IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

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|---|---|---|
| U.S. PHILIPS CORPORATION,<br><br>Plaintiff,<br><br>v.<br><br>EASTMAN KODAK COMPANY,<br><br>Defendant. | ) | C.A. No. 06-251-GMS |

**PLAINTIFF U.S. PHILIPS CORPORATION'S OPENING *MARKMAN* BRIEF**

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**STATUTES**

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Plaintiff U.S. Philips Corporation ("Philips") submits this brief in support of its proposed claim constructions of U.S. Patent No. 4,901,075 ("the '075 patent"), which is attached as Exhibit 1.[1] The competing proposed claim constructions of Philips and defendant Eastman Kodak Company ("Kodak") are set forth in the Final Joint Claim Chart, which was filed on September 25, 2007, and which is attached as Exhibit 2.

## I. FACTUAL BACKGROUND

### A. The '075 Patent

The '075 patent was filed on September 11, 1987, and issued on February 13, 1990. Ex. 1. The patent claims priority from three German patent applications, the earliest of which was filed on September 13, 1986.[2] The patent lists Peter Vogel, who was an employee of PKI, as the sole inventor.[3]

The '075 patent describes and claims a method and system for coding images. To understand the improvement that the '075 patent made over the prior art, it is helpful to understand the technology of transform coding of images to which the invention applies.

The '075 patent specifically refers to, and improves on, a prior art method of coding images, described in an article by Chen & Pratt.[4] Specifically, the '075 patent suggests a method of improving the compression of images. In the field of image compression, smaller is better. By increasing the compression, an image can be stored in less space or transmitted faster.

Mr. Vogel increased the amount an image can be compressed by discovering a key statistical property of images that were coded using the prior art methods. This is explained in detail below. No one had this insight before Mr. Vogel, and the improvement was substantial. In

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[1] The Exhibits are included in a Joint Appendix to be filed later, and referred herein as "Ex. __."

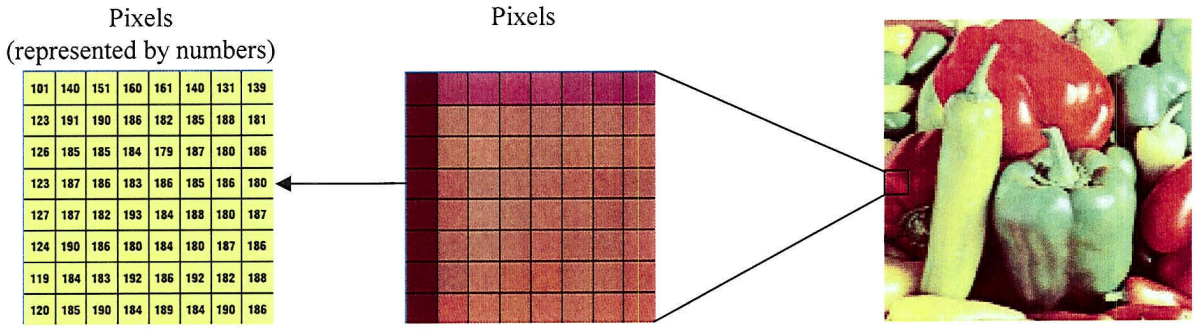
[2] The three German priority documents are attached as Exhibits 3-5.

[3] PKI, which stands for Philips Kommunikations Industrie, AG, is a German company that was related to Philips.

[4] W. Chen & W. K. Pratt, "Scene Adaptive Coder," IEEE Transactions on Communications, Vol. Com. 32, No. 3, (March 1984), attached as Exhibit 6 ("Chen & Pratt").

the test images that Mr. Vogel experimented with, he was able to achieve an additional 12% compression, as compared to the prior art compression methods he started from. '075 patent, col. 3:13. Mr. Vogel's invention is used to compress images, and is equally applicable to still images (*e.g.*, a photograph) and to frames of moving images (*e.g.,* a movie). Moving images are no more than a sequence of still images.

An image, such as a photograph, is typically represented in electronic form by an array, or grid, of ***pixels***.[5] Pixels are simply numbers that represent the brightness and/or the color of the image at a particular point.[6] For example, the image below (on the far right) is represented by thousands of tiny points, each of which having a particular color and a particular brightness. If one were to zoom in on a small section of the image (below, in the middle), one could see each of the pixels of the image. The far left of the figure below illustrates how each pixel may be represented by a number.




In a digital system, each of the numbers that represents a pixel is stored in binary form, or "bits." In a typical system, each pixel requires 8 bits to store the pixel value.[7] Thus, for a picture

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[5] The term "pixel" comes from a combination of the words "**pic**ture **el**ement." '075 patent, col. 2:23-25.

[6] The parties have agreed that the term "pixel" as used in the '075 patent should be construed as "a number representing an image at a single point." Ex. 2, Final Joint Claim Chart, at 3.

[7] Binary numbers can be used to represent decimal numbers, like the pixel values, in the following way. Each bit in the binary number represents a power of two. The far right bit represents $2^0 = 1$. The next bit represents $2^1 = 2$. The next bit represents $2^2 = 4$. The next bit represents $2^3 = 8$. And so on. Thus, for example, the bottom right pixel of the figure above has a decimal value of 186. This number can be represented by the 8-bit binary number 10111010, since 186 equals (from left to right): [**1** x $2^7 = 128$] + [**0** x $2^6 = 0$] + [**1** x $2^5 = 32$] + [**1** x $2^4 = 16$] + [**1** x $2^3 = 8$] + [**0** x $2^2 = 0$] + [**1** x $2^1 = 2$] + [**0** x $2^0 = 0$].

with thousands, or even millions, of pixels, this leads to image files that are very large, meaning they require lots of space to store and a long time to send.

The goal of image compression is to represent an image in fewer bits in order to reduce required storage space and transmission times. The amount of compression that is achieved is expressed in terms of ***bit rate***, or bits per pixel. Ex. 6, Chen & Pratt at 225, 229. The more compression achieved, the smaller the bit rate.

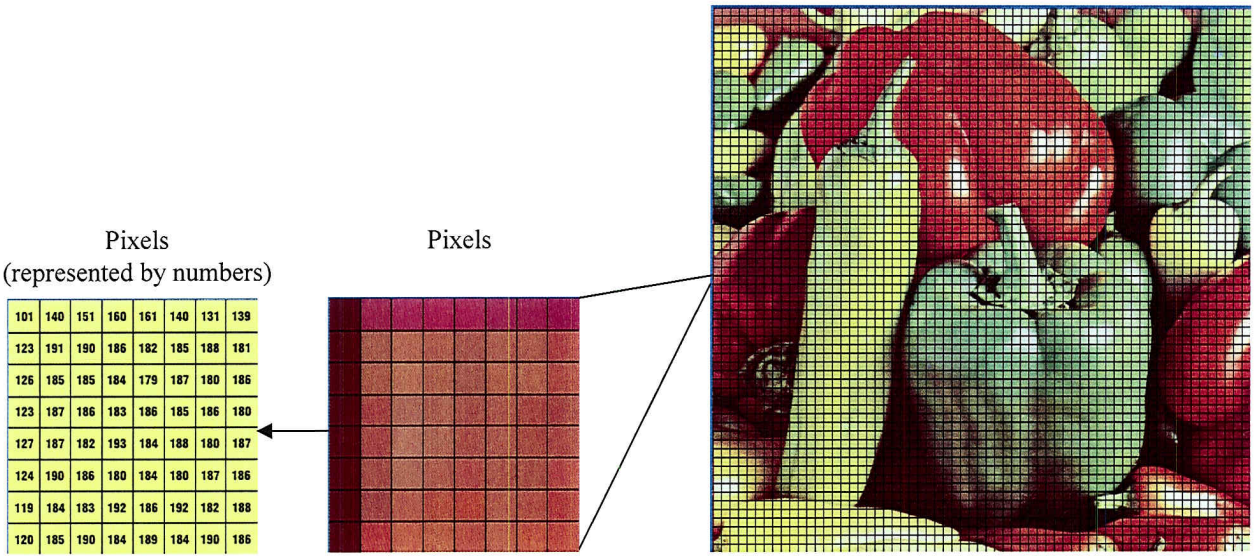
Both the '075 patent and the Chen & Pratt article use a process called "transform image coding" to reduce the bit rate, so the image can be stored in less space on an electronic device, or transmitted faster or with less bandwidth.[8] This coding process consists of two steps. First, the pixels of the image are transformed into an alternative representation, which consists of a sequence of "coefficients." Second, the coefficients are coded to reduce the overall size of the file required to represent the image. These two steps are described in detail below.

### 1. Step 1 – Transforming Image into Quantized Coefficients

Divide into Blocks of Pixels

Transform image coding begins by dividing the image into smaller, equal-sized blocks of pixels. This process is illustrated for a sample image below (on the far right), in which the image has been divided into blocks of 8x8 pixels. To the left of the image is depicted one of these blocks of 8x8 pixels, blown up so that each pixel can be seen. To the far left of the figure are the numbers representing each of the pixels in the 8x8 block.

[8] Chen & Pratt report the ability to encode an image with a bit rate of 0.4 bits per pixel, as compared to the 8 bits per pixel that would be required to store an image with no compression at all. Ex. 6, Chen & Pratt at 229.




DCT Transform

Once the image has been so divided, a mathematical operation, called a ***transform*** is applied to each block of pixels:

> In the basic transform image coding concept, an image is divided into small blocks of pixels, and each block undergoes a two-dimensional transformation to produce an equal-sized array of transform coefficients.

Ex. 6, Chen & Pratt, at 225.

The transform that is applied to a block of pixels results in what are called ***transform coefficients***. The particular mathematical equation that is used to transform the image in the '075 patent and Chen & Pratt article to generate these coefficients is called a Discrete Cosine Transform ("DCT"). Chen & Pratt provides the specific mathematical equation that is used to perform a DCT transform. Specifically, Chen & Pratt provides an equation that transforms the block of pixels into a corresponding block of coefficients. *Id.* at 225. Thus, once the transform has been applied to the pixels, the coefficients are an alternative way to represent the image, rather than using the pixel values themselves.

Chen & Pratt also provides the mathematical equation to perform the inverse process: *i.e.*, transforming the block of coefficients back into the block of pixel values. *Id.* at 225. As that equation shows, the coefficients are used to multiply other values to obtain the pixel values in the inverse transform process. That is why they are called "coefficients."

Because of the specifics of the way the DCT transform works, a large number of coefficients that result from the DCT transform are zero or approximately zero.

> 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.

'075 patent, col. 1:22-26.

Quantization

After the coefficients are obtained from the transform coding, the coefficients are ***quantized***. Quantization is simply a process of replacing a range of values with a single value.[9] For example, Chen & Pratt describes dividing the coefficient by a predetermined number, and then rounding the resulting fractional numbers to the nearest whole number (*e.g.*, a coefficient of 76 might be divided by 8 and then rounded to the nearest whole number, which is 10). *See, e.g.*, Ex. 6, Chen & Pratt, at 226. This quantization leads to a large number of whole number coefficients whose value is zero, since any fractional numbers that are close to zero will be rounded to zero (*e.g.*, the coefficient 0.4 would be rounded to 0):

> A subsequent quantization of the coefficients always renders the greater part of the elements 0....

'075 patent, col. 1:26-28. The coefficients whose quantized values are not zero can take on any number of different positive or negative values.

Once the quantized coefficients have been obtained for a particular block of pixels, using the above process, the coefficients are ordered from the block of pixels in a "zigzag scan" that starts from the top left of the pixel block. Ex. 6, Chen & Pratt, at 227 Fig. 2. This process is illustrated below for a single block of 8x8 pixels of an image.

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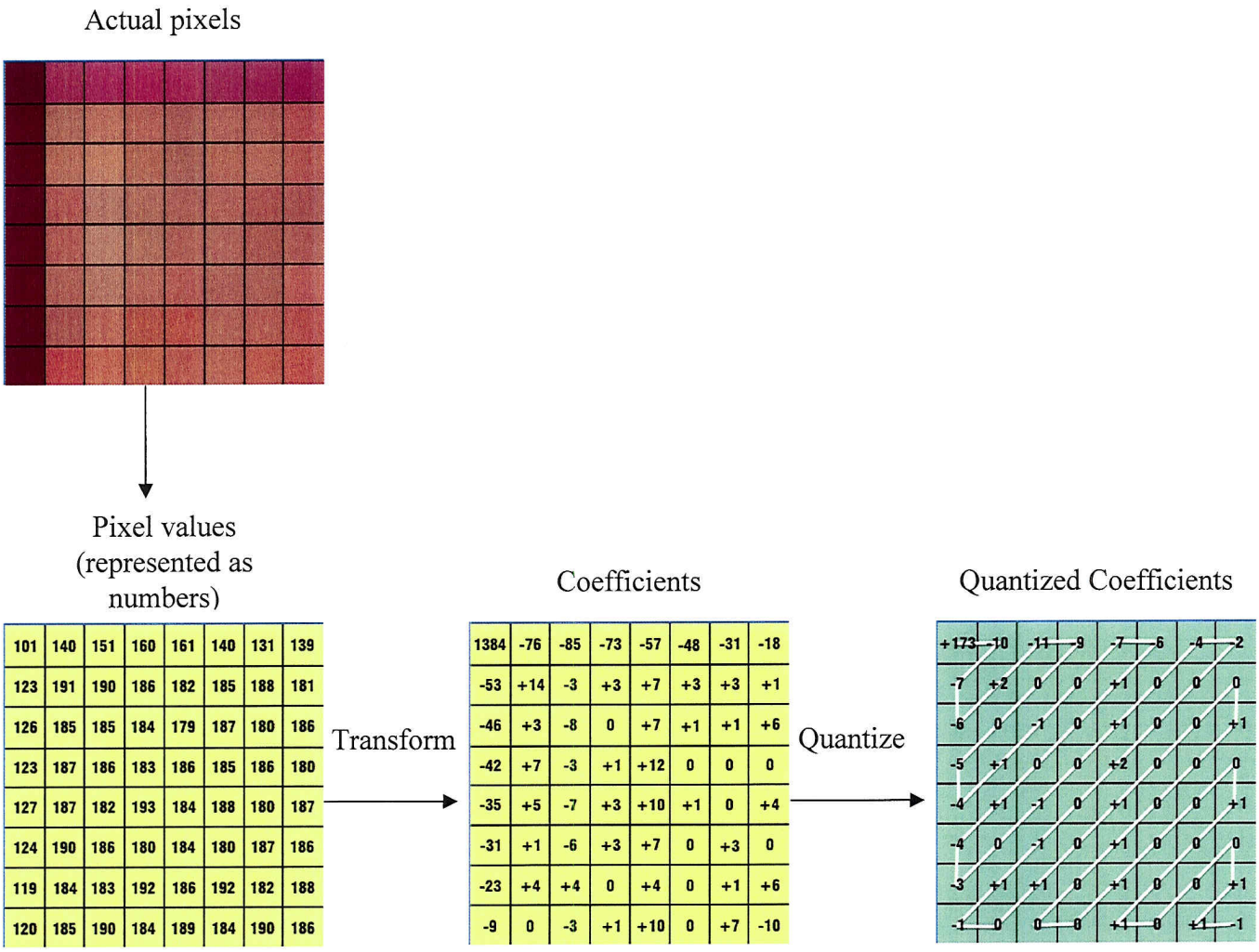
[9] The parties have agreed that the term "quantization" should be construed as "a process that substitutes a single whole number for a range of signal values." Ex. 2 at 3.




As depicted above, first, the block of pixels (each of which is represented by a set of numbers indicating the brightness and color of the image at that location) is transformed using the DCT transform equation to obtain transform coefficients. The coefficients are then quantized, leading to a large number of coefficients that are zero.[10] The quantized coefficients are subsequently ordered using the zigzag scan.

This leads to an alternative representation of the original block of pixels that consists of a sequence of quantized coefficients. In this particular example, that sequence (following the zigzag line in the far right of the figure above) is: "+173 -10 -7 -6 +2 -11 -9 0 0 -5 -4 +1 -1 0 -7

[10] Here, the particular quantization that is depicted involves dividing each coefficient by 8, and then rounding to the nearest whole number. Thus, the top left coefficient (1384) divided by 8 yields a quantized coefficient of 173. The next coefficient (-76) divided by 8 results in -9.5, which rounds to a quantized coefficient of -10. The next coefficient (-85) divided by 8 results in -10.5, which rounds to a quantized coefficient of -11. And so on.

-6 +1 0 0 +1 -4 . . . +1 0 0 0 +1 0 0 +1 0 0 0 +1 +1 -1". As shown in the far right figure above, a large number of the coefficients are zero. These are referred to in the patent as ***"zero coefficients."*** Moreover, the zero coefficients tend to occur in ***runs***, *i.e.,* a sequence of coefficients where each coefficient is zero.[11] The coefficients whose values are not zero, and instead have magnitudes proceeding through the natural numbers are referred to in the '075 patent as "***non-zero coefficients***."

### 2. Step 2 – Coding the Quantized Coefficients

Once the quantized coefficients are obtained, the true value of the invention becomes apparent. In particular, the sequence of quantized coefficients that results from the above process can be viewed as consisting of non-zero coefficients, and runs of zero coefficients. It is at this step of the process that the prior art Chen & Pratt method and the claimed invention diverge. The Chen & Pratt method is described below, followed by the method of the '075 patent.

#### a. Prior Art Method of Coding the Coefficients

The Chen & Pratt method uses ***Huffman codewords*** to separately code the non-zero coefficients and the runs of zero coefficients. Huffman coding is a well-known algorithm since the 1950s used to code ***events***. '075 patent, col. 1:36-45. An event is simply an occurrence that has a certain probability. Huffman coding takes advantage of the probability of each event and assigns shorter code words to events that are more likely to occur, and longer code words to events that are less likely to occur. The result is that the average code word length is reduced. *Id.* This provides the ability to represent data with fewer bits than if the data were not coded, or if the probability of events was not taken into account.

Chen & Pratt use Huffman codewords in two ways. A first Huffman code table is used to code the magnitude of non-zero coefficients. A second Huffman code table is used to code the length of runs of zero coefficients:

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[11] As will be explained below, according to the patent a run can also contain no "0"s.

> For coding the intermediate signal two Huffman code tables are required according to [Chen& Pratt]. A first table shows how the (quantized) coefficients different from 0 are to be coded.... A second table shows how the run length is to be coded.

'075 patent, col. 1:46-53.

**b. '075 Patent Method of Coding the Coefficients**

The '075 patent improved upon the coding methodology of Chen & Pratt, and all other prior art, by taking advantage of Mr. Vogel's insight that there is a statistical relationship between the length of the run of zero coefficients, and the magnitude of the non-zero coefficient that precedes or follows that run. In particular, longer runs of zeros are more likely to be followed by smaller non-zero coefficients. '075 patent; Fig. 1; col. 2:44-48. Prior to this insight, no prior art had recognized this key statistical relationship. Mr. Vogel's recognition of this relationship is what allowed him to increase how much an image can be compressed, which in turn allows images to be stored in less space and transmitted in less time.

The patent illustrates this key inventive recognition in Figure 1. Figure 1 is a chart that illustrates Mr. Vogel's findings, based on his tests, as to the relationship between the length of the run of zero coefficients and the magnitude of the non-zero coefficient that follows the run:

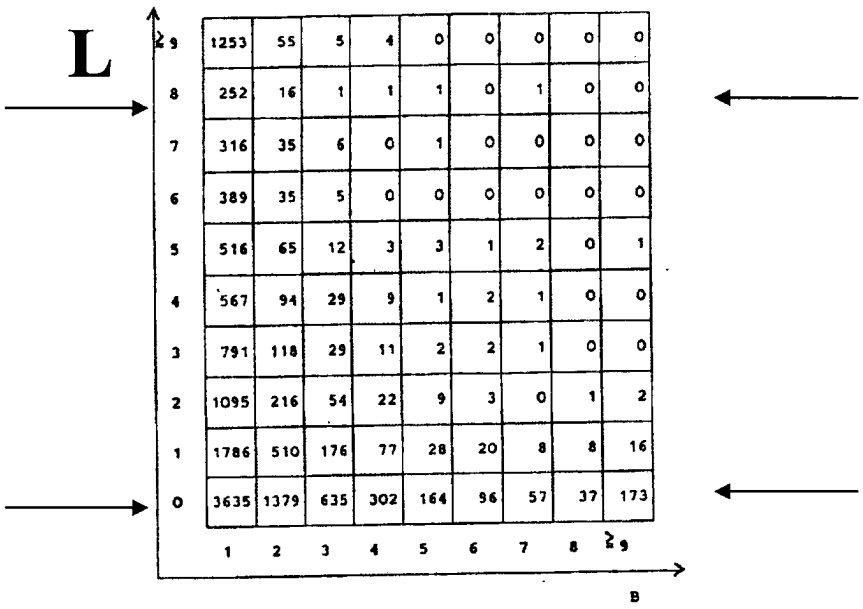


FIG. 1

**B**

'075 patent, Fig. 1 (emphasis added). In Figure 1, Mr. Vogel plotted the length of the run of zero coefficients (represented on the vertical axis by "L") against the magnitude of the non-zero coefficient that followed the run (represented on the horizontal axis by "B"). He then reported how many occurrences of each "event" were present in his sample image data, which consisted of approximately 15000 coefficients. '075 patent, col. 2:50-68. Each square of the figure reports how many events with the indicated run length (L) and magnitude (B) occurred. For example, the event consisting of eight "0"s (L = 8) followed by a "2" (B = 2) occurred in his tests 16 times, according to Figure 1.

As shown by Figure 1, as the run length (L) increases, it becomes more likely that the magnitude of the following non-zero coefficient (B) will be small. Compare, for example, the horizontal lines of Figure 1 that correspond to L = 8 and L = 1, which are highlighted with arrows above. When the run length (L) is 8 (*i.e.*, eight "0"s in a row), Figure 1 indicates that the next coefficient is likely to be a "1" or perhaps a "2," but unlikely to be anything else. In contrast, when the run length (L) is 1 (*i.e.*, only one "0"), the figure indicates that there is a substantial likelihood that the next coefficient will be greater than "1" or "2." In other words, Mr. Vogel found, as illustrated in this figure, that longer runs are more likely to be followed by a small non-zero coefficient (such as "1" or "2"), whereas shorter runs have a greater chance of being followed by a larger non-zero coefficient (such as "7" or "8").

Based on the recognition of this statistical relationship, the '075 patent uses a "two dimensional coding" scheme to code as a single event a run of zeros and the non-zero coefficient that precedes or follows that run.

> 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.

'075 patent, col. 2:36-42.[12] Thus, rather than coding the magnitude of non-zero coefficients separately from the lengths of runs of zero coefficients, as Chen & Pratt did, the '075 patent codes these together as a single event. The '075 patent explains that this "two dimensional" coding provides for additional compression of images as compared to the prior art:

> 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.

'075 patent, col. 3:18-25. In the sample data that Mr. Vogel experimented with, he found that his method provided an "additional bit rate reduction of 12%" as compared with using the Chen & Pratt method. '075 patent, col. 3:13. In other words, with the sample image data he was working with, the claimed method of the '075 patent allowed for an additional 12% compression of an image compared to the prior art. Of course, depending on the particular image being compressed, the amount of additional compression the method of the '075 patent provides might be more or less than 12%.

### 3. Preferred embodiment of the '075 patent

The '075 patent provides a preferred embodiment that uses the claimed two-dimensional coding method. In particular, Figures 3-5 provide a Huffman coding table that is used to code the events that are identified from the sequence of zero coefficients and non-zero coefficients. This table is used to code the events, which consist of a combination of a particular run length (L) and a particular non-zero coefficient that follows the run (B).

As an example, consider a sequence of following coefficients "**0 0 0 0 0 +2 +13**". The method of the '075 patent would first identify as an "event," the run of five "0"s followed by the non-zero coefficient "+2". The coding table of Figures 3-5 provides how to code that event. In

[12] As indicated in this passage, isolated non-zero coefficients are treated as an event consisting of a run of length zero (*i.e.*, no zeros, expressed in Figure 1 as L=0) together with the following non-zero coefficient.

particular, item number 29, which corresponds to a run length (L) of 5 (*i.e.*, five "0"s), and a non-zero coefficient magnitude (B) of 2, provides the following entry:

| Nr. | B | L | code word | length |
|---|---|---|---|---|
| 29 | 2 | 5 | 00001001s | 9 |

*See* '075 patent, Fig. 3. This entry provides that the code word to be assigned to that event should consist of the binary code "00001001s" where "s" is a single bit used to indicate whether the "2" is positive or negative (*i.e.*, the ***sign*** of the non-zero coefficient).[13] *Id.* For example, an "s" bit of "0" might indicate the coefficient is negative, while a "1" might indicate the coefficient is positive. Thus, the code word that would be generated for the event "0 0 0 0 0 +2" might be the sequence of bits "00001001 1".

In the example sequence of coefficients above ("**0 0 0 0 0 +2 +13**"), the method of the '075 patent would next identify as a second "event" the single coefficient "+13," being preceded by a run of length zero (*i.e.*, no "0"s). For that event, the run length (L) is zero, since there are no "0" coefficients that precede the "+13" coefficient, and the magnitude of the non-zero coefficient is "13". The coding table of Figures 3-5 provides an entry that provides how to generate a codeword when the run length is zero, and the magnitude of the non-zero coefficient is "9" or greater. *See* '075 patent, Fig. 4. Specifically, item 60 provides the following entry.[14]

| Nr. | B | L | code word | length |
|---|---|---|---|---|
| 60 | 9 | 0 | 00001111s+++++++ | 16 |

Thus, this entry provides that the code word to be assigned to that event should consist of the binary code "00001111s+++++++". Here, the "s" again represents a single bit used to indicate

[13] The particular bits that are provided in the code table (in this example, the bits "00001001") are obtained by using Huffman coding. '075 patent, col. 3:36-44. The patent refers to these particular bits as a "Huffman code word." *Id.*

[14] While item number 60 lists a magnitude of 9, the specification of the '075 patent makes clear that this item is used to code any event whose run length is zero, and whose non-zero coefficient magnitude is 9 or greater. '075 patent, col. 3:33-35; 4:66-5:1; Fig 1.

the sign of the non-zero coefficient (*e.g.*, a "0" for a negative and a "1" for a positive). The "+++++++" indication in the table entry signifies seven additional bits that are used to specify the precise value of the non-zero coefficient.[15] '075 patent, col. 4:66-5:1.

In the case of the event consisting of a run length of zero and a non-zero coefficient of "+13", the "s" bit would be a "1" to indicate that the non-zero coefficient is positive. The "+++++++" bits would be "0000100" to indicate that the precise magnitude of the non-zero coefficient in the event is 13.[16] Thus, the full code word that would be used to represent the event consisting of a run length of zero and a non-zero coefficient of "+13" would be the sequence of bits "00001111 1 0000100". This consists of the Huffman codeword "00001111," followed by a "1" to indicate positive, followed by a "0000100" to indicate a precise magnitude of 13.

The '075 patent makes clear that the terms "codeword" and "Huffman codeword" are used to refer to either a) the first part of the entry provided in Figures 3-5 (i.e. the specific bits that are provided in the entry, without the "s" or "+++++++" placeholder bits); or b) the entire codeword that is generated for an event that includes the "s" bit and/or the "+++++++" bits. *See* '075 patent, col. 3:36-44; 4:45-52.

## II. ARGUMENT

### A. "coefficient," "zero coefficient," and "non-zero coefficient"

| Term / Phrase | Claim(s) | Philips' Proposal | Kodak's Proposal |
|---|---|---|---|
| "coefficient" | All | "a multiplication factor that results from transform coding" | A whole number |

[15] While the '075 patent uses the "+" symbol for each of these bits, these bits do not represent the sign of the non-zero coefficient, and instead are used merely to represent the precise magnitude of the coefficient. '075 patent, col. 4:66-5:1.

[16] The bit pattern "0000100" is used because that is the binary equivalent of 4, which indicates that the precise value of the non-zero coefficient can be obtained by adding 4 to 9. *i.e.*, 4 + 9 = 13, which is the value of the non-zero coefficient in this case.

| Term / Phrase | Claim(s) | Philips' Proposal | Kodak's Proposal |
|---|---|---|---|
| "zero coefficient" | All | "a coefficient whose value is zero or approximately zero" | A whole number whose value is zero |
| "non-zero coefficient" | All | "a coefficient whose possible magnitudes proceed through the natural numbers without the zero" | A whole number whose value is not zero |

The first group of terms on which the parties disagree relate to a fundamental concept in the '075 patent: coefficients. These terms illustrate one of the critical flaws in Kodak's claim construction analysis. Here, Kodak has attempted to define "coefficient" in a way that flies in the face of basic mathematics. According to Kodak, any whole number is a coefficient, regardless of how that number is derived or used. Kodak's proposed definition incorrectly defines "coefficient" by ignoring the fact that it is a mathematical term used only to describe numbers derived from or used in a specific type of mathematical operation (*i.e.*, multiplication). Kodak's purpose in doing so is to try to invalidate the patent with prior art involving numbers that are never used as coefficients. Kodak's attempt to rewrite the claims should fail.

### 1. A "coefficient" is a multiplication factor that results from transform coding, not just any whole number

As an initial matter, Philips' definition would tell the jury what a "coefficient" is; namely, it is a multiplication factor that results from transform coding. This is an elementary property of a coefficient, as confirmed by reference to any standard dictionary. *See, e.g.*, Ex. 7, Oxford American Dictionary and Language Guide at 180 (defining "coefficient" in mathematics usage as "a quantity placed before and multiplying an algebraic expression (e.g., *4* in $4x^y$)"); *see also* Ex. 8, S. Gibilisco, Illustrated Dictionary of Electronics at 122 (7th ed., 1997) ("coefficient": "A factor in an indicated product. Thus, in $4y$, 4 is the coefficient of $y$.").

Philips' proposed construction of "coefficient" is wholly consistent with how that term is used in the '075 patent. In particular, the specification makes clear that the "coefficients" that are being coded are the result of transform coding:

> 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.***

'075 patent, col. 1:18-23 (emphasis added). The '075 patent goes on to describe that the intermediate signal that is coded is comprised of these transform coefficients:

> 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***.

'075 patent, col. 2:23-27 (emphasis added).

Moreover, the Chen & Pratt article, which the '075 patent improves upon, describes that the coefficients that are obtained from the transform process are used to multiply the signal components to approximate the original pixel values in the inverse DCT transform. As set forth above, Chen & Pratt provides the actual mathematical equation that is used to derive the transform coefficients from pixel values, and also provides the equation used to recreate the original pixel values from the transform coefficients. *See supra* § II.A.2; Ex. 6, Chen & Pratt at 225. The transform coefficients are multiplied by the signal components to recreate the original pixel values. *Id.* Indeed, that is why transform coefficients are called "coefficients."

Thus, Philips' definition accurately describes what "coefficients" are. Kodak, on the other hand, violates basic mathematical principles by incorrectly equating the term "coefficient" with any "whole number," regardless of how that number is derived or used. This construction is flawed because a coefficient is not just any number—it is a number that is used or derived in a particular way, *i.e.*, as a multiplication factor in a mathematical expression. Indeed, using Kodak's reasoning, other well-understood mathematical terms that specify a particular way in which a number is derived or used, such as "sum," "quotient," or "exponent," would all mean the same thing as "coefficient." Kodak's construction can only be seen as an attempt to ignore what a "coefficient" is, in an attempt to argue that the patent is invalid over prior art in which numbers are not used as coefficients. Kodak's attempt should be rejected.

**2. A "coefficient" need not be a whole number, since it**

**can be a fractional number**

Another flaw with Kodak's proposed construction of "coefficient" is that it would limit coefficients to only whole numbers, and would not include fractional numbers. The specification and claims of the '075 patent, however, make clear that the term "coefficient" refers to coefficients that have not been quantized, as well as coefficients that have been quantized. For instance, in the background of the invention, the specification of the '075 patent unambiguously refers to both pre-quantized and post-quantized coefficients.

> 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.

'075 patent, col. 1:24-30 (emphasis added). Similarly, claim 3 recites "a sequence of coefficients … with subsequent quantization," clearly referring to coefficients both pre-quantization and post-quantization. '075 patent, col. 7:41-45.

Prior to quantization, coefficients can certainly be non-whole numbers. Indeed, Chen & Pratt explicitly teaches as much:

> Because many of the threshold subtracted ***coefficients are of fractional value***, the roundoff process will set some of the coefficients to zero and leave only a limited number of significant coefficients to be amplitude coded.

Ex. 6, Chen & Pratt at 226 (emphasis added). Thus, the term "coefficient" cannot be defined, as Kodak proposes, as "whole numbers" since such a definition would not read on unquantized coefficients that may have a fractional component (*e.g.*, 7.2).

**3. The term "zero coefficient" refers to coefficients that are zero or approximately zero**

Philips' proposed construction of "zero coefficient" comes directly from the definition of "zero coefficient" from the specification. When a patentee defines a term in the specification, that definition should be dispositive. *Phillips*, 415 F.3d at 1315-16. Here, the specification of the '075 patent explicitly defines the term "zero coefficient" as follows:

> In the following embodiments, signal value A equals zero ***or approximately zero*** zero [sic] (referred to hereinafter as the "zero-coefficient") because it appears most frequently in runs after transform coding.

'075 patent, col. 2:30-33 (emphasis added). Thus, the specification defines a "zero coefficient" as a coefficient whose value is zero or approximately zero. In particular, "zero coefficient" can refer to a pre-quantization coefficient that is a fractional value close to zero (*e.g.,* 0.2 or 0.4), or to the post-quantization coefficient that is exactly 0:

> 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....

'075 patent, col. 1:24-28 (emphasis added). Thus, the term "zero coefficient" refers to both the pre-quantization and post-quantization value of the coefficient. Philips proposes the Court adopt the specification's explicit definition of "zero coefficient."

**4. The term "non-zero coefficient" refers to coefficients that can take on multiple values, and does not include binary systems whose signal values can only be "1" or "0"**

Philips' definition of "non-zero coefficient" also comes directly from the specification of the '075 patent. In particular, the specification provides: "All coefficients not having a value of zero will be referred to hereinafter as "non-zero coefficients." '075 patent, col. 2:33-35. The specification goes on to further explain that non-zero coefficients can have magnitudes that proceed through the natural numbers (*i.e.,* they can take on values of more than just 1):

> Each field of the table [of Figure 1] 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***....

'075 patent, col. 2:55-56 (emphasis added). This is an important characteristic of "non-zero coefficients" and it should be included in the definition of the term.

Specifically, the prosecution history mandates a definition of "non-zero coefficient" that is directed to non-binary systems, *i.e.*, systems in which the non-zero coefficient can take on

multiple values. During prosecution, the claims were rejected as anticipated by the Fukuoka '934 patent.[17] Fukuoka describes a binary system of encoding facsimile data that is comprised of only 1s and 0s. In response to the examiner's rejection of the claims, the applicant made clear that the claims of the invention are directed to non-binary systems, and that the claimed "coefficients" must be able to take on values other than just "one" and "zero":

> In the instant invention, the coefficients are not limited to either ones or zeros, i.e. they are ***not merely binary***. ***They can have any one of the values zero, one, two, three and up to, for example, 256*** if eight bits are used to code them.

Ex. 9, Application No. 07/096,177, Amendment, June 12, 1989, at 5 (emphasis added). This argument made during patent prosecution is entirely consistent with Philips' proposed definition, which requires that the claimed "non-zero coefficients" can take on multiple values, since the possible magnitudes "proceed through the natural numbers without the zero." Kodak's definition, on the other hand, would read on a binary system that includes only "ones" and "zeros," which is in direct contrast to the prosecution history. Claim terms must be construed consistent with how they are used in the prosecution history. *Phillips,* 415 F.3d at 1317. Accordingly, Philips' proposed construction should be adopted.

**B. "signal" and "video signal"**

| Term/Phrase | Claim(s) | Philips' Proposal | Kodak's Proposal |
|---|---|---|---|
| "signal" | All | "a sequence or array of values that represents information" | A sequence of values comprised of sequential and interdependent image frames that when rapidly displayed are capable of depicting movement |
| "video signal" | 3 | "a sequence or array of values that represents visual information (e.g., an image)" | A sequence of values comprised of sequential and interdependent image frames that when rapidly displayed are capable of depicting |

[17] Ex. 9, U.S. Patent No. 4,101,934 ("Fukuoa").

| Term/Phrase | Claim(s) | Philips' Proposal | Kodak's Proposal |
|---|---|---|---|
| | | | movement |

The fundamental difference between Philips' and Kodak's constructions of the terms "signal" and "video signal" is that Kodak improperly attempts to limit these terms to only moving pictures, to try to avoid infringement by its digital cameras that take still pictures. On the other hand, Philips defines these terms true to their plain meaning and how they are used in the specification. In particular, a "signal" is any sequence of values that represents information, whereas a "video signal" is a particular type of signal that represents visual information. Philips does not dispute that the claims of the '075 patent would apply equally to frames of a moving picture as they would to a single still picture. But there is nothing in the specification that even mentions moving pictures, let alone anything that would limit the claims to moving pictures.

**1. There is no basis whatsoever to restrict the term "signal" to just moving pictures**

The '075 patent uses the term "signal" extensively throughout the specification and the claims. As an example, claim 8 recites a "method for coding a signal" that includes "transforming said signal into a sequence comprising zero coefficients occurring in runs and non-zero coefficients." '075 patent, col. 8:8-10.

The term "signal" is one that has a well-defined, and broad, meaning in the art. For example, a text book on "Signals and Systems" defines "signal" in its opening pages as follows:

> **Definition 1: Signal**
>
> ***A signal is a function or sequence of values that represents information.***

Ex. 10, B. Girod, R. Rabenstein & A. Stenger, Signals and Systems (Wiley, 2001), at 3. Philips' definition is virtually identical to this well-accepted definition of "signal."

The specification uses the term "signal" in precisely this way. For example, the specification describes the sequence of coefficients that results from transform coding as the "intermediate signal":

> 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.

'075 patent, col. 2:23-27 (emphasis added). Thus, it is clear that a "signal" has values, and in the case of the '075 patent, signal is comprised of the coefficients that result from transform coding.

Kodak attempts to inject the concept of moving pictures into the term "signal." There is no support whatsoever for Kodak's position. There are no dictionaries, definitions, or other sources that define the term "signal" as directed to pictures, let alone moving pictures. Moreover, there is absolutely nothing in the '075 patent that limits the plain meaning of the term "signal," as it would be understood by a skilled artisan.

**2. The term "video signal" relates to any visual information and is not limited to moving pictures**

The term "video signal" appears only in claim 3, which recites in the preamble that the pixels to be coded are "of a video signal." '075 patent, col. 7:43. The meaning of this term as understood in the art, and as used in the context of the '075 patent, is a signal that represents visual information, such as a still image or a frame of a moving picture. The term should not be limited, as Kodak proposes, to only moving pictures.

The '075 patent uses the term "video signal" consistent with Philips' proposed construction. The '075 patent ***never once*** mentions moving pictures. Instead, the '075 patent is focused ***exclusively*** on the coding of single images. For example, the '075 patent describes that what is to be coded in the invention is a "picture": "In the following embodiments, the intermediate signal referred to results from the transform coding of blocks of picture elements (pixels)." '075 patent, col. 2:23-25. Moreover, there is no description whatsoever in the '075 patent of sequential or interdependent images, which Kodak tries to inject into the claims.

Also, Chen & Pratt, to which reference is made in the '075 patent, does not contain the limitation now suggested by Kodak. Chen & Pratt, like the '075 patent, describes a process of coding a single image. Like the '075 patent, the method of Chen & Pratt can certainly be applied to individual frames of a moving picture as well, but there is nothing in Chen & Pratt that

suggests that its method is limited to moving pictures. In fact, the only examples of images that are coded in Chen & Pratt are still images:

> The original ***test images shown in Figs. 8(a) and 9(a)*** are of size 512 X 512 pixels with each red, green, and blue tristimulus value uniformly quantized to 8 bits/pixel.

Ex. 6, Chen & Pratt at 229 (emphasis added). The actual still images that were coded are found on page 231 of Chen & Pratt, and are indisputably not moving pictures. Indeed, Chen & Pratt describes its coding process as "an efficient means of image coding":

> Transform image coding, developed about 15 years ago, has been proven to be an efficient means of ***image coding***. In the basic transform ***image coding*** concept, an ***image*** is divided into small blocks of pixels, and each block undergoes a two-dimensional transformation to produce an equal-sized array of transform coefficients.

*Id.* at 225 (emphasis added). Thus, the Chen & Pratt article, which the '075 patent describes as a method of coding video signals, certainly applies to the coding of still images.

The usage of the term "video signal" in the '075 patent is also consistent with how that term would be understood in the art. For example, many dictionaries, both technical and non-technical, define "video" in the context of computers as relating to images on a computer screen. *See, e.g.,* Ex. 11, Microsoft Computer Dictionary (5th ed. 2002), at 551 ("In relation to computers, *video* refers to the rendering of text and graphics images on displays."); Ex. 12, Webster's Ninth New College Dictionary (1985), at 1314 (defining the adjective "video" as "being, relating to, or involving images on a television screen or computer display"); Ex. 8, S. Gibilisco, Illustrated Dictionary of Electronics (7th ed., 1997), at 713 (defining video as "The images on a computer display or monitor").

Moreover, prior art cited in the prosecution history of the '075 patent supports the fact that "video" was not limited to moving pictures at the time the '075 patent was filed. For example, 4,316,222 to Subramaniam ("Subramaniam '222") was cited during the prosecution of the '075 patent, and thus is considered intrinsic evidence. Ex. 9, at PHLPSKD_00005143 - PHLPSKD_00005146. *Goldenberg v. Cytogen, Inc.*, 373 F.3d 1158, 1167 (Fed. Cir. 2004)

("prior art cited in a patent or cited in the prosecution history of the patent constitutes intrinsic evidence"). There, the patent clearly describes a scanned still picture as a "video image":

> This invention relates generally to a method and apparatus for data compression and decompression and, in particular, to a novel data compression and decompression method and apparatus for reducing the number of bits of information when transmitting a ***video image***." Subramaniam '222, at col. 1:8-12 (emphasis added).

There is nothing in the Subramaniam '222 patent that refers in any way to moving pictures, and this reference to a "video image" is indisputably a reference to a scanned still picture.

Similarly, other prior art asserted by Kodak in this case even more clearly illustrates that the term "video signal" was commonly used to refer to still images, and was certainly not limited to moving pictures. For example, U.S. Patent. No. 4,136,363 to Saran ("Saran '363"), which Kodak asserts in this case as prior art, extensively discusses video signals, and unambiguously refers only to scanned (*i.e.,* still image) documents, such as those scanned by a fax machine:

> Raster input and output scanning feature a characteristic scan structure, whereby a ***graphic image is represented by a video signal*** containing a predetermined number of picture elements (sometimes referred to as "pixels") for each of a plurality of substantially equidistantly spaced scan lines. [Ex. 13, Saran '363, at col. 1:40-45 (emphasis added).]
>
> Reviewing the transmitting terminal 13 on a functional level, there is a raster input scanner 16 for converting the information content of an ***original document*** (i.e., a "subject copy") into a corresponding ***video signal***. [*Id.* at 4:50-54 (emphasis added).]
>
> Under those circumstances, the ***scanning of a standard 8½" X 11" document*** provides a binary ***video signal having*** 1,728 picture elements/scan line for 1,056 scan lines or, in other words, a total of 1,824,768 picture elements/page. [*Id.* at 4:64-68 (emphasis added).]

There is no reference whatsoever in the Saran '363 patent to moving pictures, or anything other than scanned documents, yet the patent consistently refers to the resulting data as a "video signal." This extrinsic evidence supports the fact that "video signal" was not understood in the art as being limited only to moving pictures.

**3. If the term "video signal" refers only to moving**

**pictures, it would merely recite an intended use of claim 3, and would not limit the claim**

If Kodak prevails in its flawed assertion that the term "video signal" would limit the use of the patented method to moving pictures, then the reference to "video signals" would be no more than an "intended use" of claim 3, and would not limit the claim.

The term "video signal" appears only once in the asserted claims, and that is in the preamble of claim 3. Specifically, the preamble of claim 3 recites:

> 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:

'075 patent, col. 7:41-47 (emphasis added). If "video signal" means anything more specific that simply a signal representing visual information, it would be merely a statement of an intended environment in which the claimed method is to be used.

Terms and phrases recited in the preamble are only limitations of a claim under certain circumstances. *See Allen Eng'g Corp.*, 299 F.3d at 1346. A preamble phrase may be a limitation "if it recites essential structure or steps, or if it is necessary to give life, meaning, and vitality to the claim." *Catalina Mktg. Int'l, Inc.* 289 F.3d at 808 (internal quotations omitted). On the other hand, where a preamble phrase does no more than state an "intended use" or intended environment of a claimed invention, such preamble language is not a limitation of the claim. *Bristol-Myers Squibb Co.*, 246 F. 3d at 1372 (where the steps of a claimed method are performed the same way, regardless of whether the preamble language is included or not, the preamble language is no more than "intended use" language and is not a claim limitation).

The Federal Circuit held similarly-phrased preamble language to be non-limiting in *Apple Computer, Inc. v. Articulate Sys., Inc.*, 234 F.3d 14, 22 (Fed. Cir. 2000). There, the preamble of the claim at issue recited:

> In a computer display system having a central processing unit (CPU) coupled to a display such that *data is displayed on said display in a plurality of windows*, a method for displaying said windows and operating upon said windows and *said*

*data in said windows* by a user, comprising the steps of:

*Id.* at 17-18 (emphasis added). Even though the preamble recited that "data" was in the "window," the Federal Circuit refused to require as a claim limitation that the window must include such data. *Id.* at 22 ("[T]he recitation of 'data' in the preambles of claims 1 and 23 does not give meaning to these claims nor serve to define the invention. Instead, the term 'data' refers to a purpose of intended use or the windows of the claimed invention.").

Thus, while Philips has demonstrated that "video signal" can encompass still pictures, if the Court holds that "video signal" means moving pictures, it should not limit claim 3 because it would recite only the intended use of the claim.

**C. "code word" and "assigning a code word..."**

| Term/Phrase | Claim(s) | Philips' Proposal | Kodak's Proposal |
|---|---|---|---|
| "code word" | All | "a sequence of bits assigned to represent a particular event or events in accordance with a predefined set of rules" | A unique representation for an event in a single code table |
| "assigning a code word to represent said non-zero coefficient and said run length"[18] | 3 | Plain meaning for terms not otherwise construed, i.e., "assigning a sequence of bits to represent the non-zero coefficient and the run length of the event in accordance with a predefined set of rules" | Selecting a unique entry in the single code table for the event. From this code word, the original run length of zero coefficients and the magnitude of the non-zero coefficient can be determined, without any additional information. |

Philips' proposed construction defines "code word" as it would be understood to one of ordinary skill in the art; *i.e.*, a sequence of bits that is assigned to represent an event or events according to a predefined set of rules.

Kodak, on the other hand, tries to add limitations to the term "code word" and to the phrases that use that term, that are nowhere found in the claims or the specification. In fact,

[18] The arguments in this section apply equally to the limitation of claim 8, which is worded nearly identical to that of claim 3, and recites: "assigning a code word to represent said run length and said non-zero coefficient."

Kodak's construction would exclude the only preferred embodiment described in the specification, and therefore should be rejected. "A claim construction that excludes a preferred embodiment . . . 'is rarely, if ever, correct.'" *SanDisk Corp.*, 415 F.3d at 1285.

**1. A "code word" need not be a "unique" representation for a particular event**

Kodak's attempt to add a requirement that the code word be "unique" for a given event has no support whatsoever in the claims or specification of the '075 patent. There is nothing in the plain language of the claims themselves that require a "unique" code word, nor is there anything in the specification that suggests that such uniqueness is a requirement of the invention. Kodak's attempt to require that a code word be "unique" for a given event is also contrary to the preferred embodiment. For that reason, it must be rejected. *SanDisk Corp.*, 415 F.3d at 1285.

In the preferred embodiment the same code word can be assigned to multiple events. Specifically, the '075 patent explains that several events are grouped together and are then assigned a single Huffman codeword, which is the same for all events in that group. Additional bits are then added to the Huffman codeword, for example, to specify the exact value of the non-zero coefficient that has been coded. The purpose of using a single code word to represent several events is to keep the code table within a reasonable size:

> [T]he 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.

'075 patent, col. 3:28-32. The specification also explains that the sequence of bits that represent the group of events is called a "Huffman codeword":

> 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.

'075 patent, col. 3:38-44 (emphasis added). This Huffman code word for the group of events is not unique. Instead, the same code word is used to represent different events.

In the Huffman coding table of Figures 3-5, the Huffman codeword of item 60, for example, represents a group of events having a run length of zero (*i.e.*, no "0s"), followed by a non-zero coefficient with a magnitude of 9 or above. In fact, this single code word ("00001111") is used to represent 256 events.[19] In order to inform the decoder which of the events is actually coded by the Huffman codeword, additional bits are added to specify the sign and the exact value of the non-zero coefficient in the event. Thus, Kodak's attempt to graft a "unique" requirement onto the definition of "code word" is directly at odds with the preferred embodiment.

In fact, each and every entry in the code table of the preferred embodiment contains a non-unique codeword that does not uniquely identify an event. For example, entry number 29, in Figure 3, provides how to generate the code word for the event that corresponds to a run of five "0"s followed by a non-zero coefficient with a magnitude of "2." For such an event, the code word generated is comprised of the Huffman code word "00001001" followed by a single bit, denoted by "s", which indicates whether the non-zero coefficient is positive or negative, *i.e.*, whether the non-zero coefficient is "+2" or "-2." Just like in item 60, the same code word ("00001001") is used to represent multiple events: namely a) the event corresponding to a run length of 5 and a non-zero coefficient of "+2"; and b) the event corresponding to a run length of 5 and a non-zero coefficient of "-2". Thus, this code word is not unique.

The sign bit "s" appears in every single entry in the preferred embodiment's code table, just like in item 29 discussed above. Thus, every single entry in the code table includes code words that do not uniquely identify an event.[20]

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[19] Since there are seven additional "+" bits that are added to the Huffman code word of item 60, there are $2^7$ (128) possible coefficient magnitudes represented by this code word, each of which can be either positive or negative, which is indicated by the "s" bit that is also added to the Huffman code word, totaling 256 possible events that can be represented by the single "code word."

[20] As indicated above in section I.A.3, the specification also calls the entire string of bits that is assigned to a particular event (*i.e.*, the specific bits for the group of events in addition to the additional bits that specify the particular event in the group), a "code word," and specifically a "Huffman codeword" '075 patent, col. 4:46-52. Accordingly, the specification is unambiguous that the term "code word" refers to both a) the first part of the entry in the code table of Figures 3-5 that specifically identifies bits to be used; and b) the entire entry in the code table of Figures 3-5, including the sign and additional bits.

Indeed, Kodak's contention that a code word must be "unique" is also directly at odds with the claim language of claim 7. Claim 7 recites that the "Huffman codeword is independent of the sign of [the] non-zero coefficient" and that the "sign is coded by a separate bit." '075 patent, col. 8:3-7. In other words, it is unambiguous that a single Huffman codeword of claim 7 represents at least two events: a first event that has a particular run length and a positive non-zero coefficient, and a second event that has the same run length and the negative non-zero coefficient of the same magnitude (*e.g.*, a first event "0 0 0 +2" and a second event "0 0 0 -2"). The sign bit is added to the Huffman code word to specify which of the two events is actually coded.

Since any definition of "code word" that requires it to uniquely identify an event is inconsistent with the claim language and excludes the preferred embodiment, it must be rejected.

**2. There is no requirement for a "single code table"**

Kodak also attempts improperly to add a requirement that the code word be an entry in a "single code table." There is nothing in the claims that requires a "single code table" to be used. Moreover, there is no suggestion in the preferred embodiment that a single code table is necessary or important to the invention. Accordingly, Kodak's attempt to add a litigation-inspired limitation into the plain language of the claims should be rejected.

**3. The phrase "assigning a code word to represent..." should be given its plain meaning**

Kodak tries to completely rewrite the plain English phrase of the claims that recites "assigning a code word to represent" an event. The words "assigning" and "represent" are plain English words that require no further construction to be understood by a lay juror. *See, e.g., British Telecomm,* 189 F. Supp. 2d at 119.

Courts have held on many occasions that the words "assigning" and "represent" are clear, broad, plain English words that should be given their plain meaning. *Globetrotter Software, Inc. v. Elan Computer Group, Inc.*, No. C-98-20419 JF, 1999 U.S. Dist. LEXIS 22482, at *50 (N.D. Cal. Oct. 22, 1999); *Ferguson Beauregard/Logic Controls v. Mega Sys., L.L.C.*, No. 6:99CV437,

2001 U.S. Dist. LEXIS 25682, at *176 (E.D. Tex. Aug. 31, 2001); *AT&T Corp. v. Microsoft Corp.*, No. 01 Civ. 4872 (WHP), 2003 U.S. Dist. LEXIS 10716, *26-27 (S.D.N.Y. June 23, 2003); *Omax Corp. v. Flow Int'l Corp.*, No. C04-2334L, 2006 U.S. Dist. LEXIS 81914, at *14 (W.D. Wash. Nov. 7, 2006). Similarly, the terms "assigning" and "represent," as used in the '075 patent do not have any specialized meaning in the art, and should be given their plain meaning.

Kodak improperly insists on rewriting the plain English language of the claim limitation to include the use of a "unique entry" and a "single code table," which would not read on the preferred embodiment. Kodak also tries to add the following sentence to its construction: "From this code word, the original run length of zero coefficients and the magnitude of the non-zero coefficient can be determined, without any additional information." Even from a grammatical point of view, this sentence could not possibly be included as part of a proper construction of the phrase "assigning a code word to represent. . ."

Kodak's attempted rewrite is directly contrary to the specification and the preferred embodiment, which explicitly provide that additional information may be necessary to determine the original run length of zero coefficients and the magnitude of the non-zero coefficient. Specifically, the '075 patent states:

> 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***.

'075 patent, col. 3:38-44 (emphasis added). This passage unambiguously demonstrates that in the preferred embodiment, it is sometimes necessary to add additional information to the Huffman code word to precisely identify the exact value of the non-zero coefficient. In other words, the Huffman code word is not unique to a particular event.

Kodak's approach is contrary to black-letter patent law and should be rejected. *SanDisk Corp.*, 415 F.3d at 1285; *see also 800 Adept, Inc. v. Murex Securities, Ltd.*, No. 6:02-cv-1354-Orl-28DAB, 2006 U.S. Dist. LEXIS 53696, at *30 (M.D. Fla. Aug. 3, 2006) (holding that the

term "assigning" does not require a single, static look-up table). Instead, the phrase "assigning a code word to represent…" should be given its plain meaning.

**D. "Huffman code word"**

| Term/Phrase | Claim(s) | Philips' Proposal | Kodak's Proposal |
|---|---|---|---|
| "Huffman code word" | 4 | "a sequence of bits assigned to represent a particular event or events in accordance with a predefined set of rules with the following characteristics: a) the code words may be of different lengths; b) no code word is a prefix of another code word; and c) the predefined set of rules strives to minimize the average code word length by exploiting the distribution of event probabilities" | A variable-length code word that identifies each unique event, where the code word is shorter for more frequently occurring events and longer for less frequently occurring events, whereby no Huffman code word is the prefix of another Huffman code word. |

Claim 4 depends from claim 3, and recites that "said code words are Huffman code words." '075 patent, col. 7:56-57. There is a great deal of similarity between the parties' proposed constructions of "Huffman codeword." However, the parties' proposed constructions of the term differ in one material respect. Philips' proposed construction includes the key characteristic of a Huffman code, *i.e.*, that the probabilities of events are used to try to minimize the average code word length.

For example, the specification of the '075 patent states that Huffman coding tries to maximize compression by assigning codewords based on the probabilities of each event:

> 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.

'075 patent, col. 1:36-45. The specification's use of "Huffman codewords" is consistent with the way that text books describe Huffman coding. For instance, one text book identified by Kodak in this case defines Huffman coding consistent with Philips' proposed construction:

> Huffman coding is a statistical data-compression technique whose employment ***will reduce the average code length*** used to represent the symbols of an alphabet.

Ex. 14, Gilbert Held, Data Compression: Techniques and Applications, Hardware, and Software Considerations, John Wiley & Sons (1984), at 60 (emphasis added).

**E. The "sign" limitations of claim 7**

| Term/Phrase | Claim(s) | Philips' Proposal | Kodak's Proposal |
|---|---|---|---|
| "Huffman codeword is independent of the sign of that non-zero coefficient" | 7 | Plain meaning for terms not otherwise construed, i.e., "the sequence of bits assigned to represent a particular event or events is independent of the sign of the non-zero coefficient" | The Huffman codeword is separate from the single bit that only provides whether he non-zero coefficient is positive or negative |
| "the sign is coded by a separate bit" | 7 | "the sign can be determined solely by examining a single bit" | A single bit that only provides whether the non-zero coefficient is positive or negative |

Claim 7 of the '075 patent depends from claim 3, and specifically requires that the Huffman codeword is "independent of the sign of that non-zero coefficient" and that the "sign is coded by a separate bit." This language is plain English that requires no construction. *See, e.g., British Telecomm,* 189 F. Supp. 2d at 119.

With respect to the first phrase, that the Huffman codeword is "independent of the sign of that non-zero coefficient," there is simply no better way to say that than using the claim language itself. *See, e.g., ASM Am., Inc.*, 260 F. Supp. 2d at 850 (refusing to define "generally circular" since there was no better language than that of the claim itself to do so). Courts construing phrases with the term "independent" routinely construe "independent" as simply "independent." *See Visto Corp. v. Sproqit Techs., Inc.*, 445 F. Supp. 2d 1104, 1116 (N.D. Cal. 2006); *Gobeli*

*Research, Ltd. v. Apple Computer Inc.*, 384 F. Supp. 2d 1016, 1024 (E.D. Tex. 2005); *see also M-3 & Assocs., Inc. v. Cargo Sys., Inc.*, 33 Fed. Appx. 513, 515-16 (Fed. Cir. 2002).

As for the second phrase, "the sign is coded by a separate bit," again Philips does not believe that any construction of that phrase is necessary. The plain English language of this phrase recites only that the sign is coded by a separate bit, *i.e.*, a "0" or a "1". Kodak, however, tries to add the unsupported limitation that the separate bit only provides whether the non-zero coefficient is positive or negative. There is no such requirement stated in claim 7, nor is there any such requirement stated or implied in the specification. Instead, all that the claims require is that a separate bit is used to code the sign of the non-zero coefficient. It follows, therefore, that the sign can be determined solely by examining that single bit, which is what Philips' proposed construction states.

Indeed, it is often the case in compression algorithms, and computer programs generally, that bits can mean more than one thing. If a system coded the sign of the non-zero coefficient in a separate bit, but that separate bit also had another use in the system, other than simply indicating the sign of the non-zero coefficient, it would still satisfy the plain language of claim 7.

If the Court construes the phrase "the sign is coded by a separate bit," it should adopt Philips' proposed construction. However, were to Court to leave that phrase unconstrued, the jurors would easily be able to discern the plain English meaning of that phrase.

**F. "run" and "run length"**

| Term/Phrase | Claim(s) | Philips' Proposal | Kodak's Proposal |
|---|---|---|---|
| "run" | All | "a sequence (possibly of length zero) of successive identical particular values" | A sequence of equal value coefficients |
| "run length" | All | "the number (which can be zero) of identical particular values in a run" | The number of equal value coefficients in a sequence |

The fundamental difference between the parties' proposed construction of "run" and "run

length" is that Philips' proposed definition recognizes that the run of zero coefficients that precedes or follows the non-zero coefficient can be of zero run length (*i.e.*, no "0"s). Kodak' s proposed construction does not make that clear. "A claim construction that excludes a preferred embodiment . . . 'is rarely, if ever, correct.'" *SanDisk Corp.*, 415 F.3d at 1285.

The specification indisputably describes that the "run" of zeros can have no zeros in it all (*i.e.*, the length of the run is zero). For example, at the outset of the '075 patent, the specification defines the term event explicitly to include a situation where there are no zeros preceding or following a non-zero coefficient: "Each non-zero coefficient ***which is not preceded or followed by one or more zero coefficients*** is also referred to as an event." '075 patent, col. 2:39-41 (emphasis added). Similarly, the specification is replete with examples where the "run length" is zero. For example, Figure 1 of the patent shows the number of occurrences of each event in the sample data, and clearly shows run length (L) of zero. '075 patent, Fig. 1. In describing the figure, the patent states: "In the vertical direction the length—***also starting at 0***—of coefficient runs of the value 0 is shown." '075 patent, col. 4:16-18 (emphasis added). Similarly, the patent describes examples of events in the preferred embodiment where the run length is zero: "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." *Id.* at col. 4:20-23 (emphasis added). In addition, the coding table of the preferred embodiment describes many events that have an "L" value (corresponding to the run length), of zero. *Id.*, Figs 3-4, items 2, 5, 11, 18, 19, 27, 32, 33, 42, and 60.

Thus, there can be no doubt whatsoever that the "run" of zeros can be of zero length; *i.e.*, an event with no zero coefficients, and only a single non-zero coefficient. Accordingly, Philips' definitions should be adopted.

### G. "for transmission at a reduced bit rate" / "for transmission at a reduced bandwidth"

| Term/Phrase | Claim(s) | Philips' Proposal | Kodak's Proposal |
|---|---|---|---|
| "for transmission | 3 | "for transmission with fewer | Indefinite under 35 U.S.C. § |

| Term/Phrase | Claim(s) | Philips' Proposal | Kodak's Proposal |
|---|---|---|---|
| at a reduced bit rate" | | bits per pixel" | 112;<br><br>Otherwise, "for transmission with 12% fewer bits as compared to the Chen method" |
| "for transmission at a reduced bandwidth" | 8 | "for transmission with fewer bits per pixel" | Indefinite under 35 U.S.C. § 112;<br><br>Otherwise, "for transmission with 12% less bandwidth as compared to the Chen method" |

Claims 3 and 8 both contain a statement of intended result in their preambles. Specifically, the preamble of claim 3 suggests that its method can be used "for transmission at a reduced bit rate," and the preamble of claim 8 recites "for transmission at a reduced bandwidth." These phrases are merely statements of intended use, and are not limitations of the claims, and should not be construed as such. Moreover, even if the phrases were limitations, their definitions would be clear, as the '075 patent and the Chen & Pratt article describe what is meant by a reduced "bit rate" or reduced "bandwidth."

**1. These phrases are not limitations of the claims as they recite merely an intended use of the claimed methods**

The phrases "for transmission at a reduced bit rate" and "for transmission at a reduced bandwidth" do no more than state an intended use or result of using the claimed methods. There is nothing in the limitations of the claims that relies on that language for antecedent basis. Moreover, that preamble language was not used to distinguish prior art during prosecution of the patent. Accordingly, there is no basis for construing those phrases as limitations.

The Federal Circuit has held nearly identical language to be merely a statement of intended use, and not a limitation of the claim. In *Bristol-Myers Squibb Co.*, the Federal Circuit was faced with two method claims whose preamble recited: "A method for

reducing hematologic toxicity…" and "A method … being associated with reduced hematological toxicity." 246 F.3d at 1371-72. There, the Federal Circuit held that those phrases were merely statements of "intended result," and should not limit the scope of the method claims. *Id.* at 1375; *see also Heidelberg Harris, Inc. v. Mitsubishi Heavy Indus., Ltd.*, 56 U.S.P.Q. 2d 1714 (Fed. Cir. 2000).

Similarly, here, the "for transmission at a reduced bit rate" and "for transmission at a reduced bandwidth" are no more than statements of intended result or intended use. Like in *Bristol-Myers Squibb*, the steps of claims 3 and 8 are performed in the same way, regardless of whether there is in fact transmission at a reduced bit rate or bandwidth.

**2. If these phrases are considered to be limitations, they are definite, and they refer to a reduction in bits per pixel**

If the Court is persuaded that these phrases are limitations of the claims, Philips' proposed construction accurately reflects the meanings of those phrases. In particular, these phrases refer to a reduction in the number of bits that are required to store a given image. This improvement is expressed as "bits per pixel."

The '075 patent refers to reduction of "bit rate" several times throughout the specification as a goal of the invention. The patent refers to the Chen & Pratt article as one method of reducing the bit rate in coding an image, and then notes that the patented method is intended to further reduce that bit rate:

> [Chen & Pratt] describes a coding process of video signals for the purpose of transmitting video pictures of satisfactory quality at a ***minimum possible bit rate***. ['075 patent, col. 1:11-17 (emphasis added)]

> 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***. ['075 patent, col. 1:60-65 (emphasis added)]

> 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.
['075 patent, col. 3:13-17 (emphasis added)]

The Chen & Pratt article, which is referred to as the state of the art in the '075 patent, describes precisely what is meant by "bit rate" as applied to compression of images. In describing the advantages of its coding method, Chen & Pratt states: "A pixel coding ***rate*** of about 1.5 ***bits/pixel*** is achievable, with no apparent visual degradation." Ex. 6, Chen & Pratt at 225 (emphasis added). Similarly, Chen & Pratt tout the benefits of their coding method as one that achieves a low "bit rate," as expressed in bits per pixel: "Figs 8(b) and 9(b) show the reconstructed images at a ***combined average bit rate of 0.4 bits per pixel***." *Id.* at 229 (emphasis added).

Accordingly, it is clear from the intrinsic evidence, of which Chen & Pratt is a part,[21] that the reference to a "reduced bit rate" refers to a reduction in the number of bits per pixel that is achievable in compression of an image. Similarly, the phrase "for transmission at reduced bandwidth" has the same meaning. That phrase refers to a reduction in the amount of bandwidth that is necessary to transmit a picture. It follows that if an image can be represented with fewer bits per pixel, less bandwidth would be necessary to transmit that image.

Thus, the definitions of these preamble phrases of claims 3 and 8, if the Court deems them limitations of the claims, are clear. Kodak, however, contends that the terms are indefinite, and otherwise they should be defined with a precise numerical limitation to the relative term "reduced." Specifically, Kodak contends that if the phrases are not indefinite, the term "reduced" must mean reduced by 12% "as compared to the Chen method." Not so. There is no basis whatsoever to add such a precise numerical limitation from the specification that is found nowhere in the claim language. Where the language of claims would be understood by a person of ordinary skill in the art, courts have applied established Federal Circuit law to hold that the claims are not indefinite. *Novo NorDisk A/S v. Becton Dickinson & Co.*, No. 96 Civ. 9506 (BSJ),

[21] Prior art references that are expressly addressed in the specification of a patent are considered to be part of the intrinsic evidence, and should be considered for claim construction. *Goldenberg*, 373 F.3d at 1167 ("prior art cited in a patent or cited in the prosecution history of the patent constitutes intrinsic evidence").

2000 U.S. Dist. LEXIS 3384 (S.D.N.Y. Mar. 16, 2000) (refusing to hold indefinite the term "standard" indefinite). Here, since a person of ordinary skill in the art would readily understand what is meant by "reduced bit rate" and "reduced bandwidth," those phrases are not indefinite.

Here, the specification of the '075 patent makes clear that the "reduced" bit rate that the invention is intended to achieve is in comparison to prior art methods that do not use the claimed invention. While the '075 patent reports that a 12% reduction was found in comparison to Chen & Pratt, it is abundantly clear that the specifically-reported 12% reduction was experienced for a particular set of test data. Two paragraphs prior to the reference to a 12% reduction, and in the same discussion, the '075 patent states that the findings were made on a sample video signal "with approximately 15000 signal values." '075 patent, col. 2:62-64. The specific amount of additional compression achieved for any given image, however, will depend on the specifics of that image. Some images compressed using the '075 patent would result in even greater compression, whereas others would result in less compression. Thus, there is no basis to import the precise amount of improvement that was reported for a particular test image as a limitation of the claims. Instead, the preambles of the claims state merely that the claimed method is intended to "reduce" the bit rate and bandwidth, and a person of ordinary skill in the art would readily understand those phrases without the need for further mathematical precision.

**H. "event"**

| Term / Phrase | Claim(s) | Philips' Proposal | Kodak's Proposal |
|---|---|---|---|
| "event" | All | "an occurrence of a run of zero coefficients and the non-zero coefficient which immediately precedes or follows that run, some occurrences being more likely than others" | A run of zero coefficients and the value of the non-zero coefficient which immediately precedes or follows that run |

The term "event" is used throughout the '075 patent and its claims. Philips' definition of "event" comes nearly verbatim from the specification's definition of "event." Specifically, the

'075 patent explicitly defines that an event is defined as the combination of a run of zero and the non-zero coefficient that precedes or follows the run:

> 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.... It is to be noted that some events are more likely to occur than others.

'075 patent, col. 2:36-44.

When a patentee goes out of its way to explicitly define a term, as it has done here, that definition is controlling. *Phillips*, 415 F.3d at 1315-16. Here, Philips' definition comes directly from the language of the specification, and should be adopted.

Kodak's proposal omits the key defining characteristic of "event" that is provided by the specification; namely that some events are more likely than others.[22] *See* '075 patent, col. 2:43-44 ("some events are more likely to occur than others"). This is the notion that each event has a certain probability. It is the recognition and the existence of such probabilities that makes the coding scheme of the '075 patent effective. *See, e.g.,* '075 patent, col. 3:36-38 ("As is shown in Fig. 1, relatively rarely occurring events are concerned, and therefore they are coded with relatively long Huffman codewords.").

The use of "events" to refer to occurrences that have a certain probability is wholly consistent with how the term "event" is used in the field of statistics. In statistics, the term "event" is universally understood to mean an occurrence that has a certain probability. For example, a well-recognized statistics text book describes events in exactly that way in its introduction to probability theory:

> The purpose of the theory [of probability] is to describe and predict such averages in terms of ***probabilities of events***. The probability of an event $\mathcal{A}$ is a number $P(\mathcal{A})$ assigned to this event.

Ex. 15, A. Papoulis, Probability, Random Variables and Stochastic Processes (1984), at 3 (emphasis added).

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[22] Kodak's definition also deviates from language of the specification's definition since Kodak refers to the "value of the non-zero coefficient" as opposed to the "non-zero coefficient."

Kodak's definition attempts to omit the defining characteristic of an "event" as that term is used generally in statistics, and specifically in the '075 patent. Philips' definition, which comes directly from the specification, and properly describes the fundamental characteristics of an "event," should be adopted.

## I. The plain English phrases of claim 11 should be given their plain meaning

| Term/Phrase | Claim(s) | Philips' Proposal | Kodak's Proposal |
|---|---|---|---|
| "determining whether the run length of each event exceeds a predetermined run length" | 11 | Plain meaning for terms not otherwise construed, i.e., "determining whether the number (which can be zero) of identical particular values in the run occurring in each event exceeds a run length determined prior to coding" | Selecting an event and then determining whether the number of consecutive zero coefficients exceeds the predetermined run length |
| "splitting said respective event into a plurality of sections" | 11 | Plain meaning for terms not otherwise construed, i.e., "splitting the respective occurrence of a run of zero coefficients and the non-zero coefficient which immediately precedes or follows that run, some occurrences being more likely than others, into two or more sections" | Dividing a single event into two or more sub-events. |
| "assigning a code word to each section" | 11 | Plain meaning for terms not otherwise construed, i.e., "assigning to each section a sequence of bits to represent a particular event or events in accordance with a predefined set of rules" | Selecting a unique entry in the single code table for each sub-event |

Claim 11 of the '075 patent depends from claim 8, and recites:

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.

This claim needs no further interpretation (other than interpreting the technical terms already discussed, such as "run length," "event," and "code word"). None of the phraseology of this claim is anything but plain English, understandable by any lay juror. Accordingly, there is no need to construe any phrases in this claim.

### 1. The purpose of claim construction is not to rewrite plain English phrases

As the Federal Circuit has held, when terms and phrases are ordinary and commonly used, the Court need not construe them. In *W.E. Hall Co.*, 370 F.3d at1350-51, the Federal Circuit refused to adopt the plaintiff's construction for "single piece construction" because "'[s]ingle piece' is sufficiently clear to make even resort to the dictionary unnecessary." *Id.* at 1350-51.

Stated differently, when a term or phrase is best defined by that term or phrase itself, the Court need not set forth an explicit construction. For example, in *ASM Am., Inc.*, 260 F. Supp. 2d at 850, the Court refused to construe the phrase "generally circular" because "there is no better way to define 'generally circular' than to simply say 'generally circular.'" Similarly, here there is no better way to state the phrases of claim 11 than using the language of claim 11.

### 2. Kodak attempts to add an entirely new limitation, found nowhere in the claims or specification, into claim 11

Nevertheless content to rewrite claim 11, Kodak has improperly added an entirely new limitation, found nowhere in the claims or the specification, that has no purpose other than to provide it with a perceived non-infringement argument. Specifically, Kodak adds the phrase "Selecting an event and then" to the front of claim 11. As rewritten by Kodak, this claim would seem to require that an entire event must be "selected" before it can be divided into smaller subsections. There is no such requirement in the claims. In fact, the preferred embodiment described in the specification does not "select" an event before determining whether it needs to

be split into smaller sections. Instead, the preferred embodiment continuously monitors the run of zero coefficients to determine whether the predetermined maximum run length has been reached, in which case the system creates a separate event:

> The comparator circuit K ***continuously compares the actual counting [of zeros] 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.

'075 patent, col. 6:67-7:5 (emphasis added).

Accordingly, to the extent Kodak's proposed rewrite would require an entire event to be read in and selected before determining whether it needs to be split into smaller events, such a construction would not read on the preferred embodiment. This is impermissible. "A claim construction that excludes a preferred embodiment . . . 'is rarely, if ever, correct.'" *SanDisk Corp.*, 415 F.3d at 1285.

#### 3. Kodak improperly tries to inject into claim 11 its unsupported limitation of a "unique" entry from a "single code table"

Finally, Kodak attempts to rewrite the plain English phrase "assigning a code word to each section" to require that the code word must be "unique" and must be found in a "single code table." Again, there is no need to rewrite these plain English words. *See, e.g., British Telecomm,* 189 F. Supp. 2d at 119. Moreover, as discussed in detail above, Kodak's attempt to inject the "unique" and "single code table" concepts into these claims is contrary to the preferred embodiment, and has no support whatsoever in the specification.

### J. "transform" and "transforming" words and phrases

| Term/Phrase | Claim(s) | Philips' Proposal | Kodak's Proposal |
|---|---|---|---|
| "transform" | 3 | "a mathematical operation which yields an alternative representation of a sequence or array of values" | A mathematical operation that converts a signal |

Claim 3 recites a "transform" that is applied to a signal to yield a sequence of

coefficients.[23] This is the essence of '075 patent's process of "transform coding" that is described above in the factual background.

The parties agree that a "transform" is a mathematical operation performed on a signal (which is just a sequence or array of values that represents information). The only dispute between the parties' definitions of "transform" is that Philips contends that the transform "yields an alternative representation" of the signal, whereas Kodak contends that a transform "converts" the signal. Philips expects that Kodak's use of the term "convert" is intended to broaden "transform" to mean any type of operation performed on data, in an attempt to bring more prior art into relevance. To the extent Kodak's use of the word "convert" means something other than yielding an alternative representation of the signal, that does not accurately reflect the meaning of a transform. On the other hand, if Kodak's use of the term "converts" means that the transform yields an alternative representation of the signal, there may be no substantive dispute on this term.

However, since Philips' definition more explicitly and unambiguously instructs the jury that a "transform" must yield an alternative representation of a signal, it should be adopted.

## III. CONCLUSION

For the foregoing reasons, the Court should adopt Philips' constructions of the disputed claim terms that are set forth in the Final Joint Claim Chart, and should reject Kodak's attempts to rewrite the claims of the '075 patent.

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[23] The arguments in this section apply not only to the term "transform" in claim 3, but also to the term "transforming" and the phrase "transforming said signal" in claim 8. *See* Ex. 2, Final Joint Claim Chart, at 15, 17. For the same reasons Philips' sets forth for its proposed construction of "transform," Philips' proposed constructions of those other terms should also be adopted.

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