

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

AMAZON.COM, INC., AMAZON.COM SERVICES, LLC,
Petitioner

v.

NOKIA TECHNOLOGIES OY,
Patent Owner

Case: IPR2024-00691
U.S. Patent No. 8,050,321

PATENT OWNER'S PRELIMINARY RESPONSE

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Exhibit	Description
2001	Expert Declaration of Dr. Ian Richardson

I. INTRODUCTION

Institution should be denied because Petitioner has failed to show a reasonable likelihood of success on the merits. Petitioner's two main grounds—MPEG-1 and Kim—fail because they do not disclose key limitations, including the indication of a first frame of an independent sequence. This makes sense because MPEG-1 and Kim are prior art that do not have the functionality of random seek that exists in the patented invention of the '321 Patent. For both MPEG-1 and Kim, the Petition relies on “exemplary” figures (Figure D.18(a) in MPEG-1 and Figure 5A in Kim) as proof of the claimed indication. However, in each case the Petition confuses happenstance with the meaning of an indication *of* a first frame of an independent sequence. To be the claimed indication *of* a first frame of an independent sequence, an alleged indication must actually indicate a first frame of an independent sequence. Petitioner cannot show this limitation by merely pointing to coincidences where an indication of something else (e.g., closed_GOP flag and Temporal Reference in MPEG-1 or IAD in Kim) happens to coincide in particular examples with image frames that merely appear similar to the '321 Patent's first frame of an independent sequence. The alleged “indications” in MPEG-1 and Kim do not require or identify any particular frame. Further, MPEG-1 and Kim each lack the ability to reset the indicator value, a key feature of the claimed invention that makes random seek functional.

Moreover, Petitioner's deficient grounds are supported by restating testimony from the expert declaration that merely mimics the arguments in the Petition, and should be entitled to no weight.

II. BACKGROUND

A. Technical Background

The '321 Patent relates to an improvement in video decoding enabling a decoder to identify where start a decoding process. Minimizing bitrate is extremely important for applications such as video streaming and various techniques have been developed to improve video compression (video encoding), such as techniques that take advantage of spatial redundancy (similarities between areas within a video frame, intra-frame techniques) and temporal redundancy (similarities between successive video frames, inter-frame techniques). As the '321 Patent notes, "[t]o reduce the amount of data in video files, the image data can be compressed into a smaller form by reducing the amount of redundant information in the image frames." '321 Patent, 2:5-7.

One such inter-frame technique, known as motion-compensated temporal prediction, can be used to take advantage of the redundancy of successive image frames. '321 Patent, 2:15-17. In this method, a portion of a current frame to be encoded can be predicted from a portion in another, previously-encoded frame such as a past or future frame in display order. Motion-compensated temporal prediction

attempts to identify a matching portion in a previously coded frame, which may be in a different position due to motion of objects or areas, and to use this to predict a portion of a current frame. '321 Patent, 2:16-20. I-frames (or INTRA-frames) are encoded frames whose encoded image information was not determined using this motion-compensated temporal prediction process, while INTER-frames (also known as P-frames or B-frames) are encoded frames whose image information is, at least in part, determined based on prediction from one or more previously encoded frames in the sequence. Such previously encoded frames may be preceding frames in display order and/or subsequent frames in display order. A P-frame is encoded using only one previously encoded frame and a B-frame may be encoded using two previously-encoded frames, for example one preceding frame and one subsequent frame in display order. '321 Patent, 2:20-32, 2:42-47.

In prior art systems, the '321 Patent describes that “[t]o allow for flexible streaming of video files, many video coding systems employ scalable coding in which some elements or groups of elements of a video sequence can be removed without affecting the reconstruction of other parts of the video sequence.” '321 Patent, 3:3-7. By scalable coding, the '321 Patent refers to known video coding implementations that include “grouping the image frames into a number of hierarchical layers. The image frames coded into the image frames of the base layer substantially comprise only the ones that are compulsory for the decoding of the

video information at the receiving end. The base layer of each group of pictures (“GOP”) thus comprises one I-frame and a necessary number of P-frames and/or B-frames. One or more enhancement layers can be determined below the base layer, each one of the layers improving the quality of the video coding in comparison with an upper layer.” ’321 Patent, 3:7-20. That is, each layer, aside from the base layer, can be included or not based on bandwidth concerns or picture quality requirements or some balance thereof. EX2001, ¶¶41-44.

In prior art such as the MPEG-1 Video standard (Ex. 1005), a Group of Pictures (GOP) is “a series of ... coded pictures intended to assist random access. The group of pictures is one of the layers in the coding syntax.” (Ex. 1005 at 23). Ex. 1005 defines a syntax for a coded video bitstream, comprising a set of layers (note: these are distinct from the ‘hierarchical layers’ discussed above with respect to scalable coding). These layers include the topmost or Video Sequence Layer, which includes coded syntax elements describing the entire coded video bitstream, the Group of Pictures Layer, which includes syntax elements that relate to an entire GOP, the Picture Layer, which includes syntax elements that relate to a single coded video frame or picture, and the Slice Layer, which includes syntax elements that relate to a slice or a portion of a coded picture (Ex. 1005 at 35-40). EX2001, ¶45.

A group of pictures is “a set of coded pictures which are contiguous in display order [and which] must contain at least one I-picture [intra coded picture” (Ex. 1005

at 84). A series of GOPs are illustrated, with regard to MPEG-1 below. EX1005, 32.

At the encoder input,

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
I	B	B	P	B	B	P	B	B	I	B	B	P	B	B	P	B	B	I	B	B	P	B	B	P

In the above illustration, the double vertical bars denote the group of pictures boundaries. EX1005, 32. “Note that in this example, the first group of pictures is two pictures shorter than subsequent groups of pictures, since at the beginning of video coding there are no B-pictures preceding the first I-Picture. However, in general, in display order, there may be B-Pictures preceding the first I-Picture in the group of pictures, even for the first group of pictures to be decoded.” EX1005, 32; EX2001, ¶¶ 46-47.

While these prior art methods improved aspects of video streaming, including bitrate efficiency, problems still existed. For example, some video coding standards such as the H.263 standard support a process known as Reference Picture Selection, in which it is possible to predict part of a current picture from a previously coded picture that is not the immediately preceding I- or P-picture. In such a case, as “it is possible to also select[] at least one image preceding an I-image that begins a group of picture GOP as the reference image, a group of pictures employing reference picture selection cannot necessarily be decoded independent.” ’321 Patent, 3:44-56. In other words, when a process such as Reference Picture Selection is employed, it

is not guaranteed that a decoder can begin decoding independently from an I-picture that begins a GOP. The aforementioned scalability improvements presented further problems, as “the adjusting of scalability or coding method in the streaming server or a network element becomes difficult, because the video sequence must be decoded, parsed, and buffered for a long period of time to allow any dependencies between different image groups to be detected.” ’321 Patent, 3:55-61; EX2001, ¶48.

Further, another problem arises “relate[d] to detection of image frames from which a decoder can start the decoding process. The detection is useful for multiple purposes. For example, an end-user may wish to start browsing a video file from the middle of a video sequence. Another example relates to starting the reception of a broadcast or multicast video transmission from the middle of the video transmission. A third example relates to on-demand streaming from a server and occurs when an end-user wishes to start playback from a certain position of a stream.” ’321 Patent 3:62-4:5. That is, it is important to be capable of identifying a coded video frame (picture) from which it is guaranteed that a decoder can begin decoding independently, for example to enable playback from or seeking to a particular position in a coded video stream (random access). EX2001, ¶¶ 48-49.

B. The ’321 Patent

The ’321 Patent claims an improved method “that enable[s] detection of image frames from which a decoder can start the decoding process.” ’321 Patent,

4:8-10. “The invention is based on the idea of encoding a video sequence comprising an independent sequence of image frames, wherein at least one reference picture is predictable from at least one previous image frame that is earlier than the previous reference image frame in decoding order.” ’321 Patent, 4:16-20. The idea behind the ’321 Patent’s invention was to be able to identify during decoding of a bitstream an initiation picture among a series of pictures in an independently decodable sequence; and thus during the decoding process, any picture before the initiation picture is discarded, by being defined as unusable as a reference picture. *See* ’321 Patent, 4:31-35.

C. The Prior Art

1. MPEG-1

MPEG-1 Video ((ISO/IEC 11172-2, “MPEG-1”) is a standard developed by the Moving Pictures Expert Group, a subgroup of the ISO/IEC standardization body, that was approved in 1993.

Several properties of groups of pictures in MPEG-1 are important to keep in mind. First is a Group of Pictures, or “GOP,” as previously defined. MPEG-1 defines a Group of Pictures or GOP as per below:

D.5.2 Group of pictures

Two distinct picture orderings exist, the display order and the bitstream order (as they appear in the video bitstream). A group of pictures (gop) is a set of pictures which are contiguous in display order. A group of pictures must contain at least one I-picture. This required picture may be followed by any number of I and P-pictures. Any number of B-pictures may be interspersed between each pair of I or P-pictures, and may also precede the first I-picture.

Property 1. A group of pictures, in bitstream order, must start with an I-picture and may be followed by any number of I, P or B-pictures in any order.

Property 2. Another property of a group of pictures is that it must begin, in display order, with an I or a B-picture, and must end with an I or a P-picture. The smallest group of pictures consists of a single I-picture, whereas the largest size is unlimited.

The original concept of a group of pictures was a set of pictures that could be coded and displayed independently of any other group. In the final version of this part of ISO/IEC 11172 this is not always true, and any B-pictures preceding (in display order) the first I-picture in a group may require the last picture in the previous group in order to be decoded. Nevertheless encoders can still construct groups of pictures which are independent of one another. One way to do this is to omit any B-pictures preceding the first I-picture. Another way is to allow such B-pictures, but to code them using only backward motion compensation.

Property 3. From a coding point of view, a concisely stated property is that a group of pictures begins with a group of pictures header, and either ends at the next group of pictures header or at the next sequence header or at the end of sequence, whichever comes first.

Some examples of groups of pictures are given below:

```

I
I  P  P
I  B  P  B  P
B  B  I  B  P  B  P
B  B  I  B  B  P  B  B  P  B  B  P
B  I  B  B  B  B  P  B  I  B  B  I  I

```

Figure D.17 -- Examples of groups of pictures in display order

These examples illustrate what is possible, and do not constitute a suggestion for structures of groups of pictures.

EX1005, 84-85 (Explaining and providing examples of Group of Pictures for MPEG-1); EX2001, ¶¶ 52-53.

One important aspect of MPEG-1 related to Petitioner's arguments is MPEG-1's "closed_gop flag." MPEG-1's closed_gop flag is part of the "Group of pictures layer," i.e. it is part of the syntax layer that applies to an entire GOP, MPEG-1 at

2.4.2.4 (“Group of pictures layer”).

closed_gop -- This is a one-bit flag which may be set to "1" if the group of pictures has been encoded without motion vectors pointing to the previous group of pictures.

As specified MPEG-1, the closed_gop flag is received in the group of pictures header. MPEG-1 defines “Closed GOPs” as follows:

Closed GOP

A one bit flag follows the time code. It denotes whether the group of pictures is open or closed. Closed groups can be decoded without using decoded pictures of the previous group for motion compensation, whereas open groups require such pictures to be available.

A typical example of a closed group is shown in figure D.18a.

I	B	B	P	B	B	P	B	B	P	B	B	P
0	1	2	3	4	5	6	7	8	9	10	11	12

(a) closed group

B	B	I	B	B	P	B	B	P	B	B	P	B	B	P
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14

(b) open or closed group

Figure D.18 -- Example groups of pictures in display order

A less typical example of a closed group is shown in figure D.18b. In this example, the B-pictures which precede the first I-picture must use backward motion compensation only, i.e. any motion compensation must be based only on picture number 2 in the group.

If the closed_gop flag is set to 0 then the group is open. The first B-pictures that precede the first I-picture in the group may have been encoded using the last picture in the previous group for motion compensation.

MPEG-1 at D.5.2 (“Group of pictures”). The “one bit flag” referred to is the closed_gop flag. EX2001, ¶¶ 54-55. The closed_gop flag is a flag in the group of pictures header, i.e. it is a syntax element that applies to an entire GOP. The closed_gop flag is therefore not an indication of any specific image frame. For example, in Figure D.18 above, the value of the closed_gop flag (0 or 1) defines a property of the entire GOP, such as the 13-picture GOP shown in Fig. D.18a or the

15-picture GOP shown in Fig. D.18b. More specifically, as the cited text above explains, the value of `closed_gop` defines certain properties of the coding of certain B-pictures in the GOP, namely whether or not B-pictures preceding the first I-picture may or may not use forward motion compensation (i.e. motion compensation from the preceding P- or I-picture). Thus, the `closed_gop` flag is not an indication of an image frame in the GOP and at most, indicates certain properties of certain B-pictures in the GOP. As shown in Figure D.18 above, a `closed_gop` flag does not indicate any particular image frame. EX2001, ¶¶ 55-58.

Another aspect of MPEG-1 that is important with respect to Petitioner's argument is "Temporal Reference," encoded as a syntax element `temporal_reference` that is part of the Picture Layer syntax, i.e. it is a syntax element that is associated with a specific coded picture (Ex. 1005 at p38). MPEG-1 explains that "Temporal Reference" can be used to define "the order in which the pictures must be displayed." For a given group of pictures (whether open or closed), the first picture in display order has a Temporal Reference of zero:¹

¹ Temporal reference is also set to zero when there are more than 1024 pictures in a GOP.. EX1005, 87. This is a limitation of the number of bits used to express numbers.

D.5.3.2 Temporal reference

The Temporal Reference is a ten-bit number which can be used to define the order in which the pictures must be displayed. It may be useful since pictures are not transmitted in display order, but rather in the order which the decoder needs to decode them. The first picture, in display order, in each group must have Temporal Reference equal to zero. This is incremented by one for each picture in the group.

Some example groups of pictures with their Temporal Reference numbers are given below:

Example (a) in display order	I	B	P	B	P								
	0	1	2	3	4								
Example (a) in decoding order	I	P	B	P	B								
	0	2	1	4	3								
Example (b) in display order	B	B	I	B	B	P	B	B	P	B	B	P	
	0	1	2	3	4	5	6	7	8	9	10	11	
Example (b) in coded order	I	B	B	P	B	B	P	B	B	P	B	B	
	2	0	1	5	3	4	8	6	7	11	9	10	
Example (c) in display order	B	I	B	B	B	B	P	B	I	B	B	I	I
	0	1	2	3	4	5	6	7	8	9	10	11	12
Example (c) in coded order	I	B	P	B	B	B	B	I	B	I	B	B	I
	1	0	6	2	3	4	5	8	7	11	9	10	12

Figure D.19 -- Examples of groups of pictures and temporal references

EX1005, 87-88; EX2001, ¶¶ 59-61. This is different from the “coded order” of the pictures, which defines the order that the pictures are decoded. As illustrated in Figure D.19, the coded order for a picture can be different from the temporal order.

a) Petitioner’s False Exemplar

In order to make the arguments that Petitioner asserts in Ground 1, Petitioner must first construct a narrowed interpretation of MPEG-1, which Petitioner calls the “Exemplary Closed GOP.” Pet. 16-18. Ignoring the entirety of Figure D.18 of MPEG-1, Petitioner, and its expert, focus solely on one “typical example” shown in Fig. D.18(a), ignoring the remainder of Fig. D.18 and the associated text. EX1005, 86. The problem with Petitioner’s reliance on its False Exemplar from Figure

D.18(a) is that Petitioner confuses the information that closed_gop flag actually conveys according to MPEG-1 (i.e., “whether the group of pictures is open or closed,” EX1005, MPEG-1 at D.5.2) with a particular circumstance shown by Figure D.18 that goes beyond the information closed_gop flag conveys.

Specifically, Petitioner argues that a “a key feature of this exemplary closed GOP is a single I-picture must be the first picture of the GOP in both decoding order and display order and must have a Temporal Reference of zero.” Pet. 17. But these are not requirements imposed by MPEG-1. These circumstances are not required by the presence of a closed_gop flag. Rather, these circumstances merely reflect a “[e]xample group[] of pictures in display order.” EX1005, 86; EX2001, ¶¶ 62-64.

This conflation—between an example group of pictures and the actual meaning of the closed_gop parameter—goes to the heart of one deficiency of the Petition. One of the claim elements in the Challenged Claims is “an indication of at least one image frame, which is the first image frame, in decoding order, of an independent sequence, wherein all motion-compensated temporal prediction references of the independent refer only to image frames within said independent sequence.” Petitioner cannot show the claimed indication by pointing to an indication (such as closed_gop flag) that does not convey the required indication but—in a coincidental scenario shown as an example—happens to coincide with certain conditions. EX2001, ¶¶ 62-64.

Below is the entire Fig. D.18.

Closed GOP

A one bit flag follows the time code. It denotes whether the group of pictures is open or closed. Closed groups can be decoded without using decoded pictures of the previous group for motion compensation, whereas open groups require such pictures to be available.

A typical example of a closed group is shown in figure D.18a.

I	B	B	P	B	B	P	B	B	P	B	B	P
0	1	2	3	4	5	6	7	8	9	10	11	12

(a) closed group

B	B	I	B	B	P	B	B	P	B	B	P	B	B	P
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14

(b) open or closed group

Figure D.18 -- Example groups of pictures in display order

A less typical example of a closed group is shown in figure D.18b. In this example, the B-pictures which precede the first I-picture must use backward motion compensation only, i.e. any motion compensation must be based only on picture number 2 in the group.

If the closed_gop flag is set to 0 then the group is open. The first B-pictures that precede the first I-picture in the group may have been encoded using the last picture in the previous group for motion compensation.

Fig. D.18 shows that for D.18(b), described as an “open *or closed* group [of pictures],” the I-frame is not necessarily the first frame in display order. The example of D.18(b) shows that the first coded pictures or frames in a closed GOP may be B-pictures. EX1005, 86; EX2001, ¶¶ 65-67. Even Petitioner and its expert acknowledge this, noting that the I-frame is only first in its False Exemplar because “the example specifies that any B-pictures preceding the first I-picture have been omitted.” Pet. 17; EX2001, ¶¶ 65-67.

Further, in its False Exemplar, there is—coincidentally—only one I-frame. Pet. 17. Yet, other well-known examples of GOPs in MPEG-1 have more than one I-frame. Figure D.17 makes this clear:

Petitioner relies heavily on Figure 5A of Kim. Kim describes FIGS. 5A and 5B as illustrating “examples of a logical data structure of a digital data stream compressed and recorded on the optical disk according to [Kim’s] present invention.” EX2001, ¶71.

According to Kim, in FIG. 5A, each “P-picture frame P1, P2, P3 has a current address (“CAD”) indicating the current address of the P-picture, and an I-picture reference address (“IAD”) indicating the address of the corresponding (or previous) I-frame.” Kim at 4:46-52 (shown below).

The bit stream generated and transmitted to the recording/
reproducing unit **140** as described above has a logical
structure as shown in, e.g., FIG. **5A**. As shown therein, each
P-picture frame P1, P2, P3 has a current address CAD
50 indicating the current address of the P-picture, and an
I-picture reference address IAD indicating the address of the
corresponding (or previous) I-frame. If image signals are

EX2001, ¶72.

Petitioner relies on FIG. 5A and Kim at 4:46-52 to show “an indication of at least one image frame, which is the first image frame, in decoding order, of an independent sequence, wherein all motion-compensated temporal prediction references of the independent sequence refer only to image frames within said independent sequence.” This is incorrect. EX2001, ¶73. Petitioner points to an IAD of 0000 as the claimed “indication” and argues FIG. 5A discloses an independent sequence because coincidentally the P pictures in FIG. 5A refer to the first I frame.

As with MPEG-1, Petitioner relies on what appears to be happenstance, not actual teaching of Kim, to then infer the “indication” claim limitation. EX2001, ¶74. For example, that is because the IAD address for an I-picture is “zero or absent” and Kim discloses it as such referring to Fig. 6.

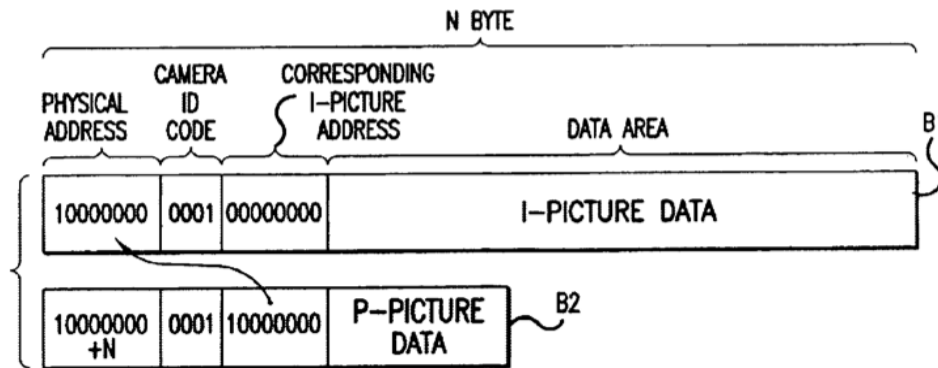


FIG.6

Since an I-picture does not require a reference to another I-picture, the field can be “zero or absent” and a POSITA reading the disclosure would understand that the field could take any value. Kim, 4:66-5:1; EX2001, ¶¶74-75. Thus, there is no particular need for it to be zero or absent, and does not have any functional use. EX2001, ¶¶74-76.

D. Asserted Grounds

Petitioner asserts the following grounds, none of which have a reasonable likelihood of success:

Ground		Claims	Prior Art
1	103	8, 10, 11	MPEG-1
2	103	8, 10, 11	Kim
3	103	9	MPEG-1, Yagasaki

Pet. 2.

E. POSITA

Petitioner identified that the POSITA “would have had a (1) Bachelor’s degree in electrical engineering, computer engineer, computer science, or a comparable field of study such as physics, and (2) approximately two to three years of practical experience with video encoding/decoding . . . [and] [a]dditional experience can substitute for the level of education, and vice-versa.” Pet. 9. Because this Response does not depend on the level of ordinary skill in the art, Patent Owner has applied Petitioner’s definition of a POSITA. Patent Owner reserves the right to argue in favor of different level of skill should this Petition be instituted.

F. Claim Construction

Petitioner identifies no claims for construction. Pet. 9. Likewise, Patent Owner identifies no claims for construction at this juncture based on Petitioner’s representation that it has not sought to construe any claim terms. Patent Owner reserves the right to address this position should this Petition be instituted.

G. Claim Table

For the sake of this analysis, Patent Owner will adopt Petitioner's limitation labels reproduced below:

Reference	Claim Limitation
Claim 8	
8[pre]	A method for decoding a compressed video sequence, the method comprising:
8[a]	decoding from the video sequence an indication of at least one image frame, which is the first image frame, in decoding order, of an independent sequence, wherein all motion-compensated temporal prediction references of the independent sequence refer only to image frames within said independent sequence;
8[b]	starting the decoding of the video sequence from said first image frame of the independent sequence, whereby the video sequence is decoded without prediction from any image frame decoded prior to said first image frame
8[c]	decoding identifier values for image frames according to a numbering scheme; and
8[d]	resetting the identifier value for the indicated first image frame of the independent sequence
Claim 9	

9	A method according to claim 8, wherein the indication is a separate flag included in the header of a slice
Claim 10	
10[pre]	A video decoder comprising at least one processor and at least one memory including computer program code, the at least one memory and the computer program code configured to, with the at least one processor, cause the video decoder to decode a compressed video sequence, by causing the video decoder to at least:
10[a]	decode from the video sequence an indication of at least one image frame, which is the first image frame, in decoding order, of an independent sequence, wherein all motion-compensated temporal prediction references of the independent sequence refer only to image frames within said independent sequence;
10[b]	start the decoding of the video sequence from said first image frame of the independent sequence, whereby the video sequence is decoded without prediction from any image frame decoded prior to said first image frame; and
10[c]	decode identifier values for image frames according to a numbering scheme; and
10[d]	reset the identifier value for the indicated first image frame of the independent sequence.
Claim 11	
11[pre]	A computer program product, stored on a non-transitory computer readable medium and executable in a data processing device, for

	decoding a compressed video sequence, the computer program product comprising:
11[a]	a computer program code for decoding from the video sequence an indication of at least one image frame, which is the first image frame, in decoding order, of an independent sequence, wherein all motion-compensated temporal prediction references of the independent sequence refer only to image frames within said independent sequence;
11[b]	a computer program code for starting the decoding of the video sequence from said first image frame of the independent sequence, whereby the video sequence is decoded without prediction from any image frame decoded prior to said first image frame;
11[c]	a computer program code for decoding identifier values for image frames according to a numbering scheme; and
11[d]	a computer program code for resetting the identifier value for the indicated first image frame of the independent sequence.

III. ARGUMENT

A. Petitioner’s Expert Declaration Should be Given No Weight Because it Repeats Arguments From the Petition with No Substantive Difference

The Board has previously denied institution in part because the Petitioner’s expert declaration was given no probative weight. For example, in *Kinetic Technologies*, the Board denied institution, in part because the petitioner’s expert declaration was given “no probative weight” because it contained arguments that

were identical to arguments set forth in the petition and merely added the phrase “it is my opinion that,” and the Board found that “merely repeating an argument from the Petition in the declaration of a proposed expert does not give that argument enhanced probative value.” *See Kinetic Technologies, Inc. v. Skyworks Solutions, Inc.*, IPR2014-00529, Paper 8 at 14-15 (PTAB Sep. 23, 2014). In *Volkswagen*, the Board denied institution, in part because the petitioner’s expert declaration “provide[d] little additional probative value” because it contained arguments that were identical to arguments set forth in the petition. *Volkswagen Group of America, Inc. v. StratosAudio, Inc.*, IPR2021-00717, Paper 12 at 36-38 (PTAB Nov. 12, 2021); *see also Facebook, Inc. v. Voxer IP LLC*, IPR2021-00399, Paper 8 at 22 (PTAB July 21, 2021) (“Petitioner cites [Expert’s] declaration to support its arguments. . . [Expert’s] arguments, however, mirror the arguments set forth in the Petition and do not provide further support for Petitioner’s position that Munje discloses or suggests ‘[a]n embeddable communications software module that allows a software application to access a communications system.’ Thus, Petitioner fails to show how Munje discloses or suggests this limitation”).

Here, Petitioner’s expert’s (EX1003) analysis of the limitations is almost identical to the analysis in the Petition, down to the same parentheticals in the citations. *Compare* Pet. 19-25 (regarding limitation 8[a], 8[b] *with* EX1003 at ¶¶84-102. The only differences are changes from, for example, “MPEG-1 teaches . . .” to

“In my opinion, MPEG-1 teaches” (e.g. Pet. 19 (following header “b. 8[a]”) and beginning of ¶84) or adding “it is my opinion that” to the concluding paragraph in the declaration where it excludes that in the Petition.

This Board has previously held in situations like this when an expert adds nothing beyond what is already found in the Petition, that the expert testimony should be given little to no weight. *Samsung Electronics Co., Ltd. et al v. RightQuestion, LLC*, IPR2022-0025, Paper 17 at 24 (PTAB June 9, 2022) (“Petitioner’s declarant also makes this same statement verbatim, without more, and with no further explanation or additional citations to evidence. . . We give such conclusory, unsupported assertions by Petitioner’s expert little or no weight.”); *see also In re Am. Acad. of Sci. Tech Ctr.*, 367 F.3d 1359, 1368 (Fed. Cir. 2004) (“[T]he Board is entitled to weigh the declarations and conclude that the lack of factual corroboration warrants discounting the opinions expressed in the declarations.”); *Rohm and HaasCo. v. Brotech Corp.*, 127 F.3d 1089, 1092 (Fed. Cir. 1997) (noting that a fact finder is not required to “credit the unsupported assertions of an expert witness”); 37 C.F.R. § 42.65(a) (“Expert testimony that does not disclose the underlying facts or data on which the opinion is based is entitled to little or no weight.”). Accordingly, Petitioner’s expert’s support for the arguments Petitioner asserts should be given no weight and the arguments within the Petition should be reviewed in that light.

B. Petitioner Has Not Established A Reasonable Likelihood That The Challenged Claims Are Unpatentable In Light Of Ground 1 (MPEG-1).

1. Petitioner fails to demonstrate that limitations 8[a], 10[a], and 11[a] are obvious over MPEG-1

Each of limitations 8[a], 10[a], and 11[a] are written with similar language and require “[decoding/decode] from the video sequence an indication of at least one image frame, which is the first image frame, in decoding order, of an independent sequence, wherein all motion-compensated temporal prediction references of the independent sequence refer only to image frames within said independent sequence.” Petitioner² has failed to show that MPEG-1 teaches or suggests these limitations. EX2001, ¶¶78-79.

Petitioner asserts two distinct arguments for how the “[decoding/decode] from the video sequence an indication of at least one image frame, which is the first image frame, in decoding order, of an independent sequence limitations” are taught or

² Because Petitioner put forth an expert declaration that is substantively identical to the limitation by limitation analysis, Petitioner as used in these claim sections refers to both Petitioner’s argument and the substantively identical expert declaration substance.

suggested—pointing to MPEG-1’s closed GOP or, alternatively, to MPEG-1’s Temporal Reference.

First, Petitioner first asserts that MPEG-1’s closed_gop teaches or suggests “[decoding/decode] from the video sequence an indication of at least one image frame, which is the first image frame, in decoding order, of an independent sequence.” Petitioner is incorrect. EX2001, ¶¶79-80.

As an initial matter, MPEG-1’s closed GOP is only an indication of whether or not the group of pictures is open or closed; it does not indicate an I-frame, nor does it identify an I-frame. EX1005, 37; EX2001, ¶81. Indeed, the closed GOP information at its own structural level of the coded video bitstream data and is not related to any particular frame:

0.5 Structure of the coded video bitstream

This part of ISO/IEC 11172 specifies a syntax for a coded video bitstream. This syntax contains six layers, each of which either supports a signal processing or a system function:

Layers of the syntax	Function
Sequence layer	Random access unit: context
Group of pictures layer	Random access unit: video
Picture layer	Primary coding unit
Slice layer	Resynchronization unit
Macroblock layer	Motion compensation unit
Block layer	DCT unit

EX1005, 16; EX2001, ¶81. Syntax elements in the GOP layer apply to an **entire GOP**, i.e. a collection of coded pictures, whereas syntax elements in the Picture layer apply to a specific coded picture. This means that when a decoder processes the bitstream and decodes the syntax element closed_gop, it does not decode an

indication about any particular coded frame, but instead receives information that pertains to an entire GOP. EX2001, ¶82. That is, there is no further information provided about a frame whatsoever when the decoder processes the closed_gop flag. EX2001, ¶82. The decoder remains unaware of any particular frame. For this reason alone, closed_gop, it cannot indicate a first image frame (or indeed any specific coded frame) in an independent sequence. EX2001, ¶82.

Nor can the closed_GOP flag be used inherently to determine an initiation picture (or any specific coded frame or picture) in an independently decodable group of pictures. The disclosures of MPEG-1 specify the opposite, namely that a “group of pictures shall contain one or more I-Pictures.” EX1005, 85. EX2001, ¶83. Indeed, it could even be unconstrained. EX2001, ¶83. The Figures and examples in MPEG-1 illustrate that a wide variation in GOP sizes and structures is possible, such that for example there may be a varying number of I pictures in GOPs that conform to MPEG-1:

Some examples of groups of pictures are given below:

I												
I	P	P										
I	B	P	B	P								
B	B	I	B	P	B	P						
B	B	I	B	B	P	B	B	P	B	B	P	
B	I	B	B	B	B	P	B	I	B	B	I	I

Figure D.17 -- Examples of groups of pictures in display order

EX1005, 85; EX2001, ¶84.

Thus, while the closed_GOP flag can indicate whether or not the GOP is closed, it cannot and does not identify or indicate which I-picture in the GOP is the first image, in decoding order, of that group of pictures. EX2001, ¶85. Petitioner's False Exemplar ignores these facts.

Further, this distinction is not mere semantics. The “idea of the [’321 Patent’s] invention” “is to determine an initiation picture in an independently decodable group of pictures, whereby in the decoding phase any picture prior to said initiation picture is defined as unusable for reference.” ’321 Patent, 4:31-38. And in failing to do so, the scalability and random access benefits described by the ’321 Patent would not be achieved. EX2001, ¶86. For example, according to the ’321 Patent, SI pictures can be used to allow random access into what MPEG-1 would deem a closed group of pictures, but without the indication provided by the ’321 Patent being related to the *frame*, not the *group*, a decoder would not be able to recognize the SI frame types (among others) for random access, subsequences, or other scalability benefits. ’321 Patent, 9:54-10:23; EX2001, ¶87.

Second, Petitioner points to MPEG-1’s Temporal Reference of zero teaches “decoding from the video sequence an indication of at least one image frame, which is the first image frame, in decoding order, of [the] independent sequence.” Pet. 23-24. Relying on its False Exemplar Petitioner asserts that “the first picture in decoding order of the *exemplary* closed GOP will always be an I-frame with a

Temporal Reference of zero”. *Id.* (emphasis added). The problem with Petitioner’s argument, however, is that it relies on an “*exemplary* closed GOP.” *Id.* (emphasis added). In another words, the Petition relies on coincidence rather than any indication *of* something (here, an indication *of* at least one image frame, which is the first image frame, in decoding order, of [the] independent sequence). EX2001, ¶¶88-89. It is not true that a closed GOP will always have a first picture in decoding order that is an “I-frame with a Temporal Reference of zero” as the Petition suggests. EX2001, ¶89. Neither closed_GOP flag nor Temporal Reference indicate any such arrangement. EX2001, ¶89. For example, Figure D.19 shows many instances where an I-picture is not the first image in display order:

D.5.3.2 Temporal reference

The Temporal Reference is a ten-bit number which can be used to define the order in which the pictures must be displayed. It may be useful since pictures are not transmitted in display order, but rather in the order which the decoder needs to decode them. The first picture, in display order, in each group must have Temporal Reference equal to zero. This is incremented by one for each picture in the group.

Some example groups of pictures with their Temporal Reference numbers are given below:

Example (a) in display order	I	B	P	B	P								
	0	1	2	3	4								
Example (a) in decoding order	I	P	B	P	B								
	0	2	1	4	3								
Example (b) in display order	B	B	I	B	B	P	B	B	P	B	B	P	
	0	1	2	3	4	5	6	7	8	9	10	11	
Example (b) in coded order	I	B	B	P	B	B	P	B	B	P	B	B	
	2	0	1	5	3	4	8	6	7	11	9	10	
Example (c) in display order	B	I	B	B	B	B	P	B	I	B	B	I	I
	0	1	2	3	4	5	6	7	8	9	10	11	12
Example (c) in coded order	I	B	P	B	B	B	B	I	B	I	B	B	I
	1	0	6	2	3	4	5	8	7	11	9	10	12

Figure D.19 -- Examples of groups of pictures and temporal references

EX1005, 87; EX2001, ¶90. Petitioner cannot ignore this by simply altering MPEG-1 through its False Exemplar.

Two reasons show the error in Petitioner’s argument. For the first example, Fig. D.18b, which MPEG-1 discloses may describe an “open or closed GOP”. This MPEG-1 example may be a closed GOP and begins with two B-pictures. Thus the first coded picture in display order, with a Temporal Reference of 0, is in this case a B-picture. As MPEG-1 specifies (p84), the first coded picture in a GOP in **bitstream** (i.e. decoding) order must be an I-picture. Thus in the D.18b example, a Temporal Reference of 0 does not indicate “the first image frame, in decoding order” of the GOP, let alone of an independent sequence. In the D.18b example, the first coded image frame in decoding order is the I-picture with display order 2 and therefore with Temporal Reference of 2. EX2001, ¶91.

The examples of Fig. D.19 further illustrate the flaw in Petitioner’s argument. Out of the three examples, only Example (a) has the property that the picture with Temporal Reference 0 happens to be an I-picture. Examples (b) and (c) start with a B-picture in display order, so that the first I-picture in decoding order (“coded order”) has a Temporal Reference of 2 or 1 respectively. Thus out of the five examples in Figs. D.18 and D.19, only **two** illustrate GOPs in which Temporal Reference of the first I-picture happens to be 0 and **three** show GOPs where the Temporal Reference of the first I-picture is **not** 0. EX2001, ¶92.

Second, MPEG-1 explains that the Temporal Reference may be reset to zero in a large GOP, whenever Temporal Reference reaches 1023. Figure D.20 illustrates an example of just such a GOP. EX2001, ¶93.

Thus Temporal Reference is not and cannot be “an indication of a first image frame in decoding order of an independent sequence”. In an MPEG-1 GOP, whether or not the first frame of a GOP in decoding order (which is always an I-picture) has a Temporal Reference of 0 is mere coincidence. EX2001, ¶94.

In the False Exemplar, Petitioner has constructed a case such that the I-picture is coincidentally the first image in display order, and then relied on it being the first image in display order (hence a Temporal Reference of zero) to show that an I-picture is the first image in display order—a circular argument that results from its False Exemplar. EX2001, ¶95. But Temporal Reference is just that—a reference for *display order* and while display order and decoding order may at times incidentally coincide with one another, such events do not rise to the level of a rule taught by MPEG-1. EX2001, ¶95. Thus, Petitioner has failed to show that MPEG-1 teaches or suggests the [a] limitations. EX2001, ¶96.

2. Petitioner fails to demonstrate that limitations 8[b], 10[b], and 11[b] are obvious over MPEG-1 for the same reasons as 8[a], 10[a], and 11[a]

Each of limitations 8[b], 10[b], and 11[b] are written with similar language and require “indication of at least one image frame, which is the first image frame,

in decoding order, of an independent sequence” as with 8[a], 10[a], and 11[a]. And, as discussed above in III.B.2, MPEG-1 does not teach or suggest the “indication of at least one image frame, which is the first image frame, in decoding order, of an independent sequence” as the claim requires. EX2001, ¶¶97-98. Thus, MPEG-1 does not teach or suggest starting the decoding of the video sequence from the “first image frame” of the independent sequence under either theories Petitioner and Dr. Havlicek assert for the “indication of at least one image frame, which is the first image frame, in decoding order, of an independent sequence.” EX2001, ¶¶97-98.

3. Petitioner fails to demonstrate that limitations 8[d], 10[d], and 11[d] are obvious over MPEG-1 because MPEG-1 does not teach or suggest resetting the identifier value as required

Each of limitations 8[d], 10[d], and 11[d] are written with similar language and require “[resetting/reset] the identifier value for the indicated first image frame of the independent sequence.” Petitioner has failed to show that MPEG-1 teaches or suggests these [d] limitations. EX2001, ¶99.

While alternatively pointing to the Temporal Reference as an indication of at least one image frame, which is the first image frame, in decoding order, of an independent sequence, Petitioner also asserts it teaches or suggests the “resetting the identifier value for the indicated first image frame of the independent sequence.” Petitioner is wrong here, too. EX2001, ¶100. Petitioner’s arguments are flawed.

First, Petitioner uses its False Exemplar and ignores the full disclosure of MPEG-1. For Petitioner to make its argument, it has to show that the Temporal Reference must be set to zero for the indicated first image frame of the independent sequence. But, as shown above III.B.1, MPEG-1 does not require that an I-frame always have a temporal reference of zero, and as a result there can be no “resetting” of an identifier value. EX2001, ¶¶101. (see Fig. D.18(b), showing B-frames with Temporal Reference values of 0 and 1, while the first I-frame has a Temporal Reference of 2). Additionally, Petitioner’s False Exemplar excludes the case where there are multiple I-frames in a closed GOP. In such an instance it could be that an I-frame after the first one (if that first one also coincidentally was the first frame in display order), would be the first I-frame to be decoded, but it would not have a Temporal Reference of zero, and thus there would not be a “reset.” EX2001, ¶102.

Thus, Petitioner has failed to establish a reasonable likelihood that this limitation would be found unpatentable. EX2001, ¶103.

C. Petitioner Has Not Established A Reasonable Likelihood That The Challenged Claims Are Unpatentable In Light Of Ground 2—Kim.

1. Petitioner fails to demonstrate that limitations 8[a], 10[a], and 11[a] are obvious over Kim

Each of limitations 8[a], 10[a], and 11[a] are written with similar language and require “[decoding/decode] from the video sequence an indication of at least one image frame, which is the first image frame, in decoding order, of an independent

sequence, wherein all motion-compensated temporal prediction references of the independent sequence refer only to image frames within said independent sequence.” Petitioner has failed to show that Kim teaches or suggests these [a] limitations. EX2001, ¶104.

Petitioner points to Figure 5A of Kim as “show[ing] the recited “indication of at least one image frame, which is the first image frame, in decoding order, of an independent sequence.” Pet. 44. Specifically, Petitioner states that “Kim also teaches the recited ‘indication’” because “in Kim’s Figure 5A, an IAD of 0000 or zero is ‘in indication of at least one image frame, which is the first image frame, in decoding order, of an independent sequence.’” But, the only thing that an IAD of 0000 indicates is that the existing frame is an I-frame. EX2001, ¶105. Petitioner attempts to explain this away by arguing that “[b]ecause each I-picture starts an independent sequence, the IAD of 0000 or zero indicates that a given picture starts an independent sequence.” This is proven incorrect by Figure 5B, which shows three I-frames in decoding order in a row, followed by three p-frames each depending on a different I-frame:

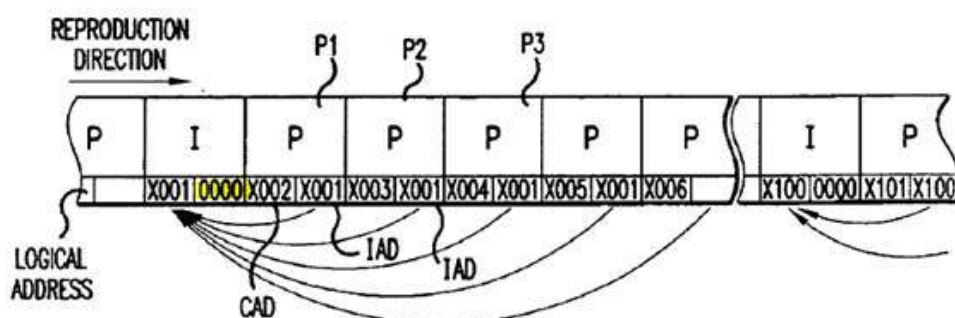


FIG.5A

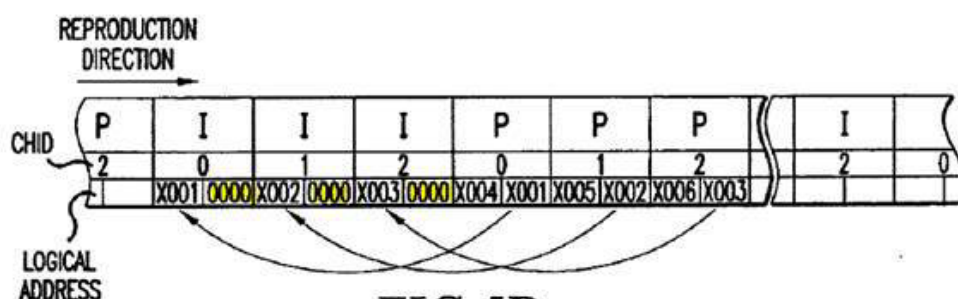


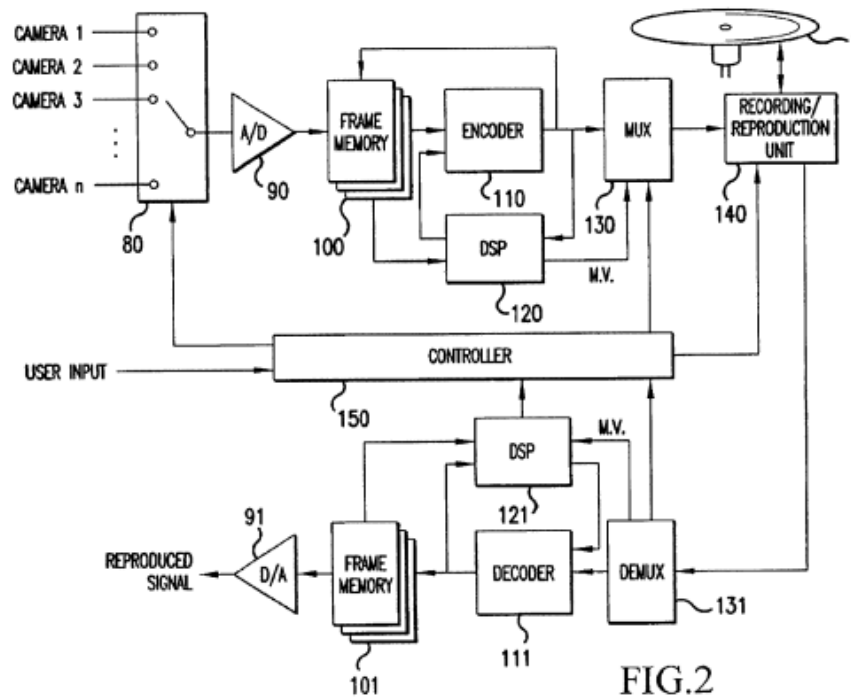
FIG.5B

Kim, Fig. 5. EX2001, ¶106. Thus, while Figure 5A coincidentally has an image in which an I-frame begins a sequence followed by P-frames, the full disclosure of Kim confirms Petitioner is incorrect. EX2001, ¶107.

Further, Petitioner misses that Kim confirms that these IAD values are not decoded by the decoder at all. In Petitioner's argument, it suggests that a POSITA would combine the bitstream of Figure 5B with the decoding pathways of Figure 4.³ Pet. 41. EX2001, ¶108. This is crucial, because Figure 4, then, provides the only source of potential evidence for Petitioner on decoding. But the specification makes

³ In the event this IPR is instituted, Patent Owner reserves the right to argue there is a lack of motivation to combine.

clear that the controller of Kim does not look at IAD information until after it decodes the requested frame. EX2001, ¶109. Below is a Figure identifying the components of Kim:



EX1006, Fig. 2; EX2001, ¶109.

As explained in column 5, first the decoder goes about reproducing the correct, requested image data (lines 11-25, also shown as steps S21, S22, and S23 in Figure 4). Only after that decoding does the Kim decoder actually look to determine what “type” the original data is. EX2001, ¶110. Fig. 4 (step S31/S32); 5:38-45. In fact, it isn’t the controller that does this at all, but DSP 121, an entirely different module. Kim, 5:34-37 (“Then the property (type) of the currently restored image

data is determined in Step S31 by the reproducing DSP 121, and the determination result is transmitted to the controller 150.”) EX2001, ¶111. It is only at that point does the Kim device even consider what type the frame is, after having pulled the requested frame. EX2001, ¶112. Thus, it is not possible for Kim to disclose this limitation—it does not decode an indication of a first image frame. EX2001, ¶¶112-13.

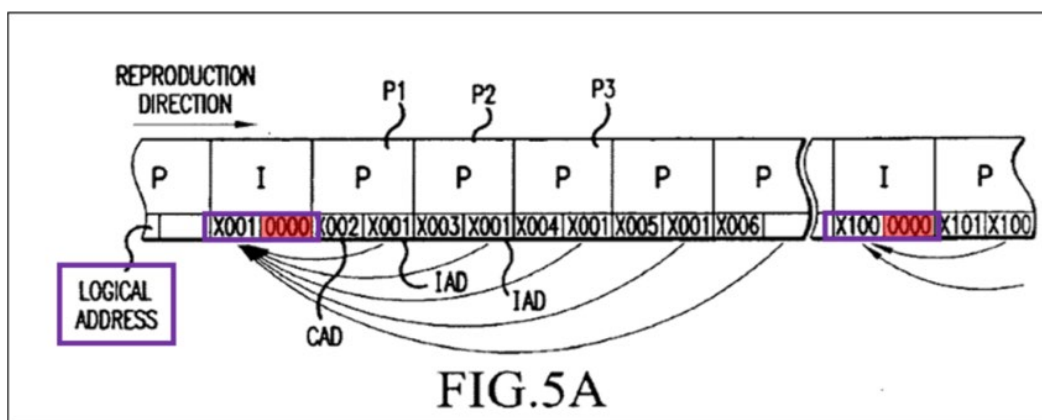
2. Petitioner fails to demonstrate that limitations 8[b], 10[b], and [11[b] are obvious over Kim for the same reasons as 8[a], 10[a], and 11[a]

Each of limitations 8[b], 10[b], and 11[b] are written with similar language and require “indication of at least one image frame, which is the first image frame, in decoding order, of an independent sequence” as with 8[a], 10[a], and 11[a]. And, as discussed above in III.C.2, Kim does not teach or suggest the “indication of at least one image frame, which is the first image frame, in decoding order, of an independent sequence” as the claim requires. EX2001, ¶¶114-16.

3. Petitioner fails to demonstrate that limitations 8[d], 10[d], and 11[d] are obvious over Kim because Kim does not teach or suggest resetting the identifier value as required

Each of limitations 8[d], 10[d], and 11[d] are written with similar language and require “[resetting/reset] the identifier value for the indicated first image frame of the independent sequence.” Petitioner has failed to show that Kim teaches or suggests these limitations. EX2001, ¶¶117-18.

Contrary to Petitioner’s argument, Kim does not teach resetting the identifier value. @RRR Petitioner argues, at Pet. 55, that Figure 5A “shows that the IAD component of each logical address is reset to zero for each I-picture” and provides an annotated Figure 5 (reproduced below) where the I-picture logical address is in red and the “whole logical address” is outlined in purple:



Pet. 56. This is incorrect. EX2001, ¶118.

Petitioner asserted that Figure 4 is the alleged decoder for the combination, but nowhere in Figure 4 or anywhere else in Kim is there any disclosure that the decoder is doing any logical addressing, let alone any resetting. EX2001, ¶119. This fact alone dooms Petitioner’s argument. In fact, the contrary appears true from Kim’s limited disclosure, which states: “[i]n Step S13, the MUX 130 selectively outputs the I-picture data (or P-picture data), the camera ID code, and *the address of the I-picture data received from the encoder 110*, the recording DSP 120 and the

controller 150, *and generates a bit stream of certain bytes for each frame.*”

EX1006, 4:38-42. EX2001, ¶120.

D. Petitioner Has Not Established A Reasonable Likelihood That The Challenged Claims Are Unpatentable In Light Of Ground 3.

1. Petitioner fails to demonstrate that Claim 9 is obvious over MPEG-1 in combination with Yagasaki

Petitioner cannot show it met its burden for Ground 3. Claim 9 depends on Claim 8 and Petitioner relies on its Ground 1 to show the predicate independent claim is taught or suggested. But, as shown above in III.B.1-3, MPEG-1 fails to teach or suggest at least limitation 8[a], 8[b], and 8[d]. EX2001, ¶122-23. For that reason, Ground 3 fails.

IV. CONCLUSION

For any or all of the above-described reasons, Patent Owner respectfully requests that the Board deny institution.

Dated: June 27, 2024

Respectfully submitted,

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CERTIFICATION OF WORD COUNT

The undersigned hereby certifies that the portions of the above-captioned **PATENT OWNER'S PRELIMINARY RESPONSE** specified in 37 C.F.R. §42.24 include 6,985 words, in compliance with the 14,000 word limit set forth in 37 C.F.R. §42.24(b)(1). This word count was prepared using Microsoft Word 2010.

Dated: June 27, 2024

Respectfully submitted,

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CERTIFICATION OF SERVICE

The undersigned hereby certifies that a copy of this **PATENT OWNER'S PRELIMINARY RESPONSE PURSUANT TO 37 C.F.R. § 42.10(b)** has been served on Petitioner via email on the following counsel of record for Petitioner:

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