits for coding vectors
frame	56:	14465 bits for coding vectors
frame	57:	14490 bits for coding vectors
frame	58:	14169 bits for coding vectors
frame	59:	14377 bits for coding vectors
frame	60:	14368 bits for coding vectors
frame	61:	0 bits for coding vectors
frame	62:	14661 bits for coding vectors
frame	63:	14843 bits for coding vectors

frame	64:	14705 bits for coding vectors
frame	65:	14788 bits for coding vectors
frame	66:	14914 bits for coding vectors
frame	67:	14667 bits for coding vectors
frame	68:	14819 bits for coding vectors
frame	69:	14847 bits for coding vectors
frame	70:	15539 bits for coding vectors
frame	71:	0 bits for coding vectors
frame	72:	15388 bits for coding vectors
frame	73:	15414 bits for coding vectors
frame	74:	15319 bits for coding vectors
frame	75:	15440 bits for coding vectors
frame	76:	15218 bits for coding vectors
frame	77:	15089 bits for coding vectors
frame	78:	15174 bits for coding vectors
frame	79:	15224 bits for coding vectors
frame	80:	15128 bits for coding vectors
frame	81:	0 bits for coding vectors
frame	82:	15617 bits for coding vectors
frame	83:	15199 bits for coding vectors
frame	84:	15239 bits for coding vectors
frame	85:	15571 bits for coding vectors
frame	86:	15193 bits for coding vectors
frame	87:	15029 bits for coding vectors
frame	88:	15011 bits for coding vectors
frame	89:	15012 bits for coding vectors
frame	90:	14737 bits for coding vectors
frame	91:	0 bits for coding vectors
frame	92:	14908 bits for coding vectors
frame	93:	15006 bits for coding vectors
frame	94:	14872 bits for coding vectors
frame	95:	14953 bits for coding vectors
frame	96:	14993 bits for coding vectors
frame	97:	14904 bits for coding vectors
frame	98:	15128 bits for coding vectors
frame	99:	15384 bits for coding vectors
frame	100:	15328 bits for coding vectors
frame	101:	0 bits for coding vectors
frame	102:	14552 bits for coding vectors
frame	103:	14633 bits for coding vectors
frame	104:	14818 bits for coding vectors
frame	105:	14648 bits for coding vectors
frame	106:	14988 bits for coding vectors
frame	107:	15105 bits for coding vectors
frame	108:	14680 bits for coding vectors
frame	109:	14652 bits for coding vectors
frame	110:	14710 bits for coding vectors
frame	111:	0 bits for coding vectors
frame	112:	14771 bits for coding vectors
frame	113:	14707 bits for coding vectors
frame	114:	15475 bits for coding vectors
frame	115:	14721 bits for coding vectors
frame	116:	14289 bits for coding vectors
frame	117:	14073 bits for coding vectors
frame	118:	13817 bits for coding vectors
frame	119:	13872 bits for coding vectors
frame	120:	14085 bits for coding vectors
frame	121:	0 bits for coding vectors
frame	122:	14300 bits for coding vectors
frame	123:	14180 bits for coding vectors
frame	124:	14386 bits for coding vectors

MOBILE & CALENDAR 9MBit/s

frame	1:	32.48 dB for L	35.32 dB for C1	33.24 dB for C2
frame	2:	30.82 dB for L	35.73 dB for C1	33.50 dB for C2
frame	3:	29.97 dB for L	35.69 dB for C1	33.50 dB for C2
frame	4:	29.78 dB for L	35.68 dB for C1	33.40 dB for C2
frame	5:	29.69 dB for L	35.44 dB for C1	33.17 dB for C2
frame	6:	29.49 dB for L	35.32 dB for C1	32.95 dB for C2
frame	7:	29.32 dB for L	35.20 dB for C1	32.78 dB for C2
frame	8:	29.04 dB for L	35.05 dB for C1	32.66 dB for C2
frame	9:	28.95 dB for L	34.97 dB for C1	32.66 dB for C2
frame	10:	29.09 dB for L	34.93 dB for C1	32.72 dB for C2
frame	11:	32.24 dB for L	35.44 dB for C1	33.34 dB for C2
frame	12:	30.40 dB for L	35.89 dB for C1	33.65 dB for C2
frame	13:	29.09 dB for L	35.76 dB for C1	33.56 dB for C2
frame	14:	29.01 dB for L	35.72 dB for C1	33.52 dB for C2
frame	15:	29.50 dB for L	35.88 dB for C1	33.66 dB for C2
frame	16:	29.01 dB for L	35.79 dB for C1	33.54 dB for C2
frame	17:	28.90 dB for L	35.60 dB for C1	33.48 dB for C2
frame	18:	29.00 dB for L	35.44 dB for C1	33.38 dB for C2
frame	19:	28.82 dB for L	35.18 dB for C1	33.12 dB for C2
frame	20:	28.83 dB for L	35.05 dB for C1	32.93 dB for C2
frame	21:	32.23 dB for L	35.33 dB for C1	33.25 dB for C2
frame	22:	31.12 dB for L	35.79 dB for C1	33.59 dB for C2
frame	23:	30.07 dB for L	35.88 dB for C1	33.61 dB for C2
frame	24:	29.32 dB for L	35.75 dB for C1	33.51 dB for C2
frame	25:	28.87 dB for L	35.44 dB for C1	33.26 dB for C2
frame	26:	28.94 dB for L	35.35 dB for C1	33.15 dB for C2
frame	27:	28.98 dB for L	35.13 dB for C1	32.93 dB for C2
frame	28:	28.92 dB for L	34.86 dB for C1	32.67 dB for C2
frame	29:	29.06 dB for L	34.70 dB for C1	32.53 dB for C2
frame	30:	29.53 dB for L	34.53 dB for C1	32.41 dB for C2
frame	31:	32.41 dB for L	35.18 dB for C1	33.13 dB for C2
frame	32:	31.26 dB for L	35.56 dB for C1	33.41 dB for C2
frame	33:	29.69 dB for L	35.46 dB for C1	33.34 dB for C2
frame	34:	29.10 dB for L	35.20 dB for C1	33.20 dB for C2
frame	35:	29.96 dB for L	35.80 dB for C1	33.70 dB for C2
frame	36:	30.30 dB for L	35.90 dB for C1	33.48 dB for C2
frame	37:	31.09 dB for L	35.89 dB for C1	33.66 dB for C2
frame	38:	31.72 dB for L	35.76 dB for C1	33.56 dB for C2
frame	39:	32.25 dB for L	35.68 dB for C1	33.53 dB for C2
frame	40:	33.18 dB for L	35.72 dB for C1	33.59 dB for C2
frame	41:	32.87 dB for L	35.12 dB for C1	33.09 dB for C2
frame	42:	33.40 dB for L	35.60 dB for C1	33.32 dB for C2
frame	43:	33.36 dB for L	35.67 dB for C1	33.41 dB for C2
frame	44:	32.93 dB for L	35.71 dB for C1	33.44 dB for C2
frame	45:	32.51 dB for L	35.65 dB for C1	33.46 dB for C2
frame	46:	32.03 dB for L	35.61 dB for C1	33.37 dB for C2
frame	47:	31.50 dB for L	35.51 dB for C1	33.30 dB for C2
frame	48:	30.91 dB for L	35.45 dB for C1	33.22 dB for C2
frame	49:	30.14 dB for L	35.38 dB for C1	33.22 dB for C2
frame	50:	29.46 dB for L	35.20 dB for C1	33.08 dB for C2
frame	51:	32.62 dB for L	35.02 dB for C1	32.79 dB for C2
frame	52:	30.10 dB for L	35.22 dB for C1	32.92 dB for C2
frame	53:	29.09 dB for L	34.93 dB for C1	32.73 dB for C2
frame	54:	28.66 dB for L	34.65 dB for C1	32.41 dB for C2
frame	55:	28.51 dB for L	34.33 dB for C1	32.09 dB for C2
frame	56:	28.70 dB for L	34.12 dB for C1	31.95 dB for C2
frame	57:	28.74 dB for L	33.85 dB for C1	31.78 dB for C2
frame	58:	28.94 dB for L	33.80 dB for C1	31.65 dB for C2
frame	59:	29.10 dB for L	33.78 dB for C1	31.60 dB for C2
frame	60:	29.29 dB for L	33.79 dB for C1	31.72 dB for C2
frame	61:	32.54 dB for L	34.78 dB for C1	32.60 dB for C2
frame	62:	30.16 dB for L	35.13 dB for C1	32.76 dB for C2

frame	63:	29.08 dB for L	34.92 dB for C1	32.63 dB for C2
frame	64:	28.85 dB for L	34.71 dB for C1	32.51 dB for C2
frame	65:	28.74 dB for L	34.53 dB for C1	32.36 dB for C2
frame	66:	28.65 dB for L	34.37 dB for C1	32.19 dB for C2
frame	67:	28.54 dB for L	34.19 dB for C1	31.98 dB for C2
frame	68:	28.55 dB for L	34.11 dB for C1	31.90 dB for C2
frame	69:	28.56 dB for L	34.05 dB for C1	31.82 dB for C2
frame	70:	28.67 dB for L	34.19 dB for C1	32.18 dB for C2
frame	71:	32.39 dB for L	34.68 dB for C1	32.55 dB for C2
frame	72:	29.99 dB for L	34.88 dB for C1	32.72 dB for C2
frame	73:	29.02 dB for L	34.71 dB for C1	32.56 dB for C2
frame	74:	28.87 dB for L	34.51 dB for C1	32.40 dB for C2
frame	75:	28.87 dB for L	34.36 dB for C1	32.35 dB for C2
frame	76:	28.70 dB for L	34.33 dB for C1	32.23 dB for C2
frame	77:	28.71 dB for L	34.16 dB for C1	32.14 dB for C2
frame	78:	28.74 dB for L	34.03 dB for C1	32.01 dB for C2
frame	79:	28.80 dB for L	33.83 dB for C1	31.96 dB for C2
frame	80:	29.04 dB for L	33.82 dB for C1	32.82 dB for C2
frame	81:	32.46 dB for L	34.58 dB for C1	32.38 dB for C2
frame	82:	30.97 dB for L	34.71 dB for C1	32.70 dB for C2
frame	83:	30.95 dB for L	34.63 dB for C1	32.72 dB for C2
frame	84:	31.08 dB for L	34.40 dB for C1	32.66 dB for C2
frame	85:	31.14 dB for L	34.36 dB for C1	32.62 dB for C2
frame	86:	30.92 dB for L	34.36 dB for C1	32.63 dB for C2
frame	87:	30.84 dB for L	34.38 dB for C1	32.54 dB for C2
frame	88:	31.17 dB for L	34.40 dB for C1	32.51 dB for C2
frame	89:	31.51 dB for L	34.36 dB for C1	32.69 dB for C2
frame	90:	31.98 dB for L	35.40 dB for C1	33.34 dB for C2
frame	91:	32.75 dB for L	34.56 dB for C1	32.60 dB for C2
frame	92:	32.53 dB for L	34.96 dB for C1	32.85 dB for C2
frame	93:	32.74 dB for L	34.90 dB for C1	32.85 dB for C2
frame	94:	33.12 dB for L	35.01 dB for C1	32.87 dB for C2
frame	95:	33.54 dB for L	35.13 dB for C1	32.89 dB for C2
frame	96:	33.97 dB for L	35.00 dB for C1	32.92 dB for C2
frame	97:	33.77 dB for L	34.95 dB for C1	32.85 dB for C2
frame	98:	33.18 dB for L	34.82 dB for C1	32.77 dB for C2
frame	99:	31.92 dB for L	34.95 dB for C1	33.30 dB for C2
frame	100:	31.33 dB for L	35.97 dB for C1	33.64 dB for C2
frame	101:	32.53 dB for L	34.57 dB for C1	32.46 dB for C2
frame	102:	31.17 dB for L	34.80 dB for C1	32.86 dB for C2
frame	103:	30.21 dB for L	34.77 dB for C1	32.57 dB for C2
frame	104:	29.68 dB for L	34.66 dB for C1	32.46 dB for C2
frame	105:	29.41 dB for L	34.48 dB for C1	32.36 dB for C2
frame	106:	29.13 dB for L	34.33 dB for C1	32.20 dB for C2
frame	107:	29.07 dB for L	34.17 dB for C1	32.09 dB for C2
frame	108:	28.99 dB for L	34.12 dB for C1	31.97 dB for C2
frame	109:	28.80 dB for L	34.01 dB for C1	32.35 dB for C2
frame	110:	29.06 dB for L	34.93 dB for C1	32.78 dB for C2
frame	111:	32.34 dB for L	34.37 dB for C1	32.34 dB for C2
frame	112:	30.11 dB for L	34.57 dB for C1	32.43 dB for C2
frame	113:	28.94 dB for L	34.28 dB for C1	32.20 dB for C2
frame	114:	28.74 dB for L	34.14 dB for C1	32.03 dB for C2
frame	115:	29.14 dB for L	34.12 dB for C1	32.02 dB for C2
frame	116:	29.81 dB for L	34.15 dB for C1	32.04 dB for C2
frame	117:	30.41 dB for L	34.20 dB for C1	32.06 dB for C2
frame	118:	30.53 dB for L	34.18 dB for C1	32.06 dB for C2
frame	119:	30.38 dB for L	34.29 dB for C1	32.75 dB for C2
frame	120:	31.78 dB for L	35.48 dB for C1	34.06 dB for C2
frame	121:	32.52 dB for L	34.31 dB for C1	32.09 dB for C2
frame	122:	31.51 dB for L	34.58 dB for C1	32.32 dB for C2
frame	123:	30.94 dB for L	34.67 dB for C1	32.44 dB for C2
frame	124:	30.87 dB for L	34.62 dB for C1	32.45 dB for C2

TABLE TENNIS 4 MBit/s

frame	1:	28.89 dB for L	39.10 dB for C1	36.67 dB for C2
frame	2:	28.71 dB for L	38.75 dB for C1	36.77 dB for C2
frame	3:	28.58 dB for L	38.55 dB for C1	36.79 dB for C2
frame	4:	28.65 dB for L	38.21 dB for C1	36.71 dB for C2
frame	5:	28.26 dB for L	37.98 dB for C1	36.69 dB for C2
frame	6:	27.21 dB for L	37.99 dB for C1	36.65 dB for C2
frame	7:	24.66 dB for L	37.37 dB for C1	35.55 dB for C2
frame	8:	26.29 dB for L	36.33 dB for C1	36.45 dB for C2
frame	9:	27.17 dB for L	37.19 dB for C1	37.02 dB for C2
frame	10:	28.13 dB for L	37.47 dB for C1	37.87 dB for C2
frame	11:	33.41 dB for L	41.01 dB for C1	40.40 dB for C2
frame	12:	31.47 dB for L	40.08 dB for C1	39.40 dB for C2
frame	13:	31.08 dB for L	39.89 dB for C1	39.17 dB for C2
frame	14:	30.98 dB for L	39.74 dB for C1	39.23 dB for C2
frame	15:	30.84 dB for L	39.41 dB for C1	39.07 dB for C2
frame	16:	30.85 dB for L	39.09 dB for C1	38.91 dB for C2
frame	17:	30.90 dB for L	39.27 dB for C1	39.07 dB for C2
frame	18:	30.43 dB for L	38.78 dB for C1	38.75 dB for C2
frame	19:	30.44 dB for L	38.89 dB for C1	38.96 dB for C2
frame	20:	30.72 dB for L	39.15 dB for C1	38.99 dB for C2
frame	21:	34.89 dB for L	40.59 dB for C1	40.77 dB for C2
frame	22:	32.26 dB for L	39.36 dB for C1	39.43 dB for C2
frame	23:	31.14 dB for L	38.92 dB for C1	38.97 dB for C2
frame	24:	30.47 dB for L	38.46 dB for C1	38.75 dB for C2
frame	25:	30.25 dB for L	38.39 dB for C1	38.72 dB for C2
frame	26:	30.32 dB for L	38.22 dB for C1	38.55 dB for C2
frame	27:	30.12 dB for L	37.98 dB for C1	38.45 dB for C2
frame	28:	30.23 dB for L	37.81 dB for C1	38.46 dB for C2
frame	29:	30.11 dB for L	37.52 dB for C1	38.26 dB for C2
frame	30:	30.18 dB for L	37.39 dB for C1	37.68 dB for C2
frame	31:	33.77 dB for L	38.54 dB for C1	39.00 dB for C2
frame	32:	31.71 dB for L	38.15 dB for C1	37.94 dB for C2
frame	33:	30.79 dB for L	37.86 dB for C1	37.82 dB for C2
frame	34:	30.10 dB for L	37.73 dB for C1	37.66 dB for C2
frame	35:	29.69 dB for L	37.48 dB for C1	37.61 dB for C2
frame	36:	29.43 dB for L	37.19 dB for C1	37.36 dB for C2
frame	37:	29.27 dB for L	37.10 dB for C1	37.29 dB for C2
frame	38:	29.29 dB for L	36.86 dB for C1	37.38 dB for C2
frame	39:	29.09 dB for L	36.66 dB for C1	37.36 dB for C2
frame	40:	28.96 dB for L	36.59 dB for C1	37.30 dB for C2
frame	41:	32.72 dB for L	38.09 dB for C1	38.47 dB for C2
frame	42:	30.70 dB for L	37.22 dB for C1	37.49 dB for C2
frame	43:	29.73 dB for L	36.91 dB for C1	37.41 dB for C2
frame	44:	29.22 dB for L	36.58 dB for C1	37.10 dB for C2
frame	45:	28.95 dB for L	36.49 dB for C1	36.99 dB for C2
frame	46:	28.78 dB for L	36.44 dB for C1	36.90 dB for C2
frame	47:	28.48 dB for L	36.22 dB for C1	36.80 dB for C2
frame	48:	28.28 dB for L	36.05 dB for C1	36.59 dB for C2
frame	49:	28.24 dB for L	36.11 dB for C1	36.48 dB for C2
frame	50:	28.11 dB for L	35.98 dB for C1	36.70 dB for C2
frame	51:	32.09 dB for L	37.19 dB for C1	37.31 dB for C2
frame	52:	30.18 dB for L	36.68 dB for C1	36.72 dB for C2
frame	53:	28.91 dB for L	36.32 dB for C1	36.27 dB for C2
frame	54:	27.21 dB for L	33.80 dB for C1	32.06 dB for C2
frame	55:	28.29 dB for L	36.39 dB for C1	34.14 dB for C2
frame	56:	28.14 dB for L	36.55 dB for C1	34.38 dB for C2
frame	57:	28.89 dB for L	36.62 dB for C1	34.45 dB for C2
frame	58:	27.82 dB for L	36.59 dB for C1	34.48 dB for C2
frame	59:	28.36 dB for L	36.62 dB for C1	34.56 dB for C2
frame	60:	28.97 dB for L	36.78 dB for C1	35.29 dB for C2
frame	61:	30.60 dB for L	39.57 dB for C1	36.52 dB for C2
frame	62:	30.63 dB for L	38.98 dB for C1	36.11 dB for C2
frame	63:	30.89 dB for L	38.94 dB for C1	36.12 dB for C2
frame	64:	31.22 dB for L	38.84 dB for C1	36.13 dB for C2
frame	65:	31.33 dB for L	38.48 dB for C1	36.27 dB for C2
frame	66:	31.21 dB for L	38.56 dB for C1	36.26 dB for C2
frame	67:	31.35 dB for L	38.89 dB for C1	36.31 dB for C2
frame	68:	31.66 dB for L	38.58 dB for C1	36.34 dB for C2
frame	69:	31.89 dB for L	38.40 dB for C1	36.34 dB for C2
frame	70:	31.88 dB for L	38.77 dB for C1	36.86 dB for C2
frame	71:	30.68 dB for L	39.46 dB for C1	36.40 dB for C2
frame	72:	30.98 dB for L	39.10 dB for C1	36.31 dB for C2
frame	73:	31.24 dB for L	38.93 dB for C1	36.33 dB for C2
frame	74:	31.50 dB for L	38.88 dB for C1	36.38 dB for C2
frame	75:	31.86 dB for L	38.86 dB for C1	36.39 dB for C2
frame	76:	32.23 dB for L	38.82 dB for C1	36.36 dB for C2
frame	77:	32.44 dB for L	38.95 dB for C1	36.39 dB for C2
frame	78:	32.47 dB for L	38.81 dB for C1	36.45 dB for C2
frame	79:	32.46 dB for L	38.91 dB for C1	36.45 dB for C2
frame	80:	32.55 dB for L	39.88 dB for C1	36.76 dB for C2
frame	81:	30.67 dB for L	39.34 dB for C1	36.51 dB for C2
frame	82:	30.53 dB for L	38.98 dB for C1	36.35 dB for C2
frame	83:	29.50 dB for L	34.94 dB for C1	32.10 dB for C2
frame	84:	29.66 dB for L	37.34 dB for C1	33.72 dB for C2
frame	85:	29.55 dB for L	37.45 dB for C1	33.87 dB for C2
frame	86:	29.87 dB for L	37.51 dB for C1	34.00 dB for C2
frame	87:	28.83 dB for L	37.47 dB for C1	34.18 dB for C2
frame	88:	28.65 dB for L	37.55 dB for C1	34.29 dB for C2
frame	89:	29.41 dB for L	37.58 dB for C1	34.38 dB for C2
frame	90:	29.89 dB for L	38.78 dB for C1	35.07 dB for C2
frame	91:	29.17 dB for L	39.01 dB for C1	35.63 dB for C2
frame	92:	30.14 dB for L	39.86 dB for C1	35.38 dB for C2
frame	93:	30.68 dB for L	39.87 dB for C1	35.87 dB for C2
frame	94:	31.07 dB for L	39.76 dB for C1	35.88 dB for C2
frame	95:	31.13 dB for L	39.74 dB for C1	35.71 dB for C2
frame	96:	31.19 dB for L	39.69 dB for C1	35.74 dB for C2
frame	97:	30.95 dB for L	39.64 dB for C1	35.80 dB for C2
frame	98:	30.37 dB for L	39.52 dB for C1	35.78 dB for C2
frame	99:	29.63 dB for L	39.34 dB for C1	35.71 dB for C2
frame	100:	29.33 dB for L	40.17 dB for C1	36.17 dB for C2
frame	101:	29.20 dB for L	39.95 dB for C1	35.85 dB for C2
frame	102:	29.67 dB for L	39.32 dB for C1	35.59 dB for C2
frame	103:	29.50 dB for L	39.26 dB for C1	35.56 dB for C2
frame	104:	28.82 dB for L	39.12 dB for C1	35.45 dB for C2
frame	105:	29.43 dB for L	38.95 dB for C1	35.36 dB for C2
frame	106:	29.28 dB for L	38.89 dB for C1	35.18 dB for C2
frame	107:	29.53 dB for L	38.73 dB for C1	34.96 dB for C2
frame	108:	29.26 dB for L	38.70 dB for C1	34.79 dB for C2
frame	109:	29.25 dB for L	38.62 dB for C1	34.74 dB for C2
frame	110:	29.63 dB for L	39.72 dB for C1	35.83 dB for C2
frame	111:	29.08 dB for L	39.60 dB for C1	35.71 dB for C2
frame	112:	29.64 dB for L	39.60 dB for C1	35.66 dB for C2
frame	113:	28.35 dB for L	39.57 dB for C1	35.63 dB for C2
frame	114:	27.98 dB for L	39.52 dB for C1	35.64 dB for C2
frame	115:	27.57 dB for L	39.51 dB for C1	35.67 dB for C2
frame	116:	28.02 dB for L	39.52 dB for C1	35.77 dB for C2
frame	117:	28.60 dB for L	39.54 dB for C1	35.87 dB for C2
frame	118:	28.32 dB for L	39.61 dB for C1	36.00 dB for C2
frame	119:	29.76 dB for L	39.63 dB for C1	36.02 dB for C2
frame	120:	29.84 dB for L	40.35 dB for C1	36.46 dB for C2
frame	121:	29.02 dB for L	39.76 dB for C1	35.63 dB for C2
frame	122:	29.83 dB for L	39.62 dB for C1	35.50 dB for C2
frame	123:	29.09 dB for L	39.39 dB for C1	35.63 dB for C2
frame	124:	29.74 dB for L	39.17 dB for C1	35.56 dB for C2

Motion vector coding

frame	2:	24072 bits for coding vectors
frame	3:	24617 bits for coding vectors
frame	4:	25020 bits for coding vectors
frame	5:	25479 bits for coding vectors
frame	6:	48989 bits for coding vectors
frame	7:	61032 bits for coding vectors
frame	8:	40585 bits for coding vectors
frame	9:	38600 bits for coding vectors
frame	10:	37546 bits for coding vectors
frame	11:	0 bits for coding vectors
frame	12:	36967 bits for coding vectors
frame	13:	36950 bits for coding vectors
frame	14:	37422 bits for coding vectors
frame	15:	37542 bits for coding vectors
frame	16:	37507 bits for coding vectors
frame	17:	38105 bits for coding vectors
frame	18:	38901 bits for coding vectors
frame	19:	39445 bits for coding vectors
frame	20:	38893 bits for coding vectors
frame	21:	0 bits for coding vectors
frame	22:	39366 bits for coding vectors
frame	23:	38576 bits for coding vectors
frame	24:	38629 bits for coding vectors
frame	25:	38457 bits for coding vectors
frame	26:	38556 bits for coding vectors
frame	27:	38275 bits for coding vectors
frame	28:	38243 bits for coding vectors
frame	29:	37961 bits for coding vectors
frame	30:	37906 bits for coding vectors
frame	31:	0 bits for coding vectors
frame	32:	37941 bits for coding vectors
frame	33:	38588 bits for coding vectors
frame	34:	38853 bits for coding vectors
frame	35:	39882 bits for coding vectors
frame	36:	39244 bits for coding vectors
frame	37:	38998 bits for coding vectors
frame	38:	39207 bits for coding vectors
frame	39:	38616 bits for coding vectors
frame	40:	39521 bits for coding vectors
frame	41:	0 bits for coding vectors
frame	42:	40400 bits for coding vectors
frame	43:	39950 bits for coding vectors
frame	44:	39501 bits for coding vectors
frame	45:	38906 bits for coding vectors
frame	46:	39067 bits for coding vectors
frame	47:	39320 bits for coding vectors
frame	48:	39588 bits for coding vectors
frame	49:	40015 bits for coding vectors
frame	50:	40233 bits for coding vectors
frame	51:	0 bits for coding vectors
frame	52:	39463 bits for coding vectors
frame	53:	55700 bits for coding vectors
frame	54:	26967 bits for coding vectors
frame	55:	26780 bits for coding vectors
frame	56:	26893 bits for coding vectors
frame	57:	27640 bits for coding vectors
frame	58:	27654 bits for coding vectors
frame	59:	27538 bits for coding vectors
frame	60:	27449 bits for coding vectors
frame	61:	0 bits for coding vectors
frame	62:	26367 bits for coding vectors
frame	63:	25927 bits for coding vectors
frame	64:	25363 bits for coding vectors
frame	65:	25541 bits for coding vectors
frame	66:	25900 bits for coding vectors
frame	67:	26181 bits for coding vectors
frame	68:	26030 bits for coding vectors
frame	69:	25805 bits for coding vectors
frame	70:	25948 bits for coding vectors
frame	71:	0 bits for coding vectors
frame	72:	25060 bits for coding vectors
frame	73:	24756 bits for coding vectors
frame	74:	24328 bits for coding vectors
frame	75:	24599 bits for coding vectors
frame	76:	24672 bits for coding vectors
frame	77:	24983 bits for coding vectors
frame	78:	25544 bits for coding vectors
frame	79:	25871 bits for coding vectors
frame	80:	26202 bits for coding vectors
frame	81:	0 bits for coding vectors
frame	82:	54251 bits for coding vectors
frame	83:	19848 bits for coding vectors
frame	84:	19607 bits for coding vectors
frame	85:	19379 bits for coding vectors
frame	86:	19401 bits for coding vectors
frame	87:	19234 bits for coding vectors
frame	88:	19425 bits for coding vectors
frame	89:	19280 bits for coding vectors
frame	90:	18939 bits for coding vectors
frame	91:	0 bits for coding vectors
frame	92:	18287 bits for coding vectors
frame	93:	18465 bits for coding vectors
frame	94:	18520 bits for coding vectors
frame	95:	18448 bits for coding vectors
frame	96:	17807 bits for coding vectors
frame	97:	18960 bits for coding vectors
frame	98:	20284 bits for coding vectors
frame	99:	20291 bits for coding vectors
frame	100:	20112 bits for coding vectors
frame	101:	0 bits for coding vectors
frame	102:	21300 bits for coding vectors
frame	103:	21852 bits for coding vectors
frame	104:	22024 bits for coding vectors
frame	105:	22552 bits for coding vectors
frame	106:	24275 bits for coding vectors
frame	107:	24882 bits for coding vectors
frame	108:	26927 bits for coding vectors
frame	109:	23868 bits for coding vectors
frame	110:	20383 bits for coding vectors
frame	111:	0 bits for coding vectors
frame	112:	21507 bits for coding vectors
frame	113:	26244 bits for coding vectors
frame	114:	20292 bits for coding vectors
frame	115:	19152 bits for coding vectors
frame	116:	19844 bits for coding vectors
frame	117:	20877 bits for coding vectors
frame	118:	22296 bits for coding vectors
frame	119:	25845 bits for coding vectors
frame	120:	26769 bits for coding vectors
frame	121:	0 bits for coding vectors
frame	122:	25236 bits for coding vectors
frame	123:	24056 bits for coding vectors
frame	124:	23438 bits for coding vectors

TABLE TENNIS 9 MBit/s

frame	1:	33.40 dB for L	40.84 dB for C1	38.49 dB for C2
frame	2:	29.83 dB for L	40.30 dB for C1	33.94 dB for C2
frame	3:	29.27 dB for L	40.02 dB for C1	39.25 dB for C2
frame	4:	30.94 dB for L	39.53 dB for C1	30.88 dB for C2
frame	5:	31.52 dB for L	40.22 dB for C1	34.17 dB for C2
frame	6:	30.80 dB for L	32.38 dB for C1	30.67 dB for C2
frame	7:	29.40 dB for L	39.05 dB for C1	35.36 dB for C2
frame	8:	28.58 dB for L	37.69 dB for C1	37.02 dB for C2
frame	9:	30.64 dB for L	38.58 dB for C1	38.14 dB for C2
frame	10:	29.38 dB for L	39.32 dB for C1	38.90 dB for C2
frame	11:	38.35 dB for L	43.31 dB for C1	40.72 dB for C2
frame	12:	35.10 dB for L	41.76 dB for C1	40.04 dB for C2
frame	13:	29.74 dB for L	41.67 dB for C1	40.06 dB for C2
frame	14:	32.62 dB for L	41.50 dB for C1	40.16 dB for C2
frame	15:	34.14 dB for L	41.30 dB for C1	40.03 dB for C2
frame	16:	29.47 dB for L	30.46 dB for C1	39.97 dB for C2
frame	17:	29.34 dB for L	33.21 dB for C1	40.11 dB for C2
frame	18:	31.71 dB for L	37.22 dB for C1	40.43 dB for C2
frame	19:	34.28 dB for L	38.76 dB for C1	40.16 dB for C2
frame	20:	35.31 dB for L	39.78 dB for C1	40.31 dB for C2
frame	21:	40.93 dB for L	43.57 dB for C1	41.19 dB for C2
frame	22:	36.60 dB for L	41.25 dB for C1	40.20 dB for C2
frame	23:	35.63 dB for L	40.59 dB for C1	39.92 dB for C2
frame	24:	35.41 dB for L	40.14 dB for C1	39.95 dB for C2
frame	25:	29.53 dB for L	39.95 dB for C1	39.78 dB for C2
frame	26:	32.49 dB for L	40.01 dB for C1	39.70 dB for C2
frame	27:	29.98 dB for L	39.86 dB for C1	32.83 dB for C2
frame	28:	29.97 dB for L	40.62 dB for C1	36.81 dB for C2
frame	29:	29.54 dB for L	40.11 dB for C1	37.91 dB for C2
frame	30:	29.65 dB for L	39.91 dB for C1	37.99 dB for C2
frame	31:	40.12 dB for L	42.06 dB for C1	40.31 dB for C2
frame	32:	34.99 dB for L	40.72 dB for C1	39.25 dB for C2
frame	33:	32.97 dB for L	40.20 dB for C1	39.01 dB for C2
frame	34:	32.04 dB for L	39.74 dB for C1	38.63 dB for C2
frame	35:	33.71 dB for L	39.48 dB for C1	27.77 dB for C2
frame	36:	34.13 dB for L	39.10 dB for C1	38.55 dB for C2
frame	37:	28.23 dB for L	39.03 dB for C1	38.47 dB for C2
frame	38:	27.95 dB for L	38.83 dB for C1	38.60 dB for C2
frame	39:	28.11 dB for L	38.54 dB for C1	38.66 dB for C2
frame	40:	28.01 dB for L	38.00 dB for C1	38.66 dB for C2
frame	41:	38.56 dB for L	36.48 dB for C1	36.52 dB for C2
frame	42:	34.43 dB for L	37.24 dB for C1	37.09 dB for C2
frame	43:	35.70 dB for L	37.65 dB for C1	37.59 dB for C2
frame	44:	35.90 dB for L	37.68 dB for C1	37.58 dB for C2
frame	45:	33.18 dB for L	37.78 dB for C1	37.76 dB for C2
frame	46:	29.00 dB for L	37.89 dB for C1	37.88 dB for C2
frame	47:	29.83 dB for L	37.71 dB for C1	37.83 dB for C2
frame	48:	29.69 dB for L	37.63 dB for C1	37.74 dB for C2
frame	49:	32.06 dB for L	37.59 dB for C1	37.74 dB for C2
frame	50:	33.01 dB for L	37.58 dB for C1	37.60 dB for C2
frame	51:	37.90 dB for L	36.88 dB for C1	36.68 dB for C2
frame	52:	34.17 dB for L	37.51 dB for C1	36.68 dB for C2
frame	53:	38.13 dB for L	37.42 dB for C1	36.85 dB for C2
frame	54:	29.37 dB for L	32.09 dB for C1	30.68 dB for C2
frame	55:	32.40 dB for L	35.59 dB for C1	33.49 dB for C2
frame	56:	34.20 dB for L	36.83 dB for C1	34.84 dB for C2
frame	57:	34.92 dB for L	37.67 dB for C1	35.54 dB for C2
frame	58:	35.27 dB for L	38.01 dB for C1	36.06 dB for C2
frame	59:	35.63 dB for L	38.12 dB for C1	36.46 dB for C2
frame	60:	35.93 dB for L	38.43 dB for C1	36.70 dB for C2
frame	61:	36.43 dB for L	39.11 dB for C1	36.24 dB for C2
frame	62:	35.05 dB for L	39.35 dB for C1	36.64 dB for C2
frame	63:	37.30 dB for L	39.77 dB for C1	37.07 dB for C2
frame	64:	37.79 dB for L	40.02 dB for C1	37.43 dB for C2
frame	65:	37.36 dB for L	40.25 dB for C1	37.73 dB for C2
frame	66:	37.02 dB for L	40.15 dB for C1	37.87 dB for C2
frame	67:	36.94 dB for L	40.38 dB for C1	38.02 dB for C2
frame	68:	37.00 dB for L	40.41 dB for C1	38.11 dB for C2
frame	69:	36.93 dB for L	40.44 dB for C1	38.17 dB for C2
frame	70:	36.84 dB for L	40.44 dB for C1	38.25 dB for C2
frame	71:	36.37 dB for L	38.96 dB for C1	36.16 dB for C2
frame	72:	35.80 dB for L	39.50 dB for C1	36.95 dB for C2
frame	73:	37.83 dB for L	39.71 dB for C1	37.42 dB for C2
frame	74:	37.70 dB for L	39.68 dB for C1	37.68 dB for C2
frame	75:	37.82 dB for L	39.79 dB for C1	37.89 dB for C2
frame	76:	37.87 dB for L	40.09 dB for C1	38.08 dB for C2
frame	77:	37.80 dB for L	40.30 dB for C1	38.20 dB for C2
frame	78:	37.70 dB for L	40.09 dB for C1	38.29 dB for C2
frame	79:	37.63 dB for L	40.48 dB for C1	38.34 dB for C2
frame	80:	37.42 dB for L	40.62 dB for C1	38.38 dB for C2
frame	81:	36.42 dB for L	40.15 dB for C1	37.04 dB for C2
frame	82:	35.67 dB for L	40.24 dB for C1	37.53 dB for C2
frame	83:	28.39 dB for L	32.57 dB for C1	32.43 dB for C2
frame	84:	31.23 dB for L	36.49 dB for C1	34.21 dB for C2
frame	85:	33.17 dB for L	37.61 dB for C1	34.95 dB for C2
frame	86:	34.03 dB for L	38.24 dB for C1	35.66 dB for C2
frame	87:	34.99 dB for L	38.61 dB for C1	36.19 dB for C2
frame	88:	35.85 dB for L	38.97 dB for C1	36.64 dB for C2
frame	89:	36.47 dB for L	39.20 dB for C1	36.87 dB for C2
frame	90:	36.88 dB for L	39.51 dB for C1	36.91 dB for C2
frame	91:	35.11 dB for L	40.63 dB for C1	36.41 dB for C2
frame	92:	35.93 dB for L	40.98 dB for C1	37.04 dB for C2
frame	93:	36.92 dB for L	41.22 dB for C1	37.27 dB for C2
frame	94:	36.99 dB for L	41.28 dB for C1	37.49 dB for C2
frame	95:	36.88 dB for L	41.35 dB for C1	37.60 dB for C2
frame	96:	36.71 dB for L	41.39 dB for C1	37.73 dB for C2
frame	97:	36.16 dB for L	41.35 dB for C1	37.83 dB for C2
frame	98:	35.08 dB for L	41.21 dB for C1	37.72 dB for C2
frame	99:	34.04 dB for L	40.93 dB for C1	37.57 dB for C2
frame	100:	33.91 dB for L	40.66 dB for C1	37.50 dB for C2
frame	101:	35.43 dB for L	42.21 dB for C1	37.35 dB for C2
frame	102:	34.95 dB for L	41.29 dB for C1	37.41 dB for C2
frame	103:	34.35 dB for L	40.92 dB for C1	37.49 dB for C2
frame	104:	33.12 dB for L	40.69 dB for C1	37.44 dB for C2
frame	105:	31.92 dB for L	40.52 dB for C1	37.14 dB for C2
frame	106:	31.21 dB for L	40.30 dB for C1	36.74 dB for C2
frame	107:	30.82 dB for L	40.27 dB for C1	36.48 dB for C2
frame	108:	30.70 dB for L	40.23 dB for C1	36.38 dB for C2
frame	109:	30.82 dB for L	40.40 dB for C1	36.36 dB for C2
frame	110:	31.75 dB for L	40.58 dB for C1	36.86 dB for C2

FLOWER GARDEN 4 MBit/s

frame	1:	0 bits for coding vectors
frame	2:	37654 bits for coding vectors
frame	3:	39258 bits for coding vectors
frame	4:	38513 bits for coding vectors
frame	5:	35576 bits for coding vectors
frame	6:	36281 bits for coding vectors
frame	7:	37125 bits for coding vectors
frame	8:	36578 bits for coding vectors
frame	9:	34417 bits for coding vectors
frame	10:	33010 bits for coding vectors
frame	11:	0 bits for coding vectors
frame	12:	32785 bits for coding vectors
frame	13:	32284 bits for coding vectors
frame	14:	32138 bits for coding vectors
frame	15:	31979 bits for coding vectors
frame	16:	30360 bits for coding vectors
frame	17:	30704 bits for coding vectors
frame	18:	30226 bits for coding vectors
frame	19:	33097 bits for coding vectors
frame	20:	30614 bits for coding vectors
frame	21:	0 bits for coding vectors
frame	22:	31480 bits for coding vectors
frame	23:	30968 bits for coding vectors
frame	24:	31450 bits for coding vectors
frame	25:	30411 bits for coding vectors
frame	26:	31810 bits for coding vectors
frame	27:	33674 bits for coding vectors
frame	28:	32833 bits for coding vectors
frame	29:	31163 bits for coding vectors
frame	30:	32039 bits for coding vectors
frame	31:	0 bits for coding vectors
frame	32:	33537 bits for coding vectors
frame	33:	32673 bits for coding vectors
frame	34:	31352 bits for coding vectors
frame	35:	32372 bits for coding vectors
frame	36:	29572 bits for coding vectors
frame	37:	30191 bits for coding vectors
frame	38:	32239 bits for coding vectors
frame	39:	28951 bits for coding vectors
frame	40:	31969 bits for coding vectors
frame	41:	0 bits for coding vectors
frame	42:	39363 bits for coding vectors
frame	43:	34731 bits for coding vectors
frame	44:	34160 bits for coding vectors
frame	45:	35014 bits for coding vectors
frame	46:	32183 bits for coding vectors
frame	47:	41124 bits for coding vectors
frame	48:	36479 bits for coding vectors
frame	49:	33095 bits for coding vectors
frame	50:	31200 bits for coding vectors
frame	51:	0 bits for coding vectors
frame	52:	35124 bits for coding vectors
frame	53:	34860 bits for coding vectors
frame	54:	31040 bits for coding vectors
frame	55:	32416 bits for coding vectors
frame	56:	34050 bits for coding vectors
frame	57:	33017 bits for coding vectors
frame	58:	34480 bits for coding vectors
frame	59:	33080 bits for coding vectors
frame	60:	31114 bits for coding vectors
frame	61:	0 bits for coding vectors
frame	62:	29300 bits for coding vectors
frame	63:	29533 bits for coding vectors
frame	64:	30607 bits for coding vectors
frame	65:	32361 bits for coding vectors
frame	66:	32383 bits for coding vectors
frame	67:	29952 bits for coding vectors
frame	68:	29449 bits for coding vectors
frame	69:	31973 bits for coding vectors
frame	70:	31864 bits for coding vectors
frame	71:	0 bits for coding vectors
frame	72:	32196 bits for coding vectors
frame	73:	31009 bits for coding vectors
frame	74:	31267 bits for coding vectors
frame	75:	32418 bits for coding vectors
frame	76:	32011 bits for coding vectors
frame	77:	32126 bits for coding vectors
frame	78:	31220 bits for coding vectors
frame	79:	32938 bits for coding vectors
frame	80:	33583 bits for coding vectors
frame	81:	0 bits for coding vectors
frame	82:	30730 bits for coding vectors
frame	83:	34849 bits for coding vectors
frame	84:	36586 bits for coding vectors
frame	85:	34047 bits for coding vectors
frame	86:	31337 bits for coding vectors
frame	87:	30933 bits for coding vectors
frame	88:	33235 bits for coding vectors
frame	89:	39802 bits for coding vectors
frame	90:	39007 bits for coding vectors
frame	91:	0 bits for coding vectors
frame	92:	34725 bits for coding vectors
frame	93:	38282 bits for coding vectors
frame	94:	39666 bits for coding vectors
frame	95:	36480 bits for coding vectors
frame	96:	33937 bits for coding vectors
frame	97:	32082 bits for coding vectors
frame	98:	36269 bits for coding vectors
frame	99:	34065 bits for coding vectors
frame	100:	33123 bits for coding vectors
frame	101:	0 bits for coding vectors
frame	102:	32478 bits for coding vectors
frame	103:	34769 bits for coding vectors
frame	104:	39152 bits for coding vectors
frame	105:	38420 bits for coding vectors
frame	106:	37894 bits for coding vectors
frame	107:	43825 bits for coding vectors
frame	108:	44619 bits for coding vectors
frame	109:	40288 bits for coding vectors
frame	110:	37999 bits for coding vectors
frame	111:	0 bits for coding vectors
frame	112:	33507 bits for coding vectors
frame	113:	32614 bits for coding vectors
frame	114:	32139 bits for coding vectors
frame	115:	31154 bits for coding vectors
frame	116:	30724 bits for coding vectors
frame	117:	31605 bits for coding vectors
frame	118:	32540 bits for coding vectors
frame	119:	30491 bits for coding vectors
frame	120:	29480 bits for coding vectors
frame	121:	0 bits for coding vectors
frame	122:	32999 bits for coding vectors
frame	123:	30910 bits for coding vectors
frame	124:	32168 bits for coding vectors

Motion vector coding

frame 1:	0	bits for coding vectors
frame 2:	37634	bits for coding vectors
frame 3:	39258	bits for coding vectors
frame 4:	38513	bits for coding vectors
frame 5:	35574	bits for coding vectors
frame 6:	36281	bits for coding vectors
frame 7:	37125	bits for coding vectors
frame 8:	36578	bits for coding vectors
frame 9:	34417	bits for coding vectors
frame 10:	33010	bits for coding vectors
frame 11:	0	bits for coding vectors
frame 12:	32785	bits for coding vectors
frame 13:	32284	bits for coding vectors
frame 14:	32138	bits for coding vectors
frame 15:	31979	bits for coding vectors
frame 16:	30360	bits for coding vectors
frame 17:	30704	bits for coding vectors
frame 18:	30224	bits for coding vectors
frame 19:	33097	bits for coding vectors
frame 20:	30614	bits for coding vectors
frame 21:	0	bits for coding vectors
frame 22:	31480	bits for coding vectors
frame 23:	30968	bits for coding vectors
frame 24:	31450	bits for coding vectors
frame 25:	30611	bits for coding vectors
frame 26:	31810	bits for coding vectors
frame 27:	33674	bits for coding vectors
frame 28:	32833	bits for coding vectors
frame 29:	31163	bits for coding vectors
frame 30:	32039	bits for coding vectors
frame 31:	0	bits for coding vectors
frame 32:	33537	bits for coding vectors
frame 33:	32673	bits for coding vectors
frame 34:	31352	bits for coding vectors
frame 35:	32372	bits for coding vectors
frame 36:	29572	bits for coding vectors
frame 37:	30191	bits for coding vectors
frame 38:	32239	bits for coding vectors
frame 39:	28951	bits for coding vectors
frame 40:	31969	bits for coding vectors
frame 41:	0	bits for coding vectors
frame 42:	39363	bits for coding vectors
frame 43:	34731	bits for coding vectors
frame 44:	34160	bits for coding vectors
frame 45:	35014	bits for coding vectors
frame 46:	32183	bits for coding vectors
frame 47:	41124	bits for coding vectors
frame 48:	36479	bits for coding vectors
frame 49:	33095	bits for coding vectors
frame 50:	31200	bits for coding vectors
frame 51:	0	bits for coding vectors
frame 52:	35124	bits for coding vectors
frame 53:	34860	bits for coding vectors
frame 54:	31040	bits for coding vectors
frame 55:	32416	bits for coding vectors
frame 56:	34050	bits for coding vectors
frame 57:	33027	bits for coding vectors
frame 58:	34480	bits for coding vectors
frame 59:	33080	bits for coding vectors
frame 60:	31114	bits for coding vectors
frame 61:	0	bits for coding vectors
frame 62:	29300	bits for coding vectors
frame 63:	29533	bits for coding vectors
frame 64:	30607	bits for coding vectors
frame 65:	32361	bits for coding vectors
frame 66:	32383	bits for coding vectors
frame 67:	29982	bits for coding vectors
frame 68:	29449	bits for coding vectors
frame 69:	31973	bits for coding vectors
frame 70:	31864	bits for coding vectors
frame 71:	0	bits for coding vectors
frame 72:	32196	bits for coding vectors
frame 73:	31009	bits for coding vectors
frame 74:	31247	bits for coding vectors
frame 75:	32418	bits for coding vectors
frame 76:	32011	bits for coding vectors
frame 77:	32126	bits for coding vectors
frame 78:	31220	bits for coding vectors
frame 79:	32938	bits for coding vectors
frame 80:	33583	bits for coding vectors
frame 81:	0	bits for coding vectors
frame 82:	30730	bits for coding vectors
frame 83:	34849	bits for coding vectors
frame 84:	36586	bits for coding vectors
frame 85:	34047	bits for coding vectors
frame 86:	31337	bits for coding vectors
frame 87:	30933	bits for coding vectors
frame 88:	33235	bits for coding vectors
frame 89:	39802	bits for coding vectors
frame 90:	39007	bits for coding vectors
frame 91:	0	bits for coding vectors
frame 92:	34725	bits for coding vectors
frame 93:	38282	bits for coding vectors
frame 94:	39666	bits for coding vectors
frame 95:	36480	bits for coding vectors
frame 96:	33937	bits for coding vectors
frame 97:	32082	bits for coding vectors
frame 98:	36269	bits for coding vectors
frame 99:	34065	bits for coding vectors
frame 100:	33113	bits for coding vectors
frame 101:	0	bits for coding vectors
frame 102:	32478	bits for coding vectors
frame 103:	34769	bits for coding vectors
frame 104:	39152	bits for coding vectors
frame 105:	38620	bits for coding vectors
frame 106:	37894	bits for coding vectors
frame 107:	43825	bits for coding vectors
frame 108:	44619	bits for coding vectors
frame 109:	40288	bits for coding vectors
frame 110:	37999	bits for coding vectors
frame 111:	0	bits for coding vectors
frame 112:	33807	bits for coding vectors
frame 113:	32614	bits for coding vectors
frame 114:	32139	bits for coding vectors
frame 115:	31154	bits for coding vectors
frame 116:	30724	bits for coding vectors
frame 117:	31605	bits for coding vectors
frame 118:	32540	bits for coding vectors
frame 119:	30491	bits for coding vectors
frame 120:	29480	bits for coding vectors
frame 121:	0	bits for coding vectors
frame 122:	32999	bits for coding vectors
frame 123:	30910	bits for coding vectors
frame 124:	32168	bits for coding vectors

POPPLE 9 MBit/s

frame 1:	34.76 dB for L	42.01 dB for C1	38.83 dB for C2
frame 2:	33.55 dB for L	36.54 dB for C1	35.15 dB for C2
frame 3:	33.23 dB for L	36.61 dB for C1	35.30 dB for C2
frame 4:	33.06 dB for L	36.05 dB for C1	34.80 dB for C2
frame 5:	32.96 dB for L	36.21 dB for C1	35.02 dB for C2
frame 6:	32.96 dB for L	35.79 dB for C1	34.48 dB for C2
frame 7:	32.74 dB for L	35.83 dB for C1	34.56 dB for C2
frame 8:	32.78 dB for L	35.74 dB for C1	34.19 dB for C2
frame 9:	32.79 dB for L	35.64 dB for C1	34.17 dB for C2
frame 10:	32.79 dB for L	35.38 dB for C1	33.92 dB for C2
frame 11:	34.65 dB for L	42.31 dB for C1	38.88 dB for C2
frame 12:	33.63 dB for L	36.68 dB for C1	35.13 dB for C2
frame 13:	33.21 dB for L	36.60 dB for C1	35.16 dB for C2
frame 14:	33.02 dB for L	36.11 dB for C1	34.60 dB for C2
frame 15:	33.05 dB for L	36.06 dB for C1	34.43 dB for C2
frame 16:	33.02 dB for L	36.06 dB for C1	34.37 dB for C2
frame 17:	33.02 dB for L	36.17 dB for C1	34.50 dB for C2
frame 18:	33.08 dB for L	36.06 dB for C1	34.34 dB for C2
frame 19:	33.05 dB for L	35.75 dB for C1	34.24 dB for C2
frame 20:	33.09 dB for L	35.74 dB for C1	34.20 dB for C2
frame 21:	34.57 dB for L	42.18 dB for C1	38.70 dB for C2
frame 22:	33.56 dB for L	36.23 dB for C1	34.96 dB for C2
frame 23:	33.06 dB for L	36.26 dB for C1	35.00 dB for C2
frame 24:	32.88 dB for L	35.82 dB for C1	34.53 dB for C2
frame 25:	32.79 dB for L	35.70 dB for C1	34.31 dB for C2
frame 26:	32.82 dB for L	35.64 dB for C1	34.24 dB for C2
frame 27:	32.86 dB for L	35.93 dB for C1	34.27 dB for C2
frame 28:	32.82 dB for L	35.93 dB for C1	34.11 dB for C2
frame 29:	32.87 dB for L	35.86 dB for C1	34.33 dB for C2
frame 30:	32.77 dB for L	35.58 dB for C1	34.19 dB for C2
frame 31:	34.59 dB for L	42.45 dB for C1	39.36 dB for C2
frame 32:	33.48 dB for L	36.53 dB for C1	35.25 dB for C2
frame 33:	33.10 dB for L	35.86 dB for C1	34.76 dB for C2
frame 34:	32.77 dB for L	35.83 dB for C1	34.54 dB for C2
frame 35:	32.54 dB for L	35.64 dB for C1	34.13 dB for C2
frame 36:	32.55 dB for L	35.58 dB for C1	34.17 dB for C2
frame 37:	32.68 dB for L	35.38 dB for C1	34.03 dB for C2
frame 38:	32.52 dB for L	35.70 dB for C1	34.23 dB for C2
frame 39:	32.63 dB for L	35.61 dB for C1	34.06 dB for C2
frame 40:	32.44 dB for L	35.73 dB for C1	34.24 dB for C2
frame 41:	34.77 dB for L	42.42 dB for C1	39.00 dB for C2
frame 42:	33.37 dB for L	36.66 dB for C1	35.18 dB for C2
frame 43:	32.94 dB for L	36.69 dB for C1	34.89 dB for C2
frame 44:	31.80 dB for L	36.10 dB for C1	34.55 dB for C2
frame 45:	31.45 dB for L	36.06 dB for C1	34.49 dB for C2
frame 46:	31.33 dB for L	35.73 dB for C1	34.14 dB for C2
frame 47:	31.27 dB for L	35.94 dB for C1	34.31 dB for C2
frame 48:	31.33 dB for L	35.62 dB for C1	34.23 dB for C2
frame 49:	30.00 dB for L	35.72 dB for C1	34.00 dB for C2
frame 50:	29.86 dB for L	35.75 dB for C1	33.92 dB for C2
frame 51:	34.25 dB for L	42.32 dB for C1	38.64 dB for C2
frame 52:	31.41 dB for L	36.67 dB for C1	34.63 dB for C2
frame 53:	31.01 dB for L	36.02 dB for C1	34.36 dB for C2
frame 54:	31.01 dB for L	35.88 dB for C1	34.18 dB for C2
frame 55:	30.66 dB for L	35.50 dB for C1	34.11 dB for C2
frame 56:	30.07 dB for L	35.77 dB for C1	34.28 dB for C2
frame 57:	30.57 dB for L	35.31 dB for C1	34.13 dB for C2
frame 58:	30.13 dB for L	35.33 dB for C1	34.32 dB for C2
frame 59:	30.59 dB for L	35.20 dB for C1	34.04 dB for C2
frame 60:	30.93 dB for L	35.14 dB for C1	34.24 dB for C2
frame 61:	34.19 dB for L	43.29 dB for C1	41.17 dB for C2
frame 62:	33.83 dB for L	35.95 dB for C1	35.26 dB for C2
frame 63:	33.12 dB for L	35.69 dB for C1	34.56 dB for C2
frame 64:	32.99 dB for L	35.26 dB for C1	34.30 dB for C2
frame 65:	33.10 dB for L	35.25 dB for C1	34.43 dB for C2
frame 66:	33.36 dB for L	35.03 dB for C1	33.86 dB for C2
frame 67:	33.16 dB for L	34.81 dB for C1	33.82 dB for C2
frame 68:	33.01 dB for L	34.69 dB for C1	33.88 dB for C2
frame 69:	33.23 dB for L	34.53 dB for C1	33.98 dB for C2
frame 70:	33.13 dB for L	34.81 dB for C1	33.96 dB for C2
frame 71:	38.52 dB for L	43.60 dB for C1	41.39 dB for C2
frame 72:	34.37 dB for L	35.16 dB for C1	34.56 dB for C2
frame 73:	33.74 dB for L	34.50 dB for C1	33.97 dB for C2
frame 74:	33.21 dB for L	34.51 dB for C1	34.05 dB for C2

frame 1: 0 bits for coding vectors
frame 2: 52984 bits for coding vectors
frame 3: 52263 bits for coding vectors
frame 4: 52603 bits for coding vectors
frame 5: 52075 bits for coding vectors
frame 6: 52189 bits for coding vectors
frame 7: 51854 bits for coding vectors
frame 8: 52721 bits for coding vectors
frame 9: 52125 bits for coding vectors
frame 10: 52341 bits for coding vectors
frame 11: 0 bits for coding vectors
frame 12: 52302 bits for coding vectors
frame 13: 53144 bits for coding vectors
frame 14: 52783 bits for coding vectors
frame 15: 52385 bits for coding vectors
frame 16: 52509 bits for coding vectors
frame 17: 52277 bits for coding vectors
frame 18: 52617 bits for coding vectors
frame 19: 52059 bits for coding vectors
frame 20: 52384 bits for coding vectors
frame 21: 0 bits for coding vectors
frame 22: 52323 bits for coding vectors
frame 23: 52939 bits for coding vectors
frame 24: 52450 bits for coding vectors
frame 25: 52981 bits for coding vectors
frame 26: 52749 bits for coding vectors
frame 27: 52820 bits for coding vectors
frame 28: 52784 bits for coding vectors
frame 29: 53024 bits for coding vectors
frame 30: 52402 bits for coding vectors
frame 31: 0 bits for coding vectors
frame 32: 52625 bits for coding vectors
frame 33: 52797 bits for coding vectors
frame 34: 53301 bits for coding vectors
frame 35: 53386 bits for coding vectors
frame 36: 53157 bits for coding vectors
frame 37: 52841 bits for coding vectors
frame 38: 53140 bits for coding vectors
frame 39: 52747 bits for coding vectors
frame 40: 52893 bits for coding vectors
frame 41: 0 bits for coding vectors
frame 42: 53069 bits for coding vectors
frame 43: 53727 bits for coding vectors
frame 44: 53086 bits for coding vectors
frame 45: 53333 bits for coding vectors
frame 46: 53725 bits for coding vectors
frame 47: 53492 bits for coding vectors
frame 48: 54872 bits for coding vectors
frame 49: 55853 bits for coding vectors
frame 50: 55051 bits for coding vectors
frame 51: 0 bits for coding vectors
frame 52: 55406 bits for coding vectors
frame 53: 55385 bits for coding vectors
frame 54: 55394 bits for coding vectors
frame 55: 57392 bits for coding vectors
frame 56: 56140 bits for coding vectors
frame 57: 56799 bits for coding vectors
frame 58: 57136 bits for coding vectors
frame 59: 57357 bits for coding vectors
frame 60: 57915 bits for coding vectors
frame 61: 0 bits for coding vectors
frame 62: 58677 bits for coding vectors
frame 63: 58446 bits for coding vectors
frame 64: 58465 bits for coding vectors
frame 65: 59483 bits for coding vectors
frame 66: 59543 bits for coding vectors
frame 67: 60546 bits for coding vectors
frame 68: 60434 bits for coding vectors
frame 69: 59179 bits for coding vectors
frame 70: 60327 bits for coding vectors
frame 71: 0 bits for coding vectors
frame 72: 61053 bits for coding vectors
frame 73: 60631 bits for coding vectors
frame 74: 62266 bits for coding vectors
frame 75: 62336 bits for coding vectors
frame 76: 61495 bits for coding vectors
frame 77: 61830 bits for coding vectors
frame 78: 61711 bits for coding vectors
frame 79: 61275 bits for coding vectors
frame 80: 62148 bits for coding vectors
frame 81: 0 bits for coding vectors
frame 82: 60843 bits for coding vectors
frame 83: 60596 bits for coding vectors
frame 84: 60870 bits for coding vectors
frame 85: 61535 bits for coding vectors
frame 86: 60003 bits for coding vectors
frame 87: 60984 bits for coding vectors
frame 88: 59654 bits for coding vectors
frame 89: 60566 bits for coding vectors
frame 90: 60732 bits for coding vectors
frame 91: 0 bits for coding vectors
frame 92: 60905 bits for coding vectors
frame 93: 60110 bits for coding vectors
frame 94: 59925 bits for coding vectors
frame 95: 60037 bits for coding vectors
frame 96: 60973 bits for coding vectors
frame 97: 59934 bits for coding vectors
frame 98: 60103 bits for coding vectors
frame 99: 60672 bits for coding vectors
frame 100: 59486 bits for coding vectors
frame 101: 0 bits for coding vectors
frame 102: 59538 bits for coding vectors
frame 103: 60130 bits for coding vectors
frame 104: 59428 bits for coding vectors
frame 105: 59376 bits for coding vectors
frame 106: 58651 bits for coding vectors
frame 107: 58981 bits for coding vectors
frame 108: 59154 bits for coding vectors
frame 109: 58257 bits for coding vectors
frame 110: 57873 bits for coding vectors
frame 111: 0 bits for coding vectors
frame 112: 57851 bits for coding vectors
frame 113: 59573 bits for coding vectors
frame 114: 58383 bits for coding vectors
frame 115: 58673 bits for coding vectors
frame 116: 60176 bits for coding vectors
frame 117: 58873 bits for coding vectors
frame 118: 59949 bits for coding vectors
frame 119: 58799 bits for coding vectors
frame 120: 58321 bits for coding vectors
frame 121: 0 bits for coding vectors
frame 122: 57582 bits for coding vectors
frame 123: 58293 bits for coding vectors
frame 124: 57810 bits for coding vectors

CUMULATIVE BIT COUNT (CBC) AFTER 10 FRAMES of POP 9 MBit/s

frame 10:	3286036 bits	140140 bits	155344 bits	471175 bits	3581520 bits
frame 20:	6573676 bits	278497 bits	309195 bits	943805 bits	7161368 bits
frame 30:	9857670 bits	419731 bits	465642 bits	1418277 bits	10743043 bits
frame 40:	13144098 bits	560141 bits	621378 bits	1895164 bits	14325617 bits
frame 50:	16438009 bits	704242 bits	779663 bits	2381372 bits	17921914 bits
frame 60:	19711222 bits	856219 bits	945623 bits	2890296 bits	21513064 bits
frame 70:	22985612 bits	1008879 bits	1105318 bits	3425596 bits	25099809 bits
frame 80:	26263321 bits	1165042 bits	1265769 bits	3980338 bits	28694132 bits
frame 90:	29726873 bits	1374943 bits	1448504 bits	4526123 bits	32550320 bits
frame100:	33044710 bits	1615702 bits	1658479 bits	5068268 bits	36318891 bits
frame110:	36159010 bits	1907208 bits	1926768 bits	5599558 bits	39992986 bits
frame120:	39313572 bits	2179824 bits	2171446 bits	6130156 bits	43664842 bits

CUMULATIVE BIT COUNT (CBC) AFTER 10 FRAMES of Flower 9 MBit/s

frame 10:	3209896 bits	164814 bits	157695 bits	328412 bits	3532405 bits
frame 20:	6443268 bits	327102 bits	310857 bits	612599 bits	7081247 bits
frame 30:	9691580 bits	481270 bits	463614 bits	898627 bits	10636464 bits
frame 40:	12935672 bits	637611 bits	624769 bits	1181483 bits	14198052 bits
frame 50:	16165976 bits	800043 bits	804017 bits	1498832 bits	17770036 bits
frame 60:	19441557 bits	962013 bits	984541 bits	1798013 bits	21368111 bits
frame 70:	22684278 bits	1109927 bits	1180425 bits	2075435 bits	24974630 bits
frame 80:	25980208 bits	1269402 bits	1373897 bits	2364203 bits	28623507 bits
frame 90:	29255507 bits	1438498 bits	1557857 bits	2674729 bits	32248862 bits
frame100:	32507766 bits	1610363 bits	1744133 bits	2993348 bits	35862262 bits
frame110:	35754691 bits	1791134 bits	1939453 bits	3342992 bits	39485278 bits
frame120:	39010201 bits	1955296 bits	2121686 bits	3627246 bits	43087183 bits

CUMULATIVE BIT COUNT (CBC) AFTER 10 FRAMES of FLOWER 4 MBit/s

frame 10:	1474802 bits	73181 bits	74679 bits	328412 bits	1622662 bits
frame 20:	2954248 bits	144944 bits	146401 bits	612599 bits	3245593 bits
frame 30:	4434718 bits	216755 bits	219531 bits	898627 bits	4871004 bits
frame 40:	5915376 bits	288211 bits	292411 bits	1181483 bits	6495998 bits
frame 50:	7397555 bits	358823 bits	365538 bits	1498832 bits	8121916 bits
frame 60:	8886904 bits	426942 bits	437381 bits	1798013 bits	9751227 bits
frame 70:	10375223 bits	494846 bits	508855 bits	2075435 bits	11378924 bits
frame 80:	11867069 bits	559822 bits	579437 bits	2364203 bits	13006328 bits
frame 90:	13366927 bits	624472 bits	651151 bits	2674729 bits	14642550 bits
frame100:	14854494 bits	689738 bits	722253 bits	2993348 bits	16266485 bits
frame110:	16349082 bits	755554 bits	793167 bits	3342992 bits	17897803 bits
frame120:	17831017 bits	820507 bits	862874 bits	3627246 bits	19514398 bits

CUMULATIVE BIT COUNT (CBC) AFTER 10 FRAMES of TENNIS 9 MBit/s

frame 10:	3233969 bits	186802 bits	299132 bits	325940 bits	3719903 bits
frame 20:	6524004 bits	387548 bits	421330 bits	667672 bits	7332882 bits
frame 30:	9910637 bits	546489 bits	586399 bits	1013641 bits	11043525 bits
frame 40:	13448189 bits	740353 bits	715392 bits	1364491 bits	14903934 bits
frame 50:	16770801 bits	895322 bits	826233 bits	1721469 bits	18492356 bits
frame 60:	20064478 bits	1052553 bits	955878 bits	2007593 bits	22072909 bits
frame 70:	23413023 bits	1182516 bits	1050519 bits	2240635 bits	25644058 bits
frame 80:	26762872 bits	1308484 bits	1142344 bits	2466650 bits	29213700 bits
frame 90:	30055442 bits	1454630 bits	1271492 bits	2678014 bits	32781564 bits
frame100:	33420434 bits	1583629 bits	1362530 bits	2849390 bits	36366593 bits
frame110:	36760206 bits	1723471 bits	1469879 bits	3057453 bits	39953586 bits

CUMULATIVE BIT COUNT (CBC) AFTER 10 FRAMES of TENNIS 4 Mbit/s

frame 10:	1462548 bits	69347 bits	72931 bits	325940 bits	1604826 bits
frame 20:	2868499 bits	148893 bits	152524 bits	667672 bits	3189916 bits
frame 30:	4309837 bits	227580 bits	231634 bits	1013641 bits	4769051 bits
frame 40:	5735331 bits	308709 bits	310843 bits	1364491 bits	6354803 bits
frame 50:	7169092 bits	389270 bits	390832 bits	1721469 bits	7949194 bits
frame 60:	8581065 bits	490315 bits	492371 bits	2007593 bits	9563751 bits
frame 70:	10027357 bits	563668 bits	569795 bits	2240635 bits	11160820 bits
frame 80:	11479289 bits	639401 bits	646633 bits	2466650 bits	12765323 bits
frame 90:	12903342 bits	741160 bits	750823 bits	2678014 bits	14395125 bits

frame100: 14356633 bits	814509 bits	829615 bits	2849390 bits	16000757 bits
frame110: 15819739 bits	888953 bits	909239 bits	3057453 bits	17617931 bits
frame120: 17280884 bits	961937 bits	988309 bits	3260279 bits	19231130 bits

CUMULATIVE BIT COUNT (CBC) AFTER 10 FRAMES of MOB 9 MBit/s

frame 10: 3293242 bits	140175 bits	152290 bits	132747 bits	3585707 bits
frame 20: 6589069 bits	281836 bits	303861 bits	267926 bits	7174766 bits
frame 30: 9879823 bits	423096 bits	454927 bits	400732 bits	10757846 bits
frame 40: 13139451 bits	559104 bits	600621 bits	530684 bits	14299376 bits
frame 50: 16441513 bits	698026 bits	748718 bits	661876 bits	17888257 bits
frame 60: 19726899 bits	842016 bits	903892 bits	792693 bits	21472907 bits
frame 70: 23015923 bits	987669 bits	1042558 bits	926476 bits	25066150 bits
frame 80: 26300176 bits	1133980 bits	1229220 bits	1063870 bits	28663376 bits
frame 90: 29568721 bits	1282105 bits	1388577 bits	1200478 bits	32239803 bits
frame100: 32870167 bits	1430760 bits	1551091 bits	1335954 bits	35852018 bits
frame110: 36177679 bits	1583731 bits	1718783 bits	1468740 bits	39480193 bits
frame120: 39437950 bits	1734474 bits	1896707 bits	1598550 bits	43069131 bits

CUMULATIVE BIT COUNT (CBC) AFTER 10 FRAMES of MOB 4 MBit/s

frame 10: 1451239 bits	78619 bits	80597 bits	132747 bits	1610455 bits
frame 20: 2901187 bits	157938 bits	162562 bits	267926 bits	3221687 bits
frame 30: 4356405 bits	237318 bits	243836 bits	400732 bits	4837559 bits
frame 40: 5806042 bits	316371 bits	325518 bits	530684 bits	6447931 bits
frame 50: 7249749 bits	396165 bits	406103 bits	661876 bits	8052017 bits
frame 60: 8699898 bits	477337 bits	488859 bits	792693 bits	9666094 bits
frame 70: 10142188 bits	561342 bits	571906 bits	926476 bits	11275428 bits
frame 80: 11590358 bits	644991 bits	654553 bits	1063870 bits	12889902 bits
frame 90: 13040318 bits	727400 bits	736485 bits	1200478 bits	14504203 bits
frame100: 14482980 bits	810246 bits	818253 bits	1335954 bits	16111499 bits
frame110: 15927497 bits	893863 bits	901804 bits	1468740 bits	17723164 bits
frame120: 17368187 bits	977479 bits	985456 bits	1598550 bits	19331122 bits

ANNEX 5

Code Tables for VLC

Table 1

-128 : 1111111101011010
-127 : 1111111101011001
-126 : 1111111101011100
-125 : 1111111101011011
-124 : 1111111101010110
-123 : 1111111101010101
-122 : 1111111101011000
-121 : 1111111101010111
-120 : 1111111101011101
-119 : 1111111101100011
-118 : 1111111101100010
-117 : 1111111101100101
-116 : 1111111101100100
-115 : 1111111101011111
-114 : 1111111101011110
-113 : 1111111101100001
-112 : 1111111101100000
-111 : 1111111101001001
-110 : 1111111101001000
-109 : 1111111101001011
-108 : 1111111101001010
-107 : 1111111101000101
-106 : 1111111101000100
-105 : 1111111101000111
-104 : 1111111101000110
-103 : 1111111101001100
-102 : 1111111101010010
-101 : 1111111101010001
-100 : 1111111101010100
-99 : 1111111101010011
-98 : 1111111101001110
-97 : 1111111101001101
-96 : 1111111101010000
-95 : 1111111101001111
-94 : 1111111101111100
-93 : 1111111101111011
-92 : 1111111101111110
-91 : 1111111101111101
-90 : 1111111101111000
-89 : 1111111101110111
-88 : 1111111101111010
-87 : 1111111101111001
-86 : 1111111101111111
-85 : 1111111110000101
-84 : 1111111110000100
-83 : 1111111110000111
-82 : 1111111110000110
-81 : 1111111110000001
-80 : 1111111110000000
-79 : 1111111110000011
-78 : 1111111110000010
-77 : 1111111101101011
-76 : 1111111101101010
-75 : 1111111101101101
-74 : 1111111101101100
-73 : 1111111101100111
-72 : 1111111101100110
-71 : 1111111101101001
-70 : 1111111101101000
-69 : 1111111101101110
-68 : 1111111101110100
-67 : 1111111101110011
-66 : 1111111101110110
-65 : 1111111101110101
-64 : 1111111101110000
-63 : 1111111101101111
-62 : 1111111101110010
-61 : 1111111101110001
-60 : 1111111100100000
-59 : 1111111100100001
-58 : 1111111100100010
-57 : 1111111100011101
-56 : 1111111100011110
-55 : 1111111100011111
-54 : 1111111100100011
-53 : 1111111100100111
-52 : 1111111100101000
-51 : 1111111100101001
-50 : 1111111100100100
-49 : 1111111100100101
-48 : 1111111100100110
-47 : 1111111100010011
-46 : 1111111100010100
-45 : 1111111100010101
-44 : 1111111100010000
-43 : 1111111100010001
-42 : 1111111100010010
-41 : 1111111100010110
-40 : 1111111100011010
-39 : 1111111100011011
-38 : 1111111100011100
-37 : 1111111100010111
-36 : 1111111100011000
-35 : 1111111100011001
-34 : 1111111100111010
-33 : 1111111100111011
-32 : 1111111100111100
-31 : 1111111100110111
-30 : 1111111100111000
-29 : 1111111100111001
-28 : 1111111100111101
-27 : 1111111101000001
-26 : 1111111101000010
-25 : 1111111101000011
-24 : 1111111100111110
-23 : 1111111100111111
-22 : 1111111101000000
-21 : 1111111100101101
-20 : 1111111100101110
-19 : 1111111100101111
-18 : 1111111100101010
-17 : 1111111100101011
-16 : 1111111100101100
-15 : 1111111100110000
-14 : 1111111100110100
-13 : 1111111100110101
-12 : 1111111100110110
-11 : 1111111100110001
-10 : 1111111100110010
-9 : 1111111100110011
-8 : 111111110000
-7 : 111111101
-6 : 11111101
-5 : 1111100
-4 : 111100
-3 : 11101
-2 : 1100
-1 : 100
0 : 0
1 : 101
2 : 1101
3 : 11100
4 : 111101
5 : 1111101
6 : 11111100
7 : 111111100
8 : 1111111111010111
9 : 1111111111011000
10 : 1111111111011001
11 : 1111111111010110
12 : 1111111111010011
13 : 1111111111010100
14 : 1111111111010101
15 : 1111111111011010
16 : 1111111111011111
17 : 1111111111100000
18 : 1111111111100001
19 : 1111111111011110
20 : 1111111111011011
21 : 1111111111011100
22 : 1111111111011101
23 : 1111111111001000
24 : 1111111111001001
25 : 1111111111001010
26 : 1111111111000111
27 : 1111111111000100
28 : 1111111111000101
29 : 1111111111000110
30 : 1111111111001011
31 : 1111111111010000
32 : 1111111111010001
33 : 1111111111010010
34 : 1111111111001111
35 : 1111111111001100
36 : 1111111111001101
37 : 1111111111001110
38 : 1111111111110101
39 : 1111111111110110
40 : 1111111111110111
41 : 1111111111110100
42 : 1111111111110001
43 : 1111111111110010
44 : 1111111111110011
45 : 1111111111111000
46 : 1111111111111101
47 : 1111111111111110
48 : 1111111111111111
49 : 1111111111111100
50 : 1111111111111001
51 : 1111111111111010
52 : 1111111111111011
53 : 1111111111100110
54 : 1111111111100111
55 : 1111111111101000
56 : 1111111111100101
57 : 1111111111100010
58 : 1111111111100011
59 : 1111111111100100
60 : 1111111111101001
61 : 1111111111101110
62 : 1111111111101111
63 : 1111111111110000
64 : 1111111111101101
65 : 1111111111101010
66 : 1111111111101011
67 : 1111111111101100
68 : 1111111110011011
69 : 1111111110011100
70 : 1111111110011101
71 : 1111111110011010
72 : 1111111110010111
73 : 1111111110011000
74 : 1111111110011001
75 : 1111111110011110
76 : 1111111110100011
77 : 1111111110100100
78 : 1111111110100101
79 : 1111111110100010
80 : 1111111110011111
81 : 1111111110100000
82 : 1111111110100001
83 : 1111111110001100
84 : 1111111110001101
85 : 1111111110001110
86 : 1111111110001011
87 : 1111111110001000
88 : 1111111110001001
89 : 1111111110001010
90 : 1111111110001111
91 : 1111111110010100
92 : 1111111110010101
93 : 1111111110010110
94 : 1111111110010011
95 : 1111111110010000
96 : 1111111110010001
97 : 1111111110010010
98 : 1111111110111001
99 : 1111111110111010
100 : 1111111110111011
101 : 1111111110111000
102 : 1111111110110101
103 : 1111111110110110
104 : 1111111110110111
105 : 1111111110111100
106 : 1111111111000001
107 : 1111111111000010
108 : 1111111111000011
109 : 1111111111000000
110 : 1111111110111101
111 : 1111111110111110
112 : 1111111110111111
113 : 1111111110101010
114 : 1111111110101011
115 : 1111111110101100
116 : 1111111110101001
117 : 1111111110100110
118 : 1111111110100111
119 : 1111111110101000
120 : 1111111110101101
121 : 1111111110110010
122 : 1111111110110011
123 : 1111111110110100
124 : 1111111110110001
125 : 1111111110101110
126 : 1111111110101111
127 : 1111111110110000

Table 1

0 : 010
1 : 011
2 : 000
3 : 001
4 : 1010
5 : 1011
6 : 1000
7 : 1001
8 : 11010
9 : 11011
10 : 11000
11 : 11001
12 : 111010
13 : 111011
14 : 111000
15 : 111001
16 : 1111010
17 : 1111011
18 : 1111000
19 : 1111001
20 : 11111010
21 : 11111011
22 : 11111000
23 : 11111001
24 : 111111010
25 : 111111011
26 : 111111000
27 : 111111001
28 : 1111111010
29 : 1111111011
30 : 1111111000
31 : 1111111001
32 : 11111111000
33 : 1111111110010000
34 : 1111111101100000
35 : 1111111101100001
36 : 1111111101011111
37 : 1111111101011101
38 : 1111111101011110
39 : 1111111101100010
40 : 1111111101100110
41 : 1111111101100111
42 : 1111111101100101
43 : 1111111101100011
44 : 1111111101100100
45 : 1111111101011100
46 : 1111111101010100
47 : 1111111101010101
48 : 1111111101010011

49 : 1111111101010001
50 : 1111111101010010
51 : 1111111101010110
52 : 1111111101011010
53 : 1111111101011011
54 : 1111111101011001
55 : 1111111101010111
56 : 1111111101011000
57 : 1111111101101000
58 : 1111111101111000
59 : 1111111101111001
60 : 1111111101110111
61 : 1111111101110101
62 : 1111111101110110
63 : 1111111101111010
64 : 1111111101111110
65 : 1111111101111111
66 : 1111111101111101
67 : 1111111101111011
68 : 1111111101111100
69 : 1111111101110100
70 : 1111111101101100
71 : 1111111101101101
72 : 1111111101101011
73 : 1111111101101001
74 : 1111111101101010
75 : 1111111101101110
76 : 1111111101110010
77 : 1111111101110011
78 : 1111111101110001
79 : 1111111101101111
80 : 1111111101110000
81 : 1111111100110001
82 : 1111111100110010
83 : 1111111100110000
84 : 1111111100101110
85 : 1111111100101111
86 : 1111111100110011
87 : 1111111100110111
88 : 1111111100111000
89 : 1111111100110110
90 : 1111111100110100
91 : 1111111100110101
92 : 1111111100101101
93 : 1111111100100101
94 : 1111111100100110
95 : 1111111100100100
96 : 1111111100100010
97 : 1111111100100011
98 : 1111111100100111
99 : 1111111100101011
100 : 1111111100101100
101 : 1111111100101010
102 : 1111111100101000
103 : 1111111100101001
104 : 1111111100111001
105 : 1111111101001001
106 : 1111111101001010
107 : 1111111101001000
108 : 1111111101000110
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110 : 1111111101001011
111 : 1111111101001111
112 : 1111111101010000
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114 : 1111111101001100
115 : 1111111101001101
116 : 1111111101000101
117 : 1111111100111101
118 : 1111111100111110
119 : 1111111100111100
120 : 1111111100111010
121 : 1111111100111011
122 : 1111111100111111
123 : 1111111101000011
124 : 1111111101000100
125 : 1111111101000010
126 : 1111111101000000
127 : 1111111101000001
128 : 1111111111010101
129 : 1111111111010100
130 : 1111111111010111
131 : 1111111111010110
132 : 1111111111010001
133 : 1111111111010000
134 : 1111111111010011
135 : 1111111111010010
136 : 1111111111011101
137 : 1111111111011100
138 : 1111111111011111
139 : 1111111111011110
140 : 1111111111011001
141 : 1111111111011000
142 : 1111111111011011
143 : 1111111111011010
144 : 1111111111000101
145 : 1111111111000100
146 : 1111111111000111
147 : 1111111111000110
148 : 1111111111000001
149 : 1111111111000000
150 : 1111111111000011
151 : 1111111111000010
152 : 1111111111001101
153 : 1111111111001100
154 : 1111111111001111
155 : 1111111111001110
156 : 1111111111001001
157 : 1111111111001000
158 : 1111111111001011
159 : 1111111111001010
160 : 1111111111110101
161 : 1111111111110100
162 : 1111111111110111
163 : 1111111111110110
164 : 1111111111110001
165 : 1111111111110000
166 : 1111111111110011
167 : 1111111111110010
168 : 1111111111111101
169 : 1111111111111100
170 : 1111111111111111
171 : 1111111111111110
172 : 1111111111111001
173 : 1111111111111000
174 : 1111111111111011
175 : 1111111111111010
176 : 1111111111100101
177 : 1111111111100100
178 : 1111111111100111
179 : 1111111111100110
180 : 1111111111100001
181 : 1111111111100000
182 : 1111111111100011
183 : 1111111111100010
184 : 1111111111101101
185 : 1111111111101100
186 : 1111111111101111
187 : 1111111111101110
188 : 1111111111101001
189 : 1111111111101000
190 : 1111111111101011
191 : 1111111111101010
192 : 1111111110010101
193 : 1111111110010100
194 : 1111111110010111
195 : 1111111110010110
196 : 1111111110010001
197 : 1111111110010000
198 : 1111111110010011
199 : 1111111110010010
200 : 1111111110011101
201 : 1111111110011100
202 : 1111111110011111
203 : 1111111110011110
204 : 1111111110011001
205 : 1111111110011000
206 : 1111111110011011
207 : 1111111110011010
208 : 1111111110000101
209 : 1111111110000100
210 : 1111111110000111
211 : 1111111110000110
212 : 1111111110000001
213 : 1111111110000000
214 : 1111111110000011
215 : 1111111110000010
216 : 1111111110001101
217 : 1111111110001100
218 : 1111111110001111
219 : 1111111110001110
220 : 1111111110001001
221 : 1111111110001000
222 : 1111111110001011
223 : 1111111110001010
224 : 1111111110110101
225 : 1111111110110100
226 : 1111111110110111
227 : 1111111110110110
228 : 1111111110110001
229 : 1111111110110000
230 : 1111111110110011
231 : 1111111110110010
232 : 1111111110111101
233 : 1111111110111100
234 : 1111111110111111
235 : 1111111110111110
236 : 1111111110111001
237 : 1111111110111000
238 : 1111111110111011
239 : 1111111110111010
240 : 1111111110100101
241 : 1111111110100100
242 : 1111111110100111
243 : 1111111110100110
244 : 1111111110100001
245 : 1111111110100000
246 : 1111111110100011
247 : 1111111110100010
248 : 1111111110101101
249 : 1111111110101100
250 : 1111111110101111
251 : 1111111110101110
252 : 1111111110101001
253 : 1111111110101000
254 : 1111111110101011
255 : 1111111110101010

Table 2

-128 : 1111111101011110
-127 : 1111111101011101
-126 : 1111111101100000
-125 : 1111111101011111
-124 : 1111111101011010
-123 : 1111111101011001
-122 : 1111111101011100
-121 : 1111111101011011
-120 : 1111111101100001
-119 : 1111111101100111
-118 : 1111111101100110
-117 : 1111111101101001
-116 : 1111111101101000
-115 : 1111111101100011
-114 : 1111111101100010
-113 : 1111111101100101
-112 : 1111111101100100
-111 : 1111111101011000
-110 : 1111111101001100
-109 : 1111111101001011
-108 : 1111111101001110
-107 : 1111111101001101
-106 : 1111111101001000
-105 : 1111111101000111
-104 : 1111111101001010
-103 : 1111111101001001
-102 : 1111111101001111
-101 : 1111111101010101
-100 : 1111111101010100
-99 : 1111111101010111
-98 : 1111111101010110
-97 : 1111111101010001
-96 : 1111111101010000
-95 : 1111111101010011
-94 : 1111111101010010
-93 : 1111111101101010
-92 : 1111111110000010
-91 : 1111111110000001
-90 : 1111111110000100
-89 : 1111111110000011
-88 : 1111111101111110
-87 : 1111111101111101
-86 : 1111111110000000
-85 : 1111111101111111
-84 : 1111111110000101
-83 : 1111111110001011
-82 : 1111111110001010
-81 : 1111111110001101
-80 : 1111111110001100
-79 : 1111111110000111
-78 : 1111111110000110
-77 : 1111111110001001
-76 : 1111111110001000
-75 : 1111111101111100
-74 : 1111111101110000
-73 : 1111111101101111
-72 : 1111111101110010
-71 : 1111111101110001
-70 : 1111111101101100
-69 : 1111111101101011
-68 : 1111111101101110
-67 : 1111111101101101
-66 : 1111111101110011
-65 : 1111111101111001
-64 : 1111111101111000
-63 : 1111111101111011
-62 : 1111111101111010
-61 : 1111111101110101
-60 : 1111111101110100
-59 : 1111111101110111
-58 : 1111111101110110
-57 : 1111111100101010
-56 : 1111111100101011
-55 : 1111111100101001
-54 : 1111111100100111
-53 : 1111111100101000
-52 : 1111111100101111
-51 : 1111111100110000
-50 : 1111111100101110
-49 : 1111111100101100
-48 : 1111111100101101
-47 : 1111111100100110
-46 : 1111111100011111
-45 : 1111111100100000
-44 : 1111111100011110
-43 : 1111111100011100
-42 : 1111111100011101
-41 : 1111111100100100
-40 : 1111111100100101
-39 : 1111111100100011
-38 : 1111111100100001
-37 : 1111111100100010
-36 : 1111111100110001
-35 : 1111111101000000
-34 : 1111111101000001
-33 : 1111111100111111
-32 : 1111111100111101
-31 : 1111111100111110
-30 : 1111111101000101
-29 : 1111111101000110
-28 : 1111111101000100
-27 : 1111111101000010
-26 : 1111111101000011
-25 : 1111111100111100
-24 : 1111111100110101
-23 : 1111111100110110

-22 : 1111111100110100
-21 : 1111111100110010
-20 : 1111111100110011
-19 : 1111111100111010
-18 : 1111111100111011
-17 : 1111111100111001
-16 : 1111111100110111
-15 : 1111111100111000
-14 : 1111111111011001
-13 : 111111110001101
-12 : 111111010
-11 : 11111100
-10 : 11111010
-9 : 11111100
-8 : 1111011
-7 : 1111100
-6 : 111100
-5 : 11011
-4 : 11010
-3 : 1010
-2 : 1011
-1 : 100
0 : 00
1 : 011
2 : 010
3 : 1100
4 : 11100
5 : 111011
6 : 111010
7 : 1111010
8 : 11111010
9 : 11111011
10 : 111111011
11 : 1111111011
12 : 111111110000
13 : 1111111100010
14 : 11111110001100
15 : 1111111111011010
16 : 1111111111011011
17 : 1111111111011000
18 : 1111111111010101
19 : 1111111111010110
20 : 1111111111010111
21 : 1111111111100000
22 : 1111111111100001
23 : 1111111111100010
24 : 1111111111011111
25 : 1111111111011100
26 : 1111111111011101
27 : 1111111111011110
28 : 1111111111001011
29 : 1111111111001100
30 : 1111111111001101
31 : 1111111111001010
32 : 1111111111000111
33 : 1111111111001000
34 : 1111111111001001
35 : 1111111111010010
36 : 1111111111010011
37 : 1111111111010100
38 : 1111111111010001
39 : 1111111111001110
40 : 1111111111001111
41 : 1111111111010000
42 : 1111111111100011
43 : 1111111111110110
44 : 1111111111110111
45 : 1111111111111000
46 : 1111111111110101
47 : 1111111111110010
48 : 1111111111110011
49 : 1111111111110100
50 : 1111111111111101
51 : 1111111111111110
52 : 1111111111111111
53 : 1111111111111100
54 : 1111111111111001
55 : 1111111111111010
56 : 1111111111111011
57 : 1111111111101000
58 : 1111111111101001
59 : 1111111111101010
60 : 1111111111100111
61 : 1111111111100100
62 : 1111111111100101
63 : 1111111111100110
64 : 1111111111101111
65 : 1111111111110000
66 : 1111111111110001
67 : 1111111111101110
68 : 1111111111101011
69 : 1111111111101100
70 : 1111111111101101
71 : 1111111110100000
72 : 1111111110100001
73 : 1111111110100010
74 : 1111111110011111
75 : 1111111110011100
76 : 1111111110011101
77 : 1111111110011110
78 : 1111111110100111
79 : 1111111110101000
80 : 1111111110101001
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126 : 1111111110110011
127 : 1111111110110100

Table 2

0 : 00
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3 : 011
4 : 1100
5 : 1010
6 : 1011
7 : 11100
8 : 11010
9 : 11011
10 : 111011
11 : 111010
12 : 1111100
13 : 1111011
14 : 1111010
15 : 11111100
16 : 11111011
17 : 11111010
18 : 111111100
19 : 111111011
20 : 111111010
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162 : 1111111111110111

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165	1111111111110010
166	1111111111110011
167	1111111111111000
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175	1111111111110000
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213	1111111110000010
214	1111111110000011
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218	1111111110001111
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251	1111111110101100
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253	1111111110101010
254	1111111110101011
255	111100

Table 3

-128	1111111101100001
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-120	1111111101011101
-119	1111111101101010
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-117	1111111101101100
-116	1111111101101011
-115	1111111101101000
-114	1111111101100101
-113	1111111101100100
-112	1111111101100111
-111	1111111101100110
-110	1111111101001111
-109	1111111101001110
-108	1111111101010001
-107	1111111101010000
-106	1111111101001101
-105	1111111101001010
-104	1111111101001001
-103	1111111101001100
-102	1111111101001011
-101	1111111101011000
-100	1111111101010111
-99	1111111101011010
-98	1111111101011001
-97	1111111101010110
-96	1111111101010011
-95	1111111101010010
-94	1111111101010101
-93	1111111101010100
-92	1111111110000101
-91	1111111110000100
-90	1111111110000111
-89	1111111110000110
-88	1111111110000011
-87	1111111110000000
-86	1111111101111111
-85	1111111110000010
-84	1111111110000001
-83	1111111110001110
-82	1111111110001101
-81	1111111110010000
-80	1111111110001111
-79	1111111110001100
-78	1111111110001001
-77	1111111110001000
-76	1111111110001011
-75	1111111110001010
-74	1111111101110011
-73	1111111101110010
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-71	1111111101110100
-70	1111111101110001
-69	1111111101101110
-68	1111111101101101
-67	1111111101110000
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-65	1111111101111100
-64	1111111101111011
-63	1111111101111110
-62	1111111101111101
-61	1111111101111010
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-56	1111111101001000
-55	1111111100101110
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-53	1111111100101100
-52	1111111100101101
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-50	1111111100110011
-49	1111111100110100
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-47	1111111100110010
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-42	1111111100100011
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-34	1111111100111111
-33	1111111101000000
-32	1111111101000011
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-30	1111111101000111
-29	1111111101000100
-28	1111111101000101
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-25	1111111100111000
-24	1111111100110101
-23	1111111100110110
-22	1111111100111001
-21	1111111100111100
-20	1111111100111101
-19	1111111100111010
-18	1111111100111011
-17	1111111111011010
-16	1111111000
-15	1111111010
-14	1111111011
-13	111111001
-12	11111001
-11	11111010
-10	11111000
-9	1111011
-8	111000
-7	111011
-6	111010
-5	11001
-4	11000
-3	1000
-2	1001
-1	011
0	000
1	010
2	001
3	1011
4	1010
5	11010
6	11011
7	111001
8	1111000
9	1111010
10	1111001
11	11111011
12	111111000
13	111111011
14	111111010
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16	1111111000
17	1111111110010000
18	1111111111011011
19	1111111111011100
20	1111111111010111
21	1111111111011000
22	1111111111011001
23	1111111111011101
24	1111111111100001
25	1111111111100010
26	1111111111100011
27	1111111111011110
28	1111111111011111
29	1111111111100000
30	1111111111010110
31	1111111111001100
32	1111111111001101
33	1111111111001110
34	1111111111001001
35	1111111111001010
36	1111111111001011
37	1111111111001111
38	1111111111010011
39	1111111111010100
40	1111111111010101
41	1111111111010000
42	1111111111010001
43	1111111111010010
44	1111111111100100
45	1111111111110110
46	1111111111110111
47	1111111111111000
48	1111111111110011
49	1111111111110100
50	1111111111110101
51	1111111111111001
52	1111111111111101
53	1111111111111110
54	1111111111111111
55	1111111111111010
56	1111111111111011
57	1111111111111100
58	1111111111110010
59	1111111111101000
60	1111111111101001
61	1111111111101010
62	1111111111100101
63	1111111111100110
64	1111111111100111
65	1111111111101011
66	1111111111101111
67	1111111111110000
68	1111111111110001
69	1111111111101100
70	1111111111101101
71	1111111111101110
72	1111111111001000
73	1111111110100010
74	1111111110100011
75	1111111110100100
76	1111111110011111
77	1111111110100000
78	1111111110100001
79	1111111110100101
80	1111111110101001
81	1111111110101010
82	1111111110101011
83	1111111110100110
84	1111111110100111
85	1111111110101000
86	1111111110011110
87	1111111110010100
88	1111111110010101
89	1111111110010110
90	1111111110010001

91	1111111110010010
92	1111111110010011
93	1111111110010111
94	1111111110011011
95	1111111110011100
96	1111111110011101
97	1111111110011000
98	1111111110011001
99	1111111110011010
100	1111111110101100
101	1111111110111110
102	1111111110111111
103	1111111111000000
104	1111111110111011
105	1111111110111100
106	1111111110111101
107	1111111111000001
108	1111111111000101
109	1111111111000110
110	1111111111000111
111	1111111111000010
112	1111111111000011
113	1111111111000100
114	1111111110111010
115	1111111110110000
116	1111111110110001
117	1111111110110010
118	1111111110101101
119	1111111110101110
120	1111111110101111
121	1111111110110011
122	1111111110110111
123	1111111110111000
124	1111111110111001
125	1111111110110100
126	1111111110110101
127	1111111110110110

Table 3

0	001
1	000
2	1001
3	1010
4	1000
5	0110
6	0111
7	11001
8	11010
9	11000
10	10110
11	10111
12	111001
13	111010
14	111000
15	110110
16	110111
17	1111001
18	1111010
19	1111000
20	1110110
21	1110111
22	11111001
23	11111010
24	11111000
25	11110110
26	11110111
27	111111001
28	111111010
29	111111000
30	111110110
31	111110111
32	11111101111
33	11111110000
34	11111101110
35	11111101100
36	11111101101
37	111111100110
38	111111100111
39	111111101000
40	111111100101
41	111111100010
42	111111100011
43	111111100100
44	1111111011100
45	1111111011011
46	1111111011010
47	1111111011101
48	1111111100000
49	1111111011111
50	1111111011110
51	1111111011001
52	1111111010100
53	1111111010011
54	1111111010010
55	1111111010101
56	1111111011000
57	1111111010111
58	1111111010110
59	11111111001101
60	11111111001110
61	11111111001011
62	11111111001100
63	11111111001111
64	11111111010010
65	11111111010011
66	11111111010000
67	11111111010001
68	11111111000100
69	11111111000101
70	11111111000010
71	11111111000011
72	11111111000110
73	11111111001001
74	11111111001010
75	11111111000111
76	11111111001000
77	1111111110110010
78	1111111110110001
79	1111111110110011
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81	1111111110110100
82	1111111110110000
83	1111111110101010
84	1111111110101011
85	1111111110101000
86	1111111110101001
87	1111111110101110
88	1111111110101111
89	1111111110101100
90	1111111110101101
91	1111111111100101
92	1111111111101000
93	1111111111101011
94	1111111111101100
95	1111111111101001
96	1111111111101010
97	1111111111011101
98	1111111111011110
99	1111111111011011
100	1111111111011100
101	1111111111011111
102	1111111111100010
103	1111111111100011
104	1111111111100000
105	1111111111100001
106	1111111111101101
107	1111111111110001
108	1111111111111010
109	1111111111110111
110	1111111111111000
111	1111111111111011
112	1111111111111110
113	1111111111111111
114	1111111111111100
115	1111111111111101
116	1111111111110000
117	1111111111110001
118	1111111111101110
119	1111111111101111
120	1111111111110010
121	1111111111110101
122	1111111111110110
123	1111111111110011
124	1111111111110100
125	1111111111000001
126	1111111111000010
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130	1111111111000110
131	1111111111000111
132	1111111111000100
133	1111111111000101
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135	1111111110111001
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140	1111111110111110
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145	1111111111010101
146	1111111111010010
147	1111111111010011
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149	1111111111011001
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152	1111111111011000
153	1111111111001011
154	1111111111001100
155	1111111111001001
156	1111111111001010
157	1111111111001101
158	1111111111010000
159	1111111111010001
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161	1111111111001111
162	1111111111100100
163	1111111111100111
164	1111111111100110
165	1111111101111111
166	1111111110000000
167	1111111110000001
168	1111111101111110
169	1111111101111011
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171	1111111101111101
172	1111111110000010
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174	1111111110001000
175	1111111110001001
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177	1111111110000011
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183	1111111101101111
184	1111111101101100
185	1111111101101101
186	1111111101101110
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188	1111111101111000
189	1111111101111001
190	1111111101111010
191	1111111101110111
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193	1111111101110101
194	1111111101110110
195	1111111110100111
196	1111111110100110
197	1111111110101000
198	1111111110101010
199	1111111110101001
200	1111111110100101
201	1111111110100001
202	1111111110100000
203	1111111110100010
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205	1111111110100011
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208	1111111110110011
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212	1111111110101100
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231	1111111110011111
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235	1111111110010101
236	1111111110010111
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238	1111111110011000
239	010

Table 4

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-123	1111111101011001
-122	1111111101011100
-121	1111111101011011
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-114	1111111101100010
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-112	1111111101100100
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-108	1111111101001110
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-106	1111111101001000
-105	1111111101000111
-104	1111111101001010
-103	1111111101001001
-102	1111111101001111
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-100	1111111101010100
-99	1111111101010111
-98	1111111101010110

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-27 : 1111111101000010
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-11 : 11111100
-10 : 111111010
-9 : 11111100
-8 : 1111011
-7 : 1111100
-6 : 111100
-5 : 11011
-4 : 11010
-3 : 1010
-2 : 1011
-1 : 100
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1 : 011
2 : 010
3 : 1100
4 : 11100
5 : 111011
6 : 111010
7 : 1111010
8 : 11111010
9 : 11111011
10 : 111111011
11 : 1111111011
12 : 11111110000
13 : 111111100010
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15 : 1111111111011010
16 : 1111111111011011
17 : 1111111111011000
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92 : 1111111110011001
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122 : 1111111110110111
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125 : 1111111110110010
126 : 1111111110110011
127 : 1111111110110100

Table 4

0 : 011
1 : 010
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3 : 001
4 : 1011
5 : 1000
6 : 1001
7 : 11010
8 : 11011
9 : 11000
10 : 11001
11 : 111010
12 : 111011
13 : 111000
14 : 111001
15 : 1111010
16 : 1111011
17 : 1111000
18 : 1111001
19 : 11111010
20 : 11111001
21 : 11111000
22 : 111110111
23 : 111110110
24 : 1111110011
25 : 1111110100
26 : 1111110101
27 : 1111110000
28 : 1111110001
29 : 1111110010
30 : 11111110010
31 : 11111110001
32 : 11111110100
33 : 11111110011
34 : 11111110000
35 : 11111101101
36 : 11111101100
37 : 11111101111
38 : 11111101110
39 : 111111101101
40 : 111111101110
41 : 111111101100
42 : 111111101010
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45 : 1111111100011
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61 : 111111110100101
62 : 111111110100010
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75 : 111111101111001
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77 : 111111101101011
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84 : 111111101101111
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145 : 1111111110101001
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236 : 1111111110001011
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238 : 1111111110001100
239 : 1010

Table 5

-128 : 1111111101011101
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-121 : 1111111101011010
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-116 : 1111111101100111
-115 : 1111111101100010
-114 : 1111111101100001
-113 : 1111111101100100
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-111 : 1111111101010111
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-109 : 1111111101001010
-108 : 1111111101001101
-107 : 1111111101001100
-106 : 1111111101000111
-105 : 1111111101000110
-104 : 1111111101001001
-103 : 1111111101001000
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-98 : 1111111101010101
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-96 : 1111111101001111
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-80 : 1111111110000101
-79 : 1111111110000100
-78 : 1111111110000111
-77 : 1111111110000110
-76 : 1111111101111010
-75 : 1111111101101110
-74 : 1111111101101101
-73 : 1111111101110000
-72 : 1111111101101111
-71 : 1111111101101010
-70 : 1111111101101001
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-68 : 1111111101101011
-67 : 1111111101110001
-66 : 1111111101110111
-65 : 1111111101110110
-64 : 1111111101111001
-63 : 1111111101111000
-62 : 1111111101110011
-61 : 1111111101110010
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-55 : 1111111100100100
-54 : 1111111100100101
-53 : 1111111100101001
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-50 : 1111111100101100
-49 : 1111111100101010
-48 : 1111111100101011
-47 : 1111111100100011
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-45 : 1111111100011100
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-39 : 1111111100100010
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-32 : 1111111100111011
-31 : 1111111100111100
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-28 : 1111111101000101
-27 : 1111111101000011
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-8 : 11111010
-7 : 11111011
-6 : 1111100
-5 : 111100
-4 : 11010
-3 : 11011
-2 : 1100
-1 : 01
0 : 00
1 : 101
2 : 100
3 : 11101
4 : 11100
5 : 1111010
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28 : 1111111111001011
29 : 1111111111001100
30 : 1111111111001001

Code Tables for VLC

31 : 1111111111000110
32 : 1111111111000111
33 : 1111111111001000
34 : 1111111111010001
35 : 1111111111010010
36 : 1111111111010011
37 : 1111111111010000
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39 : 1111111111001110
40 : 1111111111001111
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125 : 1111111110110000
126 : 1111111110110001
127 : 1111111110110010

Table 5

0 : 011
1 : 000
2 : 001
3 : 1010
4 : 1011
5 : 1000
6 : 1001
7 : 11010
8 : 11011
9 : 11000
10 : 11001
11 : 111010
12 : 111011
13 : 111000
14 : 111001
15 : 1111010
16 : 1111011
17 : 1111000
18 : 1111001
19 : 11111010
20 : 11111011
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22 : 11111001
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33 : 11111101111
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36 : 111111101101
37 : 111111101111
38 : 111111110001
39 : 111111110000
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67 : 111111111000100
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72 : 1111111111101011
73 : 1111111111101010
74 : 1111111111101101
75 : 1111111111110000
76 : 1111111111101111
77 : 1111111111101110
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79 : 1111111111100100
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83 : 1111111111101000
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85 : 1111111111110001
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157 : 1111111110011110
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163 : 1111111110011011
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170 : 1111111110100101
171 : 1111111110100010
172 : 1111111110100001
173 : 1111111110100100
174 : 1111111110100011
175 : 010

Table 6

-128 : 1111111101011010
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-126 : 1111111101011100
-125 : 1111111101011011
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-13 : 1111111100110101
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-10 : 1111111100110010
-9 : 1111111100110011
-8 : 111111110000
-7 : 111111101
-6 : 11111101
-5 : 1111100
-4 : 111100
-3 : 11101
-2 : 1100
-1 : 100
0 : 0
1 : 101
2 : 1101
3 : 11100
4 : 111101
5 : 1111101
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53 : 1111111111100110
54 : 1111111111100111
55 : 1111111111101000
56 : 1111111111100101
57 : 1111111111100010
58 : 1111111111100011
59 : 1111111111100100
60 : 1111111111101001
61 : 1111111111101110
62 : 1111111111101111
63 : 1111111111110000
64 : 1111111111101101
65 : 1111111111101010
66 : 1111111111101011
67 : 1111111111101100
68 : 1111111110011011
69 : 1111111110011100
70 : 1111111110011101
71 : 1111111110011010
72 : 1111111110010111
73 : 1111111110011000
74 : 1111111110011001
75 : 1111111110011110
76 : 1111111110100011
77 : 1111111110100100
78 : 1111111110100101
79 : 1111111110100010
80 : 1111111110011111
81 : 1111111110100000
82 : 1111111110100001
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84 : 1111111110001101
85 : 1111111110001110
86 : 1111111110001011
87 : 1111111110001000
88 : 1111111110001001
89 : 1111111110001010
90 : 1111111110001111
91 : 1111111110010100
92 : 1111111110010101
93 : 1111111110010110
94 : 1111111110010011
95 : 1111111110010000
96 : 1111111110010001
97 : 1111111110010010
98 : 1111111110111001
99 : 1111111110111010
100 : 1111111110111011
101 : 1111111110111000
102 : 1111111110110101
103 : 1111111110110110
104 : 1111111110110111
105 : 1111111110111100
106 : 1111111111000001
107 : 1111111111000010
108 : 1111111111000011
109 : 1111111111000000
110 : 1111111110111101
111 : 1111111110111110
112 : 1111111110111111
113 : 1111111110101010
114 : 1111111110101011
115 : 1111111110101100
116 : 1111111110101001
117 : 1111111110100110
118 : 1111111110100111
119 : 1111111110101000
120 : 1111111110101101
121 : 1111111110110010
122 : 1111111110110011
123 : 1111111110110100
124 : 1111111110110001
125 : 1111111110101110
126 : 1111111110101111
127 : 1111111110110000

Table 6

0 : 011
1 : 000
2 : 001
3 : 1010
4 : 1011
5 : 1000
6 : 1001
7 : 11010
8 : 11011
9 : 11000
10 : 11001
11 : 111010
12 : 111011
13 : 111000
14 : 111001
15 : 1111010
16 : 1111011
17 : 1111000
18 : 1111001
19 : 11111010
20 : 11111001
21 : 11111000
22 : 111111000
23 : 111111001
24 : 111110110
25 : 111110111
26 : 1111110110
27 : 1111110101
28 : 1111110100
29 : 11111110010
30 : 11111110011
31 : 11111110100
32 : 11111110001
33 : 11111101110
34 : 11111101111
35 : 11111110000
36 : 111111101111
37 : 111111101110
38 : 111111110001
39 : 111111110000
40 : 111111101011
41 : 111111101010
42 : 111111101101
43 : 111111101100
44 : 1111111100110
45 : 1111111100111
46 : 1111111100100
47 : 1111111100101
48 : 1111111101010
49 : 1111111101011
50 : 1111111101000
51 : 1111111101001
52 : 11111111011011
53 : 11111111011100
54 : 11111111011010
55 : 11111111011000
56 : 11111111011001
57 : 11111111100000
58 : 11111111100001
59 : 11111111011111
60 : 11111111011101
61 : 11111111011110
62 : 111111111001000
63 : 111111111001001
64 : 111111111001010
65 : 111111111000111
66 : 111111111000100
67 : 111111111000101
68 : 111111111000110
69 : 1111111111101011
70 : 1111111111101010
71 : 1111111111101001
72 : 1111111111101100
73 : 1111111111101111
74 : 1111111111101110
75 : 1111111111101101
76 : 1111111111101000
77 : 1111111111100011
78 : 1111111111100010
79 : 1111111111100001
80 : 1111111111100100
81 : 1111111111100111
82 : 1111111111100110
83 : 1111111111100101
84 : 1111111111110000
85 : 1111111111111011
86 : 1111111111111010
87 : 1111111111111001
88 : 1111111111111100
89 : 1111111111111111
90 : 1111111111111110
91 : 1111111111111101

92 : 1111111111111000
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96 : 1111111111110100
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99 : 1111111111110101
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101 : 1111111111001011
102 : 1111111111001010
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104 : 1111111111010000
105 : 1111111111001111
106 : 1111111111001110
107 : 1111111111001001
108 : 1111111111000100
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110 : 1111111111000010
111 : 1111111111000101
112 : 1111111111001000
113 : 1111111111000111
114 : 1111111111000110
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116 : 1111111111011100
117 : 1111111111011011
118 : 1111111111011010
119 : 1111111111011101
120 : 1111111111100000
121 : 1111111111011111
122 : 1111111111011110
123 : 1111111111011001
124 : 1111111111010100
125 : 1111111111010011
126 : 1111111111010010
127 : 1111111111010101
128 : 1111111111011000
129 : 1111111111010111
130 : 1111111111010110
131 : 1111111110101000
132 : 1111111110111001
133 : 1111111110111010
134 : 1111111110111011
135 : 1111111110110110
136 : 1111111110110111
137 : 1111111110111000
138 : 1111111110111111
139 : 1111111111000000
140 : 1111111111000001
141 : 1111111110111100
142 : 1111111110111101
143 : 1111111110111110
144 : 1111111110110101
145 : 1111111110101100
146 : 1111111110101101
147 : 1111111110101110
148 : 1111111110101001
149 : 1111111110101010
150 : 1111111110101011
151 : 1111111110110010
152 : 1111111110110011
153 : 1111111110110100
154 : 1111111110101111
155 : 1111111110110000
156 : 1111111110110001
157 : 1111111110011000
158 : 1111111110100101
159 : 1111111110100100
160 : 1111111110100111
161 : 1111111110100110
162 : 1111111110100011
163 : 1111111110100000
164 : 1111111110011111
165 : 1111111110100010
166 : 1111111110100001
167 : 1111111110011100
168 : 1111111110011011
169 : 1111111110011110
170 : 1111111110011101
171 : 1111111110011010
172 : 1111111110010111
173 : 1111111110010110
174 : 1111111110011001
175 : 010

Table 7

-100 : 1111111110000000
-99 : 1111111110000001
-98 : 1111111110000010
-97 : 1111111101111101
-96 : 1111111101111110
-95 : 1111111101111111
-94 : 1111111110000011
-93 : 1111111110000111
-92 : 1111111110001000
-91 : 1111111110001001
-90 : 1111111110000100
-89 : 1111111110000101
-88 : 1111111110000110
-87 : 1111111101111100
-86 : 1111111101110010
-85 : 1111111101110011
-84 : 1111111101110100
-83 : 1111111101101111
-82 : 1111111101110000
-81 : 1111111101110001
-80 : 1111111101110101
-79 : 1111111101111001
-78 : 1111111101111010
-77 : 1111111101111011
-76 : 1111111101110110
-75 : 1111111101110111
-74 : 1111111101111000
-73 : 1111111110011011
-72 : 1111111110011100
-71 : 1111111110011101
-70 : 1111111110011000
-69 : 1111111110011001
-68 : 1111111110011010
-67 : 1111111110011110
-66 : 1111111110100010
-65 : 1111111110100011
-64 : 1111111110100100
-63 : 1111111110011111
-62 : 1111111110100000
-61 : 1111111110100001
-60 : 1111111110010111
-59 : 1111111110001101
-58 : 1111111110001110
-57 : 1111111110001111
-56 : 1111111110001010
-55 : 1111111110001011
-54 : 1111111110001100
-53 : 1111111110010000
-52 : 1111111110010100
-51 : 1111111110010101
-50 : 1111111110010110
-49 : 1111111110010001
-48 : 1111111110010010
-47 : 1111111110010011
-46 : 1111111101101110
-45 : 1111111101010101
-44 : 1111111101010110
-43 : 1111111101010011
-42 : 1111111101010100
-41 : 1111111101010111
-40 : 1111111101011010
-39 : 1111111101011011
-38 : 1111111101011000
-37 : 1111111101011001
-36 : 1111111101001100
-35 : 1111111101001101
-34 : 1111111101001010
-33 : 1111111101001011
-32 : 1111111101001110
-31 : 1111111101010001
-30 : 1111111101010010
-29 : 1111111101001111
-28 : 1111111101010000
-27 : 1111111101100111
-26 : 1111111101101000
-25 : 1111111101100101
-24 : 1111111101100110
-23 : 1111111101101001
-22 : 1111111101101100
-21 : 1111111101101101
-20 : 1111111101101010
-19 : 1111111101101011
-18 : 1111111101011110
-17 : 1111111101011111
-16 : 1111111101011100
-15 : 1111111101011101
-14 : 1111111101100000
-13 : 1111111101100011
-12 : 1111111101100100
-11 : 1111111101100001
-10 : 1111111101100010
-9 : 1111111111100001
-8 : 1111111100
-7 : 111111101
-6 : 11111100
-5 : 1111101
-4 : 111101
-3 : 11100
-2 : 1100
-1 : 100
0 : 0
1 : 101
2 : 1101
3 : 11101
4 : 111100
5 : 1111100
6 : 11111101
7 : 111111100
8 : 1111111101000
9 : 1111111110100100
10 : 1111111111100010
11 : 1111111111100000
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13 : 1111111111011111
14 : 1111111111100011
15 : 1111111111100111
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17 : 1111111111100110
18 : 1111111111100100
19 : 1111111111100101
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21 : 1111111111010111
22 : 1111111111010101
23 : 1111111111010011
24 : 1111111111010100
25 : 1111111111011000
26 : 1111111111011100
27 : 1111111111011101
28 : 1111111111011011
29 : 1111111111011001
30 : 1111111111011010
31 : 1111111111101001
32 : 1111111111111000
33 : 1111111111111001
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35 : 1111111111110101
36 : 1111111111110110
37 : 1111111111111010
38 : 1111111111111110
39 : 1111111111111111
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43 : 1111111111101101
44 : 1111111111101110
45 : 1111111111101100
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47 : 1111111111101011
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63 : 1111111110111000
64 : 1111111110110110
65 : 1111111110110111
66 : 1111111110101000
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71 : 1111111110101010
72 : 1111111110101110
73 : 1111111110101111
74 : 1111111110101101
75 : 1111111110101011
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77 : 1111111110111011
78 : 1111111111001010
79 : 1111111111001011
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81 : 1111111111000111
82 : 1111111111001000
83 : 1111111111001100
84 : 1111111111010000
85 : 1111111111010001
86 : 1111111111001111
87 : 1111111111001101
88 : 1111111111001110
89 : 1111111110111111
90 : 1111111111000000
91 : 1111111110111110
92 : 1111111110111100
93 : 1111111110111101
94 : 1111111111000001
95 : 1111111111000101
96 : 1111111111000110
97 : 1111111111000100
98 : 1111111111000010
99 : 1111111111000011

Table 7

0 : 1010
1 : 1011
2 : 1000
3 : 1001
4 : 11010
5 : 11011
6 : 11000
7 : 11001
8 : 111010
9 : 111011
10 : 111000
11 : 111001
12 : 1111010
13 : 1111011
14 : 1111000
15 : 1111001
16 : 11111010
17 : 11111011
18 : 11111000
19 : 11111001
20 : 111111010
21 : 111111011
22 : 111111000
23 : 111111001
24 : 1111111010

25 : 1111111011
26 : 1111111000
27 : 1111111001
28 : 11111111011
29 : 11111111010
30 : 11111111001
31 : 11111111000
32 : 111111111011
33 : 111111111010
34 : 111111111001
35 : 111111111000
36 : 1111111111010
37 : 1111111111011
38 : 1111111111000
39 : 1111111111001
40 : 11111111111010
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42 : 11111111111000
43 : 1111111111110110
44 : 1111111111111000
45 : 1111111111111010
46 : 1111111111111001
47 : 1111111111110111
48 : 1111111111111110
49 : 1111111111111111
50 : 1111111111111101
51 : 1111111111111011
52 : 1111111111111100
53 : 1111111111101111
54 : 1111111111110000
55 : 1111111111101110
56 : 1111111111101100
57 : 1111111111101101
58 : 1111111111110100
59 : 1111111111110010
60 : 1111111111110001
61 : 1111111111110011
62 : 1111111111110101
63 : 0

Table 8

-100 : 1111111110000000
-99 : 1111111110000001
-98 : 1111111110000010
-97 : 1111111101111101
-96 : 1111111101111110
-95 : 1111111101111111
-94 : 1111111110000011
-93 : 1111111110000111
-92 : 1111111110001000
-91 : 1111111110001001
-90 : 1111111110000100
-89 : 1111111110000101
-88 : 1111111110000110
-87 : 1111111101111100
-86 : 1111111101110010
-85 : 1111111101110011
-84 : 1111111101110100
-83 : 1111111101101111
-82 : 1111111101110000
-81 : 1111111101110001
-80 : 1111111101110101
-79 : 1111111101111001
-78 : 1111111101111010
-77 : 1111111101111011
-76 : 1111111101110110
-75 : 1111111101110111
-74 : 1111111101111000
-73 : 1111111110011011
-72 : 1111111110011100
-71 : 1111111110011101
-70 : 1111111110011000
-69 : 1111111110011001
-68 : 1111111110011010
-67 : 1111111110011110
-66 : 1111111110100010
-65 : 1111111110100011
-64 : 1111111110100100
-63 : 1111111110011111
-62 : 1111111110100000
-61 : 1111111110100001
-60 : 1111111110010111
-59 : 1111111110001101
-58 : 1111111110001110
-57 : 1111111110001111
-56 : 1111111110001010
-55 : 1111111110001011
-54 : 1111111110001100
-53 : 1111111110010000
-52 : 1111111110010100
-51 : 1111111110010101
-50 : 1111111110010110
-49 : 1111111110010001
-48 : 1111111110010010
-47 : 1111111110010011
-46 : 1111111101101110
-45 : 1111111101010101
-44 : 1111111101010110
-43 : 1111111101010011
-42 : 1111111101010100
-41 : 1111111101010111
-40 : 1111111101011010
-39 : 1111111101011011
-38 : 1111111101011000
-37 : 1111111101011001
-36 : 1111111101001100
-35 : 1111111101001101
-34 : 1111111101001010
-33 : 1111111101001011
-32 : 1111111101001110
-31 : 1111111101010001
-30 : 1111111101010010
-29 : 1111111101001111
-28 : 1111111101010000
-27 : 1111111101100111
-26 : 1111111101101000
-25 : 1111111101100101
-24 : 1111111101100110
-23 : 1111111101101001
-22 : 1111111101101100
-21 : 1111111101101101
-20 : 1111111101101010
-19 : 1111111101101011
-18 : 1111111101011110
-17 : 1111111101011111
-16 : 1111111101011100
-15 : 1111111101011101
-14 : 1111111101100000
-13 : 1111111101100011
-12 : 1111111101100100
-11 : 1111111101100001
-10 : 1111111101100010
-9 : 1111111111100001
-8 : 1111111100
-7 : 111111101
-6 : 11111100
-5 : 1111101
-4 : 111101
-3 : 11100
-2 : 1100
-1 : 100
0 : 0
1 : 101
2 : 1101
3 : 11101
4 : 111100
5 : 1111100
6 : 11111101
7 : 111111100
8 : 1111111101000
9 : 1111111110100100
10 : 1111111111100010
11 : 1111111111100000
12 : 1111111111011110
13 : 1111111111011111
14 : 1111111111100011
15 : 1111111111100111
16 : 1111111111101000
17 : 1111111111100110
18 : 1111111111100100
19 : 1111111111100101
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21 : 1111111111010111
22 : 1111111111010101
23 : 1111111111010011
24 : 1111111111010100
25 : 1111111111011000
26 : 1111111111011100
27 : 1111111111011101
28 : 1111111111011011
29 : 1111111111011001
30 : 1111111111011010
31 : 1111111111101001
32 : 1111111111111000
33 : 1111111111111001
34 : 1111111111110111
35 : 1111111111110101
36 : 1111111111110110
37 : 1111111111111010
38 : 1111111111111110
39 : 1111111111111111
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42 : 1111111111111100
43 : 1111111111101101
44 : 1111111111101110
45 : 1111111111101100
46 : 1111111111101010
47 : 1111111111101011
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51 : 1111111111110010
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53 : 1111111111110001
54 : 1111111111010010
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62 : 1111111110111010
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64 : 1111111110110110
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85 : 1111111111010001
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88 : 1111111111001110
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90 : 1111111111000000
91 : 1111111110111110
92 : 1111111110111100
93 : 1111111110111101
94 : 1111111111000001
95 : 1111111111000101
96 : 1111111111000110
97 : 1111111111000100
98 : 1111111111000010
99 : 1111111111000011

Table 8

0 : 1010
1 : 1011
2 : 1000
3 : 1001
4 : 11010
5 : 11011
6 : 11000
7 : 11001
8 : 111010
9 : 111011
10 : 111000
11 : 111001
12 : 1111010
13 : 1111011
14 : 1111000
15 : 1111001
16 : 11111010
17 : 11111011
18 : 11111000
19 : 11111001
20 : 111111010
21 : 111111011
22 : 111111000
23 : 111111001
24 : 1111111010
25 : 1111111011
26 : 1111111000
27 : 1111111001
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29 : 11111111010
30 : 11111111001
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37 : 1111111111100
38 : 1111111111010
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42 : 111111111110100
43 : 1111111111110110
44 : 1111111111111000
45 : 1111111111111010
46 : 1111111111111001
47 : 1111111111110111
48 : 1111111111111110
49 : 1111111111111111
50 : 1111111111111101
51 : 1111111111111011
52 : 1111111111111100
53 : 1111111111101111
54 : 1111111111110000
55 : 1111111111101110
56 : 1111111111101100
57 : 1111111111101101
58 : 1111111111110100
59 : 1111111111110010
60 : 1111111111110001
61 : 1111111111110011
62 : 1111111111110101

63 : 0

Bitstream files

```
-rw------- 1 schamel  2487296 Oct 13 14:29 bitstream.flow_4mb
-rw------- 1 schamel  5611176 Oct 11 19:17 bitstream.flow_9mb
-rw------- 1 schamel  2481664 Oct 14 23:54 bitstream.mob_4mb
-rw------- 1 schamel  5608104 Oct 13 03:21 bitstream.mob_9mb
-rw------- 1 schamel  2499584 Oct 12 09:43 bitstream.ten_4mb
-rw------- 1 schamel  5610152 Oct 14 10:33 bitstream.ten_9mb
-rw------- 1 schamel  5601448 Oct 14 01:04 bitstream.pop_9mb
```