IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

U.S. PHILIPS CORPORATION, Plaintiff, v. EASTMAN KODAK COMPANY, Defendant.	Case No. 06-0251 GMS

DECLARATION OF NICOLE WYLL IN SUPPORT OF DEFENDANT EASTMAN KODAK COMPANY'S MOTION TO STAY LITIGATION OF U.S. PATENT NO. 4,901,075 PENDING COMPLETION OF PATENT REEXAMINATION [EXHIBIT B FILED UNDER SEAL]

I, Nicole Wyll, declare as follows:

1. I am an associate with the law firm DLA Piper US LLP, attorneys of record for defendant Eastman Kodak Company ("Kodak") in the above matter. Unless the context indicates otherwise, I make this declaration based upon my own personal knowledge.

2. Attached hereto as Exhibit A is a true and correct copy of U.S. Patent No. 4,901,075, bearing Bates labels Kodak_000216-225.

3. Attached hereto as Exhibit B is a true and correct copy of pages 1, 21-26 and 35 of U.S. Philips Corporation's Supplemental Responses to Defendant Eastman Kodak Company's First Set of Interrogatories (Nos. 1-3, 5, 10-12).

4. Attached hereto as Exhibit C is a true and correct copy of excerpts of the November 6, 2007 deposition of Steven J. Sasson.

5. Attached hereto as Exhibit D is a true and correct copy of the Request for *Ex Parte* Reexamination Transmittal Form, dated February 7, 2008.

6. Attached here to as Exhibit E is a true and correct copy of the Attachment to Request for *Ex Parte* Reexamination (Form PTO-1465) Providing Information on U.S. Patent No, 4,901,075.

7. Attached here to as Exhibit F is a true and correct copy of the Expert Report of Dr. Touradj Ebrahimi for U.S. Patent No. 4,901,075 on Invalidity, dated December 14, 2007.

8. Attached hereto as Exhibit G is a true and correct copy of the cover page and page 121 of the United States Patent and Trademark Office Performance and Accountability Report, Fiscal Year 2007.

9. Attached hereto as Exhibit H is a true and correct copy of the United States Patent and Trademark Office *Ex Parte* Reexamination Filing Data, dated June 30, 2006.

I declare under penalty of perjury that the forgoing is true and correct to the best of my knowledge.

Dated this 11 day of February, 2008, in San Diego, California.

Nicole Wyll

EXHIBIT A

United States Patent [19]

Vogel

[11] **Patent Number: 4,901,075**

[45] **Date of Patent: Feb. 13, 1990**

[54] **METHOD AND APPARATUS FOR BIT RATE REDUCTION**

[75] Inventor: **Peter Vogel, Diepersdorf, Fed. Rep. of Germany**

[73] Assignee: **U. S. Philips Corporation, New York, N.Y.**

[21] Appl. No.: **96,177**

[22] Filed: **Sep. 11, 1987**

[30] **Foreign Application Priority Data**

Sep. 13, 1986 [DE] Fed. Rep. of Germany 3631252
Nov. 8, 1986 [DE] Fed. Rep. of Germany 3638127
May 23, 1987 [DE] Fed. Rep. of Germany 3717399

[51] Int. Cl.[4] H03M 7/46
[52] U.S. Cl. 341/63; 341/59; 358/261.1
[58] Field of Search ..... 340/347 DD; 358/13, 358/136, 138, 261.2, 261.3, 261.4, 263, 261.1; 341/63, 106; 375/25

[56] **References Cited**

U.S. PATENT DOCUMENTS

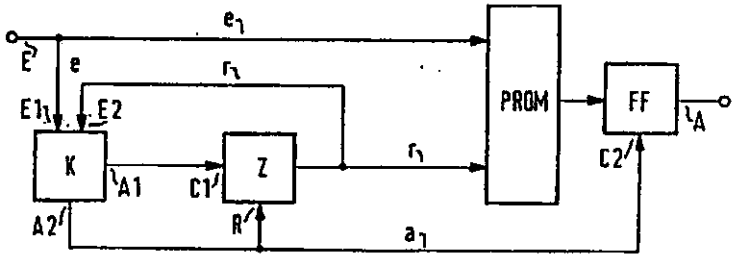
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Primary Examiner—William M. Shoop, Jr.
Assistant Examiner—Brian K. Young
Attorney, Agent, or Firm—Michael E. Marion

[57] **ABSTRACT**

A method and apparatus for coding a signal for transmission in order to achieve improved reduction in the bit rate. A signal is a transform coded in order to form a sequence of zero coefficients and non-zero coefficients, and run lengths of zero coefficients together with preceding or subsequent non-zero coefficients are grouped as events and coded.

13 Claims, 5 Drawing Sheets



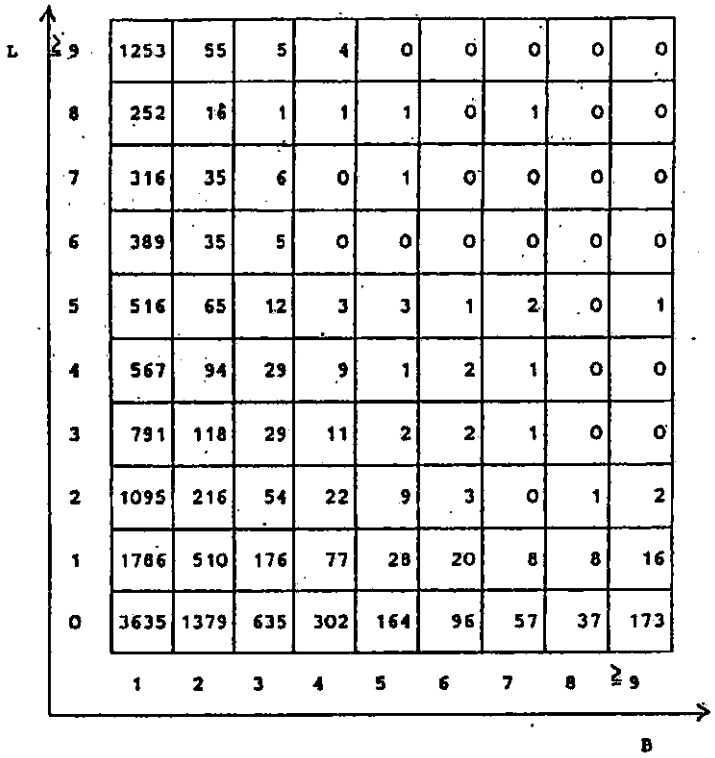

L
≥9
8
7
6
5
4
3
2
1
0
1253 55 5 4 0 0 0 0 0
252 16 1 1 1 0 1 0 0
316 35 6 0 1 0 0 0 0
389 35 5 0 0 0 0 0 0
516 65 12 3 3 1 2 0 1
567 94 29 9 1 2 1 0 0
791 118 29 11 2 2 1 0 0
1095 216 54 22 9 3 0 1 2
1786 510 176 77 28 20 8 8 16
3635 1379 635 302 164 96 57 37 173
1 2 3 4 5 6 7 8 ≥9
B

FIG. 1

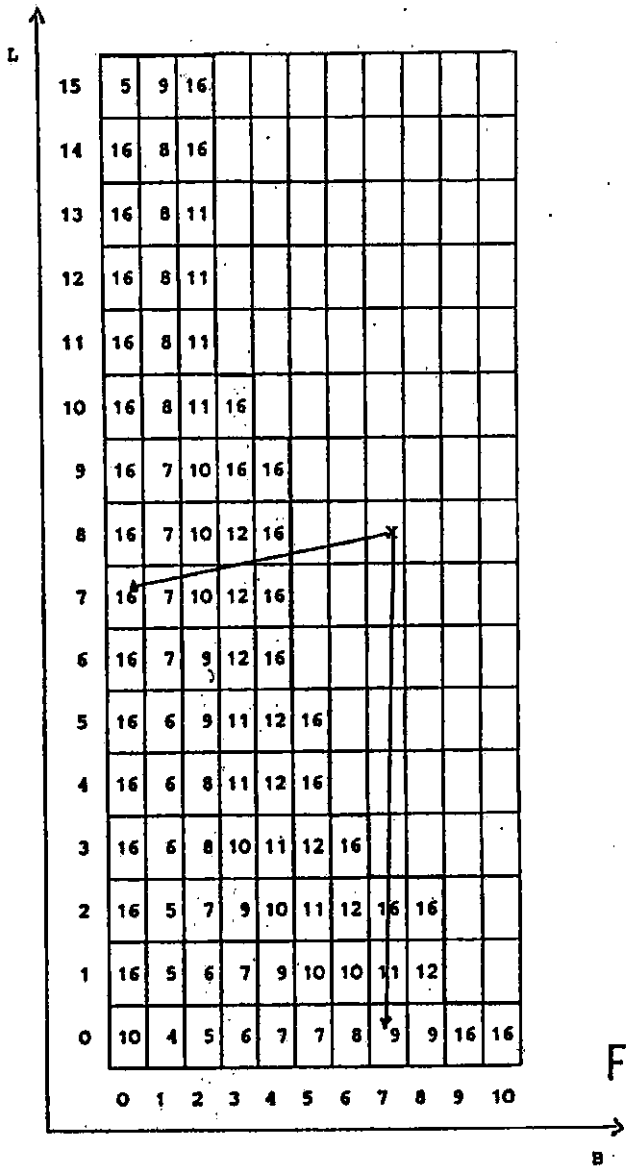

L
B
15 5 9 16
14 16 8 16
13 16 8 11
12 16 8 11
11 16 8 11
10 16 8 11 16
9 16 7 10 16 16
8 16 7 10 12 16
7 16 7 10 12 16
6 16 7 9 12 16
5 16 6 9 11 12 16
4 16 6 8 11 12 16
3 16 6 8 10 11 12 16
2 16 5 7 9 10 11 12 16 16
1 16 5 6 7 9 10 10 11 12
0 10 4 5 6 7 7 8 9 9 16 16
0 1 2 3 4 5 6 7 8 9 10

FIG. 2

Nr.	B	L	code word		length
1	-	-	11	(end of block)	2
2	1	0	010s		4
3	1	1	1000s		5
4	1	2	1001s		5
5	2	0	1010s		5
6	0	15	10110		5
7	1	3	10111s		6
8	1	4	01100s		6
9	1	5	01101s		6
10	2	1	01110s		6
11	3	0	01111s		6
12	1	6	001000s		7
13	1	7	001001s		7
14	1	8	001010s		7
15	1	9	001011s		7
16	2	2	001100s		7
17	3	1	001101s		7
18	4	0	001110s		7
19	5	0	001111s		7
20	1	10	0001000s		8
21	1	11	0001001s		8
22	1	12	0001010s		8
23	1	13	0001011s		8
24	1	14	0001100s		8
25	2	3	0001101s		8
26	2	4	0001110s		8
27	6	0	0001111s		8
28	1	15	00001000s		9
29	2	5	00001001s		9
30	3	2	00001010s		9
31	4	1	00001011s		9
32	7	0	00001100s		9
33	8	0	00001101s		9

FIG. 3

Nr.	B	L	code word	length
34	2	6	00001110s	9
35	2	7	000001000s	10
36	2	8	000001001s	10
37	2	9	000001010s	10
38	3	3	000001011s	10
39	4	2	000001100s	10
40	5	1	000001101s	10
41	6	1	000001110s	10
42	0	0	0000011111	10
43	2	10	0000011110s	11
44	3	4	0000001000s	11
45	3	5	0000001001s	11
46	4	3	0000001010s	11
47	5	2	0000001011s	11
48	7	1	0000001100s	11
49	2	11	0000001101s	11
50	2	12	0000001110s	11
51	2	13	0000001111s	11
52	3	6	00000001000s	12
53	3	7	00000001001s	12
54	3	8	00000001010s	12
55	4	4	00000001011s	12
56	4	5	00000001100s	12
57	5	3	00000001101s	12
58	6	2	00000001110s	12
59	8	1	00000001111s	12
60	9	0	00001111s+++++++	16
61	0	1	00000000100000---	16
62	0	2	00000000100001---	16
63	0	3	00000000100010---	16
64	0	4	00000000100011---	16
65	0	5	00000000100100---	16

FIG. 4

Nr.	B	L	code word	length
66	0	6	00000000100101--	16
67	0	7	00000000100110--	16
68	0	8	00000000100111--	16
69	0	9	00000000101000--	16
70	0	10	00000000101001--	16
71	0	11	00000000101010--	16
72	0	12	00000000101011--	16
73	0	13	00000000101100--	16
74	0	14	00000000101101--	16
75	2	14	00000000101110s-	16
76	2	15	00000000101111s-	16
77	3	9	00000000110000s-	16
78	3	10	00000000110001s-	16
79	4	6	00000000110010s-	16
80	4	7	00000000110011s-	16
81	4	8	00000000110100s-	16
82	4	9	00000000110101s-	16
83	5	4	00000000110110s-	16
84	5	5	00000000110111s-	16
85	6	3	00000000111000s-	16
86	7	2	00000000111001s-	16
87	8	2	00000000111010s-	16

FIG. 5

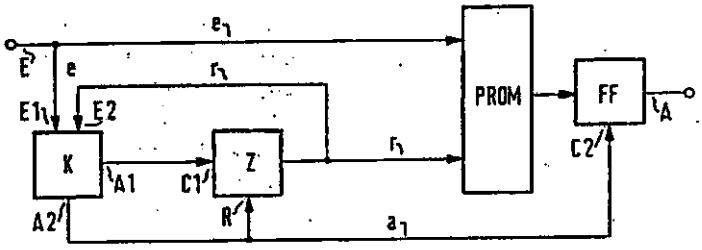


FIG.6

METHOD AND APPARATUS FOR BIT RATE REDUCTION

BACKGROUND OF THE INVENTION

The invention relates to a method of and a circuit arrangement for bit rate reduction. Bit rate reduction is carried out when coding a signal, which comprises a series of digital signal values and has a signal value A, occurring most frequently in runs.

An Article by Wen-Hsiung Chen and William K. Pratt (Chen, When-Hsiung and Pratt, William K.; Scene Adaptive Coder IEEE Transactions on Communications, vol. Com-32, No. 3, March 1984, pages 225–232) describes a coding process of video signals for the purpose of transmitting video pictures of satisfactory quality at a minimum possible bit rate. Coding is effected in several steps. First, equally large video picture sections which are represented by blocks of pixels are subjected to a Discrete Cosine Transform. In this transform process, a special two-dimensional Fourier transform is used. By the transform, a new block of values (coefficients) is obtained from the original block. This coefficient block has the property that a large number of its elements—thus a large number of the coefficients—are approximately 0 or exactly 0. A subsequent quantization of the coefficients always renders the greater part of the elements 0 so that a subsequent Huffman coding would therefore already involve a considerable bit rate reduction. The authors of the above-mentioned Article achieve a further bit rate reduction in that the frequent occurrence of zero runs in the intermediate signal in which the coefficients are serially arranged is utilized by means of a Huffman coding.

It is known that in a Huffman coding in which the codewords have different lengths, statistic properties of the signal to be coded are utilized. In the present case this particularly implies that the frequency with which zero runs having lengths 1, 2, 3, etc. occur in the above-mentioned intermediate signal is investigated. The shortest Huffman codeword is then assigned to the run that occurs most frequently. The next larger codeword is assigned to the run that occurs less frequently, and so forth.

For coding the intermediate signal two Huffman code tables are required according to the above-mentioned Article. A first table shows how the (quantized) coefficients different from 0 are to be coded. Only the coefficient values are coded because equally large coefficients also occur at the same frequency. The signs are transmitted in a separate bit. A second table shows how the run length is to be coded. In order that the codewords of one table can be distinguished from those of the other table during decoding, a separate codeword, the so-called run length prefix, is used for the identification of the coded run length.

SUMMARY OF THE INVENTION

It is an object of the invention to provide a coding method for a signal of the kind mentioned in the opening paragraph and comprising in a special case, an intermediate signal resulting from a picture coding operation, leading to a bit rate reduction which is larger than that hitherto known.

This object is achieved by assigning a Huffman codeword to each run of signals having the value A, where A having length 0, 1, 2 etc., together with the signal value subsequent to the run or together with the signal value preceding the run.

Advantageous embodiments of the invention, particularly for exeptional cases of the signal characterized in the opening paragraph as well as a circuit arrangement for carrying out the method according to the invention, can be derived from the sub-claims.

BRIEF DESCRIPTION OF THE DRAWING

The invention will now be described in greater detail by way of examples with reference to the accompanying drawings in which

FIG. 1 is a table stating the occurrence of events,

FIG. 2 is a further table elucidating the split-up of the events,

FIG. 3 to FIG. 5 show a coding table, and

FIG. 6 shows the circuit diagram of arrangements for coding video signals according to the invention.

DETAILED DESCRIPTION OF THE INVENTION

In the following embodiments, the intermediate signal referred to results from the transform coding of blocks of picture elements (pixels). The signal values of the intermediate signal thus represent the transform coefficients. As stated above, the coefficient which occurs most frequently in runs within the intermediate signal is represented herein as having the signal value A. In the following embodiments, signal value A equals zero or approximately zero zero (referred to hereinafter as the "zero-coefficient") because it appears most frequently in runs after transform coding. All coefficients not having a value of zero will be referred to hereinafter as "non-zero coefficients".

As used in the following description, a run of zero coefficients and the non-zero coefficient which immediately precedes or follows this run, is referred to as an event. Each non-zero coefficient which is not preceded or followed by one or more zero coefficients is also referred to as an event. According to the invention these events are to be coded.

It is to be noted that some events are more likely to occur than others. For example coefficients having small values will occur more frequently than coefficients having large values, and it is more likely that a coefficient having a small value will be preceded by a run of zero coefficients.

FIG. 1 shows the frequency distribution of the above-mentioned events in the case of a cosine-transformed and subsequently quantized video signal. Each field of the table represents an event characterized by the zero run length L and by the value B of the subsequent (quantized) coefficient. The values B proceed through the natural numbers without the zero and the length L proceeds through the natural numbers with the zero. In order that the table does not become arbitrarily large, all events with B larger than or equal to 9 are combined to an overall event. The same applies to L when larger than or equal to 9.

The numbers in the different fields indicate how often the associated event occurs in a quantized video signal with approximately 15000 signal values. The assignment of Huffman codewords is shown in the table: the series $L=0$, $B=1$ acquires the shortest codeword; this is followed by the series $L=1$, $B=1$ with the next longer codeword, and so forth.

If the assigned codewords instead of the frequencies are introduced in the event fields of the table, a two-dimensional coding table is obtained. It is not shown for the events according to FIG. 1 because such coding tables can generally be set up by those skilled in the art. For the sake of completeness it is to be noted that a maximum number of 11 bits follows for the events in which L is larger than or equal to 9 or in which B is larger than or equal to 9 after the assigned Huffman codeword, which bits give the receiver accurate information about the value of L and the value of B, respectively.

An additional bit rate reduction of 12% is obtained when coding video signals in accordance with the above-mentioned two dimensional coding table as compared with the coding method described in the opening paragraph.

This additional bit rate reduction is possible because, for example if the probability of a coefficient having the value 2 occurring equals P1, and the probability of run of three zero-coefficients occurring equals P2, and the probability of the run of three zero-coefficients occurring followed by a coefficient having the value 2, equals P3; probability P3 will not be equal to the product of probabilities P1 and P2.

The limitation of FIG. 1 will now be considered in greater detail. As is evident from the above-mentioned embodiments the number of the events to be coded in accordance with FIG. 1 is kept within efficient limits because all zero runs with an equally large subsequent value of a coefficient are considered as an event if the run length L is larger than eight.

Similarly, all zero runs of equal length are considered as an event if the subsequent value B of a coefficient is larger than eight.

As is shown in FIG. 1, relatively rarely occurring events are concerned, and therefore they are coded with relatively long Huffman codewords. Since the receiver for decoding should know the exact zero run length or the exact value of a coefficient without any loss of information, an additional codeword is added to the Huffman codeword—as already indicated above—from which the exact length or the exact value or both can be derived.

A clearly defined state is encoded by the Huffman codeword and the additional information. Since the number of bits of such combinations is also dependent on the statistic properties of the signal, such combinations should also be present at the receiver and the decoder in order that the state which is based on these combinations can unambiguously be recognized at the receiver end.

The Huffman codewords defined in this sense may be up to 30 bits long. Since the processing of codewords which are at most 16 bits long does not require any special arrangements, but is possible, for example with a 16-bit microprocessor, given events are split into sub-events—to improve the method described so far—such that codewords whose length is at most 16 bits are sufficient for coding all events and sub-events. This split-up will now be described in greater detail.

Firstly, an event to be coded consisting of an L=Lm zero run with subsequent coefficient of the value B=Bm is designated by (Lm, Bm). In contrast to the foregoing, Bm=0 is now also explicitly admitted. It is true that the two-dimensional diversity of events (Lm, Bm) occurring in practice is finite, because arbitrarily large values of coefficients do not occur, but it is very large. Consequently, the Huffman codewords to be used are correspondingly large as regards number and length. To reduce the overall number of the events to be coded the starting point is that, for example a run of 19 zeros with subsequent coefficient of the value 7 can be split up into sections, the first of which represents a run of 16 zeros, the second of which represents a run of 3 zeros and the third of which is a run without a zero and subsequent coefficient of the value 7. Each of these sections is now considered as a sub-event which is coded by a Huffman codeword. The length of each section is below a given value which can be predetermined and which will be further dealt with below.

This split-up is illustrated in FIG. 2. In the horizontal direction all occurring values B—including the value 0—of the coefficients are shown. In the vertical direction the length—also starting at 0—of coefficient runs of the value 0 is shown. The "events Fields" shown symbolize the event (Lm, Bm) i.e. Lm zeros followed by a coefficient of the value Bm. The event (0; 3) for example, means that a coefficient of the value 3 is preceded by a run length 0 which means that there is no coefficient of the value 0 preceding. Isolated zeros in the signal are symbolized by the event (0, 0). The reference (3, Bm) refers inter alia to the event in which a coefficient of the value Bm is succeeded by three successive zeros. Since the value of zero is also admitted for Bm, the event (3, 0) means that there are four successive zeros.

FIG. 2 shows a polygonal curve in a solid line dividing the series fields into two ranges. The left-hand range comprises the events which are referred to as being codable and the right-hand range shows the events which are referred to as non-codable. The maximum length for a section of signal values—corresponding to a codable event—is 16; the events (0, 15), (1, 15) and (2, 15) are involved. All other codable events correspond to signal sections which are shorter. The division into codable and non-codable events is not completely arbitrary; the most frequently occurring event should be associated with the codable ones. The crossed non-codable event (8, 7) is split, for example, into the events (0, 7) and (7, 0). There are various possibilities for the split-up; the simplest is the indicated "projection on the event axes".

The numbers in the event fields which are associated with the codable events signify the length—hence the number of bits—of the Huffman codewords with which the events are coded. The codewords also comprise the signs of the coefficients and possibly data about the magnitude of the value B; none of them is longer than 16 bits. In setting up the Huffman codewords it was assumed that coefficients having values of more than 136 do not occur.

FIGS. 3 to 5 show the exact structure of the Huffman codewords used. The first codeword 11 represents the coded signal value for characterizing a block end; at the transmission it succeeds the last codeword which is associated with a coefficient block. The first column of these figures states consecutive numbers, the second column states the values B of the coefficients and the third states the lengths L of the zero runs. The two latter data combined result in the "coordinates" of a codable event according to FIG. 2. In the fourth column of FIGS. 3–5 the code words are shown bitwise. The bit s denotes the sign bit, the positions indicated by "—" are meaningless, and the positions indicated by "+" comprise the coded values of the coefficients in so

far as they are larger than eight. The last column once more states the length of the Huffman codewords.

A possibility of further reducing the bit rate results from the fact that—as in the present embodiment—the signal to be coded is structured in accordance with blocks. As already indicated, the coefficients of a coefficient block are separated from those of the next block by an "end-of-block" signal. Also this "end-of-block" signal is converted into a codeword (compare FIG. 3) while the sequence of m (codable) events of the type

(L1, B1) (L2, B2) . . . (Lm, Bm)	(1)

and into a sequence of assigned codewords. The number m of the events is dependent on the special values of the coefficients. If the overall coefficient block comprises, for example 63 zeros with subsequent coefficients of the value 1, it is split up into only one event, namely (63, 1) or into several codable events according to FIG. 2. As it is not known in advance into how many codable events a coefficient block is split, the separate blocks must for this reason already be separated from one another by means of an "end-of-block" signal. At the receiver end the transmitted Huffman codewords are retransformed into events and these events are again converted into a sequence of coefficients. The receiver knows that, for example, 64 coefficients are associated with a coefficient block.

For further explanation and for the sake of simplicity, it is assumed that 4×4 blocks are concerned, so that one block comprises a total of 16 coefficients. All data associated with a block are separated from the data of the subsequent block by an "end of block" sign. This sign and the corresponding codeword is excepted from the split-up of the signal to be coded in accordance with the events. If, for example the sequence of coefficients of a block in a decimal representation has the form of

XX 4005000050000001 XX, (2)

The block is split up according to scheme (1) into the following events.

(0, 4) (2, 5)(4, 5) (6, 1)	(3)

In order that the coefficient sequence of a block can at any rate be split into events in accordance with scheme (1) or (3) above, the coefficients are temporarily stored before they are further processed. The temporal sequence of the coefficients in scheme (2) and that of the events in schemes (1) and (3) corresponds to the sequence of their written registration (European writing direction assumed). The symbols XX in the embodiment according to scheme (2) symbolize the "end-of-block" signs of the previous block and the represented block.

The coefficients in scheme (2) which are different from 0 are all positive and are represented as integral multiples of the smallest unit, namely 1. As can be seen from scheme (3), the last event is the event (6, 1). The Huffman codewords assigned to the events are not indicated.

Firstly, the weight of reception of the last event, namely (6, 1) of the block according to (2) is checked for the receiver. In the coding of pictures general experience has proved that the transmission of events with a run of more than five zeros become less worthwhile as the value of the subsequent coefficient is smaller. If in accordance with the rule based on experience, checked events for which L=5 and B=1 are not transmitted, the transmission of the last event does not take place. In that case the preceding series (4, 5) is checked in accordance with the same criterion. In the example according to (2) the check for this block is ended because the event (4, 5) and the assigned Huffman codeword must be transmitted.

After decoding the Huffman codewords at the receiver end all coefficients of the block according to scheme (2) can be recovered, but for those which are associated with non-transmitted events. However, since these are associated with the last coefficients of the block, the decoded coefficients at the receiver end are augmented with coefficients of the value 0 until the overall number of coefficients is 16.

FIG. 6 shows a circuit arrangement realising a simple split-up of the sequence of coefficients in accordance with codable events. The supply of clock pulses and details of the logic operation of binary values are not shown because they are known to those skilled in the art. In the circuit arrangement according to FIG. 6 events are coded which consist of a run of coefficients of the value zero and a subsequent coefficient. If the run length L in the signal to be coded exceeds a predetermined length Lmax, the associated event cannot be encoded and is split into codable events. Due to the predetermined maximum length Lmax which is independent of the subsequent coefficient, no delays or intermediate storages of the coefficients are required.

The coefficients are serially applied from an input E via a multiple lead e to the address inputs of an addressable memory PROM and to a first input E1 of a comparator circuit K. The multiple lead e comprises as many wires as bits are required for the binary representation of a coefficient. A coding table is filed in the memory PROM.

The position of a counter Z is applied to a second input E2 of the comparator K—via a multiple lead f. The multiple lead f is simultaneously connected to further address inputs of the memory PROM.

It is assumed that a coefficient which is different from zero is present at the input E1. In this case the comparator circuit K supplies a pulse from an output A2, which pulse is applied via a lead a to the reset input R of the counter Z and to the clock input C2 of a flipflop circuit FF. The counter is reset to the zero position with this pulse and the codeword which is present at the output of the memory PROM is bit-parallel taken over in the flipflop circuit FF. The codeword can be derived from the output A of the circuit arrangement according to FIG. 6. The codewords present at output A are not the ultimate Huffman codewords because all of them have the same length. To convert codewords of the same length into codewords of unequal length, and conversely—the latter conversion is required at the receiver end—reference is made to patent applications DE 35 10 902, DE 35 10 901 and DE 36 32 682.

If a zero is present at the input E1, the comparator circuit K supplies a counting pulse from a further output A1 and applies it to the clock input C1 of the counter Z which increases it count by one unit. The comparator circuit K continuously compares the actual

counting with the value Lmax which is stored in one of its memories not shown. If the count reaches the value Lmax, the supply of a further counting pulse does not take place. Instead, the reset or transfer pulse is supplied from the output A2.

The complete coefficients—thus also their signs—are processed in the circuit arrangement according to FIG. 6. In a modification the signs of the coefficients are applied via a separate wire to the output A of the circuit arrangement and to accept them from a comparison by the comparator circuit K and from determining the codewords by the programmable memory PROM.

What is claimed is:

1. A circuit arrangement for coding a signal comprising a run of zero coefficients and a subsequent coefficient, wherein said coefficients are applied with predetermined delays to the address inputs of a memory (PROM) and to a first input (E1) of a comparator circuit (K), in that a counter (Z) is provided whose count is applied to further address inputs of the memory (PROM) and to a second input (E2) of the comparator circuit (K), in that the comparator circuit (K) supplies a counting pulse to the counter (Z) from a first output (A1) if a zero coefficient is present at the first input (E1) and if the count has not exceeded a value stored in a memory of the comparator circuit (K) supplies a pulse from a second output (A2) if the conditions for the supply of a counting pulse are not fulfilled, and in that the counter (Z) is reset by means of the pulse at the second output (A2) of the comparator circuit (K), and in that the codeword present at the outputs of the memory (PROM) is transferred to an intermediate memory (FF).

2. A circuit arrangement as claimed in claim 1, characterized in that only the values of the coefficients are applied to the address inputs of the memory (PROM) and the comparator circuit (K) and in that the sign bits of the coefficients are supplied through a separate wire to the output (A) of the circuit arrangement.

3. In a method of coding a signal comprising a sequence of coefficients which results after a blockwise transform of pixels of a video signal with subsequent quantization, for transmission at a reduced bit rate, said signal comprising a plurality of zero coefficients, and a plurality of non-zero coefficients said method comprising the steps of:

(a) deriving from said signal, a plurality of events each comprising a run of said zero-coefficients having a respective run length and preceded or followed by at least one non-zero coefficient, and

(b) for each of said events, determining said respective run length and assigning a code word to represent said non-zero coefficient and said run length.

4. The method of claim 3, wherein said code words are Huffman code words.

5. A method as claimed in claim 4, characterized in that a Huffman codeword is not transmitted if the length of the associated run of zero-coefficients exceeds a barrier which is dependent on the magnitude of the subsequent non-zero-coefficients.

6. A method as claimed in claim 4, characterized in that the signal comprises a sequence of coefficients which results after a blockwise transform of pixels of a video signal with subsequent quantisation and in that a checked Huffman codeword is not transmitted if the length of the associated zero run is larger than five and if the magnitude of the subsequent non-zero-coefficient has the smallest possible value different from zero.

7. A method as claimed in claim 4, characterized in that the Huffman codeword is independent of the sign of that non-zero coefficient which succeeds or precedes the run of zero-coefficients and in that the sign is coded by a separate bit.

8. A method for coding a signal for transmission at a reduced bandwidth, comprising the steps of:

(a) transforming said signal into a sequence comprising zero coefficients occurring in runs and non-zero coefficients;

(b) deriving from said sequence, a plurality of events each comprised of a run of zero coefficients having a respective run length, which is preceded or followed by at least one non-zero coefficient, and

(c) for each of said events, determining the run length and assigning a code word to represent said run length and said non-zero coefficient.

9. The method of claim 8, comprising the additional steps of:

determining for each event, whether the run length of said run of zero coefficients exceeds a predetermined length and if so assigning the same code word to represent each said run length and respective non-zero coefficient.

10. The method of claim 8, comprising the additional steps of:

determining for each event, whether the non-zero coefficient exceeds a predetermined value and if so assigning the same code to represent said run length and said non-zero coefficient.

11. The method of claim 8, comprising the additional steps of:

determining whether the run length of each event exceeds a predetermined run length and if so, splitting said respective event into a plurality of sections so that each of said sections has a run length below said predetermined run length, and assigning a code word to each section.

12. An apparatus for coding a signal comprising a run of zero coefficients and a subsequent coefficient, said apparatus comprising:

(a) means for determining if the length of said run exceeds a predetermined length;

(b) splitting means coupled to said length determining means, for splitting a run which exceeds said predetermined length into a plurality of codable events; and

(c) coding means coupled to said splitting means for assigning a code word to represent each said codable event.

13. In a method of coding a signal comprising a sequence of coefficients which results after a blockwise transform of pixels of a video signal with subsequent quantization, for transmission at a reduced bit rate, said signal comprising a plurality of first coefficients having a signal value A and occurring in runs most frequently in said signal, and a plurality of second coefficients having values not equal to A, said method comprising the steps of:

(a) deriving from said signal, a plurality of events each comprising a run of said first coefficients having a respective run length, which is preceded or followed by at least one second coefficient, and

(b) for each of said events, determining said respective run lengths and assigning a code word to represent said second coefficient and said run length.

* * * * *

THIS DOCUMENT

WAS FILED

UNDER SEAL

EXHIBIT C

UNITED STATES DISTRICT COURT

DISTRICT OF DELAWARE

- -

U.S. PHILIPS CORPORATION,

ORIGINAL

Plaintiff,

Civil Action No. 06-00251-GMS

v.

EASTMAN KODAK COMPANY,

Defendant.

- -

Videotaped 30(b)(6) Deposition Upon Oral Examination

Of:

Steven J. Sasson

CONFIDENTIAL - OUTSIDE ATTORNEYS' EYES ONLY

Location: Hyatt Regency - Rochester
125 East Main Street
Rochester, New York 14604

Date: November 6, 2007

Time: 9:05 a.m.

Reported By: MARIA A. WOLCZYK, CSR

this Professional DCS camera?

A. I have no knowledge about the budget associated with the development of that particular product.

Q. Did Mr. McGarvey tell you anything else about this Professional DCS camera?

A. No, not that I remember.

Q. Do you recall anything else about this Professional DCS camera that you may have learned from any other sources or may have known from that time period?

A. No. No. I just knew it was probably the first product that was sold in any volume, it was a digital camera for Kodak, that I remember.

Q. Well, this was a professional --

A. Yes.

Q. -- type product for the photojournalists that you mentioned?

A. Yes.

Q. When was the first consumer camera produced by Kodak?

A. The first consumer camera was marketed

in 1994 under the name of Apple. It was introduced by Apple actually, it was called the Apple QuickTake 100. And it was like 1,000, you know, a roughly $1,000 type of a product. Introduced under the Apple name.

Q. But it was made by Kodak?

A. Yeah, it was made by Kodak, designed by Kodak. I don't know if it was manufactured actually in Kodak. We might have used a third party to manufacture it. This was our first one at that point so I don't...

Q. And who worked on that project?

A. I don't know the specific design team that worked on that. I was deeply in another area of the company at that time with respect to thermal printing, so I wasn't that familiar with it.

I was aware of it when it was introduced because it was our first offering, and my experience there called my attention to it.

Q. It was introduced in the 1994 time period?

A. Yes, that's my understanding.

Q. When was it designed?

A. I don't know that, but sometime before then. I would say that.

Q. Are you aware of any clearance searches, patent clearance searches for this QuickTake 100?

A. I was not specifically involved in that. That is typically our normal practice, but I don't know of any specific actions taken on this program.

Q. Are you aware of the investment that Kodak made in developing this camera?

A. I was not part of the project so unaware of the budget.

Q. In the time period between the Professional DCS and this Apple QuickTake 100, were there any other digital camera offerings by Kodak?

A. Well, the Apple QuickTake was our first consumer offering. There were several -- there were several professional offerings that were after the DCS, the Professional DCS. I previously mentioned the DCS 200, which I believe came out the following year, in 1992. And that used a different camera body and it was more self-contained. I previously

described the professional DCS as two components, a camera body and a big hip pack.

The DCS 200 as we called it was sort of self-contained. It was big, but it was all in one bundled case. And I believe that came out in 1992.

There may have been several other variance of those camera offered in terms of different features and things like that, but I don't know exactly what they were between that time period.

Q. Did Mr. McGarvey's group work on that DCS 200?

A. Generally, yes. All of the professional cameras that were described, that I'm describing, were done by that same group. That was my understanding.

Q. Are you aware of the magnitude of the investment that Kodak made in developing the DCS 200 or the other cameras between 1991 and 1994 for the professional marketplace?

A. I have no specific knowledge about budgets for development. The group, I believe the

group did grow in size because the offerings were coming out roughly, you know, once every year or couple of years. But I have no information of a budget.

Q. Are you aware of any market studies that were done for any of those cameras, those professional offerings in that time period?

A. I am unaware of any specific market studies.

Q. And you expect that patent clearance searches were done for those products as well?

MR. MULLOY: Objection. Calls for speculation. Beyond the scope.

A. That is typically what we did with commercialization products of all types. So I don't know specifically for this camera, this product, but that would be typically my expectation.

MR. FRANKEL: We're about to go into some other of the products. I just want to ask you about some of them.

THE WITNESS: Yes.

MR. FRANKEL: We've been going for about

C E R T I F I C A T I O N

STATE OF NEW YORK:

COUNTY OF MONROE:

I, MARIA A. WOLCZYK, CSR, being a Freelance Court Reporter and Notary Public in and for Monroe County, New York, do hereby certify that I reported in machine shorthand the testimony of the witness called in the above-styled cause; that the said witness was duly sworn by me; and that the foregoing pages were typed by computer-assisted transcription under my personal supervision and constitute a true record of the testimony in this proceeding.

I further certify that I am not an attorney or counsel of any parties, nor a relative or employee of any attorney or counsel connected with the action, nor financially interested in the action.

WITNESS my hand in the City of Rochester, County of Monroe, State of New York.

Maria Wolczyk

Maria A. Wolczyk, CSR, Freelance Court Reporter and Notary Public in and for Monroe County, New York

EXHIBIT D

PTO/SB/57 (09-07)
Approved for use through 08/31/2010. OMB 0651-0033
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

(Also referred to as FORM PTO-1465)

REQUEST FOR *EX PARTE* REEXAMINATION TRANSMITTAL FORM

Address to:
Mail Stop *Ex Parte* Reexam
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Attorney Docket No.: 223612-25

Date: February 7, 2008

1. [X] This is a request for *ex parte* reexamination pursuant to 37 CFR 1.510 of patent number 4,901,075 issued February 13, 1990. The request is made by:

   [ ] patent owner. [X] third party requester.

2. [X] The name and address of the person requesting reexamination is:

   Timothy W. Lohse

   DLA Piper US LLP

   2000 University Avenue, East Palo Alto, CA 94303

3. [X] a. A check in the amount of $2520 is enclosed to cover the reexamination fee, 37 CFR 1.20(c)(1);

   [X] b. The Director is hereby authorized to charge the fee as set forth in 37 CFR 1.20(c)(1) to Deposit Account No. 07-1896 (submit duplicative copy for fee processing); or

   [ ] c. Payment by credit card. Form PTO-2038 is attached.

4. [X] Any refund should be made by [ ] check or [X] credit to Deposit Account No. 07-1896. 37 CFR 1.26(c). If payment is made by credit card, refund must be to credit card account.

5. [X] A copy of the patent to be reexamined having a double column format on one side of a separate paper is enclosed. 37 CFR 1.510(b)(4)

6. [ ] CD-ROM or CD-R in duplicate, Computer Program (Appendix) or large table
   [ ] Landscape Table on CD

7. [ ] Nucleotide and/or Amino Acid Sequence Submission
   If applicable, items a. – c. are required.

   a. [ ] Computer Readable Form (CRF)
   b. Specification Sequence Listing on:

      i. [ ] CD-ROM (2 copies) or CD-R (2 copies); **or**
      ii. [ ] paper

   c. [ ] Statements verifying identity of above copies

8. [ ] A copy of any disclaimer, certificate of correction or reexamination certificate issued in the patent is included.

9. [X] Reexamination of claim(s) 3-4, 7-8 and 11 is requested.

10. [X] A copy of every patent or printed publication relied upon is submitted herewith including a listing thereof on Form PTO/SB/08, PTO-1449, or equivalent.

11. [ ] An English language translation of all necessary and pertinent non-English language patents and/or printed publications is included.

This collection of information is required by 37 CFR 1.510. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Mail Stop *Ex Parte* Reexam, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**
If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PTO/SB/57 (09-07)
Approved for use through 08/31/2010. OMB 0651-0033
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

12. [X] The attached detailed request includes at least the following items:

a. A statement identifying each substantial new question of patentability based on prior patents and printed publications. 37 CFR 1.510(b)(1)
b. An identification of every claim for which reexamination is requested, and a detailed explanation of the pertinency and manner of applying the cited art to every claim for which reexamination is requested. 37 CFR 1.510(b)(2)

13. [ ] A proposed amendment is included (only where the patent owner is the requester). 37 CFR 1.510(e)

14. [X] a. It is certified that a copy of this request (if filed by other than the patent owner) has been served in its entirety on the patent owner as provided in 37 CFR 1.33(c).
The name and address of the party served and the date of service are:

Philips Intellectual Property & Standards

P.O. Box 3001, Briarcliff Manor, NY 10510

Date of Service: February 7, 2008; or

[ ] b. A duplicate copy is enclosed since service on patent owner was not possible.

15. Correspondence Address: Direct all communication about the reexamination to:

[X] The address associated with Customer Number: 26379

OR

[ ] Firm or Individual Name

Address

City	State	Zip
Country		
Telephone	Email	

16. [X] The patent is currently the subject of the following concurrent proceeding(s):
[ ] a. Copending reissue Application No. _____
[ ] b. Copending reexamination Control No. _____
[ ] c. Copending Interference No. _____
[X] d. Copending litigation styled:

U.S. Philips Corporation v. Eastman Kodak Company

Case No. 06-251-GMS

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

/Timothy W. Lohse/ — Authorized Signature

February 7, 2008 — Date

Timothy W. Lohse — Typed/Printed Name

35,255 — Registration No.

[ ] For Patent Owner Requester
[X] For Third Party Requester

EXHIBIT E

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Peter Vogel

U.S. Patent No. 4,901,075 Issued: February 13, 1990

Filed: September 11, 1987

Title: METHOD AND APPARATUS FOR BIT RATE REDUCTION

Certificate of Transmission Under 37 CFR 1.8
I hereby certify that this correspondence is being transmitted via electronic submission, attention Mail Stop: Reexam, Commissioner for Patents, Alexandria, VA 22313-1450 on:
February 7, 2008

/Timothy W. Lohse/
Timothy W. Lohse

* * *

ATTACHMENT TO REQUEST FOR EX-PARTE RE-EXAMINATION (FORM PTO-1465) PROVIDING INFORMATION ON U.S. PATENT NO. 4,901,075

ATTN: BOX REEXAM
Asst. Commissioner of Patents
Washington, D.C. 20231

Sir:

Reexamination under 35 U.S.C. §§ 302-307 and 37 CFR § 1.510 is requested of United States Patent Number 4,901,075 which issued on February 13, 1990 (the "Vogel patent"). This patent is still enforceable and re-examination is appropriate under 37 CFR § 1.510(a).

I. CLAIMS FOR WHICH REEXAMINATION IS REQUESTED

Reexamination is requested of claims 3-4, 7-8 and 11 of the Vogel patent in view of the prior art listed on the Citation of Prior Art under 37 CFR § 1.501 and 35 U.S.C. § 301 which is submitted with this Request for Reexamination.

II. EXPLANATION OF PERTINENCY AND MANNER OF APPLYING CITED PRIOR ART TO EVERY CLAIM FOR WHICH REEXAMINATION IS REQUESTED

A. Introduction

One or more prior art references submitted with the Citation of Prior Art render claims 3-4, 7-8 and 11 of the Vogel patent either anticipated under 35 USC 102 (a),(b) or (e) or unpatentable under 35 USC 103 so that substantial new questions of patentability of the claims in the Vogel patent have been raised by this request for reexamination. For each claim for which reexamination is sought, a specific citation of the prior art pertinent to the claim and a description of the relevancy of that prior art to the claim are set forth below in more detail. Most of the prior art relied on in this re-examination request was never submitted to the examiner and all of the prior art submitted with this re-examination request was not considered/used by the examiner during a rejection during the original prosecution of the Vogel patent.

The specific citation of the prior art pertinent to each claim and a description of the relevancy of that prior art to each claim appears below in the form of a claim chart for: 1) each anticipatory piece of prior art; and 2) each combination of prior art that renders certain claims of the Vogel patent obvious.

Furthermore, the district court in Delaware that is handling the co-pending patent litigation recently issued a claim construction order which is submitted with this request as it provides meaning to a few key terms. In addition, the expert for the assignee of the Vogel patent recently had his deposition taken (the transcript is attached to this request) and he confirms the interpretation of certain claim terms as set forth below in more detail.

B. **Anticipatory Prior Art**

1. COST 211bis Simulation Subgroup Paper entitled "Block Coding Using a Two-Dimensional Run-Length Table", published September 9, 1986 (the "COST Paper")

The COST Paper was a submission made by Dr. Peter Vogel (the named inventor) to the COST 211bis Simulation Subgroup meeting. *See Final Deposition Transcript of Peter Vogel, Ph. D. on October 24, 2007 (the "Vogel Tr.") at 117, lines 12- 24.* The paper was published/made public and distributed to the participants of the COST 211bis Simulation Subgroup by at least September 9, 1986. *See Vogel Tr. at 120, line 2 – 121, line 20.* Thus, the COST Paper is a publication that was published on September 9, 1986 (more than one year before the U.S. filing date), is therefore prior art to the Vogel patent under 35 USC 102(b) and is properly used as prior art in this re-examination request.

The COST Paper was not submitted to the examiner nor considered by the examiner during the prosecution of the Vogel patent.

As set forth below, claims 3-4 and 7-8 are anticipated by the COST Paper.

US 4,901,075 CLAIM ELEMENTS	**COST Paper**
3. In a method of coding a signal comprising a sequence of coefficients which results after a blockwise transform of pixels of a video signal with subsequent quantization, for transmission at a reduced bit rate, said signal comprising a plurality of zero coefficients, and a plurality of non-zero coefficients said method comprising the steps of:	The COST Paper discloses: "For the 2D-run-length coding the events corresponding to a run-length of consecutive zero coefficients and coefficients unequal to zero defining the end of the run-length are considered as composite rather than separate statistical events…" *See COST Paper at page 1, Section 2.* The run-length of consecutive zero coefficients and coefficients unequal to zero are generated from a blockwise transform of pixels of a video signal. *See COST Paper at page 1, Section 2.* The 2D-run-length coding with the Huffman codes provides a bit rate reduction of approximately 12% compared with coding by an amplitude-and- run-length lookup table using Huffman codes. *See COST Paper at page 2, Section 3.*
(a) deriving from said signal, a plurality of events each comprising a run of said zero-coefficients having a respective	The COST Paper discloses that a plurality of events are derived from the signal that include a run of zero coefficients and the preceding or following non-zero coefficient. (See "For the 2D-run-length coding the events

US 4,901,075 CLAIM ELEMENTS	COST Paper
run length and preceded or followed by at least one non-zero coefficient, and .	corresponding to a run-length of consecutive zero coefficients and coefficients unequal to zero defining the end of the run-length are considered as composite rather than separate statistical events…" *See COST Paper at page 1, Section 2 and Appendix A.*
(b) for each of said events, determining said respective run length and assigning a code word to represent said non-zero coefficient and said run length.	As shown in Appendix A of the COST Paper, a Huffman code for the composite events are assigned to each composite event that are a run-length of consecutive zero coefficients and coefficient unequal to zero. *See COST Paper at page 1, Sections 2 and 3 and Appendix A.* For example, a composite event with a zero run length of "2" and a "5" coefficient unequal to zero is assigned the Huffman code "00101011110". *See COST Paper at Appendix A.*
4. The method of claim 3, wherein said code words are Huffman code words.	The codes shown in Appendix A of the COST Paper are Huffman codes. *See COST Paper at page 1, Sections 2 and 3 and Appendix A.*
7. A method as claimed in claim 4, characterized in that the Huffman codeword is independent of the sign of that non-zero coefficient which succeeds or precedes the run of zero-coefficients and in that the sign is coded by a separate bit.	The Huffman codes in Appendix A of the COST Paper are independent of the sign of the non-zero coefficient since each code in Appendix A is based on the magnitude of the coefficient unequal to zero. *See COST Paper at Appendix A.* The sign bit is coded with a separate bit. *See COST Paper at page 1, Sections 2 and 3 and Appendix A.*
8. A method for coding a signal for transmission at a reduced bandwidth, comprising the steps of:	The COST Paper discloses a method for coding a signal. *See COST Paper.* The 2D-run-length coding with the Huffman codes disclosed in the COST Paper provides a bit rate reduction of approximately 12% compared with coding by an amplitude-and- run-length lookup table using Huffman codes. *See COST Paper at page 2, Section 3.*
(a) transforming said signal into a sequence comprising zero coefficients occurring in runs and non-zero coefficients;	The COST paper discloses a 2D-run-length coding of a signal. "For the 2D-run-length coding the events corresponding to a run-length of consecutive zero coefficients and coefficients unequal to zero defining the end of the run-length are considered as composite rather than separate statistical events…" *See COST Paper at page 1, Section 2.*
(b) deriving from said sequence, a	The COST Paper discloses that a plurality of events are

US 4,901,075 CLAIM ELEMENTS	COST Paper
plurality of events each comprised of a run of zero coefficients having a respective run length, which is preceded or followed by at least one non-zero coefficient, and	derived from the signal that include a run of zero coefficients and the preceding or following non-zero coefficient. (See "For the 2D-run-length coding the events corresponding to a run-length of consecutive zero coefficients and coefficients unequal to zero defining the end of the run-length are considered as composite rather than separate statistical events..." *See COST Paper at page 1, Section 2 and Appendix A.*
(c) for each of said events, determining the run length and assigning a code word to represent said run length and said non-zero coefficient.	As shown in Appendix A of the COST Paper, a Huffman code for the composite events are assigned to each composite event that are a run-length of consecutive zero coefficients and coefficient unequal to zero. *See COST Paper at page 1, Sections 2 and 3 and Appendix A.* For example, a composite event with a zero run length of "2" and a "5" coefficient unequal to zero is assigned the Huffman code "00101011110". *See COST Paper at Appendix A.*

2. U.S. Patent No. 4,698,672 to Chen et al. (the "Chen Patent")

The Chen Patent is a patent that was filed on October 27, 1986 and issued on October 6, 1987. The Vogel patent is not entitled to the filing date of the first German priority application (German Patent Application DE 3631252 – the "'252 Application") with a filing date of September 13, 1986 under 35 USC 119 because the '252 Application (which is submitted along with an English translation with this request) does not meet the requirements of 35 USC 112 as required for a valid priority claim.

In particular, the '252 Application does not disclose the best mode of the invention as required by 35 USC 112, does not meet the enablement requirement as required by 35 USC 112 and does not meet the written description requirement as required by 35 USC 112 and thus the earliest effective filing date of the Vogel Patent is November 8, 1986. In more detail, the '252 Application: 1) does not disclose a particular method for "deriving from said signal, a plurality of events each comprising a run of said zero-coefficients having a respective run length and preceded or followed by at least one non-zero coefficient" and thus fails to provide adequate written disclosure, enablement or best mode (*See Final Girod Deposition Transcript of January 30, 2008 (the "Girod Tr.") at 181:14 – 183:16*); and 2) does not contain a code table from which codewords are assigned and thus fails to provide adequate written disclosure, enablement or best mode (*See Girod Tr. at 183:17 – 190:8*)

Therefore, the Chen Patent is prior art to the Vogel patent under 35 USC 102(e) and is properly used as prior art in this re-examination request. While the Chen Patent was cited to the examiner and mentioned in passing during the prosecution, the examiner did not consider in detail the Chen Patent and it applicability to the claims of the Vogel Patent.

As set forth below, claims 3-4 and 7-8 are anticipated by the Chen Patent.

US 4,901,075 CLAIM ELEMENTS	**Chen Patent**
3. In a method of coding a signal comprising a sequence of coefficients which results after a blockwise transform of pixels of a video signal with subsequent quantization, for transmission at a reduced bit rate, said signal comprising a plurality of zero	Chen discloses a coding system for reducing redundancy. *See Title*. Chen discloses "methods and apparatus for processing signals to remove redundant information thereby making the signals more suitable for transfer through a limited bandwidth medium." Chen is specifically related to methods and apparatus useful in video compression systems. *See Abstract, Figures 1-4 and Col. 1, lines 15-20.*

US 4,901,075 CLAIM ELEMENTS	Chen Patent
coefficients, and a plurality of non-zero coefficients said method comprising the steps of:	Prior to coding in a coder 14, a forward processor 52 processes the spatial domain input signals to form processed signals which typically are transform domain signals arranged in blocks of transform domain coefficients. *See Figure 1 and Col. 4, lines 45-49.* Thus, the signal in Chen include a plurality of zero coefficients and a plurality of non-zero coefficients.
(a) deriving from said signal, a plurality of events each comprising a run of said zero-coefficients having a respective run length and preceded or followed by at least one non-zero coefficient, and	In Chen, events (known as runlength coding) are generated of type R and R'. *See Col. 5, lines 30 -36.* The type R event combines a runlength of 0's followed by the next most frequently occurring value (1 in the usual case.) *See Col. 3, lines 30 -37 and Col. 5, lines 36-38.*
(b) for each of said events, determining said respective run length and assigning a code word to represent said non-zero coefficient and said run length.	The event type, R, is coded with One's Redundancy (OR) coding or scene adaptive coding using Huffman codes. *See Col. 13, line 37- Col. 17, line 48 and Tables 6-9.* The type R encodes the run length of the zero coefficient and the following amplitude of 1. *See Col. 3, lines 32-37 and Col. 5, lines 36-38.*
4. The method of claim 3, wherein said code words are Huffman code words.	The type, R, is coded with One's Redundancy (OR) coding or scene adaptive coding using Huffman codes. *See Col. 13, line 37- Col. 17, line 48 and Tables 6-9.*
7. A method as claimed in claim 4, characterized in that the Huffman codeword is independent of the sign of that non-zero coefficient which succeeds or precedes the run of zero-coefficients and in that the sign is coded by a separate bit.	In Chen, as shown in Tables 6 and 7, the coding tables assume that a separate sign bit, not in the tables, is used to indicate the sign of each value coded in the manner indicated in Table 5. *See Col. 18, lines 3-17.* Chen also discloses that coefficient differences of one at the end of the consecutive zeros encode with R + SIGN. *See Col. 14, lines 35-37.*
8. A method for coding a signal for transmission at a reduced bandwidth, comprising the steps of:	Chen discloses a coding system for reducing redundancy. *See Title.* Chen discloses "methods and apparatus for processing signals to remove redundant information thereby making the signals more suitable for transfer through a limited bandwidth medium. Chen is specifically related to methods and apparatus useful in video compression systems. *See Abstract, Figures 1-4 and Col. 1, lines 15-20.*
(a) transforming said signal into a	Prior to coding in a coder 14, a forward processor 52

US 4,901,075 CLAIM ELEMENTS	Chen Patent
sequence comprising zero coefficients occurring in runs and non-zero coefficients;	processes the spatial domain input signals to form processed signals which typically are transform domain signals arranged in blocks of transform domain coefficients. *See Figure 1 and Col. 4, lines 45-49.* Thus, the signal in Chen include a plurality of zero coefficients occurring in runs and non-zero coefficients.
(b) deriving from said sequence, a plurality of events each comprised of a run of zero coefficients having a respective run length, which is preceded or followed by at least one non-zero coefficient, and	In Chen, events (known as runlength coding) are generated of type R and R'. *See Col. 5, lines 30 -36.* The type R event combines a runlength of 0's followed by the next most frequently occurring value (1 in the usual case.) *See Col. 3, lines 30 -37 and Col. 5, lines 36-38.*
(c) for each of said events, determining the run length and assigning a code word to represent said run length and said non-zero coefficient.	The event type, R, is coded with One's Redundancy (OR) coding or scene adaptive coding using Huffman codes. *See Col. 13, line 37- Col. 17, line 48 and Tables 6-9.* The type R encodes the run length of the zero coefficient and the following amplitude of 1. *See Col. 3, lines 32-37 and Col. 5, lines 36-38.*

3. U.S. Patent No. 4,420,771 to Pirsch (the "Pirsch Patent")

The Pirsch Patent is a patent that was filed on February 9, 1981 and issued on December 13, 1983. The Pirsch Patent is prior art to the Vogel patent under 35 USC 102(a) or 35 USC 102(b) and is properly used as prior art in this re-examination request. The Pirsch Patent was not submitted to the examiner during the prosecution nor considered by the examiner during the prosecution.

As set forth below, claims 3-4 and 8 are anticipated by the Pirsch Patent.

US 4,901,075 CLAIM ELEMENTS	**Pirsch Patent**
3. In a method of coding a signal comprising a sequence of coefficients which results after a blockwise transform of pixels of a video signal with subsequent quantization, for transmission at a reduced bit rate, said signal comprising a plurality of zero coefficients, and a plurality of non-zero coefficients said method comprising the steps of:	Pirsch discloses a method for encoding multi-level signals. *See Title and Col. 1:60- 2:8 and 2:34-50.* Pirsch also discloses that multi-level signal encoding results in reducing redundancy in the signal and reducing the amount of data needed to represent the signal and the object of the present invention is to enable more efficient encoding of a multi-level signal. *See Col. 1:45-57.* Pirsch discloses that the system is used for encoding coefficients from a blockwise transform (error prediction values) wherein a large number of the error values will have values at or near ZERO. *See Col. 2, lines 39-45.* The error prediction values may be quantized. *See Col. 3, lines 2-5.* Thus, the signals in Pirsch include zero coefficients and non-zero coefficients.
(a) deriving from said signal, a plurality of events each comprising a run of said zero-coefficients having a respective run length and preceded or followed by at least one non-zero coefficient, and	Pirsch defines an event (a run) as a series of consecutive inputs having the same value, can also be modified, if desired, without diminishing the advantages of the present invention. Specifically, an alternative definition of a run may be a series of consecutive words of like value as well as the next (subsequent) word of different value." (Emphasis added) *See Col. 11, lines 25-43.*
(b) for each of said events, determining said respective run length and assigning a code word to represent said non-zero coefficient and said run length.	Pirsch discloses a method for encoding the events (runs that are a series of consecutive words of like value as well as the next (subsequent) word of different value) using a coder 191 that uses variable length codes with an example of the codes for encoding the non-frequent values shown in Table 4. *See Col. 1:60- Col. 2:9, Col. 7:5- Col. 8:15 and Table 4.*
4. The method of claim 3, wherein said code words are Huffman code words.	The events in Pirsch (runs that are a series of consecutive words of like value as well as the next (subsequent) word of different value) are encoded by the coder 191 using a

US 4,901,075 CLAIM ELEMENTS	Pirsch Patent
	variable length Huffman code with an example of the Huffman codes for encoding the non-frequent values shown in Table 4. *See Col. 1:60- Col. 2:9, Col. 7:5- Col. 8:15 and Table 4.*
8. A method for coding a signal for transmission at a reduced bandwidth, comprising the steps of:	Pirsch discloses a method for encoding multi-level signals. *See Title and Col. 1:60- 2:8 and 2:34-50.* Pirsch also discloses that multi-level signal encoding results in reducing redundancy in the signal and reducing the amount of data needed to represent the signal and the object of the present invention is to enable more efficient encoding of a multi-level signal. *See Col. 1:45-57.*
(a) transforming said signal into a sequence comprising zero coefficients occurring in runs and non-zero coefficients;	Pirsch discloses that the system is used for encoding coefficients from a blockwise transform (error prediction values) wherein a large number of the error values will have values at or near ZERO. *See Col. 2, lines 39-45.* The error prediction values may be quantized. *See Col. 3, lines 2-5.* Thus, the signals in Pirsch include zero coefficients and non-zero coefficients.
(b) deriving from said sequence, a plurality of events each comprised of a run of zero coefficients having a respective run length, which is preceded or followed by at least one non-zero coefficient, and	Pirsch defines an event (a run) as a series of consecutive inputs having the same value, can also be modified, if desired, without diminishing the advantages of the present invention. Specifically, an alternative definition of a run may be a series of consecutive words of like value as well as the next (subsequent) word of different value." (Emphasis added) *See Col. 11, lines 25-43.*
(c) for each of said events, determining the run length and assigning a code word to represent said run length and said non-zero coefficient.	Pirsch discloses a method for encoding the events (runs that are a series of consecutive words of like value as well as the next (subsequent) word of different value) using a coder 191 that uses variable length codes with an example of the codes for encoding the non-frequent values shown in Table 4. *See Col. 1:60- Col. 2:9, Col. 7:5- Col. 8:15 and Table 4.*

4. U.S. Patent No. 3,984,833 to Van Voorhis (the "Van Voorhis Patent")

The Van Voorhis Patent is a patent that was filed on July 17, 1975 and issued on October 5, 1976. The Van Voorhis Patent is prior art to the Vogel patent under 35 USC 102(a) or 35 USC 102(b) and is properly used as prior art in this re-examination request. The Van Voorhis Patent was not submitted to the examiner during the prosecution nor considered by the examiner during the prosecution.

As set forth below, claim 8 is anticipated by the Van Voorhis Patent.

US 4,901,075 CLAIM ELEMENTS	**Van Voorhis Patent**
8. A method for coding a signal for transmission at a reduced bandwidth, comprising the steps of:	Van Voorhis discloses an apparatus for encoding extended run-length codes for the compression of digital images that are a two-dimensional array of image points. *See Col. 1:13-19.* The compression of the digital images reduces the storage requirements for digital images and reduces the bandwidth required for the transmission of the digital images *See Col. 1:27-31.*
(a) transforming said signal into a sequence comprising zero coefficients occurring in runs and non-zero coefficients;	Van Voorhis discloses that an image, for a black/white image, has image points that are transformed into a sequence that has a value of either 0 or 1 (zero coefficients or non-zero coefficients) to indicate that the corresponding area of the picture is light or dark. *See Col. 1, lines 19-23.*
(b) deriving from said sequence, a plurality of events each comprised of a run of zero coefficients having a respective run length, which is preceded or followed by at least one non-zero coefficient, and	Van Voorhis discloses that an event may be a binary encoded representation of an alphanumeric character, an analog voltage, a run of binary video information, a run of binary image information or any other type of information capable of recognition. *See Col. 6, lines 59-65.* Van Voorhis also describes that, from the signal, events are recognized as follows: "*In such a circumstance, the event recognizer 10 of Van Voorhis may recognize each sequence of consecutive bits of the same logic , which is denoted as a run. Runs may also be sequences of bits of one of the logic levels, or sequences of a level terminating in another level.*" *See Col. 7:11-15.* and *"For the purpose of the illustration, a run is defined as a one or as a string of one or more zeros and the first one following this string of zeros."* *See Col. 14:64-66; underlining was added.*
(c) for each of said events,	Van Voorhis discloses coding of events where the event

US 4,901,075 CLAIM ELEMENTS	Van Voorhis Patent
determining the run length and assigning a code word to represent said run length and said non-zero coefficient.	may include a string of one or more zeros and the first one following this string of zeros. *See Col. 14, lines 64-66.* The encoder then calculates and outputs code words for a specific class of ordinary and extended run-length codes. *See Col, 3, lines 58-61.* Examples of the codes used by the coder are shown in Tables 1 and 2. *See Col. 3, line 58 – Col. 4, line 64 and Tables 1 and 2.*

5. Wen-Hsiung Chen and William K. Pratt, "Scene Adaptive Coder", IEEE Transactions on Communications, Vol. COM-32, No. 3, March 1984, pages 225 to 232 (the "Chen Article")

The Chen Article was published in March 1984 and is prior art to the Vogel Patent under 35 USC 102(a) or 35 USC 102(b) and is properly used as prior art in this re-examination request. *See Girod Tr. at 101:12 – 102:7.* The Chen Article was submitted to the examiner late in the prosecution, but was never relied on by the examiner.

Furthermore, the court in the currently pending litigation recently issued a Markman order in which the court interpreted the following terms:

The term "code word" is construed to mean "a sequence of bits assigned to represent a particular event or events in accordance with a predefined set of rules"; and

The term "event" is construed to mean "a run of zero coefficients and the value of the non-zero coefficient which immediately precedes or follows that run."

In addition, the expert witness for the owner of the Vogel patent recently was deposed and provided additional evidence that the Vogel patent is invalid over the Chen Article.

In view of the above interpretations of these terms, claims 3-4 and 7-8 of the Vogel Patent are anticipated by the Chen Article.

US 4,901,075 CLAIM ELEMENTS	**Chen Article**
3. In a method of coding a signal comprising a sequence of coefficients which results after a blockwise transform of pixels of a video signal with subsequent quantization, for transmission at a reduced bit rate, said signal comprising a plurality of zero coefficients, and a plurality of non-zero coefficients said method comprising the steps of:	Chen discloses a system and method wherein transform image coding (which was developed 15 years before 1984) may be used for bandwidth compression for video signals. The Chen Article discloses that discrete cosine transforms (DCT) may be used to generate DCT coefficients that are quantized which results in zero coefficients and non-zero coefficients. *See pp. 225-227. See also Girod Tr. at 102:17-105:6.*
(a) deriving from said signal, a plurality of events each comprising a run of said zero-coefficients having a respective	Chen derives a plurality of events from the video signal and each event includes a run of zero coefficients and the value of the non-zero coefficient that precedes or follows that run. *See pg. 227-229. See also Girod Tr. at 115:9 – 116:3.*

US 4,901,075 CLAIM ELEMENTS	Chen Article
run length and preceded or followed by at least one non-zero coefficient, and	
(b) for each of said events, determining said respective run length and assigning a code word to represent said non-zero coefficient and said run length.	Chen assigns a sequence of bits that represents a particular event or events in accordance with a predefined set of rules. In particular, Chen assigns a sequence of bits to represent a run of zeroes followed by a non-zero coefficient comprised of a code word for the run-length prefix, a code word for the run length and a code word for the non-zero coefficient (*See pp. 228-229, Tables I and II.*) to form a composite code word that is a sequence of bits that represent a particular event or events in accordance with a predefined set of rules. Consider for example, the event of four zero coefficients followed by a non-zero coefficient equal to four (00004): According to Chen this event is represented by a sequence of bits as follows: First the run length prefix, 010, is included in the composite code word to indicate the beginning of the run of four zeroes. (*See p. 228, Table I.*) Next, the Huffman code word for a run length of 4, 0101, is included in the composite code word. (*See p. 229, Table II.*) Finally, the Huffman code word for the non-zero coefficient with an amplitude of 4, 00001, is included in the composite code word. (*See p. 228, Table I.*) Thus the composite codeword that is a sequence of bits that represents the event 00004 is: 010010100001. This is true every time the event 00004 occurs, and thus that composite codeword is assigned according to a predefined set of rules. *See Girod Tr. at 118:9 – 120:6.*
4. The method of claim 3, wherein said code words are Huffman code words.	Chen discloses that the sequence of bits assigned are Huffman codewords. *See pp. 228-229 and Tables I and II.*
7. A method as claimed in claim 4, characterized in that the Huffman codeword is	Chen discloses that the Huffman codewords are independent of the sign (since the Huffman codes in Table I are codes for the non-zero coefficient amplitude only) and the sign is coded

US 4,901,075 CLAIM ELEMENTS	Chen Article
independent of the sign of that non-zero coefficient which succeeds or precedes the run of zero-coefficients and in that the sign is coded by a separate bit.	by a separate bit (not shown, but inherent since the generated DCT coefficients include negative value non-zero coefficients and the sign of the generated DCT coefficients must be coded by using a separate bit). *See pp. 228-229 and Table I.*
8. A method for coding a signal for transmission at a reduced bandwidth, comprising the steps of:	Chen discloses a system and method wherein transform image coding (which was developed 15 years before 1984) may be used for bandwidth compression for video signals. *See pp. 225-227.*
(a) transforming said signal into a sequence comprising zero coefficients occurring in runs and non-zero coefficients;	The Chen Article discloses that discrete cosine transforms (DCT) may be used to generate DCT coefficients that are quantized which results in zero coefficients and non-zero coefficients. *See pp. 225-227. See also Girod Tr. at 102:17-105:6.*
(b) deriving from said sequence, a plurality of events each comprised of a run of zero coefficients having a respective run length, which is preceded or followed by at least one non-zero coefficient, and	Chen derives a plurality of events from the video signal and each event includes a run of zero coefficients and the value of the non-zero coefficient that precedes or follows that run. *See pg. 227-229. See also Girod Tr. at 115:9 – 116:3.*
(c) for each of said events, determining the run length and assigning a code word to represent said run length and said non-zero coefficient.	Chen assigns a sequence of bits that represents a particular event or events in accordance with a predefined set of rules. In particular, Chen assigns a sequence of bits to represent a run of zeroes followed by a non-zero coefficient comprised of a code word for the run-length prefix, a code word for the run length and a code word for the non-zero coefficient (*See pp. 228-229, Tables I and II.*) to form a composite code word that is a sequence of bits that represent a particular event or events in accordance with a predefined set of rules. Consider for example, the event of four zero coefficients followed by a non-zero coefficient equal to four (00004): According to Chen this event is represented by a sequence of bits as follows: First the run length prefix, 010, is included in the composite code word to indicate the beginning of the run of four zeroes. (*See p. 228, Table I.*) Next, the Huffman code word for a run length of 4, 0101, is included in the composite code word. (*See p. 229, Table II.*)

US 4,901,075 CLAIM ELEMENTS	Chen Article
	Finally, the Huffman code word for the non-zero coefficient with an amplitude of 4, 00001, is included in the composite code word. (*See p. 228, Table I.*) Thus the composite codeword that is a sequence of bits that represents the event 00004 is: 010010100001. This is true every time the event 00004 occurs, and thus that composite codeword is assigned according to a predefined set of rules. *See Girod Tr. at 118:9 – 120:6.*

C. **Obviousness Prior Art**

1. U.S. Patent No. 4,420,771 to Pirsch (the "Pirsch Patent") In View of Wen-Hsiung Chen and William K. Pratt, "Scene Adaptive Coder", IEEE Transactions on Communications, Vol. COM-32, No. 3, March 1984, pages 225 to 232 (the "Chen Article")

The Pirsch Patent is a patent that was filed on February 9, 1981 and issued on December 13, 1983. The Pirsch Patent is prior art to the Vogel patent under 35 USC 102(a) or 35 USC 102(b) and is properly used as prior art in this re-examination request. The Pirsch Patent was not submitted to the examiner during the prosecution nor considered by the examiner during the prosecution. The Chen Article was published in March 1984 and is prior art to the Vogel Patent under 35 USC 102(a) or 35 USC 102(b) and is properly used as prior art in this re-examination request. The Chen Article was submitted to the examiner during the prosecution, but was never relied on by the examiner and was not used in combination with any other piece of prior art by the examiner.

Claims 3-4 and 8 of the Vogel Patent are unpatentable under 35 USC 103 over the Pirsch Patent in view of the Chen Article because:

1) The prior art (disclosed in the Chen Article as set forth below in the chart) discloses a method for coding signals that may include transform coding (using discrete cosine transforms (DCTs)) in which a sequence of coefficients having zero values and non-zero values are coded using codewords. In Chen, a run of zero coefficients are coded with a codeword and the non-zero coefficients are coded with a separate codeword. In Chen, Huffman codewords are used to code the run of zero coefficients as well as the non-zero coefficients.

2) In the Vogel patent, transform coded coefficients having zero and non-zero values are coded such that a run of zero coefficients and a preceding or subsequent non-zero coefficient are coded together.

3) The prior art (disclosed in the Pirsch Patent as set forth below in the chart) discloses a known combined coding technique to code a run of zero values and a non-zero value together using a single codeword which results in a higher level of compression.

4) One of ordinary skill in the art would have recognized that applying the known combined coding technique of the Pirsch Patent to the method of coding signals disclosed in the Chen Article would have yielded the predictable result of a higher compression coding system and also resulted in an improved coding system with the higher compression. *See Ebrahimi Declaration at ¶ 10.*

Therefore, claims 3-4 and 8 of the Vogel Patent would have been obvious over the combination of the Chen Article and the Pirsch Patent.

US 4,901,075 CLAIM ELEMENTS	**Pirsch Patent**	**Chen Article**
3. In a method of coding a signal comprising a sequence of coefficients which results after a blockwise transform of pixels of a video signal with subsequent quantization, for transmission at a reduced bit rate, said signal comprising a plurality of zero coefficients, and a plurality of non-zero coefficients said method comprising the steps of:	Pirsch discloses a method for encoding multi-level signals. *See Title and Col. 1:60- 2:8 and 2:34-50.* Pirsch also discloses that multi-level signal encoding results in reducing redundancy in the signal and reducing the amount of data needed to represent the signal and the object of the present invention is to enable more efficient encoding of a multi-level signal. *See Col. 1:45-57.* Pirsch discloses that the system is used for encoding coefficients from a blockwise transform (error prediction values) wherein a large number of the error values will have values at or near ZERO. *See Col. 2, lines 39-45.* The error prediction values may be quantized. *See Col. 3, lines 2-5.*	Chen discloses a system and method wherein transform image coding (which was developed 15 years before 1984) may be used for bandwidth compression for video signals. The Chen Article discloses that discrete cosine transforms (DCT) may be used to generate DCT coefficients that are quantized which results in zero coefficients and non-zero coefficients. *See pp. 225-227. See also Girod Tr. at 102:17-105:6.*
(a) deriving from said signal, a plurality of events each comprising a run of said zero-coefficients having a respective run length and preceded or followed by at least one non-zero coefficient, and	Pirsch defines an event (a run) as a series of consecutive inputs having the same value, can also be modified, if desired, without diminishing the advantages of the present invention. Specifically, an alternative definition of a run may be a series of consecutive words of like value as well as the next (subsequent) word of different value." (Emphasis added) *See Col. 11, lines 25-43.*	Chen derives a plurality of events from the video signal and each event includes a run of zero coefficients and the value of the non-zero coefficient that precedes or follows that run. *See pg. 227-229. See also Girod Tr. at 115:9 – 116:3.*

US 4,901,075 CLAIM ELEMENTS	Pirsch Patent	Chen Article
(b) for each of said events, determining said respective run length and assigning a code word to represent said non-zero coefficient and said run length.	Pirsch discloses a method for encoding the events (runs that are a series of consecutive words of like value as well as the next (subsequent) word of different value) using a coder 191 that uses variable length codes with an example of the codes for encoding the non-frequent values shown in Table 4. *See Col. 1:60- Col. 2:9, Col. 7:5- Col. 8:15 and Table 4.*	Chen assigns a sequence of bits that represents a particular event or events in accordance with a predefined set of rules. In particular, Chen assigns a sequence of bits to represent a run of zeroes followed by a non-zero coefficient comprised of a code word for the run-length prefix, a code word for the run length and a code word for the non-zero coefficient (*See pp. 228-229, Tables I and II.*) to form a composite code word that is a sequence of bits that represent a particular event or events in accordance with a predefined set of rules. Consider for example, the event of four zero coefficients followed by a non-zero coefficient equal to four (00004): According to Chen this event is represented by a sequence of bits as follows: First the run length prefix, 010, is included in the composite code word to indicate the beginning of the run of four zeroes. (*See p. 228, Table I.*) Next, the Huffman code word for a run length of 4, 0101, is included in the

US 4,901,075 CLAIM ELEMENTS	Pirsch Patent	Chen Article
		composite code word. (*See p. 229, Table II.*) Finally, the Huffman code word for the non-zero coefficient with an amplitude of 4, 00001, is included in the composite code word. (*See p. 228, Table I.*) Thus the composite codeword that is a sequence of bits that represents the event 00004 is: 010010100001. This is true every time the event 00004 occurs, and thus that composite codeword is assigned according to a predefined set of rules. *See Girod Tr. at 118:9 – 120:6.*
4. The method of claim 3, wherein said code words are Huffman code words.	The events in Pirsch (runs that are a series of consecutive words of like value as well as the next (subsequent) word of different value) are encoded by the coder 191 using a variable length Huffman code with an example of the Huffman codes for encoding the non-frequent values shown in Table 4. *See Col. 1:60- Col. 2:9, Col. 7:5-Col. 8:15 and Table 4.*	Chen discloses that the sequence of bits assigned are Huffman codewords. *See pp. 228-229 and Tables I and II.*
7. A method as claimed in claim 4, characterized in that the Huffman codeword is independent of the sign of that non-zero coefficient which		Chen discloses that the Huffman codewords are independent of the sign (since the Huffman codes in Table I are codes for the non-zero coefficient amplitude only) and the

US 4,901,075 CLAIM ELEMENTS	Pirsch Patent	Chen Article
succeeds or precedes the run of zero-coefficients and in that the sign is coded by a separate bit.		sign is coded by a separate bit (not shown, but inherent since the generated DCT coefficients include negative value non-zero coefficients and the sign of the generated DCT coefficients must be coded by using a separate bit). *See pp. 228-229 and Table I.*
8. A method for coding a signal for transmission at a reduced bandwidth, comprising the steps of:	Pirsch discloses a method for encoding multi-level signals. *See Title and Col. 1:60- 2:8 and 2:34-50.* Pirsch also discloses that multi-level signal encoding results in reducing redundancy in the signal and reducing the amount of data needed to represent the signal and the object of the present invention is to enable more efficient encoding of a multi-level signal. *See Col. 1:45-57.*	Chen discloses a system and method wherein transform image coding (which was developed 15 years before 1984) may be used for bandwidth compression for video signals. *See pp. 225-227.*
(a) transforming said signal into a sequence comprising zero coefficients occurring in runs and non-zero coefficients;	Pirsch discloses that the system is used for encoding coefficients from a blockwise transform (error prediction values) wherein a large number of the error values will have values at or near ZERO. *See Col. 2, lines 39-45.* The error prediction values may be quantized. *See Col. 3, lines 2-5.* Thus, the signals in Pirsch include zero coefficients and non-zero coefficients.	The Chen Article discloses that discrete cosine transforms (DCT) may be used to generate DCT coefficients that are quantized which results in zero coefficients and non-zero coefficients. *See pp. 225-227. See also Girod Tr. at 102:17-105:6.*
(b) deriving from said sequence, a plurality of events each comprised of a run of zero coefficients having a respective run length, which is preceded or followed by at least one	Pirsch defines an event (a run) as a series of consecutive inputs having the same value, can also be modified, if desired, without diminishing the advantages of the present invention. Specifically, an alternative definition of a run may be a series of consecutive words of	Chen derives a plurality of events from the video signal and each event includes a run of zero coefficients and the value of the non-zero coefficient that precedes or follows that run. *See pg. 227-229.*

US 4,901,075 CLAIM ELEMENTS	Pirsch Patent	Chen Article
non-zero coefficient, and	like value as well as the next (subsequent) word of different value." (Emphasis added) *See Col. 11, lines 25-43.*	*See also Girod Tr. at 115:9 – 116:3.*
(c) for each of said events, determining the run length and assigning a code word to represent said run length and said non-zero coefficient.	Pirsch discloses a method for encoding the events (runs that are a series of consecutive words of like value as well as the next (subsequent) word of different value) using a coder 191 that uses variable length codes with an example of the codes for encoding the non-frequent values shown in Table 4. *See Col. 1:60- Col. 2:9, Col. 7:5- Col. 8:15 and Table 4.*	Chen assigns a sequence of bits that represents a particular event or events in accordance with a predefined set of rules. In particular, Chen assigns a sequence of bits to represent a run of zeroes followed by a non-zero coefficient comprised of a code word for the run-length prefix, a code word for the run length and a code word for the non-zero coefficient (*See pp. 228-229, Tables I and II.*) to form a composite code word that is a sequence of bits that represent a particular event or events in accordance with a predefined set of rules. Consider for example, the event of four zero coefficients followed by a non-zero coefficient equal to four (00004): According to Chen this event is represented by a sequence of bits as follows: First the run length prefix, 010, is included in the composite code word to indicate the beginning of the run of four zeroes. (*See p. 228, Table I.*)

US 4,901,075 CLAIM ELEMENTS	Pirsch Patent	Chen Article
		Next, the Huffman code word for a run length of 4, 0101, is included in the composite code word. (*See p. 229, Table II.*) Finally, the Huffman code word for the non-zero coefficient with an amplitude of 4, 00001, is included in the composite code word. (*See p. 228, Table I.*) Thus the composite codeword that is a sequence of bits that represents the event 00004 is: 010010100001. This is true every time the event 00004 occurs, and thus that composite codeword is assigned according to a predefined set of rules. *See Girod Tr. at 118:9 – 120:6.*

2. US Patent No. 4,363,036 to Subramaniam (the "Subramaniam '036 Patent") In View of Wen-Hsiung Chen and William K. Pratt, "Scene Adaptive Coder", IEEE Transactions on Communications, Vol. COM-32, No. 3, March 1984, pages 225 to 232 (the "Chen Article")

The Subramaniam '036 Patent was filed on March 16, 1981 and issued on December 7, 1982 and is prior art to the Vogel Patent under 35 USC 102(a) or 35 USC 102(b) and is properly used as prior art in this re-examination request. The Chen Article was published in March 1984 and is prior art to the Vogel Patent under 35 USC 102(a) or 35 USC 102(b) and is properly used as prior art in this re-examination request. The Subramaniam '036 Patent was not submitted to the examiner in prosecution not considered by the examiner during the prosecution. The Chen Article was submitted to the examiner during the prosecution, but was never relied on by the examiner and was not used in combination with any other piece of prior art by the examiner.

Claims 3-4, 8 and 11 of the Vogel Patent are unpatentable under 35 USC 103 over the Subramaniam '036 Patent in view of the Chen Article because:

1) The prior art (disclosed in the Chen Article as set forth below in the chart) discloses a method for coding signals that may include transform coding (using discrete cosine transforms (DCTs)) in which a sequence of coefficients having zero values and non-zero values are coded using codewords. In Chen, a run of zero coefficients are coded with a codeword and the non-zero coefficients are coded with a separate codeword. In Chen, Huffman codewords are used to code the run of zero coefficients as well as the non-zero coefficients.

2) In the Vogel patent, transform coded coefficients having zero and non-zero values are coded such that a run of zero coefficients and a preceding or subsequent non-zero coefficient are coded together.

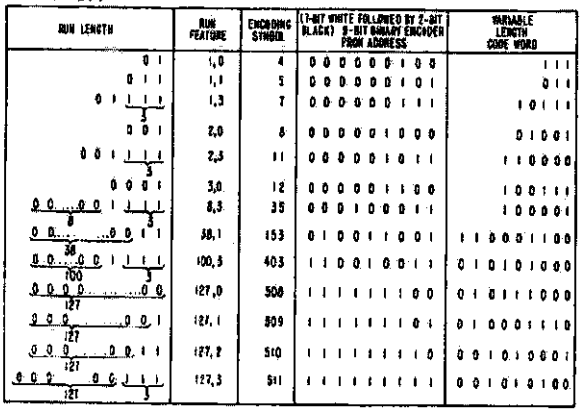
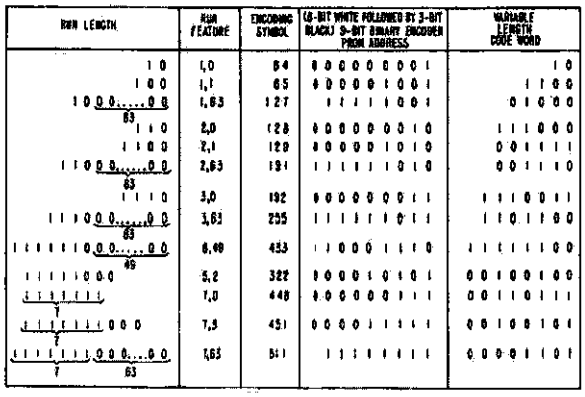
3) The prior art (disclosed in the Subramaniam '036 Patent as set forth below in the chart) discloses a known combined coding technique to code a run of zero values and a non-zero value together using a single codeword which results in a higher level of compression.

4) One of ordinary skill in the art would have recognized that applying the known combined coding technique of the Subramaniam '036 Patent to the method of coding signals disclosed in the Chen Article would have yielded the predictable result of a higher compression

coding system and also resulted in an improved coding system with the higher compression. *See Ebrahimi Declaration at ¶ 10.*

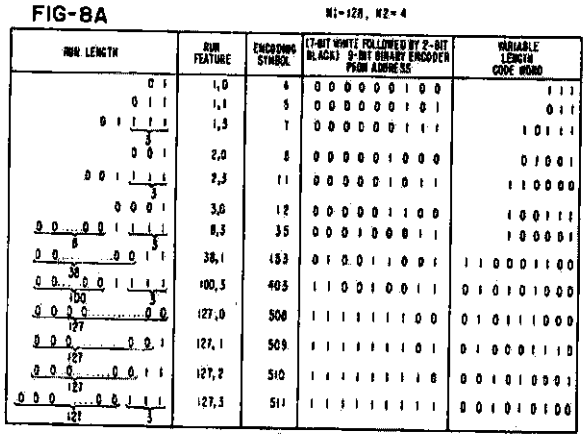
Therefore, claims 3-4, 8 and 11 of the Vogel Patent would have been obvious over the combination of the Chen Article and the Subramaniam '036 Patent.

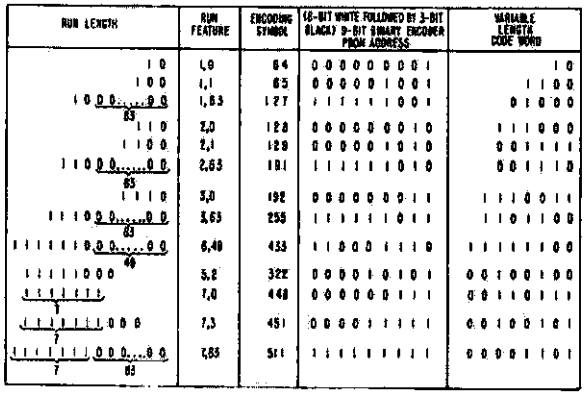
US 4,901,075 CLAIM ELEMENTS	**Subramaniam '036 Patent**	**Chen Article**
3. In a method of coding a signal comprising a sequence of coefficients which results after a blockwise transform of pixels of a video signal with subsequent quantization, for transmission at a reduced bit rate, said signal comprising a plurality of zero coefficients, and a plurality of non-zero coefficients said method comprising the steps of:	A method for compressing digital data is disclosed that generates prediction error pixels from the digital data to form events (WB runs or BW runs) which are then coded using variable length codewords. *See Abstract, Figures 8A and 8B and Col. 3:54 – Col. 4:51.* The method reduces the number of bits of information needed to transmit a video image which reduces bandwidth requirements and storage requirements. *See Col. 1: 15-24.*	Chen discloses a system and method wherein transform image coding (which was developed 15 years before 1984) may be used for bandwidth compression for video signals. The Chen Article discloses that discrete cosine transforms (DCT) may be used to generate DCT coefficients that are quantized which results in zero coefficients and non-zero coefficients. *See pp. 225-227. See also Girod Tr. at 102:17-105:6.*
(a) deriving from said signal, a plurality of events each comprising a run of said zero-coefficients having a respective run length and preceded or followed by at least one non-zero coefficient, and	The prediction error signals are combined into events (run lengths) wherein the events include: 1) white-black (WB) runs (zero values following by one or more 1 values); and 2) black-white (BW) (1 values following by one or more zero values) *See Col. 10:45-59 and Figures 8A and 8B.*	Chen derives a plurality of events from the video signal and each event includes a run of zero coefficients and the value of the non-zero coefficient that precedes or follows that run. *See pg. 227-229. See also Girod Tr. at 115:9 – 116:3.*

US 4,901,075 CLAIM ELEMENTS	Subramaniam '036 Patent	Chen Article
	FIG-8A  FIG-8B  As shown in Figures 8A and 8B, "01", "001", "0001" and "127 0's and a "1", "10", "100" and "1 with 63 0's" are examples of the events.	
(b) for each of said events, determining said respective run length and assigning a code word to represent said non-zero coefficient and said run length.	As shown in Figure 8A and 8B, each of the events are coded using a variable length code. *See Figures 8A and 8B and Col. 10:45-59.*	Chen assigns a sequence of bits that represents a particular event or events in accordance with a predefined set of rules. In particular, Chen assigns a sequence of bits to represent a run of zeroes followed by a non-zero coefficient comprised of a code

US 4,901,075 CLAIM ELEMENTS	Subramaniam '036 Patent	Chen Article
		word for the run-length prefix, a code word for the run length and a code word for the non-zero coefficient (*See pp. 228-229, Tables I and II.*) to form a composite code word that is a sequence of bits that represent a particular event or events in accordance with a predefined set of rules. Consider for example, the event of four zero coefficients followed by a non-zero coefficient equal to four (00004): According to Chen this event is represented by a sequence of bits as follows: First the run length prefix, 010, is included in the composite code word to indicate the beginning of the run of four zeroes. (*See p. 228, Table I.*) Next, the Huffman code word for a run length of 4, 0101, is included in the composite code word. (*See p. 229, Table II.*)

US 4,901,075 CLAIM ELEMENTS	Subramaniam '036 Patent	Chen Article
		Finally, the Huffman code word for the non-zero coefficient with an amplitude of 4, 00001, is included in the composite code word. (*See p. 228, Table I.*) Thus the composite codeword that is a sequence of bits that represents the event 00004 is: 010010100001. This is true every time the event 00004 occurs, and thus that composite codeword is assigned according to a predefined set of rules. *See Girod Tr. at 118:9 – 120:6.*
4. The method of claim 3, wherein said code words are Huffman code words.	The variable length codes are Huffman codes. *See Col 1:31-3, Col. 10:45-59 and Figures 8A and 8B.*	Chen discloses that the codewords assigned are Huffman codewords. *See pp. 228-229 and Tables I and II.*
8. A method for coding a signal for transmission at a reduced bandwidth, comprising the steps of:	A method for compressing digital data is disclosed that generates prediction error pixels from the digital data to form events (WB runs or BW runs) which are then coded using variable length codewords. *See Abstract, Figures 8A and 8B and Col. 3:54 – Col. 4:51.* The method reduces the number of bits of information needed to transmit a video image which reduces bandwidth requirements and storage requirements. *See Col. 1: 15-24.*	Chen discloses a system and method wherein transform image coding (which was developed 15 years before 1984) may be used for bandwidth compression for video signals. *See pp. 225-*

US 4,901,075 CLAIM ELEMENTS	Subramaniam '036 Patent	Chen Article
		227.
(a) transforming said signal into a sequence comprising zero coefficients occurring in runs and non-zero coefficients;	A prediction table and a window predictor transform the facsimile image into prediction error values with "0" values and "1" values with minimum redundancy. *See Col. 2:56-58. See also Col. 9:40-44.*	The Chen Article discloses that discrete cosine transforms (DCT) may be used to generate DCT coefficients that are quantized which results in zero coefficients and non-zero coefficients. *See pp. 225-227. See also Girod Tr. at 102:17-105:6.*
(b) deriving from said sequence, a plurality of events each comprised of a run of zero coefficients having a respective run length, which is preceded or followed by at least one non-zero coefficient, and	The prediction error signals are combined into events (run lengths) wherein the events include: 1) white-black (WB) runs (zero values following by one or more 1 values); and 2) black-white (BW) (1 values following by one or more zero values) *See Col. 10:45-59 and Figures 8A and 8B.*  FIG-8A	Chen derives a plurality of events from the video signal and each event includes a run of zero coefficients and the value of the non-zero coefficient that precedes or follows that run. *See pg. 227-229. See also Girod Tr. at 115:9 – 116:3.*

US 4,901,075 CLAIM ELEMENTS	Subramaniam '036 Patent	Chen Article
	FIG-8B  As shown in Figures 8A and 8B, "01", "001", "0001" and "127 0's and a "1", "10", "100" and "1 with 63 0's" are examples of the events.	
(c) for each of said events, determining the run length and assigning a code word to represent said run length and said non-zero coefficient.	As shown in Figure 8A and 8B, each of the events are coded using a variable length code. *See Figures 8A and 8B and Col. 10:45-59.*	Chen assigns a sequence of bits that represents a particular event or events in accordance with a predefined set of rules. In particular, Chen assigns a sequence of bits to represent a run of zeroes followed by a non-zero coefficient comprised of a code word for the run-length prefix, a code word for the run length and a code word for the non-zero coefficient (*See pp. 228-229, Tables I and II.*) to form a composite code word that is a sequence of bits that represent a particular event or events in accordance with a predefined set

US 4,901,075 CLAIM ELEMENTS	Subramaniam '036 Patent	Chen Article
		of rules. Consider for example, the event of four zero coefficients followed by a non-zero coefficient equal to four (00004): According to Chen this event is represented by a sequence of bits as follows: First the run length prefix, 010, is included in the composite code word to indicate the beginning of the run of four zeroes. (*See p. 228, Table I.*) Next, the Huffman code word for a run length of 4, 0101, is included in the composite code word. (*See p. 229, Table II.*) Finally, the Huffman code word for the non-zero coefficient with an amplitude of 4, 00001, is included in the composite code word. (*See p. 228, Table I.*) Thus the composite codeword that is a sequence of bits that represents the event

US 4,901,075 CLAIM ELEMENTS	Subramaniam '036 Patent	Chen Article
		00004 is: 010010100001. This is true every time the event 00004 occurs, and thus that composite codeword is assigned according to a predefined set of rules. *See Girod Tr. at 118:9 – 120:6.*
11. The method of claim 8, comprising the additional steps of: determining whether the run length of each event exceeds a predetermined run length and if so, splitting said respective event into a plurality of sections so that each of said sections has a run length below said predetermined run length, and assigning a code word to each section.	The method provides that, if the first half or second half of an event (run length) exceeds the maximum length specified for that particular value, then that run length must be broken down by using both the general rule and its exception. *See Col. 11:26- Col. 12:54.*	

3. US Patent No. 4,316,222 to Subramaniam (the "Subramaniam '222 Patent") in view of Wen-Hsiung Chen and William K. Pratt, "Scene Adaptive Coder", IEEE Transactions on Communications, Vol. COM-32, No. 3, March 1984, pages 225 to 232 (the "Chen Article")

The Subramaniam '222 Patent was filed on December 7, 1979 and issued on February 16, 1982 and is prior art to the Vogel Patent under 35 USC 102(a) or 35 USC 102(b) and is properly used as prior art in this re-examination request. The Chen Article was published in March 1984 and is prior art to the Vogel Patent under 35 USC 102(a) or 35 USC 102(b) and is properly used as prior art in this re-examination request. The Subramaniam '222 Patent and the Chen Article were submitted to the examiner in prosecution towards the end of prosecution. However, the examiner never used this combination of prior art to reject the claims of the Vogel Patent.

The claim elements of claims 3-4, 8 and 11 of the Vogel Patent that are disclosed by the Subramaniam '036 Patent and the Chen Article appear in the chart below.

Claims 3-4, 8 and 11 of the Vogel Patent are unpatentable under 35 USC 103 over the Subramaniam '222 Patent in view of the Chen Article because:

1) The prior art (disclosed in the Chen Article as set forth below in the chart) discloses a method for coding signals that may include transform coding (using discrete cosine transforms (DCTs)) in which a sequence of coefficients having zero values and non-zero values are coded using codewords. In Chen, a run of zero coefficients are coded with a codeword and the non-zero coefficients are coded with a separate codeword. In Chen, Huffman codewords are used to code the run of zero coefficients as well as the non-zero coefficients.

2) In the Vogel patent, transform coded coefficients having zero and non-zero values are coded such that a run of zero coefficients and a preceding or subsequent non-zero coefficient are coded together.

3) The prior art (disclosed in the Subramaniam '222 Patent as set forth below in the chart) discloses a known combined coding technique to code a run of zero values and a non-zero value together using a single codeword which results in a higher level of compression.

4) One of ordinary skill in the art would have recognized that applying the known combined coding technique of the Subramaniam '222 Patent to the method of coding signals disclosed in the Chen Article would have yielded the predictable result of a higher compression

coding system and also resulted in an improved coding system with the higher compression. *See Ebrahimi Declaration at ¶ 10.*

Therefore, claims 3-4, 8 and 11 of the Vogel Patent would have been obvious over the combination of the Chen Article and the Subramaniam '222 Patent.

US 4,901,075 CLAIM ELEMENTS	**Subramaniam '222 Patent**	**Chen Article**
3. In a method of coding a signal comprising a sequence of coefficients which results after a blockwise transform of pixels of a video signal with subsequent quantization, for transmission at a reduced bit rate, said signal comprising a plurality of zero coefficients, and a plurality of non-zero coefficients said method comprising the steps of:	A method is disclosed for reducing the number of bits of information when transmitting a video image. *See Col. 1:7-11.* In the method, an image is divided into a series of rows of data elements of different types, such as black and white colors, so that a series of digital elements (white areas generate a "0" output and black areas generate a "1" output) are generated which correspond to the sequence of signal values. *See Col. 2:30-38 and Col. 2:62-66.*	Chen discloses a system and method wherein transform image coding (which was developed 15 years before 1984) may be used for bandwidth compression for video signals. The Chen Article discloses that discrete cosine transforms (DCT) may be used to generate DCT coefficients that are quantized which results in zero coefficients and non-zero coefficients. *See pp. 225-227. See also Girod Tr. at 102:17-105:6.*
(a) deriving from said	From the image signals, events (runs length symbols) are located and these runs are white-black (WB) runs (a run of	Chen derives a plurality of events

<table>
<tr><th>US 4,901,075 CLAIM ELEMENTS</th><th>Subramaniam '222 Patent</th><th>Chen Article</th></tr>
<tr><td>signal, a plurality of events each comprising a run of said zero-coefficients having a respective run length and preceded or followed by at least one non-zero coefficient, and</td><td>zeros followed by one or more 1 values) and black-white (BW) runs (a runs of 1 values followed by one or more zero values). See Col. 2:66- Col. 3:8 and 3:4-8.</td><td>from the video signal and each event includes a run of zero coefficients and the value of the non-zero coefficient that precedes or follows that run. See pg. 227-229. See also Girod Tr. at 115:9 – 116:3.</td></tr>
<tr><td>(b) for each of said events, determining said respective run length and assigning a code word to represent said non-zero coefficient and said run length.</td><td>As shown in Figures 2A and 2B (reproduced below), the encoder codes events ("01", "001", 511 0s followed by a 1, "10", "100" and a 1 followed by 511 zeros) with the variable length code words "111", "01001", "010001110", "10", "1100" and "01000" respectively wherein a series of 0s or 1s are followed by a single bit of the other value.
<table>
<tr><th>RUN LENGTH</th><th>RUN FEATURE</th><th>ENCODING SYMBOL</th><th>BINARY PROM ADDRESS</th><th>VARIABLE LENGTH CODE WORD</th></tr>
<tr><td>01</td><td>1,0</td><td>8</td><td>1000</td><td>111</td></tr>
<tr><td>011</td><td>1,1</td><td>9</td><td>1001</td><td>011</td></tr>
<tr><td>01111111</td><td>1,6</td><td>14</td><td>1110</td><td>1010</td></tr>
<tr><td>01111111</td><td>1,7</td><td>15</td><td>1111</td><td>10111</td></tr>
<tr><td>001</td><td>2,0</td><td>16</td><td>10000</td><td>01001</td></tr>
<tr><td>001111111</td><td>2,6</td><td>22</td><td>10110</td><td>11001</td></tr>
<tr><td>001111111</td><td>2,7</td><td>23</td><td>10111</td><td>110000</td></tr>
<tr><td>0001</td><td>3,0</td><td>24</td><td>11000</td><td>100111</td></tr>
<tr><td>00···00 (8) 11···11 (7)</td><td>8,7</td><td>71</td><td>1000111</td><td>100001</td></tr>
<tr><td>00···0 (139) 11</td><td>139,1</td><td>1113</td><td>10001011001</td><td>11000100</td></tr>
<tr><td>00···0 (500) 1111111 (7)</td><td>500,7</td><td>4007</td><td>11111010011</td><td>010101000</td></tr>
<tr><td>000···00 (511)</td><td>511,0</td><td>4088</td><td>11111111000</td><td>010111000</td></tr>
<tr><td>0000 1 (511)</td><td>511,1</td><td>4089</td><td>11111111001</td><td>010001110</td></tr>
<tr><td>00···0 111111 (511)</td><td>511,6</td><td>4094</td><td>11111111110</td><td>001010001</td></tr>
<tr><td>00···00 1111111 (511)</td><td>511,7</td><td>4095</td><td>11111111111</td><td>001010100</td></tr>
</table></td><td>Chen assigns a sequence of bits that represents a particular event or events in accordance with a predefined set of rules. In particular, Chen assigns a sequence of bits to represent a run of zeroes followed by a non-zero coefficient comprised of a code word for the run-length prefix, a code word for the run length and a code word for the non-zero coefficient (See pp. 228-229, Tables I and II.) to form a composite code word that is a sequence of bits</td></tr>
</table>

US 4,901,075 CLAIM ELEMENTS	Subramaniam '222 Patent	Chen Article

RUN LENGTH	RUN FEATURE	ENCODING SYMBOL	BINARY PROM ADDRESS	VARIABLE LENGTH CODE WORD
10	1,0	512	1000	10
100	1,1	513	10000	1100
10 00000··00 511	1,511	1023	1111111111	01000
110	2,0	1024	10000000000	111000
1100	2,1	1025	10000000001	001111
110 00··000 511	2,511	1535	10111111111	001110
1110	3,0	1536	11000000000	1110010
1110 000··00 510	3,510	2046	11111111110	1101110
1110 00·00 511	3,511	2047	11111111111	1101100
110 0000 199	2,199	1223	10011000111	1111100
11111000	5,2	2562	10100000010	00100100
11111110	7,1	3585	11100000001	00110111
111111000	7,3	3587	11100000011	00100101
1111111 00·0·0 511	7,511	4095	11111111111	00001101

See Figures 2A and 2B.

that represent a particular event or events in accordance with a predefined set of rules.

Consider for example, the event of four zero coefficients followed by a non-zero coefficient equal to four (00004):

According to Chen this event is represented by a sequence of bits as follows:

First the run length prefix, 010, is included in the composite code word to indicate the beginning of the run of four zeroes. (*See p. 228, Table I.*)

Next, the Huffman code word for a run length of 4, 0101, is included in the composite code word. (*See p. 229, Table II.*)

Finally, the Huffman code word for the non-

US 4,901,075 CLAIM ELEMENTS	Subramaniam '222 Patent	Chen Article
		zero coefficient with an amplitude of 4, 00001, is included in the composite code word. (*See p. 228, Table I.*) Thus the composite codeword that is a sequence of bits that represents the event 00004 is: 010010100001. This is true every time the event 00004 occurs, and thus that composite codeword is assigned according to a predefined set of rules. *See Girod Tr. at 118:9 – 120:6.*
4. The method of claim 3, wherein said code words are Huffman code words.	The variable length codes may be Huffman codes. *See Col. 1:21-22.*	Chen discloses that the codewords assigned are Huffman codewords. *See pp. 228-229 and Tables I and II.*
8. A method for coding a signal for transmission at a reduced	A method is disclosed for reducing the number of bits of information when transmitting a video image. *See Col. 1:7-11.* In the method, an image is divided into a series of rows of data elements of different types, such as black and white colors, so that a series of digital elements (white	Chen discloses a system and method wherein transform image coding (which was

US 4,901,075 CLAIM ELEMENTS	Subramaniam '222 Patent	Chen Article
bandwidth, comprising the steps of:	areas generate a "0" output and black areas generate a "1" output) are generated which correspond to the sequence of signal values. *See Col. 2:30-38.*	developed 15 years before 1984) may be used for bandwidth compression for video signals. *See pp. 225-227.*
(a) transforming said signal into a sequence comprising zero coefficients occurring in runs and non-zero coefficients;	When working with documents, the image processor 10 converts the original image data into long strings of 0's followed by short strings of 1's and short strings of 1's followed by long strings of 0's. *See Col. 2:62-66.*	The Chen Article discloses that discrete cosine transforms (DCT) may be used to generate DCT coefficients that are quantized which results in zero coefficients and non-zero coefficients. *See pp. 225-227. See also Girod Tr. at 102:17-105:6.*
(b) deriving from said sequence, a plurality of events each comprised of a run of zero coefficients having a respective run length, which is preceded or followed by at least one non-zero coefficient, and	From the image signals, events (runs length symbols) are located and these runs are white-black (WB) runs (a run of zeros followed by one or more 1 values) and black-white (BW) runs (a runs of 1 values followed by one or more zero values). *See Col. 2:66- Col. 3:8 and 3:4-8.*	Chen derives a plurality of events from the video signal and each event includes a run of zero coefficients and the value of the non-zero coefficient that precedes or follows that run. *See pg. 227-229. See also Girod Tr. at 115:9 – 116:3.*
(c) for each of said events, determining the run length	As shown in Figures 2A and 2B (reproduced below), the encoder codes events ("01", "001", 511 0s followed by a 1, "10", "100" and a 1 followed by 511 zeros) with the variable length code words "111",	Chen assigns a sequence of bits that represents a particular event or

US 4,901,075 CLAIM ELEMENTS	Subramaniam '222 Patent	Chen Article
and assigning a code word to represent said run length and said non-zero coefficient.	"01001", "010001110", "10", "1100" and "01000" respectively wherein a series of 0s or 1s are followed by a single bit of the other value.	events in accordance with a predefined set of rules. In particular, Chen assigns a sequence of bits to represent a run of zeroes followed by a non-zero coefficient comprised of a code word for the run-length prefix, a code word for the run length and a code word for the non-zero coefficient (*See pp. 228-229, Tables I and II.*) to form a composite code word that is a sequence of bits that represent a particular event or events in accordance with a predefined set of rules. Consider for example, the event of four zero coefficients followed by a non-zero coefficient equal to four (00004): According to Chen this event is represented by a sequence of bits as

RUN LENGTH	RUN FEATURE	ENCODING SYMBOL	BINARY PROM ADDRESS	VARIABLE LENGTH CODE WORD
01	1,0	8	1000	111
011	1,1	9	1001	011
01111111	1,6	14	1110	1010
011111111	1,7	15	1111	10111
001	2,0	16	10000	01001
00111111	2,6	22	10110	11001
001111111	2,7	23	10111	110000
0001	3,0	24	11000	10011
00···00 (8) 11···11 (7)	8,7	71	1000111	10000
00···0 (139) 11	139,1	1113	10001011001	110001100
00···0 (500) 1 1111111 (7)	500,7	4007	11111010011	010101000
000···00 (511)	511,0	4088	11111111000	010111000
0000 (511) 1	511,1	4089	11111111001	010001110
00···0 (511) 111111	511,6	4094	11111111110	001010001
00···00 (511) 1111111	511,7	4095	11111111111	001010100

RUN LENGTH	RUN FEATURE	ENCODING SYMBOL	BINARY PROM ADDRESS	VARIABLE LENGTH CODE WORD
10	1,0	512	1000	10
100	1,1	513	10000	1100
10 00000···00 (511)	1,511	1023	1111111111	01000
110	2,0	1024	10000000000	111000
1100	2,1	1025	10000000001	001111
110 00···000 (511)	2,511	1535	10111111111	001110
1110	3,0	1536	11000000000	1110010
1110 000···00 (510)	3,510	2046	11111111110	1101110
1110 00·00 (511)	3,511	2047	11111111111	1101100
110 0000 (199)	2,199	1223	10011000111	1111100
11111000	5,2	2562	10100000010	00100100
1111110	7,1	3585	11100000001	00110111
11111111000	7,3	3587	11100000011	00100101
1111111 00·0·0 (511)	7,511	4095	11111111111	00001101

See Figures 2A and 2B.

US 4,901,075 CLAIM ELEMENTS	Subramaniam '222 Patent	Chen Article
		follows: First the run length prefix, 010, is included in the composite code word to indicate the beginning of the run of four zeroes. (*See p. 228, Table I.*) Next, the Huffman code word for a run length of 4, 0101, is included in the composite code word. (*See p. 229, Table II.*) Finally, the Huffman code word for the non-zero coefficient with an amplitude of 4, 00001, is included in the composite code word. (*See p. 228, Table I.*) Thus the composite codeword that is a sequence of bits that represents the event 00004 is: 010010100001. This is true every time the event 00004 occurs, and thus that

US 4,901,075 CLAIM ELEMENTS	Subramaniam '222 Patent	Chen Article
		composite codeword is assigned according to a predefined set of rules. *See Girod Tr. at 118:9 – 120:6.*
11. The method of claim 8, comprising the additional steps of: determining whether the run length of each event exceeds a predetermined run length and if so, splitting said respective event into a plurality of sections so that each of said sections has a run length below said predetermined run length, and assigning a code word to each section.	In Subramaniam '222, if the first half or second half of an event exceeds the maximum length specified for that particular value, then that event (run length) must be broken down by using both the general rule and its exception. *See Col. 3:44- Col. 4:68.*	

4. US Patent No. 4,494,151 to Liao (the "Liao Patent") in view of Wen-Hsiung Chen and William K. Pratt, "Scene Adaptive Coder", IEEE Transactions on Communications, Vol. COM-32, No. 3, March 1984, pages 225 to 232 (the "Chen Article")

The Liao Patent was filed on February 9, 1982 and issued on January 15, 1985 and is prior art to the Vogel Patent under 35 USC 102(a) or 35 USC 102(b) and is properly used as prior art in this re-examination request. The Chen Article was published in March 1984 and is prior art to the Vogel Patent under 35 USC 102(a) or 35 USC 102(b) and is properly used as prior art in this re-examination request. The Liao Patent was not submitted to the examiner during prosecution. The Chen Article was submitted to the examiner during the prosecution towards the end of prosecution. However, the examiner never used this combination of prior art to reject the claims of the Vogel Patent.

Claims 3-4, 8 and 11 of the Vogel Patent are unpatentable under 35 USC 103 over the Liao Patent in view of the Chen Article because:

1) The prior art (disclosed in the Chen Article as set forth below in the chart) discloses a method for coding signals that may include transform coding (using discrete cosine transforms (DCTs)) in which a sequence of coefficients having zero values and non-zero values are coded using codewords. In Chen, a run of zero coefficients are coded with a codeword and the non-zero coefficients are coded with a separate codeword. In Chen, Huffman codewords are used to code the run of zero coefficients as well as the non-zero coefficients.

2) In the Vogel patent, transform coded coefficients having zero and non-zero values are coded such that a run of zero coefficients and a preceding or subsequent non-zero coefficient are coded together.

3) The prior art (disclosed in the Liao Patent as set forth below in the chart) discloses a known combined coding technique to code a run of zero values and a non-zero value together using a single codeword which results in a higher level of compression.

4) One of ordinary skill in the art would have recognized that applying the known combined coding technique of the Liao Patent to the method of coding signals disclosed in the Chen Article would have yielded the predictable result of a higher compression coding system

and also resulted in an improved coding system with the higher compression. *See Ebrahimi Declaration at ¶ 10.*

Therefore, claims 3-4, 8 and 11 of the Vogel Patent would have been obvious over the combination of the Chen Article and the Liao Patent.

US 4,901,075 CLAIM ELEMENTS	US Patent No. 4,494,151 to Liao	Chen Article
3. In a method of coding a signal comprising a sequence of coefficients which results after a blockwise transform of pixels of a video signal with subsequent quantization, for transmission at a reduced bit rate, said signal comprising a plurality of zero coefficients, and a plurality of non-zero coefficients said method comprising the steps of:	Liao discloses a method for coding a signal that is a sequence of predictive values "0" and "1" values from an image predictor 31 as shown in Figures 2 and 3 which are input to an encoder 32. See Figures 2 and 3. In Liao, "*The object of the invention, therefore, is to provide a modified run-length encoding circuit which allows the efficient encoding/decoding of binary data at high data rates.*" *See Col. 2:15-19.*	Chen discloses a system and method wherein transform image coding (which was developed 15 years before 1984) may be used for bandwidth compression for video signals. The Chen Article discloses that discrete cosine transforms (DCT) may be used to generate DCT coefficients that are quantized which results in zero coefficients and non-zero coefficients. *See pp. 225-227. See also Girod Tr. at 102:17-105:6.*
(a) deriving from said signal, a plurality of events each comprising a run of said zero-coefficients having a respective run length and preceded or followed by at least one non-zero coefficient, and	In Liao, the encoder maximizes the compression of these strings by grouping the input data into data words comprising an uninterrupted line of nibbles containing all 0s (a run of zero values), regardless of how many that may be, followed by a terminating nibble having at least one 1 bit (a non-zero value). *See Col. 1:64 – Col. 2:5.*	Chen derives a plurality of events from the video signal and each event includes a run of zero coefficients and the value of the non-zero coefficient that precedes or follows that run. *See pg. 227-229. See also Girod Tr. at 115:9 – 116:3.*
(b) for each of said events, determining said respective run length and assigning a code word to represent said non-zero coefficient and said run length.	A first code word portion is assigned to the number of all-zero nibbles, and a second code word portion is assigned to the data pattern of the terminating nibble. The final code word is the combination of the first and second code word portions." *See Col. 1:64 – Col. 2:5.* The code words assigned to each portion is shown in Figure 1A and the code words are of	Chen assigns a sequence of bits that represents a particular event or events in accordance with a predefined set of rules. In particular, Chen assigns a sequence of bits to represent a run of zeroes followed by a non-zero coefficient comprised of a code word for the run-

US 4,901,075 CLAIM ELEMENTS	US Patent No. 4,494,151 to Liao	Chen Article
	variable length and wherein the code words are shorter than the original data and the more frequently occurring run lengths are assigned to short code words. *See Figure 1A and Col. 6:20-44.* Thus, Liao discloses that a series of Huffman codewords are formed from the signal values. *See Figure 2 and Col. 3:13-18.* Thus, a terminating nibble such as "1000" and a preceding run of all zero nibbles (such as 31 all-zero nibbles) are coded using a codeword.	length prefix, a code word for the run length and a code word for the non-zero coefficient (*See pp. 228-229, Tables I and II.*) to form a composite code word that is a sequence of bits that represent a particular event or events in accordance with a predefined set of rules. Consider for example, the event of four zero coefficients followed by a non-zero coefficient equal to four (00004): According to Chen this event is represented by a sequence of bits as follows: First the run length prefix, 010, is included in the composite code word to indicate the beginning of the run of four zeroes. (*See p. 228, Table I.*) Next, the Huffman code word for a run length of 4, 0101, is included in the composite code word. (*See p. 229, Table II.*) Finally, the Huffman code word for the non-zero coefficient with an amplitude of 4, 00001, is included in the composite code word. (*See p. 228, Table I.*) Thus the composite codeword that is a sequence of bits that represents the

US 4,901,075 CLAIM ELEMENTS	US Patent No. 4,494,151 to Liao	Chen Article
		event 00004 is: 010010100001. This is true every time the event 00004 occurs, and thus that composite codeword is assigned according to a predefined set of rules. *See Girod Tr. at 118:9 – 120:6.*
4. The method of claim 3, wherein said code words are Huffman code words.	The code words assigned to each portion is shown in Figure 1A and the code words are of variable length which are Huffman codewords. *See Figure 1A and Col. 6:20- 44.*	Chen discloses that the codewords assigned are Huffman codewords. *See pp. 228-229 and Tables I and II.*
8. A method for coding a signal for transmission at a reduced bandwidth, comprising the steps of:	Liao discloses a method for coding a signal that is a sequence of predictive values "0" and "1" values from an image predictor 31 as shown in Figures 2 and 3 which are input to an encoder 32. See Figures 2 and 3. In Liao, "*The object of the invention, therefore, is to provide a modified run-length encoding circuit which allows the efficient encoding/decoding of binary data at high data rates.*" *See Col. 2:15-19.*	Chen discloses a system and method wherein transform image coding (which was developed 15 years before 1984) may be used for bandwidth compression for video signals. *See pp. 225-227.*
(a) transforming said signal into a sequence comprising zero coefficients occurring in runs and non-zero coefficients;	In Liao, the encoder maximizes the compression of these strings by grouping the input data into data words comprising an uninterrupted line of nibbles containing all 0s (a run of zero values), regardless of how many that may be, followed by a terminating nibble having at least one 1 bit (a non-zero value). *See Col. 1:64 – Col. 2:5.*	The Chen Article discloses that discrete cosine transforms (DCT) may be used to generate DCT coefficients that are quantized which results in zero coefficients and non-zero coefficients. *See pp. 225-227. See also Girod Tr. at 102:17-105:6.*
(b) deriving from said sequence, a plurality of events each comprised of a run of zero	In Liao, "The encoder maximizes the compression of these strings by grouping the input data into data words comprising an uninterrupted	Chen derives a plurality of events from the video signal and each event includes a run of zero coefficients and the

US 4,901,075 CLAIM ELEMENTS	US Patent No. 4,494,151 to Liao	Chen Article
coefficients having a respective run length, which is preceded or followed by at least one non-zero coefficient, and	line of nibbles containing all 0s, regardless of how many that may be, followed by a terminating nibble having at least one 1 bit. A first code word portion is assigned to the number of all-zero nibbles, and a second code word portion is assigned to the data pattern of the terminating nibble. The final code word is the combination of the first and second code word portions." *See Col. 1:64 – Col. 2:5.*	value of the non-zero coefficient that precedes or follows that run. *See pg. 227-229. See also Girod Tr. at 115:9 – 116:3.*
(c) for each of said events, determining the run length and assigning a code word to represent said run length and said non-zero coefficient.	A first code word portion is assigned to the number of all-zero nibbles, and a second code word portion is assigned to the data pattern of the terminating nibble. The final code word is the combination of the first and second code word portions." *See Col. 1:64 – Col. 2:5.* The code words assigned to each portion is shown in Figure 1A and the code words are of variable length and wherein the code words are shorter than the original data and the more frequently occurring run lengths are assigned to short code words. *See Figure 1A and Col. 6:20-44.* Thus, Liao discloses that a series of Huffman codewords are formed from the events. *See Figure 2 and Col. 3:13-18.* For example, a terminating nibble such as "1000" and a preceding run of all zero nibbles (such as 31 all-zero nibbles) are coded using a codeword.	Chen assigns a sequence of bits that represents a particular event or events in accordance with a predefined set of rules. In particular, Chen assigns a sequence of bits to represent a run of zeroes followed by a non-zero coefficient comprised of a code word for the run-length prefix, a code word for the run length and a code word for the non-zero coefficient (*See pp. 228-229, Tables I and II.*) to form a composite code word that is a sequence of bits that represent a particular event or events in accordance with a predefined set of rules. Consider for example, the event of four zero coefficients followed by a non-zero coefficient equal to four (00004): According to Chen this event is represented by a sequence of bits as follows: First the run length prefix,

US 4,901,075 CLAIM ELEMENTS	US Patent No. 4,494,151 to Liao	Chen Article
		010, is included in the composite code word to indicate the beginning of the run of four zeroes. (*See p. 228, Table I.*) Next, the Huffman code word for a run length of 4, 0101, is included in the composite code word. (*See p. 229, Table II.*) Finally, the Huffman code word for the non-zero coefficient with an amplitude of 4, 00001, is included in the composite code word. (*See p. 228, Table I.*) Thus the composite codeword that is a sequence of bits that represents the event 00004 is: 010010100001. This is true every time the event 00004 occurs, and thus that composite codeword is assigned according to a predefined set of rules. *See Girod Tr. at 118:9 – 120:6.*
11. The method of claim 8, comprising the additional steps of: determining whether the run length of each event exceeds a predetermined run length and if so, splitting said respective event into a plurality of sections so that each of said sections has a run	Liao discloses that "*If there are 64 or more all-zero nibbles before a non-zero terminating nibble, the data string is converted into a first part comprising a number of sets of 64 all-zero nibbles and a second part comprising the remaining 0 to 63 all-zero nibbles and the terminating nibble.*" *See Col. 3:2-7.* Thus, when a run of non-zero nibbles together with the terminating nibble exceeds a predetermined length (more than 64	

US 4,901,075 CLAIM ELEMENTS	US Patent No. 4,494,151 to Liao	Chen Article
length below said predetermined run length, and assigning a code word to each section.	all-zero nibbles), the run of non-zero nibbles and the terminating nibble are split into sections (the first and second parts) wherein the length of each section is below a predetermined value (64 all-zero nibbles), and each section has a codeword assigned to the section.	

5. US Patent No. 4,136,363 to Saran (the "'363 Saran Patent") in view of Wen-Hsiung Chen and William K. Pratt, "Scene Adaptive Coder", IEEE Transactions on Communications, Vol. COM-32, No. 3, March 1984, pages 225 to 232 (the "Chen Article")

The '363 Saran Patent was filed on December 29, 1976 and issued on January 23, 1979 and is prior art to the Vogel Patent under 35 USC 102(a) or 35 USC 102(b) and is properly used as prior art in this re-examination request. The Chen Article was published in March 1984 and is prior art to the Vogel Patent under 35 USC 102(a) or 35 USC 102(b) and is properly used as prior art in this re-examination request. The '363 Saran Patent was never submitted to the examiner during prosecution. The Chen Article was submitted to the examiner during the prosecution towards the end of prosecution. However, the examiner never used this combination of prior art to reject the claims of the Vogel Patent.

Claims 3-4, 8 and 11 of the Vogel Patent are unpatentable under 35 USC 103 over the Saran '363 Patent in view of the Chen Article because:

1) The prior art (disclosed in the Chen Article as set forth below in the chart) discloses a method for coding signals that may include transform coding (using discrete cosine transforms (DCTs)) in which a sequence of coefficients having zero values and non-zero values are coded using codewords. In Chen, a run of zero coefficients are coded with a codeword and the non-zero coefficients are coded with a separate codeword. In Chen, Huffman codewords are used to code the run of zero coefficients as well as the non-zero coefficients.

2) In the Vogel patent, transform coded coefficients having zero and non-zero values are coded such that a run of zero coefficients and a preceding or subsequent non-zero coefficient are coded together.

3) The prior art (disclosed in the Saran '363 Patent as set forth below in the chart) discloses a known combined coding technique to code a run of zero values and a non-zero value together using a single codeword which results in a higher level of compression.

4) One of ordinary skill in the art would have recognized that applying the known combined coding technique of the Saran '363 Patent to the method of coding signals disclosed in the Chen Article would have yielded the predictable result of a higher compression coding

system and also resulted in an improved coding system with the higher compression. *See Ebrahimi Declaration at ¶ 10.*

Therefore, claims 3-4, 8 and 11 of the Vogel Patent would have been obvious over the combination of the Chen Article and the Saran '363 Patent.

US 4,901,075 CLAIM ELEMENTS	Saran '363 Patent	Chen Article
3. In a method of coding a signal comprising a sequence of coefficients which results after a blockwise transform of pixels of a video signal with subsequent quantization, for transmission at a reduced bit rate, said signal comprising a plurality of zero coefficients, and a plurality of non-zero coefficients said method comprising the steps of:	Saran discloses a system and method for encoding a video signal generated based on a scan of a document wherein the video signal includes black (1 value) terminated white (zero value) runs (in difference modulated and unmodulated signals) that are encoded to reduce redundancies and compress binary video signals. *See Col. 1:67 – Col. 2:38; Col. 3:31-34; Col. 4:50- Col. 5:7; Col. 9:7-26 and Col. 9:27-45.*	Chen discloses a system and method wherein transform image coding (which was developed 15 years before 1984) may be used for bandwidth compression for video signals. The Chen Article discloses that discrete cosine transforms (DCT) may be used to generate DCT coefficients that are quantized which results in zero coefficients and non-zero coefficients. *See pp. 225-227. See also Girod Tr. at 102:17-105:6.*
(a) deriving from said signal, a plurality of events each comprising a run of said zero-coefficients having a respective run length and preceded or followed by at least one non-zero coefficient, and	Events that are black terminated white runs (a run of zero values terminated by a 1 value) are derived. *See Col. 9:7-26 and Figure 4.*	Chen derives a plurality of events from the video signal and each event includes a run of zero coefficients and the value of the non-zero coefficient that precedes or follows that run. *See pg. 227-229. See also Girod Tr. at 115:9 – 116:3.*
(b) for each of said events, determining said respective run length and assigning a code word to represent said non-zero coefficient and said run length.	Saran discloses that the codeword formed for the black terminated white runs (a run of zeros with a "1" at the end), such as 3W+B and 6W+B as shown in Figure 4, are the codewords "10111" and "11010" respectively that represent run of zeros with a "1" at the end. *See Col. 9:7-26 and Figure 4.*	Chen assigns a sequence of bits that represents a particular event or events in accordance with a predefined set of rules. In particular, Chen assigns a sequence of bits to represent a run of zeroes followed by a non-zero coefficient comprised of a code word for the run-length prefix, a code word for the run

US 4,901,075 CLAIM ELEMENTS	Saran '363 Patent	Chen Article
		length and a code word for the non-zero coefficient (*See pp. 228-229, Tables I and II.*) to form a composite code word that is a sequence of bits that represent a particular event or events in accordance with a predefined set of rules. Consider for example, the event of four zero coefficients followed by a non-zero coefficient equal to four (00004): According to Chen this event is represented by a sequence of bits as follows: First the run length prefix, 010, is included in the composite code word to indicate the beginning of the run of four zeroes. (*See p. 228, Table I.*) Next, the Huffman code word for a run length of 4, 0101, is included in the composite code word. (*See p. 229, Table II.*) Finally, the Huffman code word for the non-zero coefficient with an amplitude of 4, 00001, is included in the composite code word. (*See p. 228, Table I.*) Thus the composite codeword that is a sequence of bits that represents the event 00004 is: 010010100001.

US 4,901,075 CLAIM ELEMENTS	Saran '363 Patent	Chen Article
		This is true every time the event 00004 occurs, and thus that composite codeword is assigned according to a predefined set of rules. *See Girod Tr. at 118:9 – 120:6.*
4. The method of claim 3, wherein said code words are Huffman code words.	Saran discloses that, "Thus, it should be recalled that the basic Huffman rule for taking advantage of variable length run length message codes is that the code assigned to any given run length should be no longer than the code assigned to any less probable run length. *See Col. 2:27-38 and Col. 9:39-43.*	Chen discloses that the codewords assigned are Huffman codewords. *See pp. 228-229 and Tables 1 and II.*
8. A method for coding a signal for transmission at a reduced bandwidth, comprising the steps of:	Saran discloses a system and method for encoding a video signal generated based on a scan of a document wherein the video signal includes black (1 value) terminated white (zero value) runs (in difference modulated and unmodulated signals) that are encoded to reduce redundancies and compress binary video signals. *See Col. 1:67 – Col. 2:38; Col. 3:31-34; Col. 4:50- Col. 5:7; Col. 9:7-26 and Col. 9:27-45.*	Chen discloses a system and method wherein transform image coding (which was developed 15 years before 1984) may be used for bandwidth compression for video signals. *See pp. 225-227.*
(a) transforming said signal into a sequence comprising zero coefficients occurring in runs and non-zero coefficients;	In Saran, a difference modulator 31 generates difference modulated picture elements and unmodulated picture elements of opposite logic levels (i.e., "1" and "0"). *See Col. 6:9-19* and *Col. 4:50-59 and Col. 5:56-62.* An example of the series of difference modulated and unmodulated picture elements are shown lines a-c of Figure 4. *See Col. 9:7-17.*	The Chen Article discloses that discrete cosine transforms (DCT) may be used to generate DCT coefficients that are quantized which results in zero coefficients and non-zero coefficients. *See pp. 225-227. See also Girod Tr. at 102:17-105:6.*
(b) deriving from said sequence, a plurality of events each comprised of a run of zero	Events that are black terminated white runs (a run of zero values terminated by a 1 value) are derived. *See Col. 9:7-26 and Figure 4.*	Chen derives a plurality of events from the video signal and each event includes a run of zero coefficients and the

US 4,901,075 CLAIM ELEMENTS	Saran '363 Patent	Chen Article
coefficients having a respective run length, which is preceded or followed by at least one non-zero coefficient, and		value of the non-zero coefficient that precedes or follows that run. *See pg. 227-229. See also Girod Tr. at 115:9 – 116:3.*
(c) for each of said events, determining the run length and assigning a code word to represent said run length and said non-zero coefficient.	Saran discloses that the codeword formed for the black terminated white runs (a run of zeros with a "1" at the end), such as 3W+B and 6W+B as shown in Figure 4, are the codewords "10111" and "11010" respectively that represent run of zeros with a "1" at the end. *See Col. 9:7-26 and Figure 4.*	Chen assigns a sequence of bits that represents a particular event or events in accordance with a predefined set of rules. In particular, Chen assigns a sequence of bits to represent a run of zeroes followed by a non-zero coefficient comprised of a code word for the run-length prefix, a code word for the run length and a code word for the non-zero coefficient (*See pp. 228-229, Tables I and II.*) to form a composite code word that is a sequence of bits that represent a particular event or events in accordance with a predefined set of rules. Consider for example, the event of four zero coefficients followed by a non-zero coefficient equal to four (00004): According to Chen this event is represented by a sequence of bits as follows: First the run length prefix, 010, is included in the composite code word to indicate the beginning of the run of four zeroes. (*See p. 228, Table I.*) Next, the Huffman code word

US 4,901,075 CLAIM ELEMENTS	Saran '363 Patent	Chen Article
		for a run length of 4, 0101, is included in the composite code word. (*See p. 229, Table II.*) Finally, the Huffman code word for the non-zero coefficient with an amplitude of 4, 00001, is included in the composite code word. (*See p. 228, Table I.*) Thus the composite codeword that is a sequence of bits that represents the event 00004 is: 010010100001. This is true every time the event 00004 occurs, and thus that composite codeword is assigned according to a predefined set of rules. *See Girod Tr. at 118:9 – 120:6.*
11. The method of claim 8, comprising the additional steps of: determining whether the run length of each event exceeds a predetermined run length and if so, splitting said respective event into a plurality of sections so that each of said sections has a run length below said predetermined run length, and assigning a code word to each section.	In Saran events that are black terminated white runs (a run of zero values terminated by a "1") in excess of a predetermined block length are represented by a block length multiple code d plus, if the run happens to be a noninteger multiple of the block length, a run length residue code e." *See Col. 13:1-16.* In the example shown in Figure 4 of Saran, a black terminated white run of 258W+B is encoded as eight 32W Huffman codes ("10011001") and then a 2W+B Huffman code ("1010") to form 9 sections with each section being less than a predetermined value (a run length of 33 in this example) and each section has a Huffman codeword assigned to the section.	

6. US Patent No. 4,092,676 to Saran (the "'676 Saran Patent") in view of Wen-Hsiung Chen and William K. Pratt, "Scene Adaptive Coder", IEEE Transactions on Communications, Vol. COM-32, No. 3, March 1984, pages 225 to 232 (the "Chen Article")

The '676 Saran Patent was filed on December 29, 1976 and issued on May 30, 1978 and is prior art to the Vogel Patent under 35 USC 102(a) or 35 USC 102(b) and is properly used as prior art in this re-examination request. The Chen Article was published in March 1984 and is prior art to the Vogel Patent under 35 USC 102(a) or 35 USC 102(b) and is properly used as prior art in this re-examination request. The ' 676 Saran Patent was never submitted to the examiner during prosecution. The Chen Article was submitted to the examiner during the prosecution towards the end of prosecution. However, the examiner never used this combination of prior art to reject the claims of the Vogel Patent.

Claims 3-4, 8 and 11 of the Vogel Patent are unpatentable under 35 USC 103 over the Saran '676 Patent in view of the Chen Article because:

1) The prior art (disclosed in the Chen Article as set forth below in the chart) discloses a method for coding signals that may include transform coding (using discrete cosine transforms (DCTs)) in which a sequence of coefficients having zero values and non-zero values are coded using codewords. In Chen, a run of zero coefficients are coded with a codeword and the non-zero coefficients are coded with a separate codeword. In Chen, Huffman codewords are used to code the run of zero coefficients as well as the non-zero coefficients.

2) In the Vogel patent, transform coded coefficients having zero and non-zero values are coded such that a run of zero coefficients and a preceding or subsequent non-zero coefficient are coded together.

3) The prior art (disclosed in the Saran '676 Patent as set forth below in the chart) discloses a known combined coding technique to code a run of zero values and a non-zero value together using a single codeword which results in a higher level of compression.

4) One of ordinary skill in the art would have recognized that applying the known combined coding technique of the Saran '676 Patent to the method of coding signals disclosed in the Chen Article would have yielded the predictable result of a higher compression coding

system and also resulted in an improved coding system with the higher compression. *See Ebrahimi Declaration at ¶ 10.*

Therefore, claims 3-4, 8 and 11 of the Vogel Patent would have been obvious over the combination of the Chen Article and the Saran '676 Patent.

US 4,901,075 CLAIM ELEMENTS	Saran '676 Patent	Chen Article
3. In a method of coding a signal comprising a sequence of coefficients which results after a blockwise transform of pixels of a video signal with subsequent quantization, for transmission at a reduced bit rate, said signal comprising a plurality of zero coefficients, and a plurality of non-zero coefficients said method comprising the steps of:	Saran discloses a system and method for encoding a video signal generated based on a scan of a document wherein the video signal includes black terminated white runs (in difference modulated and unmodulated signals) that are run length encoded using a code to reduce redundancies and compress binary video signals. *See Col. 1:67 – Col. 2:38; Col. 3:31-34; Col. 4:50-Col. 5:7; Col. 9:7-26 and Col. 9:27-45.*	Chen discloses a system and method wherein transform image coding (which was developed 15 years before 1984) may be used for bandwidth compression for video signals. The Chen Article discloses that discrete cosine transforms (DCT) may be used to generate DCT coefficients that are quantized which results in zero coefficients and non-zero coefficients. *See pp. 225-227. See also Girod Tr. at 102:17-105:6.*
(a) deriving from said signal, a plurality of events each comprising a run of said zero-coefficients having a respective run length and preceded or followed by at least one non-zero coefficient, and	Events that are black terminated white runs (a run of zero values terminated by a 1 value) are derived. *See Col. 9:7-26 and Figure 4.*	Chen derives a plurality of events from the video signal and each event includes a run of zero coefficients and the value of the non-zero coefficient that precedes or follows that run. *See pg. 227-229. See also Girod Tr. at 115:9 – 116:3.*
(b) for each of said events, determining said respective run length and assigning a code word to represent said non-zero coefficient and said run length.	Saran discloses that the codeword formed for the black terminated white runs (a run of zeros with a "1" at the end), such as 3W+B and 6W+B as shown in Figure 4, are the codewords "10111" and "11010" respectively that represent run of zeros with a "1" at the end. *See Col. 9:7-26 and Figure 4.*	Chen assigns a sequence of bits that represents a particular event or events in accordance with a predefined set of rules. In particular, Chen assigns a sequence of bits to represent a run of zeroes followed by a non-zero coefficient comprised of a code word for the run-length prefix, a code word for the run

US 4,901,075 CLAIM ELEMENTS	Saran '676 Patent	Chen Article
		length and a code word for the non-zero coefficient (*See pp. 228-229, Tables I and II.*) to form a composite code word that is a sequence of bits that represent a particular event or events in accordance with a predefined set of rules. Consider for example, the event of four zero coefficients followed by a non-zero coefficient equal to four (00004): According to Chen this event is represented by a sequence of bits as follows: First the run length prefix, 010, is included in the composite code word to indicate the beginning of the run of four zeroes. (*See p. 228, Table I.*) Next, the Huffman code word for a run length of 4, 0101, is included in the composite code word. (*See p. 229, Table II.*) Finally, the Huffman code word for the non-zero coefficient with an amplitude of 4, 00001, is included in the composite code word. (*See p. 228, Table I.*) Thus the composite codeword that is a sequence of bits that represents the event 00004 is: 010010100001.

US 4,901,075 CLAIM ELEMENTS	Saran '676 Patent	Chen Article
		This is true every time the event 00004 occurs, and thus that composite codeword is assigned according to a predefined set of rules. *See Girod Tr. at 118:9 – 120:6.*
4. The method of claim 3, wherein said code words are Huffman code words.	Saran discloses that, "Thus, it should be recalled that the basic Huffman rule for taking advantage of variable length run length message codes is that the code assigned to any given run length should be no longer than the code assigned to any less probable run length. *See Col. 2:27-38 and Col. 9:39-43.*	Chen discloses that the codewords assigned are Huffman codewords. *See pp. 228-229 and Tables 1 and II.*
8. A method for coding a signal for transmission at a reduced bandwidth, comprising the steps of:	Saran discloses a system and method for encoding a video signal generated based on a scan of a document wherein the video signal includes black terminated white runs (in difference modulated and unmodulated signals) that are run length encoded using a code to reduce redundancies and compress binary video signals. *See Col. 1:67 – Col. 2:38; Col. 3:31-34; Col. 4:50-Col. 5:7; Col. 9:7-26 and Col. 9:27-45.*	Chen discloses a system and method wherein transform image coding (which was developed 15 years before 1984) may be used for bandwidth compression for video signals. *See pp. 225-227.*
(a) transforming said signal into a sequence comprising zero coefficients occurring in runs and non-zero coefficients;	In Saran, a difference modulator 31 generates difference modulated picture elements and unmodulated picture elements of opposite logic levels (i.e., "1" and "0"). *See Col. 6:9-19* and *Col. 4:50-59 and Col. 5:56-62.* An example of the series of difference modulated and unmodulated picture elements are shown lines a-c of Figure 4. *See Col. 9:7-17.*	The Chen Article discloses that discrete cosine transforms (DCT) may be used to generate DCT coefficients that are quantized which results in zero coefficients and non-zero coefficients. *See pp. 225-227. See also Girod Tr. at 102:17-105:6.*
(b) deriving from said sequence, a plurality of events each comprised	Events that are black terminated white runs (a run of zero values terminated by a 1 value) are derived.	Chen derives a plurality of events from the video signal and each event includes a run

US 4,901,075 CLAIM ELEMENTS	Saran '676 Patent	Chen Article
of a run of zero coefficients having a respective run length, which is preceded or followed by at least one non-zero coefficient, and	*See Col. 9:7-26 and Figure 4.*	of zero coefficients and the value of the non-zero coefficient that precedes or follows that run. *See pg. 227-229. See also Girod Tr. at 115:9 – 116:3.*
(c) for each of said events, determining the run length and assigning a code word to represent said run length and said non-zero coefficient.	Saran discloses that the codeword formed for the black terminated white runs (a run of zeros with a "1" at the end), such as 3W+B and 6W+B as shown in Figure 4, are the codewords "10111" and "11010" respectively that represent run of zeros with a "1" at the end. *See Col. 9:7-26 and Figure 4.*	Chen assigns a sequence of bits that represents a particular event or events in accordance with a predefined set of rules. In particular, Chen assigns a sequence of bits to represent a run of zeroes followed by a non-zero coefficient comprised of a code word for the run-length prefix, a code word for the run length and a code word for the non-zero coefficient (*See pp. 228-229, Tables I and II.*) to form a composite code word that is a sequence of bits that represent a particular event or events in accordance with a predefined set of rules. Consider for example, the event of four zero coefficients followed by a non-zero coefficient equal to four (00004): According to Chen this event is represented by a sequence of bits as follows: First the run length prefix, 010, is included in the composite code word to indicate the beginning of the run of four zeroes. (*See p. 228, Table I.*)

US 4,901,075 CLAIM ELEMENTS	Saran '676 Patent	Chen Article
		Next, the Huffman code word for a run length of 4, 0101, is included in the composite code word. (*See p. 229, Table II.*) Finally, the Huffman code word for the non-zero coefficient with an amplitude of 4, 00001, is included in the composite code word. (*See p. 228, Table I.*) Thus the composite codeword that is a sequence of bits that represents the event 00004 is: 010010100001. This is true every time the event 00004 occurs, and thus that composite codeword is assigned according to a predefined set of rules. *See Girod Tr. at 118:9 – 120:6.*
11. The method of claim 8, comprising the additional steps of: determining whether the run length of each event exceeds a predetermined run length and if so, splitting said respective event into a plurality of sections so that each of said sections has a run length below said predetermined run length, and assigning a code word to each section.	In Saran events that are black terminated white runs (a run of zero values terminated by a "1") in excess of a predetermined block length are represented by a block length multiple code d plus, if the run happens to be a noninteger multiple of the block length, a run length residue code e." *See Col. 13:1-16.* In the example shown in Figure 4 of Saran, a black terminated white run of 258W+B is encoded as eight 32W Huffman codes ("10011001") and then a 2W+B Huffman code ("1010") to form 9 sections with each section being less than a predetermined value (a run length of 33 in this example) and each section has a Huffman codeword assigned to	

US 4,901,075 CLAIM ELEMENTS	Saran '676 Patent	Chen Article
	the section.	

7. US Patent No. 3,984,833 to Van Voorhis (the "Van Voorhis Patent") in view of Wen-Hsiung Chen and William K. Pratt, "Scene Adaptive Coder", IEEE Transactions on Communications, Vol. COM-32, No. 3, March 1984, pages 225 to 232 (the "Chen Article")

The Van Voorhis Patent was filed on July 17, 1975 and issued on October 5, 1976 and is prior art to the Vogel Patent under 35 USC 102(a) or 35 USC 102(b) and is properly used as prior art in this re-examination request. The Chen Article was published in March 1984 and is prior art to the Vogel Patent under 35 USC 102(a) or 35 USC 102(b) and is properly used as prior art in this re-examination request. The Van Voorhis Patent was never submitted to the examiner during prosecution. The Chen Article was submitted to the examiner during the prosecution towards the end of prosecution. However, the examiner never used this combination of prior art to reject the claims of the Vogel Patent.

Claims 3-4 of the Vogel Patent are unpatentable under 35 USC 103 over the Van Voorhis Patent in view of the Chen Article because:

1) The prior art (disclosed in the Chen Article as set forth below in the chart) discloses a method for coding signals that may include transform coding (using discrete cosine transforms (DCTs)) in which a sequence of coefficients having zero values and non-zero values are coded using codewords. In Chen, a run of zero coefficients are coded with a codeword and the non-zero coefficients are coded with a separate codeword. In Chen, Huffman codewords are used to code the run of zero coefficients as well as the non-zero coefficients.

2) In the Vogel patent, transform coded coefficients having zero and non-zero values are coded such that a run of zero coefficients and a preceding or subsequent non-zero coefficient are coded together.

3) The prior art (disclosed in the Van Voorhis Patent as set forth below in the chart) discloses a known combined coding technique to code a run of zero values and a non-zero value together using a single codeword which results in a higher level of compression.

4) One of ordinary skill in the art would have recognized that applying the known combined coding technique of the Van Voorhis Patent to the method of coding signals disclosed in the Chen Article would have yielded the predictable result of a higher compression coding

system and also resulted in an improved coding system with the higher compression. *See Ebrahimi Declaration at ¶ 10.*

Therefore, claims 3-4 of the Vogel Patent would have been obvious over the combination of the Chen Article and the Van Voorhis Patent.

US 4,901,075 CLAIM ELEMENTS	Van Voorhis Patent	Chen Article
3. In a method of coding a signal comprising a sequence of coefficients which results after a blockwise transform of pixels of a video signal with subsequent quantization, for transmission at a reduced bit rate, said signal comprising a plurality of zero coefficients, and a plurality of non-zero coefficients said method comprising the steps of:	Van Voorhis discloses an apparatus for encoding for the compression of digital images that are a two-dimensional array of image points. *See Col. 1:13-19.* The compression of the digital images (using run length codes) reduces the storage requirements for digital images and reduces the bandwidth required for the transmission of the digital images *See Col. 1:27-31.* The value zero occurs far more frequency than the signal value one. From the examples, the value zero occurs most frequency in uninterrupted runs. For example, column 14, lines 64 to 66, mentions: *"For the purpose of the illustration, a run is defined as a one or as a string of one or more zeros and the first one following this string of zeros."*	Chen discloses a system and method wherein transform image coding (which was developed 15 years before 1984) may be used for bandwidth compression for video signals. The Chen Article discloses that discrete cosine transforms (DCT) may be used to generate DCT coefficients that are quantized which results in zero coefficients and non-zero coefficients. *See pp. 225-227. See also Girod Tr. at 102:17-105:6.*
(a) deriving from said signal, a plurality of events each comprising a run of said zero-coefficients having a respective run length and preceded or followed by at least one non-zero coefficient, and	Van Voorhis discloses that an event may be a binary encoded representation of an alphanumeric character, an analog voltage, a run of binary video information, a run of binary image information or any other type of information capable of recognition. *See Col. 6, lines 59-65.* Van Voorhis also describes that, from the signal, events are recognized as follows: "*In such a circumstance, the event recognizer 10 of Van Voorhis may recognize each sequence of consecutive bits of the same logic ,*	Chen derives a plurality of events from the video signal and each event includes a run of zero coefficients and the value of the non-zero coefficient that precedes or follows that run. *See pg. 227-229. See also Girod Tr. at 115:9 – 116:3.*

US 4,901,075 CLAIM ELEMENTS	Van Voorhis Patent	Chen Article
	which is denoted as a run. Runs may also be sequences of bits of one of the logic levels, or sequences of a level terminating in another level." See Col. 7:11-15. and *"For the purpose of the illustration, a run is defined as a one or as a string of one or more zeros and the first one following this string of zeros."* *See Col. 14:64-66; underlining was added.*	
(b) for each of said events, determining said respective run length and assigning a code word to represent said non-zero coefficient and said run length.	Van Voorhis discloses coding of events where the event may include a string of one or more zeros and the first one following this string of zeros. *See Col. 14, lines 64-66.* The encoder then calculates and outputs code words for a specific class of ordinary and extended run-length codes. *See Col, 3, lines 58-61.* Examples of the codes used by the coder are shown in Tables 1 and 2. *See Col. 3, line 58 – Col. 4, line 64 and Tables 1 and 2.*	Chen assigns a sequence of bits that represents a particular event or events in accordance with a predefined set of rules. In particular, Chen assigns a sequence of bits to represent a run of zeroes followed by a non-zero coefficient comprised of a code word for the run-length prefix, a code word for the run length and a code word for the non-zero coefficient (*See pp. 228-229, Tables I and II.*) to form a composite code word that is a sequence of bits that represent a particular event or events in accordance with a predefined set of rules. Consider for example, the event of four zero coefficients followed by a non-zero coefficient equal to four (00004): According to Chen this event is represented by a sequence of bits as follows:

US 4,901,075 CLAIM ELEMENTS	Van Voorhis Patent	Chen Article
		First the run length prefix, 010, is included in the composite code word to indicate the beginning of the run of four zeroes. (*See p. 228, Table I.*) Next, the Huffman code word for a run length of 4, 0101, is included in the composite code word. (*See p. 229, Table II.*) Finally, the Huffman code word for the non-zero coefficient with an amplitude of 4, 00001, is included in the composite code word. (*See p. 228, Table I.*) Thus the composite codeword that is a sequence of bits that represents the event 00004 is: 010010100001. This is true every time the event 00004 occurs, and thus that composite codeword is assigned according to a predefined set of rules. *See Girod Tr. at 118:9 – 120:6.*
4. The method of claim 3, wherein said code words are Huffman code words.		Chen discloses that the codewords assigned are Huffman codewords. *See pp. 228-229 and Tables 1 and II.*

8. Henry H. J. Liao, "Upper Bound, Lower Bound and Run-Length Substitution Coding", NTC '77 Conference Record, Vol. 3, pp. 49:3-1 to 49:3-6 (1977) (the "Liao Article") in view of Wen-Hsiung Chen and William K. Pratt, "Scene Adaptive Coder", IEEE Transactions on Communications, Vol. COM-32, No. 3, March 1984, pages 225 to 232 (the "Chen Article")

The Liao Article was published in 1977 and is prior art to the Vogel Patent under 35 USC 102(a) or 35 USC 102(b) and is properly used as prior art in this re-examination request. The Chen Article was published in March 1984 and is prior art to the Vogel Patent under 35 USC 102(a) or 35 USC 102(b) and is properly used as prior art in this re-examination request. The Liao Article was never submitted to the examiner during prosecution. The Chen Article was submitted to the examiner during the prosecution towards the end of prosecution. However, the examiner never used this combination of prior art to reject the claims of the Vogel Patent.

Claims 3-4, 8 and 11 of the Vogel Patent are unpatentable under 35 USC 103 over the Liao Article in view of the Chen Article because:

1) The prior art (disclosed in the Chen Article as set forth below in the chart) discloses a method for coding signals that may include transform coding (using discrete cosine transforms (DCTs)) in which a sequence of coefficients having zero values and non-zero values are coded using codewords. In Chen, a run of zero coefficients are coded with a codeword and the non-zero coefficients are coded with a separate codeword. In Chen, Huffman codewords are used to code the run of zero coefficients as well as the non-zero coefficients.

2) In the Vogel patent, transform coded coefficients having zero and non-zero values are coded such that a run of zero coefficients and a preceding or subsequent non-zero coefficient are coded together.

3) The prior art (disclosed in the Liao Article as set forth below in the chart) discloses a known combined coding technique to code a run of zero values and a non-zero value together using a single codeword which results in a higher level of compression.

4) One of ordinary skill in the art would have recognized that applying the known combined coding technique of the Liao Article to the method of coding signals disclosed in the Chen Article would have yielded the predictable result of a higher compression coding system and also resulted in an improved coding system with the higher compression. *See Ebrahimi Declaration at ¶ 10.*

Therefore, claims 3-4, 8 and 11 of the Vogel Patent would have been obvious over the combination of the Chen Article and the Liao Article.

US 4,901,075 CLAIM ELEMENTS	Liao Article	Chen Article
3. In a method of coding a signal comprising a sequence of coefficients which results after a blockwise transform of pixels of a video signal with subsequent quantization, for transmission at a reduced bit rate, said signal comprising a plurality of zero coefficients, and a plurality of non-zero coefficients said method comprising the steps of:	The Liao Article a method for run-length coding for a facsimile signal quantized into a sequence of binary digits (1's and 0's) which directly represent black and white picture elements or prediction errors. *See pg. 49:3-1, left column, first paragraph of Introduction.* Thus, the Liao Article discusses bandwidth compression (bit rate reduction) bounds for run length coding of a sequence of binary digits or predictive error values.	Chen discloses a system and method wherein transform image coding (which was developed 15 years before 1984) may be used for bandwidth compression for video signals. The Chen Article discloses that discrete cosine transforms (DCT) may be used to generate DCT coefficients that are quantized which results in zero coefficients and non-zero coefficients. *See pp. 225-227. See also Girod Tr. at 102:17-105:6.*
(a) deriving from said signal, a plurality of events each comprising a run of said zero-coefficients having a respective run length and preceded or followed by at least one non-zero coefficient, and	The events (run-length of prediction errors) are a message set for these prediction values as shown in Table 1 that have runs of W followed by B (a run of zeros followed by a "1"). *See pg. 49:3-2, left column, first paragraph of Maximum Entropy Lower Bound section and Table 1.*	Chen derives a plurality of events from the video signal and each event includes a run of zero coefficients and the value of the non-zero coefficient that precedes or follows that run. *See pg. 227-229. See also Girod Tr. at 115:9 – 116:3.*
(b) for each of said events, determining said respective run length and assigning a code word to represent said non-zero coefficient and said run length.	For the events, "The best code assignment will be the set of codes with the shortest average length, i.e., the minimum redundancy code. Huffman's coding is a systematic procedure for constituting such as code with minimum redundancy." *See pg. 49:3-1, left column, second paragraph of Introduction section.* The Liao Article also contains a table with a run-length substitution code that is a Huffman code that represent a run of W values (zero to nine) followed by a B value. (zero to nine	Chen assigns a sequence of bits that represents a particular event or events in accordance with a predefined set of rules. In particular, Chen assigns a sequence of bits to represent a run of zeroes followed by a non-zero coefficient comprised of a code word for the run-length prefix, a code word for the run length and a code word for the non-zero coefficient (*See pp. 228-229,*

US 4,901,075 CLAIM ELEMENTS	Liao Article	Chen Article
	zero values) followed by a B value (a "1" value) *See pg. 49:3-3, left and right columns, Run-Length Substitution section, Table 2 and pg. 49:3-6, Table 5.*	*Tables I and II.*) to form a composite code word that is a sequence of bits that represent a particular event or events in accordance with a predefined set of rules. Consider for example, the event of four zero coefficients followed by a non-zero coefficient equal to four (00004): According to Chen this event is represented by a sequence of bits as follows: First the run length prefix, 010, is included in the composite code word to indicate the beginning of the run of four zeroes. (*See p. 228, Table I.*) Next, the Huffman code word for a run length of 4, 0101, is included in the composite code word. (*See p. 229, Table II.*) Finally, the Huffman code word for the non-zero coefficient with an amplitude of 4, 00001, is included in the composite code word. (*See p. 228, Table I.*) Thus the composite codeword that is a sequence of bits that represents the event 00004 is: 010010100001. This is true every time the

US 4,901,075 CLAIM ELEMENTS	Liao Article	Chen Article
		event 00004 occurs, and thus that composite codeword is assigned according to a predefined set of rules. *See Girod Tr. at 118:9 – 120:6.*
4. The method of claim 3, wherein said code words are Huffman code words.	The Liao Article also contains a table with a run-length substitution code that is a Huffman code that represent a run of W values (zero to nine zero values) followed by a B value (a "1" value). *See pg. 49:3-3, left and right columns, Run-Length Substitution section, Table 2 and pg. 49:3-6, Table 5.* Table 5 shows the frequency of each run-length and the Huffman length assigned to each run-length based on the frequency. In these tables, Huffman codes are formed from the prediction error values.	Chen discloses that the codewords assigned are Huffman codewords. *See pp. 228-229 and Tables 1 and II.*
8. A method for coding a signal for transmission at a reduced bandwidth, comprising the steps of:	The Liao Article a method for run-length coding for a facsimile signal quantized into a sequence of binary digits (1's and 0's) which directly represent black and white picture elements or prediction errors. *See pg. 49:3-1, left column, first paragraph of Introduction.* Thus, the Liao Article discusses bandwidth compression (bit rate reduction) bounds for run length coding of a sequence of binary digits or predictive error values.	Chen discloses a system and method wherein transform image coding (which was developed 15 years before 1984) may be used for bandwidth compression for video signals. *See 225-227.*
(a) transforming said signal into a sequence comprising zero coefficients occurring in runs and non-zero coefficients;	The facsimile image signal in Liao is transformed into a set of prediction error values. *See pg. 49:3-1, left column, first paragraph of Introduction.*	The Chen Article discloses that discrete cosine transforms (DCT) may be used to generate DCT coefficients that are quantized which results in zero coefficients and non-zero coefficients. *See pp. 225-227. See also Girod Tr. at 102:17-105:6.*
(b) deriving from said	The events (run-length of prediction	Chen derives a plurality of

US 4,901,075 CLAIM ELEMENTS	Liao Article	Chen Article
sequence, a plurality of events each comprised of a run of zero coefficients having a respective run length, which is preceded or followed by at least one non-zero coefficient, and	errors) are a message set for these prediction values as shown in Table 1 that have runs of W followed by B (a run of zeros followed by a "1"). *See pg. 49:3-2, left column, first paragraph of Maximum Entropy Lower Bound section and Table 1.*	events from the video signal and each event includes a run of zero coefficients and the value of the non-zero coefficient that precedes or follows that run. *See pg. 227-229. See also Girod Tr. at 115:9 – 116:3.*
(c) for each of said events, determining the run length and assigning a code word to represent said run length and said non-zero coefficient.	For the events, "The best code assignment will be the set of codes with the shortest average length, i.e., the minimum redundancy code. Huffman's coding is a systematic procedure for constituting such as code with minimum redundancy." *See pg. 49:3-1, left column, second paragraph of Introduction section.* The Liao Article also contains a table with a run-length substitution code that is a Huffman code that represent a run of W values (zero to nine) followed by a B value. (zero to nine zero values) followed by a B value (a "1" value) *See pg. 49:3-3, left and right columns, Run-Length Substitution section, Table 2 and pg. 49:3-6, Table 5.*	Chen assigns a sequence of bits that represents a particular event or events in accordance with a predefined set of rules. In particular, Chen assigns a sequence of bits to represent a run of zeroes followed by a non-zero coefficient comprised of a code word for the run-length prefix, a code word for the run length and a code word for the non-zero coefficient (*See pp. 228-229, Tables I and II.*) to form a composite code word that is a sequence of bits that represent a particular event or events in accordance with a predefined set of rules. Consider for example, the event of four zero coefficients followed by a non-zero coefficient equal to four (00004): According to Chen this event is represented by a sequence of bits as follows: First the run length prefix, 010, is included in the composite code word to indicate the beginning of the

US 4,901,075 CLAIM ELEMENTS	Liao Article	Chen Article
		run of four zeroes. (*See p. 228, Table I.*) Next, the Huffman code word for a run length of 4, 0101, is included in the composite code word. (*See p. 229, Table II.*) Finally, the Huffman code word for the non-zero coefficient with an amplitude of 4, 00001, is included in the composite code word. (*See p. 228, Table I.*) Thus the composite codeword that is a sequence of bits that represents the event 00004 is: 010010100001. This is true every time the event 00004 occurs, and thus that composite codeword is assigned according to a predefined set of rules. *See Girod Tr. at 118:9 – 120:6.*
11. The method of claim 8, comprising the additional steps of: determining whether the run length of each event exceeds a predetermined run length and if so, splitting said respective event into a plurality of sections so that each of said sections has a run length below said predetermined run length, and assigning a	The Liao Article discloses that in run-length substitution, "a fixed number of runs is picked from the entire message set." *See pg. 49:3-3, left column, first paragraph of Run-Length Substitution section.* The Liao Article further discloses that, "Runs without codes can be represented by two or more shorter runs with codes. For example, in Table 2, the run-length 4W is selected and 5W+B is not selected, the run 5W+B is substituted by 4W + (W+B)." *See pg. 49:3-3, left and right columns, first paragraph of Run-Length Substitution section and Table*	

US 4,901,075 CLAIM ELEMENTS	Liao Article	Chen Article
code word to each section.	*2.*	

III. STATEMENT POINTING OUT SUBSTANTIAL NEW QUESTION OF PATENTABILITY

Since claims 3-4, 7-8 and 11 of the Vogel patent are not patentable over the prior art references cited above for the reasons set forth above (the claims being anticipated by prior art and/or obvious over the prior art), a substantial new question of patentability is raised for each claim. Further, the prior art references cited above are material to the subject matter of the Vogel patent. In particular, these prior art references provide teachings not provided during the prosecution of the Vogel patent. Therefore, a substantial new question of patentability has been raised and reexamination is respectfully requested.

CONCLUSION

Based on the above remarks, it is respectfully submitted that substantial new question(s) of patentability have been raised with respect to claims 3-4, 7-8 and 11 of the Vogel patent. Therefore, reexamination of claims 3-4, 7-8 and 11 is respectfully requested.

Any fee due for this reexamination may be charged to Deposit Account No. 07-1896.

Respectfully submitted,

Dated: February 7, 2008

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EXHIBIT F

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

U.S. PHILIPS CORPORATION, Plaintiff, v. EASTMAN KODAK COMPANY, Defendant.	)	Civil Action No. 06-00251-GMS

EXPERT REPORT OF DR. TOURADJ EBRAHIMI FOR U.S. PATENT NO. 4,901,075 ON INVALIDITY

I. INTRODUCTION

1. I submit this Expert Report in this case on issues relating to invalidity of U.S. Patent No. 4,901,075 (the "'075 Patent") being asserted by U.S. Philips Corporation ("Philips") against Eastman Kodak Company ("Kodak"). I reserve the right to supplement or modify this Expert Report as necessary or appropriate and in response to any expert reports served by Philips.

2. I have been retained by DLA Piper as an expert in this case as to the '075 Patent. No part of my compensation is dependent upon the outcome of this case or any issue in it.

3. I am being compensated at my usual rate of $300 per hour for work on this case.

4. This expert report contains eight sections, including this Introduction. The additional parts are: Qualifications (Part II), List of Materials Reviewed (Part III), Legal Basis for Opinion (Part IV), Background of Technology (Part V), Claim Construction (Part VI), Invalidity (Part VII) and Conclusion (Part VIII).

II. QUALIFICATIONS

5. A copy of my current curriculum vitae ("CV") is attached as Exhibit 1.

6. I am a Professor of Image Processing at the Swiss Federal Institute of Technology (EPFL), in Lausanne, Switzerland, involved in teaching and research in the field of Multimedia Signal Processing. Before joining EPFL as a faculty member in 1994, I was with AT&T Bell Laboratories Research Center in Holmdel, NJ, USA, where I worked on video compression techniques for communication. Prior to that, I was with Sony Corporation in Tokyo, Japan, working at its Corporate Research Center in the area of image and video compression for storage applications.

7. I hold a Masters of Science Degree from EPFL in Electrical Engineering with specialization in Image Processing, and a PhD from the same University on Video Compression.

8. During my career I have been closely involved in various projects on image and video compression including many related to standardization. I am the Head of the Swiss Delegation to JPEG, MPEG and SC29 which is the body overseeing the work of these two standards. I have been and continue to be the chair of various technical subgroups within the JPEG and MPEG standardization committees, including chairman of requirements in JPEG, editor of the secure JPEG 2000 standard, and editor of the MPEG-4 video standard. I also chaired the joint Ad Hoc Group between ISO/IEC and ITU-T experts in charge of examining proposals for inclusion of new Amendments to JPEG image compression standard.

9. I have received several awards and distinctions in the area of image and video compression standardization. Examples include four ISO certificates for outstanding contributions to JPEG 2000, Secure JPEG 2000, JPEG 2000 reference software, and the MPEG-4 video standard. I have received the first prize for best publication of the IEEE Transactions on Consumer Electronics in 2000 for a paper describing the JPEG 2000 standard. I have been author or co-author of more than 150 publications (books, book chapters, journal papers, conference proceedings), and hold several patents.

10. I regularly teach courses at graduate levels in European Universities (Switzerland, France, and Italy) on image and video compression which include detailed description of the JPEG compression standard.

III. MATERIALS RELIED UPON

11. A list of the materials I relied upon is contained on Appendix A to this Report.

IV. LEGAL BASIS FOR OPINION

A. The Asserted Claims.

12. I understand that the following claims of the '075 Patent are asserted in this litigation: 3-4, 7-8 and 11.

B. Invention Date/Priority Date

13. I have been informed by counsel for Kodak that the invention date of a patent is the date of conception of the invention. I understand that conception is the mental part of the inventive act, but is more than a mere vague idea of how to solve a problem. The means for solving the problem and their interaction must be comprehended also.

14. Counsel for Kodak has additionally informed me that the date for determining priority of invention over an alleged prior art reference (the priority date) is the earliest of one of three dates:

a) the date of actual reduction to practice of the invention prior to the effective date of the reference; or

b) the date of conception of the invention coupled with due diligence from a date prior to the reference date to a subsequent actual reduction to practice; or

c) the date of conception of the invention coupled with due diligence from prior to the reference date to the filing date of the application (also known as constructive reduction to practice).

15. Counsel for Kodak has additionally informed me that the date of actual reduction to practice is the date that the invention existed and worked for its intended purpose.

C. Anticipation

16. I have been informed by counsel for Kodak that a patent claim may be invalid under 35 U.S.C. §102 if prior art anticipates the claim. I further understand that for anticipation, every element in a claim must be identically shown in a single reference and arranged as in the claim in order for that reference to anticipate the claim.

1. 35 U.S.C. §102(a)

17. Counsel for Kodak has informed me that a patent is invalid under 35 U.S.C. §102(a) if the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for patent.

18. Counsel for Kodak has additionally informed me that a patent or printed publication reference qualifies as prior art under 35 U.S.C. §102(a) if it has a publication date that predates the priority date of the invention.

2. 35 U.S.C. §102(b)

19. Counsel for Kodak has informed me that a patent is invalid under 35 U.S.C. §102(b) if the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States.

20. Counsel for Kodak has additionally informed me that a patent or printed publication reference qualifies as prior art under 35 U.S.C. §102(b) if it has a publication date that is more than one year before filing of the application for patent.

3. 35 U.S.C. §102(e)

21. Counsel for Kodak has informed me that a patent is invalid under 35 U.S.C. §102(e) if the invention was described in: (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for the purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

22. Counsel for Kodak has additionally informed me that a U.S. Patent qualifies as prior art under 35 U.S.C. §102(e) if it has an effective filing date that predates the priority date of the invention.

D. Obviousness

23. Counsel for Kodak has informed me that a patent claim is invalid when the differences between the subject matter of the claim and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the invention pertains. I have further been informed that the inquiry as to whether a patent claim is obvious includes the steps of determining the scope and content of the prior art; determining the differences between the prior art and the claims at issue; and determining the level of ordinary skill in the art. Against this background the obviousness or non-obviousness of the claim is determined.

24. I have also been informed by counsel for Kodak that a patent claim composed of several elements is not proved obvious merely by demonstrating that each element was,

independently, known in the prior art. This is because most, if not all, inventions will be combinations of known elements. A primary reference may not be modified in light of or combined with one or more secondary references where the result would be to render the primary reference inoperable for its intended purpose. Rather, the combination is likely to be obvious when it is the predictable use or variation of prior art elements according to their established functions. Stated another way, the combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results. I also understand that the prior art reference must be viewed without the benefit of hindsight reasoning.

E. Indefiniteness

25. Counsel for Kodak also has informed me that, under 35 U.S.C. § 112, patent claims must particularly point out and distinctly claim the subject matter which the applicant regards as his invention. Kodak's counsel has also informed me that this definiteness requirement does not compel absolute clarity, but that only claims not amenable to construction or insolubly ambiguous are indefinite. I further understand that the definiteness of claim terms depends on whether those terms can be given any reasonable meaning, and that claims are found indefinite only if reasonable efforts at claim construction prove futile.

V. BACKGROUND OF TECHNOLOGY

A. Digital Images and Compression

26. Digital images are produced as the result of a sampling and quantization process applied to an analog signal (picture). In their canonical form, digital images are often represented by one or three matrices whose elements contain the luminance or the three color components values of the quantized samples of the image also referred to as pixels. The

canonical form (also known as raw format) of a digital image typically generates very large files in size when compared to other digital files containing text, speech or audio.

27. Even though the size of available memory and the bandwidth of communication channels have not ceased to increase, and continue to do so, most consumer and professional applications cannot be deployed in a cost effective way unless compression is applied. Thanks to image compression, digital images have become part of everyday life, on the Internet, in Digital Still Cameras, and in Multimedia enabled Mobile Phones, to mention a few examples.

28. Image compression algorithms, as a special case of multimedia data compression, can be divided into two main processing blocks. The first processing block consists in building the messages to be coded which represent the multimedia signal. In the case of an image, the message can be the value of the color of a pixel, the pattern representing exactly or approximately a collection of pixels, or any other appropriate representation of an image. The result of the first processing block (the message) is then input to a second processing block where based on different considerations, such as statistical characteristics of the messages generated by the signal seen as a source, codewords are assigned to each message or a collection of messages.

29. Depending on the choice of the method to build the message in the first processing block, there are two main approaches for digital image compression, namely, predictive coding, and transform coding. In predictive coding, the value of an image pixel is predicted from past pixels, and only the error of such a prediction is considered as the message. Several variants of predictive coding can be distinguished depending on the way the prediction is performed, and on the method used to represent the prediction error. Transform based coding first transforms the pixel values from their original spatial domain into an abstract space in which

their energy is concentrated on a smaller number of non-zero coefficients. These coefficients are then quantized and eventually reordered in order to create the messages. Here too, several variants can be distinguished depending on the type of the transform performed, the method used for quantization, the method of re-ordering of coefficients, etc. Since the 1960s where the first operational digital image coding schemes were put forward, literally hundreds of digital image compression algorithms have been reported in the literature. Among those include the "Scene Adaptive Coder" by Pratt and Chen, published in 1984 which is also referred to in the Vogel patent. According to this approach, the digital image to be compressed is divided into blocks of size 16x16 pixels to which a 2D Discrete Cosine Transform (DCT) is applied. The resulting coefficients are then quantized and reorganized in a zig-zag scan. The message to be coded then becomes runs of consecutive zero valued coefficients, and the amplitude of non-zero coefficients.

30. An important issue in any data compression and in particular in image compression schemes is the methodology used for the bit assignment in the second processing block. The purpose of the bit assignment is to produce a uniquely decodable, and preferably an as compact as possible sequence of binary data (1 and 0) also called a bitstream, representing the encoded messages and therefore the compressed digital image. One important class of bit assignment techniques is entropy coding. The idea behind entropy coding is to assign shorter codewords (in number of bits) to messages that occur more often. In 1952, Huffman proposed a method to build minimum redundancy codes which produce optimal results in terms of compression if messages to which bits are to be assigned are independent, if each message is assigned to an integer number of bits, and if their frequency (probability) of occurrence is known. Since then, Huffman codewords have been widely used in data compression.

31. At this point, it is important to mention a few observations regarding Huffman codewords. As said above, Huffman codewords rely on statistical characteristics of the messages produced by the signal to be coded. There are two ways in which such statistics can be generated, namely, by off-line, or by on-line methods. In off-line methods, the statistics (probabilities) of the messages of the signal to be coded are estimated from a set of signals similar to the signal to be coded. A Huffman table is then built off-line based on such statistics where shorter codewords are assigned to more frequent messages. The Huffman codewords used to compress a signal is therefore based on statistics of other signals as opposed to those of the signal to be coded. The compression efficiency of such a Huffman coding will depend on how closely the statistics of the signals used to generate the Huffman codewords match those of the signal to be coded. To improve this, in on-line methods, care is taken to use the statistics of the signal to be coded in order to generate the Huffman codewords. For example, in a first pass, the statistics of messages of the signal to be coded are gathered. Based on these statistics, Huffman codewords are generated, and then used to code the signal during a second pass. The Huffman table containing the codewords of messages extracted from the signal is also included into the compressed bitstream.

32. A number of other practical considerations have to be taken into account when using Huffman codewords. On the one hand, the less frequently a message occurs in a signal, the more difficult it is to accurately estimate the probability of such an occurrence. Fortunately, this is not a serious drawback because such rare messages occur less frequently, and therefore their impact on the overall compression efficiency is limited. On the other hand, for a large population of messages (which is often the case in image compression), the less frequent messages tend to receive very long codewords which makes their implementation less practical. Based on the

above two observations, variants of Huffman codewords have been frequently used in which only Huffman codewords are produced for most frequent messages. For less frequent messages, an escape code is designed to signal that a rare message is expected. Other suboptimal bit assignment approaches are then applied to such rare messages.

B. The '075 Patent

33. The '075 patent is entitled "Method and apparatus for bit rate reduction" and defines a method for compression of digital images by transform coding. The core of the method is based on the work of Pratt and Chen in their paper entitled "Scene Adaptive Coder", published in 1984, also referred to by the inventor.

34. The major difference between the '075 Patent and the Scene Adaptive Coder is as follows. In the Scene Adaptive Coder, after quantization and zig-zag scan of transformed coefficients, the message is defined to be either the runs of consecutive zero valued coefficients or the amplitude of a non-zero coefficient. The Vogel patent instead defines the runs of consecutive zero valued coefficients together with the amplitude of the next or the previous non-zero coefficient as the message to be coded. This is justified by the fact that, based on experiments carried out, it has been observed that the probability of such a combined message is smaller than the product of the probability of the corresponding zero run multiplied by the probability of the corresponding non-zero amplitude. This means that there exists a statistical dependency between the run of zero coefficients and the amplitude of the non-zero coefficient that follows or precedes such a run. It is a known fact that in situations when there are statistical dependencies between two messages, Huffman coding of a message defined as the combination of two statistically dependent messages produces higher compression efficiency when compared to independent Huffman coding of each message separately, as was proposed in the Scene

Adaptive Coder by Chen and Pratt. Hence, Vogel proposes a single Huffman coding of zero-runs and the previous or the following non-zero amplitude coefficients, by proposing a 2D-VLC table containing the appropriate codewords of combinations of runs and the following (or the preceding) non-zero amplitude based on the statistics of the signal to be coded (see claim 3 of the Vogel patent). The Vogel patent reports gains of 12% when compared to Chen and Pratt.

35. For practical reasons, the Vogel patent also proposes various escape codes in order to reduce the number of messages that are Huffman coded by breaking them into smaller events which are signaled using appropriate and well known mechanisms.

VI. CLAIM CONSTRUCTION

36. I have reviewed the claim construction positions of Kodak. I agree with them because Kodak's claim construction positions are consistent with the way in which a person of ordinary skill in the relevant art would interpret the claims of the '075 Patent.

37. After reading the '075 patent and its prosecution history, it is my opinion that a person of ordinary skill in the art in the 1986-1987 time frame would have been an engineer having a masters degree in electrical engineering plus at least two years of experience in the field of digital signal compression.

38. My analysis of the prior art based on Kodak's claim construction positions are set forth below.

39. I have also reviewed the claim construction positions of Philips. I do not agree with their claim construction positions. However, for completeness, I have analyzed the prior art under Philips' claim constructions and, where appropriate because my opinion is different under Philips' claim constructions, I have provided a separate analysis of that prior art based on Philips' claim constructions.

VII. INVALIDITY

A. Anticipatory Prior Art Under Kodak's Constructions

40. It is my opinion that the prior art listed in this section below anticipates one or more of the Asserted Claims under Kodak's claim constructions for the reasons set forth below.

1. Widcom VTC-56

41. It is my opinion that the Widcom VTC-56 codec anticipates claims 3-4 and 7-8 of the '075 Patent. The details of my analysis of the Widcom VTC-56 codec under Kodak's constructions are set forth in Appendix B, Exhibit 1.

2. U.S. Patent No. 4,698,672 to Chen et al.

42. It is my opinion that U.S. Patent No. 4,698,672 to Chen et al. anticipates claims 3-4 and 7-8 of the '075 Patent. The details of my analysis of U.S. Patent No. 4,698,672 to Chen et al. under Kodak's constructions are set forth in Appendix B, Exhibit 2.

3. "Block Coding Using a Two-Dimensional Run-Length Table" Paper published to the COST 211bis Simulation Subgroup

43. It is my opinion that the "Block Coding Using a Two-Dimensional Run-Length Table" Paper anticipates claims 3-4 and 7-8 of the '075 Patent. The details of my analysis of the "Block Coding Using a Two-Dimensional Run-Length Table" Paper under Kodak's constructions are set forth in Appendix B, Exhibit 3.

B. Anticipatory Prior Art Under Philips' Constructions

44. It is my opinion that the prior art listed in this section below anticipates one or more of the Asserted Claims under Philips' claim constructions for the reasons set forth below.

1. Widcom VTC-56

45. It is my opinion that the Widcom VTC-56 codec anticipates claims 3-4 and 7-8 of the '075 Patent under Philips' constructions for the same reasons as set forth in Appendix B, Exhibit 1 above.

2. U.S. Patent No. 4,698,672 to Chen et al.

46. It is my opinion that U.S. Patent No. 4,698,672 to Chen et al. anticipates claims 3-4 and 7-8 of the '075 Patent under Philips' constructions for the same reasons as set forth in Appendix B, Exhibit 2 above.

3. "Block Coding Using a Two-Dimensional Run-Length Table" Paper published to the COST 211bis Simulation Subgroup

47. It is my opinion that the "Block Coding Using a Two-Dimensional Run-Length Table" Paper anticipates claims 3-4 and 7-8 of the '075 Patent under Philips' constructions for the same reasons as set forth in Appendix B, Exhibit 3 above.

C. Obviousness Prior Art Under Kodak's Constructions

48. It is my opinion that the prior art listed in this section below renders one or more of the Asserted Claims unpatentable under Kodak's claim constructions for the reasons set forth below.

1. U.S. Patent No. 3,984,833 Van Voorhis in view of Chen Article

49. It is my opinion that claims 3, 4 and 8 of the '075 Patent are unpatentable over U.S. Patent No. 3,984,833 to van Voorhis in view of the Chen Article. The details of my analysis of U.S. Patent No. 3,984,833 to van Voorhis in view of the Chen Article under Kodak's constructions are set forth in Appendix C, Exhibit 1.

2. U.S. Patent No. 4,420,771 to Pirsch in View of the Chen Article

50. It is my opinion that claims 3, 4 and 8 of the '075 Patent are unpatentable over U.S. Patent No. 4,420,771 to Pirsch in view of the Chen Article. The details of my analysis of U.S. Patent No. 4,420,771 to Pirsch under Kodak's constructions are set forth in Appendix C, Exhibit 2.

3. U.S. Patent No. 4,316,222 to Subramaniam in view of Chen Article

51. It is my opinion that claims 3-4, 8 and 11 of the '075 Patent are unpatentable over U.S. Patent No. 4,316,222 to Subramaniam in view of the Chen Article. The details of my analysis of U.S. Patent No. 4,316,222 to Subramaniam in view of the Chen Article under Kodak's constructions are set forth in Appendix C, Exhibit 3.

4. U.S. Patent No. 4,363,036 to Subramaniam in view of Chen Article

52. It is my opinion that claims 3-4, 8 and 11 of the '075 Patent are unpatentable over U.S. Patent No. 4,363,036 to Subramaniam in view of the Chen Article. The details of my analysis of U.S. Patent No. 4,363,036 to Subramaniam in view of the Chen Article under Kodak's constructions are set forth in Appendix C, Exhibit 4.

5. U.S. Patent No. 4,092,676 to Saran in view of Chen Article

53. It is my opinion that claims 3-4, 8 and 11 of the '075 Patent are unpatentable over U.S. Patent No. 4,092,676 to Saran in view of the Chen Article. The details of my analysis of U.S. Patent No. 4,092,676 to Saran in view of the Chen Article under Kodak's constructions are set forth in Appendix C, Exhibit 5.

6. U.S. Patent No. 4,136,363 to Saran in view of Chen Article

54. It is my opinion that claims 3-4, 8 and 11 of the '075 Patent are unpatentable over U.S. Patent No. 4,136,363 to Saran in view of the Chen Article. The details of my analysis of

U.S. Patent No. 4,136,363 to Saran in view of the Chen Article under Kodak's constructions are set forth in Appendix C, Exhibit 6.

7. U.S. Patent No. 4,494,151 to Liao in view of Chen Article

55. It is my opinion that claims 3-4, 8 and 11 of the '075 Patent are unpatentable over U.S. Patent No. 4,494,151 to Liao in view of the Chen Article. The details of my analysis of U.S. Patent No. 4,494,151 to Liao in view of the Chen Article under Kodak's constructions are set forth in Appendix C, Exhibit 7.

8. "Upper Bound, Lower Bound and Run-Length Substitution Coding" Article by Henry Liao in view of Chen Article

56. It is my opinion that claims 3-4, 8 and 11 of the '075 Patent are unpatentable over Liao Article in view of the Chen Article. The details of my analysis of the Liao Article in view of the Chen Article under Kodak's constructions are set forth in Appendix C, Exhibit 8.

D. Obviousness Prior Art Under Philips' Constructions

57. It is my opinion that the prior art listed in this section below renders one or more of the Asserted Claims unpatentable under Philips' claim constructions for the reasons set forth below.

1. U.S. Patent No. 3,984,833 Van Voorhis in view of Chen Article

58. It is my opinion that claims 3-4 and 8 of the '075 Patent are unpatentable over U.S. Patent No. 3,984,833 to van Voorhis in view of the Chen Article. The details of my analysis of U.S. Patent No. 3,984,833 to van Voorhis in view of the Chen Article under Philips' constructions are set forth in Appendix C, Exhibit 9.

2. U.S. Patent No. 4,420,771 to Pirsch in View of the Chen Article

59. It is my opinion that claims 3, 4 and 8 of the '075 Patent are unpatentable over U.S. Patent No. 4,420,771 to Pirsch in view of the Chen Article. The details of my analysis of U.S. Patent No. 4,420,771 to Pirsch under Philips' constructions are set forth in Appendix C, Exhibit 10.

3. U.S. Patent No. 4,316,222 to Subramaniam in view of Chen Article

60. It is my opinion that claims 3-4, 8 and 11 of the '075 Patent are unpatentable over U.S. Patent No. 4,316,222 to Subramaniam in view of the Chen Article. The details of my analysis of U.S. Patent No. 4,316,222 to Subramaniam in view of the Chen Article under Philips' constructions are the same as set forth in Appendix C, Exhibit 3.

4. U.S. Patent No. 4,363,036 to Subramaniam in view of Chen Article

61. It is my opinion that claims 3-4, 8 and 11 of the '075 Patent are unpatentable over U.S. Patent No. 4,363,036 to Subramaniam in view of the Chen Article. The details of my analysis of U.S. Patent No. 4,363,036 to Subramaniam in view of the Chen Article under Philips' constructions are set forth in Appendix C, Exhibit 11.

5. U.S. Patent No. 4,092,676 to Saran in view of Chen Article

62. It is my opinion that claims 3-4, 8 and 11 of the '075 Patent are unpatentable over U.S. Patent No. 4,092,676 to Saran in view of the Chen Article. The details of my analysis of U.S. Patent No. 4,092,676 to Saran in view of the Chen Article under Philips' constructions are set forth in Appendix C, Exhibit 12.

6. U.S. Patent No. 4,136,363 to Saran in view of Chen Article

63. It is my opinion that claims 3-4, 8 and 11 of the '075 Patent are unpatentable over U.S. Patent No. 4,136,363 to Saran in view of the Chen Article. The details of my analysis of

U.S. Patent No. 4,136,363 to Saran in view of the Chen Article under Philips' constructions are set forth in Appendix C, Exhibit 13.

7. U.S. Patent No. 4,494,151 to Liao in view of Chen Article

64. It is my opinion that claims 3-4, 8 and 11 of the '075 Patent are unpatentable over U.S. Patent No. 4,494,151 to Liao in view of the Chen Article. The details of my analysis of U.S. Patent No. 4,494,151 to Liao in view of the Chen Article under Philips' constructions are set forth in Appendix C, Exhibit 14.

8. "Upper Bound, Lower Bound and Run-Length Substitution Coding" Article by Henry Liao in view of Chen Article

65. It is my opinion that claims 3-4, 8 and 11 of the '075 Patent are unpatentable over Liao Article in view of the Chen Article. The details of my analysis of the Liao Article in view of the Chen Article under Philips' constructions are set forth in Appendix C, Exhibit 15.

E. Indefinitness under 35 USC 112, second paragraph of Terms "For Transmission at a Reduced Bit Rate" and "For Transmission at a Reduced Bandwidth" (Claims 3 and 8)

66. The preambles of claim 3 and claim 8 include claim elements that are ambiguous and would not have been understood by those skilled in the art because there are no disclosures within the '075 patent or its prosecution history to determine what is meant by the phrases "reduced bit rate" and " reduced bandwidth." Alternately, these phrases might be construed relative to the encoding method of the Chen 1984 article against which the claimed encoding method purportedly provides a 12% reduction.

1. Both Claim Phrases Should be Found Indefinite

67. Neither the patent nor the file history provide the person of ordinary skill in the art with information sufficient to determine whether the claimed coding method provides for transmission at a reduced " bit rate" or " bandwidth."

68. "Reduced" is a relative term: this reduction must be in comparison to a reference value. "Transmission" and "bit rate," in the context of the '075 patent's video signal, refer to the transfer speed of data per unit of time, that is, how fast the bits of encoded video data are transferred in a given time interval. An analogy might be that a small pipe lets a given amount of water flow (transmits water) per unit second and a pipe that is twice as large lets twice as much water flow over the same time period. Applying this to transmission of information, in 1986, a 1200 bps modem could transfer data at 1200 bits per second over a telephone line. By contrast, in 1986, a 2400 bps modem could transfer twice as many bits per second, over the same telephone line.

69. In order to determine what " for transmission at a reduced bit rate" means in the context of the '075 patent, the person of ordinary skill in the art must be able to perform a comparison between the transmitted bit rate of the alleged invention and the transmitted bit rate of the system that is accused of infringement. But if the person of ordinary skill does not know the transmission channels that are used by both methods, a reduced bit rate (i.e., a slower speed) can be shown simply by using a slower type of transmission channel (or hardware). For example, the '075 patent claims to improve the bit rate over the Chen method by 12%. If a video signal encoded by the Chen method is transmitted using a 2400 bps modem and the same video signal is encoded using the '075 patent method and transmitted using the 1200 bps modem, the '075 patent method will transmit the video signal at a reduced bit rate, regardless of the reduction

attributable to the claimed coding method. In other words, the signal transferred over the 1200 bps modem will be " transmitted at a reduced bit rate." But, the claimed invention should not be covering admitted prior art. The scope of the claim should cover coding methods that " improve" over Chen, and without additional detail, not disclosed in the patent, this comparison cannot be made.

70. A person of ordinary skill would know that determining " transmission at a reduced bit rate" requires knowing information that is not disclosed anywhere in the patent. For example, in order to determine the bit rate being compared against, it requires knowing the transmission rate of the equipment, the transmission rate of the medium (wires, atmosphere, telephone lines, etc.) and how the signals are packaged (modulated) for transmission. In other words, to determine if an accused device is transmitting at a reduced bit rate, the accused device must be compared to a transmission bit rate recited in the claim. There must be a "reference" to compare against, in order to determine if the transfer rate of the claimed coding method is reduced.

71. Because there is no disclosure of a reference coding bit rate, and further because there is no disclosure of the transmitted bit rate produced by the claimed method, it would not have been possible for a person of ordinary skill to determine if the claimed coding method produced a transmission that offered " a reduced bit rate."

72. There is a similar lack of disclosure problem for "bandwidth" as there is for "bit rate." "Bandwidth" is the actual space in a frequency spectrum through which data is sent. The frequency spectrum used for all communications are partitioned into smaller portions which are assigned to each different type of communication (e.g. radio, TV, etc). Within each portion, for example in the TV portion, there are further divisions into smaller adjacent frequency ranges,

each range corresponding to a channel on a TV. The width of the frequency used to transmit one TV channel (i.e., one video signal) corresponds to that channel' s bandwidth.

73. For another example, AM radio has stations, each of which has a bandwidth. When you tune the radio to a particular radio station on the AM dial, you do this by selecting a number on the AM dial that corresponds to the middle of the segment (bandwidth) of the frequency range that AM station is transmitted on. That is, there is a portion of frequencies above and below that center point over which the signal is transmitted. The length (width) of this segment is the bandwidth used by that radio station.

74. In order to determine whether an accused system meets the limitation " for transmission at a reduced bandwidth," the person of ordinary skill in the art must know what size bandwidth qualifies as a " reduced bandwidth." Is a bandwidth reduced by a certain percentage ? Is a bandwidth reduced by a certain amount of frequency? The '075 patent is silent on this.

75. Because there is no disclosure of any bandwidths in the patent, there is no way to determine when a sufficient reduction in bandwidth is achieved. In fact, there is not even a disclosure of the bandwidth used by the claimed coding method. Nor would a person of ordinary skill in the art be able to determine the bandwidth used or the amount reduced after performing the claimed coding method of the '075 patent.

76. Moreover, the term " bandwidth" is never used in the patent, other than in claim 8. Accordingly there is no disclosure in the '075 patent sufficient to inform a person of ordinary skill how to effect a reduction in bandwidth using the claimed encoding method.

77. Therefore, based on the above, it is my opinion that claims 3 and 8 are invalid under 35 USC 112, second paragraph.

VIII. CONCLUSION

78. In my expert opinion, the Asserted Claims of the '075 Patent are invalid because the Asserted Claims are anticipated by a piece of prior art, unpatentable over a piece of prior art or a combination of prior art or are indefinite.

79. I reserve the right to modify and supplement this report in response to any reports drafted by or testimony offered by Philips' expert witnesses and in response to any other fact discovery that is conducted by the parties.

Dated: 14 Dec 2007

Touradj Ebrahimi, Ph.D.

EXHIBIT G

United States Patent and Trademark Office

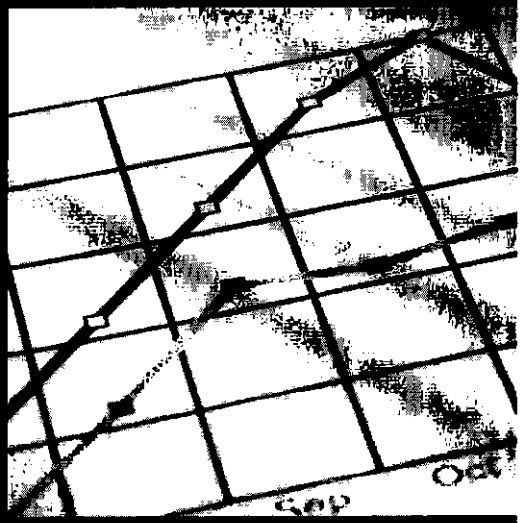
Performance and Accountability Report

Fiscal Year 2007









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TABLE 13A

EX PARTE REEXAMINATION (FY 2003 - FY 2007)

ACTIVITY	2003	2004	2005	2006	2007
Requests filed, total	**392**	**441**	**524**	**511**	**643**
By patent owner	136	166	166	129	124
By third party	239	268	358	382	519
Commissioner ordered	17	7	-	-	-
Determinations on requests, total[1]	**381**	**419**	**537**	**458**	**594**
Requests granted:					
By examiner	360	408	509	422	575
By petition	1	-	2	5	2
Requests denied	20	11	26	31	17
Requests known to have related litigation	**109**	**138**	**176**	**229**	**369**
Filings by discipline, total	**392**	**441**	**524**	**511**	**643**
Chemical	124	130	138	118	133
Electrical	118	156	188	228	275
Mechanical	150	155	198	165	235

[1] *Past years' data have been revised from prior year reports.*

TABLE 13B

INTER PARTES REEXAMINATION (FY 2003 - FY 2007)

ACTIVITY	2003	2004	2005	2006	2007
Requests filed, total	**21**	**27**	**59**	**70**	**126**
Determinations on requests, total	**20**	**25**	**57**	**47**	**119**
Requests granted:	18	25	54	43	118
By examiner	18	25	54	43	118
By petition	-	-	-	-	-
Requests denied	2	-	3	4	1
Requests known to have related litigation	**7**	**5**	**29**	**32**	**81**
Filings by discipline, total	**21**	**27**	**59**	**70**	**126**
Chemical	3	6	17	17	30
Electrical	7	7	20	27	53
Mechanical	11	14	22	26	43

EXHIBIT H

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450
www.uspto.gov

Ex Parte Reexamination Filing Data - June 30, 2006

1. Total requests filed since start of ex parte reexam on 07/01/81 8084

   a. By patent owner — 3313 — 41%
   b. By other member of public — 4606 — 57%
   c. By order of Commissioner — 165 — 2%

2. Number of filings by discipline

   a. Chemical Operation — 2496 — 31%
   b. Electrical Operation — 2608 — 32%
   c. Mechanical Operation — 2980 — 37%

3. Annual Ex Parte Reexam Filings

Fiscal Yr.	No.	Fiscal Yr.	No.	Fiscal Yr.	No.	Fiscal Yr.	No.
1981	78 (3 mos.)	1989	243	1997	376	2005	524
1982	187	1990	297	1998	350	2006	340
1983	186	1991	307	1999	385		
1984	189	1992	392	2000	318		
1985	230	1993	359	2001	296		
1986	232	1994	379	2002	272		
1987	240	1995	392	2003	392		
1988	268	1996	418	2004	441		

4. Number known to be in litigation ..... 1895 — 23%

5. Determinations on requests 7852

   a. No. granted ..... 7160 ..... 91%

      (1) By examiner — 7054
      (2) By Director (on petition) — 106

   b. No. denied ..... 692 ..... 9%

      (1) By examiner — 657
      (2) Order vacated — 35

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6. Total examiner denials (includes denials reversed by Director) 763

a. Patent owner requester	430	56%
b. Third party requester	333	44%

7. Overall reexamination pendency (Filing date to certificate issue date)

a. Average pendency	22.8 (mos.)
b. Median pendency	17.6 (mos.)

8. Reexam certificate claim analysis:

	Owner Requester	3rd Party Requester	Comm'r Initiated	Overall
a. All claims confirmed	23%	29%	13%	26%
b. All claims cancelled	7%	12%	19%	10%
c. Claims changes	70%	59%	68%	64%

9. Total ex parte reexamination certificates issued (1981 - present) 5433

a. Certificates with all claims confirmed	1410	26%
b. Certificates with all claims canceled	554	10%
c. Certificates with claims changes	3469	64%

10. Reexam claim analysis - requester is patent owner or 3rd party; or Comm'r initiated.

a. Certificates _ PATENT OWNER REQUESTER 2360

(1) All claims confirmed	543	23%
(2) All claims canceled	174	7%
(3) Claim changes	1643	70%

b. Certificates _ 3rd PARTY REQUESTER 2934

(1) All claims confirmed	849	29%
(2) All claims canceled	353	12%
(3) Claim changes	1732	59%

c. Certificates _ COMM'R INITIATED REEXAM 139

(1) All claims confirmed	18	13%
(2) All claims canceled	27	19%
(3) Claim changes	94	68%

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CERTIFICATE OF SERVICE

I, Francis DiGiovanni, hereby certify that on February 11, 2008, I caused to be electronically filed a true and correct copy of the foregoing document with the Clerk of the Court using CM/ECF, which will send notification that such filing is available for viewing and downloading to registered counsel of record via e-mail.

I hereby further certify that on February 11, 2008, I caused a copy of the foregoing document to be served on the following counsel of record by the manner so indicated:

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