

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SNAP INC. and HISENSE USA CORPORATION,

Petitioners

v.

NOKIA TECHNOLOGIES OY,

Patent Owner

Case: IPR2025-01014

U.S. Patent No. 8,050,321

DECLARATION OF DR. IAIN RICHARDSON

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I, Dr. Iain Richardson, declare as follows:

I. INTRODUCTION

1. I have been retained on behalf of Nokia Technologies OY and asked to provide opinions in respect of Inter Partes Review (IPR) proceeding IPR2025-01014 which relates to U.S. Patent No. 8,050,321, which I will also refer to as simply the '321 Patent.

2. This Declaration summarizes the independent opinions that I have formed to date which are based on the material currently available to me. I reserve the right to modify my opinions, if necessary, based on further review and analysis of information that I receive after the filing of this Declaration, including in response to any positions taken by Petitioners or their experts that I have not been provided yet.

3. My findings, as explained below, are based on my study, experience, knowledge and background in the fields discussed below. I am informed by my education and my extensive experience in the fields of video compression and multimedia coding and communications. I have also relied on my review and analysis of the prior art, on information provided to me and on information I have independently reviewed.

II. EDUCATIONAL BACKGROUND AND QUALIFICATIONS

4. Details of my professional qualifications and background are summarized below and are set out in detail in my Curriculum Vitae, attached to this declaration.

5. I am Director and co-founder of Vcodex BV.

6. I have over 30 years of experience related to video and image compression and coding. I am qualified by education and experience to testify as an expert with respect to subject matter in the fields of video, image, multimedia and general-purpose data encoding, decoding, compression, decompression, and transmission.

7. I received a Master of Engineering (M.Eng.) degree in Electronic and Electrical Engineering from Heriot-Watt University in Edinburgh, Scotland in 1990. I received a Doctor of Philosophy (Ph.D.) degree in Video Compression from Robert Gordon University in Aberdeen, Scotland in 1999. I worked as a Digital Signal Processing (“DSP”) Hardware Designer with GEC Avionics Ltd. from 1990 to 1993.

8. In 1993, I assumed a post as a Lecturer, then Reader and eventually a Full Professor in the field of image and video compression in the School of Engineering at Robert Gordon University. In 2009, I was awarded the position of Honorary Professor with Robert Gordon University.

9. At Robert Gordon University, I founded and ran an image communication technology research laboratory. I carried out original research in the field of data, image, and video compression, initiated and managed research projects, and supervised research students.

10. I am the author of four books and over 70 journal and conference papers on video and image coding and communication, including two widely cited books on the H.264 / MPEG-4 industry standards for video compression. In my 2002 book, *Video Codec Design*, I discussed in detail the efficient implementation of image and video compression on software and hardware platforms.

11. In 1995, during my employment at Robert Gordon University, I co-founded and became Technical Director, equivalent of Chief Technology Officer, at 4i2i Communications Limited. I held this position until 2000. In my role at 4i2i, I was responsible for and engaged in the design of software and hardware modules for compression and communication systems. The designs included video processing algorithms in software and hardware for implementation on processing devices and the design of compression algorithms such as block-based transforms, run-length coding, and variable-length coding in software and hardware. A modified version of one of my video compression hardware designs was successfully used by NASA to stream video from the International Space Station.

12. In 2007, I founded Vcodex Limited and currently serve as the CEO, through which I provide technical and strategic advice to technology companies particularly relating to video, image, and data compression for streaming.

13. In 2009, I founded Onecodec Limited and served as CEO, leading the company's development of innovative video, image, and multimedia data compression and storage software and systems. Onecodec's technology and business activities were merged with Vcodex Limited in 2015.

14. I have previously prepared expert reports and testified in a number of cases concerning video and image compression, graphics compression, general-purpose data compression, and multimedia streaming.

15. I am a named inventor on 11 patents or patent applications, including U.S. and non-US patents and applications.

16. Because of my background, training, and experience, I am qualified as an expert in the technical areas relevant to the '321 patent. My company Vcodex BV is being compensated for my independent analysis as an expert with respect to this inter partes review (IPR) proceeding, but neither my compensation nor Vcodex BV's compensation is contingent in any way on the content of my analysis or the outcome of this proceeding. I have no financial interest in Petitioners (Snap Inc. or Hisense USA Corporation) or Patent Owner (Nokia Technologies Oy) and I have no financial interest in the challenged patent.

III. MATERIALS REVIEWED AND TIME OF INVENTION

17. The opinions contained in this Declaration are based on the documents that I reviewed or cited here, including the Petition (as well as all materials and expert declaration cited there), my professional judgment, and my education, experience, and knowledge regarding technologies related to the '321 Patent at and around the time the patent was filed.

IV. LEGAL STANDARDS

1. Overview

18. I am not an attorney or a legal expert, and I do not opine on matters of law. The legal standards, which are listed in this section and which I applied in reaching the conclusions expressed throughout this Declaration, were provided to me and explained to me by counsel. In preparing this Declaration, I have endeavored to faithfully apply these legal standards. I do not intend to offer opinions on the law. Below, I describe the legal standards that I applied in analyzing the claims of the '321 Patent.

19. I have been informed by counsel that the challenger of a patent's validity, in this case the Petitioners, bears the burden of proving invalidity of the patent.

2. Patent Claims

20. I have been informed by counsel that a patent's claims describe the

invention made by the inventors and describe what the patent owner owns and what the owner may prevent others from doing.

21. I have been informed by counsel that claims may describe products, such as machines or chemical compounds, or processes for making or using a product. Claims are usually divided into parts or steps called limitations.

22. I have been informed by counsel that there are two types of claims: independent claims and dependent claims. An independent claim sets forth all the requirements that must be met in order to be covered by that claim. Thus, it is not necessary to look at any other claim to determine what an independent claim covers. A dependent claim does not itself recite all of the requirements of the claim, but refers to another claim for some of its requirements. In this way, a dependent claim depends on another claim. The law considers a dependent claim to incorporate all of the requirements of the claim to which it refers.

23. I have been informed by counsel that a dependent claim then adds its own additional requirements. To determine what a dependent claim covers, it is necessary to look at both the dependent claim and any other claims to which it refers.

24. I have been informed by counsel that in a case where a dependent claim incorporates the limitations of an independent claim upon which it depends, if a reference fails to disclose any of the limitations of the independent claim, the

dependent claims which depend on that independent claim cannot be made invalid by such a reference. As a result, any of the references at issue in this proceeding that fail to disclose all of the limitations of an independent claim necessarily also fail to disclose all of the limitations of claims which depend on that independent claim.

3. Burden of Proof for Invalidity

25. I have been informed by counsel and I understand that the party challenging the validity of an issued U.S. patent in an IPR bears the burden of proving invalidity through facts supported by a preponderance of the evidence. I have been informed that a “preponderance of the evidence” means evidence sufficient to prove that a fact is more likely true than it is not. I understand that, for the determination of whether to institute an IPR, the challenger must show a reasonable likelihood of success in invalidating at least one challenged claim.

4. Claim Construction

26. I have been informed by counsel and I understand that the first step in determining validity is to properly construe the claims. I have further been informed by counsel that, in this proceeding, the Board must determine the scope of the claims by using the same claim construction standard that United States District Courts use. Under this standard, the words of a claim are given their “ordinary” and “customary” meaning as would have been understood by a person of ordinary skill in the art at the time of the invention, unless there has been some specific definition or disavowal

of subject matter provided in the patent or file history. I have been informed that such a person of ordinary skill in the art looks to the claims, specification, and file history in understanding the meaning of the claim terms. I have applied this understanding in this declaration.

5. Person of Ordinary Skill in the Art

27. I have been informed by counsel and I understand that a person having ordinary skill in the art may be defined by factors such as, when considered at the time of the alleged invention: (a) the levels of education and experience of the inventor and other persons actively involved in the field; (b) the types of problems encountered in the field; (c) prior art solutions to those problems; (d) rapidity with which innovations are made; and (e) the sophistication of the technology.

6. Anticipation

28. I have been informed by counsel and I understand that a patent claim can be found invalid as anticipated if, and only if, each and every element of the claim, as properly construed, is found either explicitly or inherently in a single prior art reference. If the single prior art reference does not disclose explicitly or inherently any one claim limitation, then that claim is not anticipated. I have further been informed that the single prior art reference cannot merely disclose each element; rather, it must disclose all of the elements as arranged in the claim. I have been informed that for a prior art reference to “inherently” disclose something, the

reference must necessarily function in accordance with, or include the claimed limitations, to anticipate. The missing descriptive matter cannot merely probably or possibly include the claimed limitations. I have further been informed by counsel that, with respect to an anticipation analysis, it is improper to combine separate, distinct embodiments of a single prior art reference.

29. I have been informed that for a reference to be anticipatory, the reference must contain an enabling disclosure. I have been informed that merely naming or describing the subject matter is insufficient if it cannot be produced without undue experimentation.

7. Obviousness

30. I have been informed by counsel that a patent claim can be found invalid as obvious if the differences between the claim and the prior art references would have been obvious to a person of ordinary skill in the art at the time of the invention, taking into account (1) the scope and content of the prior art, (2) the differences between the prior art and the claims, (3) the level of ordinary skill in the art, and (4) any objective indicia of non-obviousness. I have further been informed by counsel that a claim can be found to be obvious in light of either a single prior art reference or the combination of multiple prior art references. I have been informed that references qualify as prior art for an obviousness determination only when they are analogous to the claimed invention. Two separate tests define the scope of

analogous prior art: (1) whether the art is from the same field of endeavor, regardless of the problem addressed; and (2) if the reference is not within the field of the inventor's endeavor, whether the reference still is reasonably pertinent to the particular problem with which the inventor is involved.

31. I have been informed that to be obvious in light of a single prior art reference or the combination of multiple prior art references, there must be a reason either to modify the single prior art reference or to combine the two or more prior art references to achieve the claimed invention. I have been informed by counsel that this reason may come from a teaching, suggestion, or motivation to combine which may come from the reference or references themselves, the knowledge or "common sense" of one skilled in the art, or from the nature of the problem to be solved, and may be explicit or implicit from the prior art as a whole. I have been informed by counsel that it is not sufficient that a person of ordinary skill merely could have modified or combined references, but that there must be a showing that a person of ordinary skill would have done so.

32. I have been informed by counsel that the combination of familiar elements according to known methods may be obvious when it does no more than yield predictable results.

33. I have further been informed by counsel that there is no suggestion to

combine, however, if a reference teaches away from its modification or combination with another source. A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant, or if it suggests that the line of development flowing from the reference's disclosure is unlikely to be productive of the result or property sought by the applicant. If, when combined, the references would produce a seemingly inoperative device, then they teach away from their combination. I have been informed that it is improper to combine references where the references teach away from their combination. I have been informed by counsel that the degree of teaching away will depend on the particular facts.

34. I have been informed that if a proposed modification would render the prior art device unsatisfactory or inoperable for its intended purpose, then the proposed modification would generally not be obvious.

35. I have been informed by counsel that it is improper to use hindsight in making the obviousness determination.

36. I have been informed by counsel that some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness must be made. I have been informed that, for example, there may be no rational underpinning

to support the legal conclusion of obviousness where systems are already complete and the party challenging validity seeks to mix and match components, which each exist in the separate systems, from these complete systems.

V. PERSON OF ORDINARY SKILL IN THE ART (POSITA)

37. Based on my review of the Petition, I understand that Petitioners have identified that the POSITA “would have had a (1) Bachelor’s degree in electrical engineering, computer engineering, 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.” For the purposes of my analysis for this Declaration, I have used the definition that the Petitioners have identified.

38. All of my opinions in this Declaration are from the perspective of a person of ordinary skill in the art, as the Petitioners defined it above and during the relevant time frame. During that time frame, I possessed at least the qualifications of such a POSITA.

VI. CLAIM CONSTRUCTION

39. I understand that claim terms are typically given their ordinary and customary meaning, as would have been understood by a person of ordinary skill in the art at the time of the alleged invention. In considering the meaning of the claims, I also understand that one must consider the claim language, specification,

prosecution history, and the knowledge of a person of ordinary skill in the art at the relevant time.

40. I understand that the Petition and Dr. Havlicek have stated that “no constructions are necessary” and therefore have not proposed any terms for construction. Petition at 7; Ex. 1003 (Havlicek Decl.) at ¶ 22.

41. Therefore, at this time, I have applied the plain and ordinary meaning as a POSITA would have understood it at the time of the invention and in accordance with the principles that I state above.

VII. BACKGROUND

1. The '321 Patent

42. The '321 Patent relates to improvements in video encoding and decoding that enables a decoder to identify where to start a decoding process, such as when a user randomly selects a frame to start viewing video, for example when joining a stream part-way through or when rewinding or fast-forwarding. This is known as random access in video coding, which the '321 Patent is directed to improving. '321 Patent at 3:52-56, 3:62-4:4, 4:48-60. The claims of the '321 Patent are directed to specific random-access problems and solutions described in the specification.

43. Specifically, “[a] problem in the numbering of image frames arises

when the user wishes to start browsing a video file in the middle of a video sequence. Such situations occur for example when the user wishes to browse a locally stored video file backward or forward or to browse a streaming file at a particular point; when the user initiates the playback of a streaming file from a random point, or when a video file that is to be reproduced is detected to contain an error that interrupts the playback or requires the playback to be resumed from a point following the error.” ’321 Patent at 11:11-20. The Patent identifies this as a problem because “[w]hen the browsing of a video file is resumed from a random point after previous browsing, discontinuity typically occurs in the image numbering. The decoder typically interprets this as unintentional loss of image frames and unnecessarily tries to reconstruct the image frames suspected as lost.” ’321 Patent at 11:20-25.

44. The ’321 Patent explains that this is a problem that arises in relation to the fact that video coding methods take advantage of a concept called temporal redundancy, which refers to the fact that “information comprised by consecutively displayed image frames is typically largely similar, i.e. successive image frames comprise a considerable amount of redundancy.” ’321 Patent at 1:55-2:4. Video coding methods take advantage of this redundancy by using a technique known as motion-compensated temporal prediction. ’321 Patent at 2:15-17. In this technique, a portion of a current frame to be encoded can be predicted from a portion of 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 at 2:16-20. This technique reduces redundancy in video coding and can greatly improve efficiency in video coding. '321 Patent at 2:5-33.

45. As the '321 Patent explains, I-frames (or INTRA-frames) are encoded frames whose encoded image information is 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 coded frames in the sequence. Such previously coded 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 at 2:20-32, 2:42-47.

46. However, one problem with using motion-compensated temporal prediction is that if a frame that is needed to decode other frames is missing or lost, “frames dependent on it can no longer be correctly decoded” either. '321 Patent at 2:9-33. One situation where this happens is when a user selects a random point of a video to start streaming from. '321 Patent at 11:11-25. The “decoder typically

interprets this as unintentional loss of image frames and unnecessarily tries to reconstruct the image frames suspected as lost. '321 Patent at 11:11-25.

47. The '321 Patent explains that “this [problem] can be avoided in the decoder by defining an initiation image in an independently decodable Group of Pictures GOP that is activated at the random point of the video file, and the number of the initiation image is set to zero. . . . Consequently, when activated at a random point, the decoder preferably sets the identifier of the first image frame, preferably an I-frame, of the independently decodable sub-sequence at zero.” '321 Patent at 11:26-40. Similarly, on the encoder side, “identifier values for pictures are encoded according to a numbering scheme, and the identifier value for the indicated first picture of an independent sequence is reset, preferably to zero.” '321 Patent at 4:42-45.

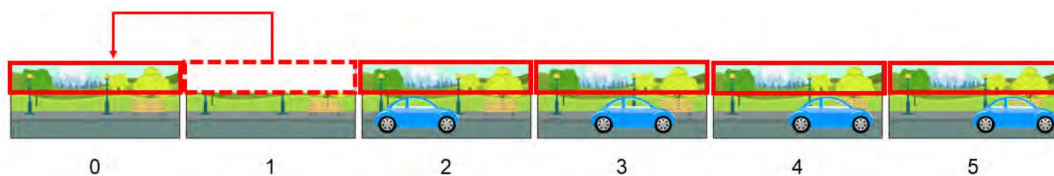
48. The '321 Patent claims such an improved method “that enable[s] detection of image frames from which a decoder can start the decoding process.” '321 Patent at 4:8-10. “The invention is based on the idea of encoding a video sequence comprising an independent sequence of image frames, wherein at least 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 at 4:16-20.

49. I have provided illustrations below to show the random-access

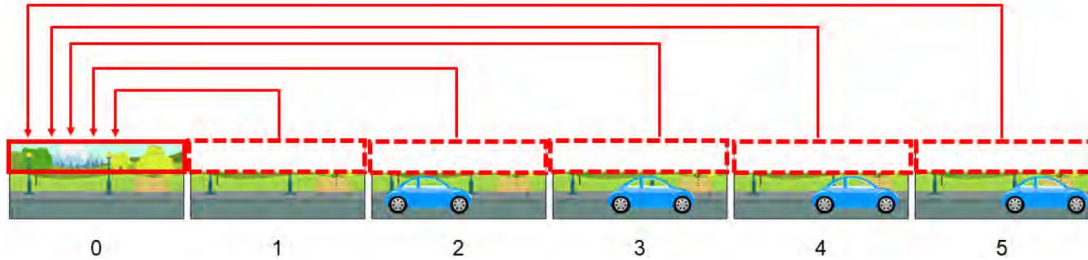
problems addressed by the '321 Patent. As shown below, a video encoder may exploit temporal redundancy, allowing redundant content in a series of video images (*e.g.*, the red boxes below) to be predicted from earlier reference pictures that include the same content, improving compression by avoiding the need to encode redundant content in later pictures.



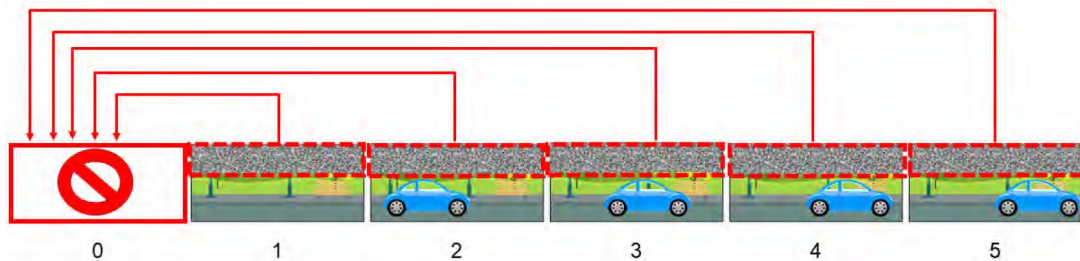
50. As shown below, the top of Picture 1 (dashed rectangle) is predicted from the top of Picture 0 (solid rectangle), exploiting the fact that Picture 0 contains the video content necessary for Picture 1.



51. In this example, the same information from Picture 0 can be used to improve the compression of a series of pictures. The top of Picture 0 (solid rectangle) is only transmitted once, and Pictures 1-5 predict that portion of their own content (arrows) from Picture 0.

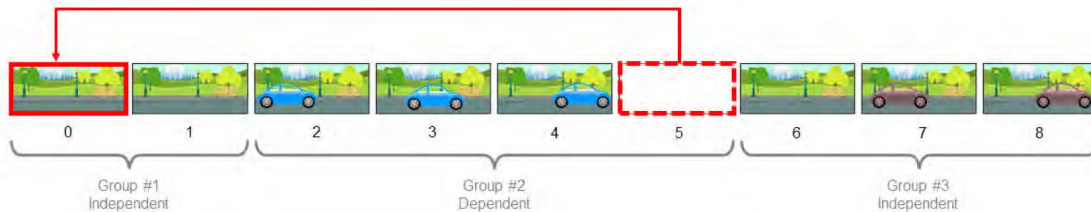


52. Temporal prediction can however lead to unwanted effects if errors occur during transmission. For example, decoding errors occur when the reference picture (Picture 0) is missing, and the predicted pictures (Pictures 1-5) cannot reference that video content, as illustrated below.



53. The '321 Patent discusses the concept of independent sequences or independently decodable groups of pictures. In the illustrative example below, a video sequence (Pictures 0-8) includes two independent sequences: Group #1 (Pictures 0-1) and Group #3 (Pictures 6-8). It also includes a dependent sequence: Group #2 (Pictures 2-5). An independent sequence makes use of predictions only from pictures within the same independent sequence, whereas a dependent sequence

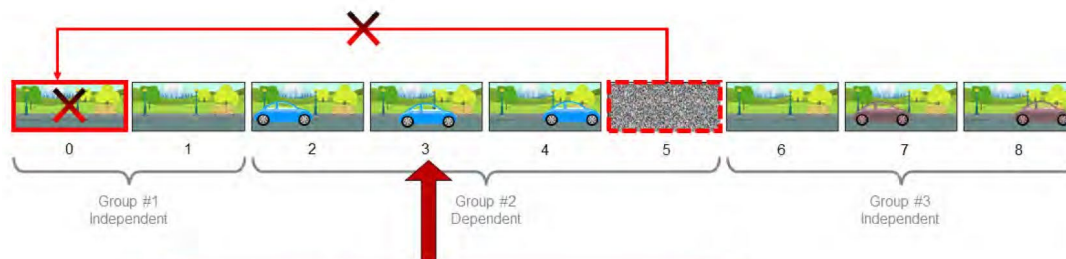
includes at least one picture that refers to another picture outside of that dependent sequence. Because Picture 5 in Group #2 is predicted from Picture 0 in Group #1, Group #2 is a dependent sequence.



54. In the above example, when a user randomly accesses a specific picture within the middle of a video sequence, the decoder must determine where it can begin decoding so that the decoded pictures can be displayed without any prediction errors. As the '321 Patent explains, prior art methods of identifying sources for prediction (such as reference picture selection) can pose challenges for random access, since certain pictures may be predicted from previous pictures that are not available at the decoder. '321 Patent, 3:52-56, 3:62-4:4. As explained in the '321 Patent, these dependencies present challenges with random access because the decoder does not know from which image frames it can begin decoding. '321 Patent, 3:52-56, 3:62-4:4.

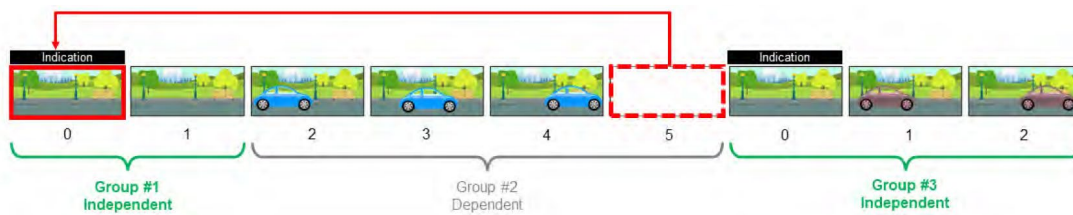
55. The example below illustrates this problem. The user selects Picture 3 as the random-access point. If the decoder starts decoding at Picture 3, an error

occurs when decoding Picture 5 because Picture 0 was not previously decoded and is not available at the decoder for predicting Picture 5.

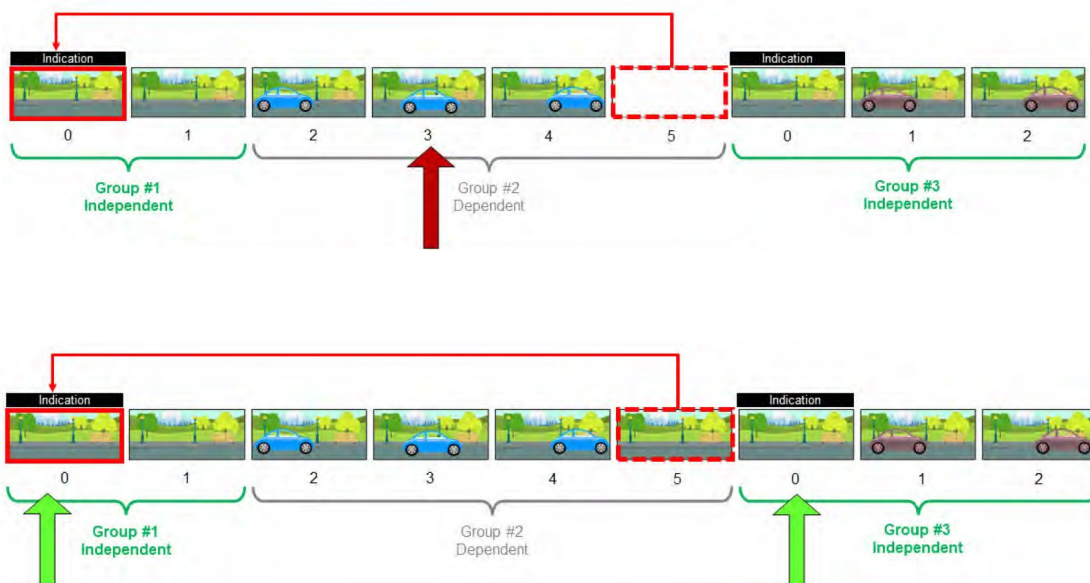


56. The '321 Patent claims a specific solution to address these prior art random-access problems. '321 Patent, 4:48-60. Specifically, the identification of an initiation frame or picture and resetting the numbering of that frame to zero solves the issue so that the decoder does not inadvertently interpret that certain frames are missing. '321 Patent, 11:11-40.

57. According to the '321 Patent claims, a decoder decodes an indication of the first image frame of an independent sequence. As an illustration, below are two independent sequences (Groups #1 and #3), each including an indication (black box) of a first image frame that informs the decoder where decoding can begin to avoid such problems with random access.



58. For example, if the user selects Picture 3 in Group #2 as the random-access point (dark red arrow in the top figure), decoding begins at the first image of one of the independent sequences, either Picture 0 in Group #1 (left-hand green arrow in the bottom figure) or Picture 0 in Group #3 (right-hand green arrow in the bottom figure). The picture numbering of Group #3 restarts with a Picture 0 and proceeds sequentially because it is an independent sequence.



59. As illustrated in the above example, 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. By detecting these image frames, the user can start playback of a video sequence from a random-access point and view the video without the errors that were present in the art at the time.

2. The Prior Art

a. Kim

60. Kim is directed to a Time Lapse recording/reproduction device and method. Ex. 1006 (Kim) at 1:8-12. Specifically, Kim describes recording, compressing and reproducing intermittently recorded image data (*i.e.*, single images captured at intermittent time intervals), which is significantly different from the problems and solutions of the ’321 Patent. In particular, Kim was concerned that traditional Time Lapse Video Cassette Recorders using magnetic tapes would suffer from “considerable use and wear” which deteriorates the quality of the images. Ex. 1006 (Kim) at 1:57-67. The solution that Kim suggests is to use an optical disk instead. Ex. 1006 (Kim) at 2:58-61. This is very far from the problems and solutions of the ’321 Patent.

61. Further, Kim is not related to video streaming, in contrast to the ’321 Patent. ’321 Patent at 1:13-15. Kim’s intermittent time lapse technology was directed to security systems for banks or museums. Ex. 1006 (Kim) at 1:14-19. In such implementations, single images may be recorded intermittently and then stored, for example on magnetic tapes or optical disk. These individual images can be

individually and incrementally reproduced when needed. However, Kim does not enable random access of streaming video or any playback of video and therefore is not directed to the issues of the '321 patent ('321 Patent at 1:13-31). Ex. 1006 (Kim) at 1:8-56, 6:17-20 (“only the desired images can be selectively reproduced with high display quality”). In fact, Kim does not discuss independently decodable video sequences anywhere in its disclosure. This makes sense given Kim’s emphasis on intermittently stored *individual image frames*. Ex. 1006 (Kim), 1:38-45.

62. More specifically, Kim describes a system that (a) encodes and stores individual images without prediction (I-frame) or with prediction from previously stored images (P-frame) and (b) identifying, decoding and displaying a selected image on a user display. Ex. 1006 (Kim) at 3:33-4:45, Figs. 3-4, 5:8-6:8.

63. 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.” Ex. 1006 (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

64. The logical address, CAD, is shown in Kim’s Fig. 5A as incrementing

by one. Ex. 1006 (Kim) at Fig. 5A. The IAD for a P-frame references the logical address of the corresponding or previous I-frame. Ex. 1006 (Kim) at 5:1-7. And the IAD field for an I-frame is either 0000 or absent because it corresponds to nothing and is not used during decoding. Ex. 1006 (Kim) at 4:65-5:1. Kim does not explain why the IAD field for an I-frame can be either 0000 or absent. A POSITA would understand that including the IAD field with an arbitrary value such as 0000 can be used to maintain a constant format or number of bits in the addressing of both I- and P-frames. In some scenarios it would be more convenient from a data formatting or programming perspective to have the same length for both I- and P-frames. Moreover, omission of the IAD field for the I-frame is possible because it has no purpose and is not used in Kim. However, omitting this field may lead to a less consistent (but somewhat more compressed) representation of the data on the optical disc. Thus, a POSITA would understand that Kim's suggestion that the IAD field of an I-frame may be set to an arbitrary value such as 0000 is merely a matter of programming convenience relative to omitting the field completely.

65. Kim's Fig. 3 and specification describes its encoding process.

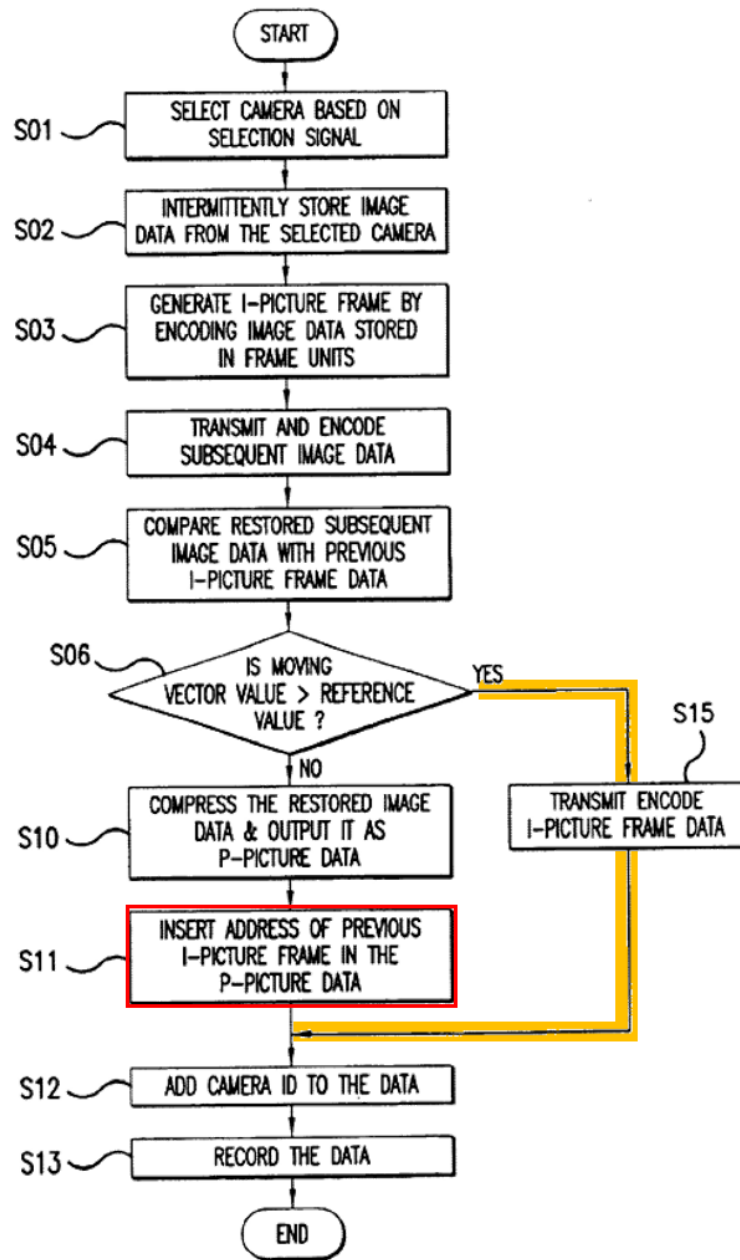


FIG.3

Ex. 1006 (Kim) at Fig. 3 (annotations added).

66. In relevant part, Kim's encoder encodes the first image as an I-frame, which will not depend on any other frame. Ex. 1006 (Kim) at 3:57-65 (Step S03).

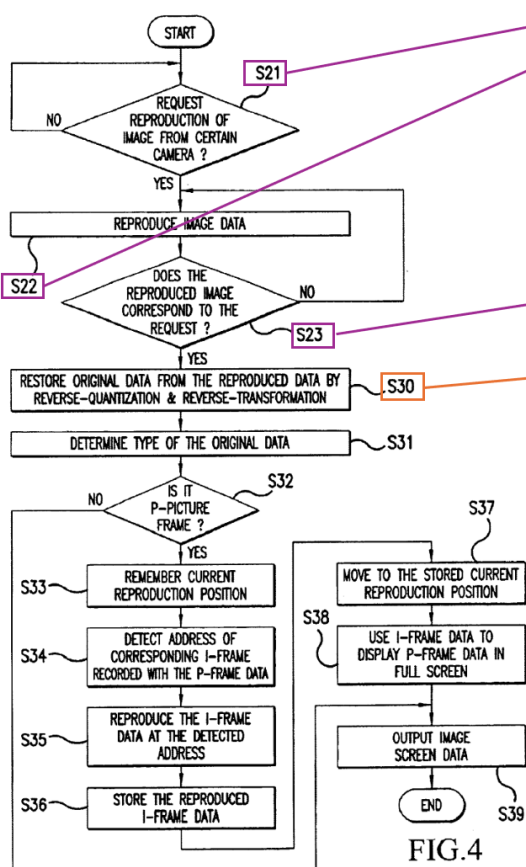
For the subsequent image, “intermittently obtained and stored” (Ex. 1006 (Kim) at 3:46-48) at a later time instant, Kim’s encoder will determine whether that image frame’s data is similar enough to the first image that it can use a P-frame to encode the subsequent (second) image. Ex. 1006 (Kim) at 3:65-4:14 (Steps S04-S06). If Kim’s encoder determines that the second image is similar enough to the first image, then it will encode the second image as a P-frame in Step S10 and then, in Step S11, Kim’s encoder will add “the moving vector and the position value of the corresponding (or previous) I-frame, so that the above information is added to the corresponding compressed P-frame output from the encoder.” Ex. 1006 (Kim) at 4:15-33.

67. On the other hand, if Kim’s encoder determines that the second image is not similar enough to the first image in Step S06, then it will encode the second image as another I-frame in Step S15. Ex. 1006 (Kim) at 4:23-27. As I show in the annotated Fig. 3 above, the process for encoding the second image as an I-frame (shown in orange) skips Step S11 (outlined in red): “insert address of previous I-picture frame in the P-picture data.” Thus, Kim’s encoder only adds “the position value of the corresponding (or previous) I-frame” to the P-frames, and not to the I-frames. Ex. 1006 (Kim) at 4:15-33.

68. For the I-frames, Kim teaches only that “the address of the corresponding I-picture frame (3) is zero or absent.” Ex. 1006 (Kim) at 4:65-5:1.

That is, the IAD for the I-frame is not a position value or anything else. The IAD field for the I-frame has no meaning or use, which is why it may be entirely absent without impact on the method of Kim. This is confirmed by the claims of Kim, which repeatedly disclose only providing “position information” of the corresponding I-frame for a P-frame but not for an I-frame. Ex. 1006 (Kim) at claims 1-2, 8, 11.

69. Kim’s decoder process is described in Fig. 4 and the associated parts of the specification. More specifically, when the user in Kim selects a picture, Kim’s decoder, shown in Fig. 4, decodes and displays that single picture, based on the user’s request for that one image.



As shown in Steps S21 and S22 of FIG. 4, if the user requests reproduction of an image data from a particular camera or channel among the intermittent image data recorded on the optical disc 1, the controller 150 controls the recording/reproducing unit 140 to reproduce the corresponding image data from the optical disc 1. The image data reproduced from the optical disc 1 is multiplexed data, which is demultiplexed by the de-MUX 131. By demultiplexing, the camera (channel) ID code CHID is separated from the reproduced image data and output to the controller 150. Based on the camera ID code CHID, the controller 150 determines whether or not the reproduced image data corresponds to the selected camera or channel, in Step S23. This ensures that the correct image data is processed to comply with the user's request. If incorrect image data has been reproduced, the controller 150 controls the recording/reproduction unit 140 to reproduce the correct image data from the optical disc 1. In Step S30, the image data corresponding to the user's request is transmitted and decoded in the decoder 111. The decoding process of the decoder 111 involves reverse-quantization and reverse-transformation to restore the original image data prior to data compression carried out during recording. 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. More specifically, if the currently restored image data is detected to be P-picture frame data in Step S32, the controller 150 stores the current reproduction position in Step S33. Then in Step S34, the controller 150 detects the address of the corresponding I-picture frame (e.g., data stored in the area (3) of the bit stream B2 shown in FIG. 6) from the reproduced image data output from the de-MUX 131, and reproduces based on the detected address the corresponding (or previous) I-picture frame data recorded on the optical disc 1 by controlling the recording/reproduction unit 140.

In Step S36, the reproduced corresponding I-picture frame data is processed by the reproducing DSP 121, and decoded by the decoder 111 to be stored in the frame memory 101. The controller 150, after Step S36, controls the recording/reproducing unit 140 to move the video heads to the original recording position stored in Step S33.

Ex. 1006 (Kim) at Fig. 4 and 5:1-41 (annotations added).

70. As shown in the annotated figure above (Figure 4 alongside column 5 of Kim), the first image data that is decoded is the image data for the frame the user selected (Step S30). Ex. 1006 (Kim) at 5:29-34. Kim's decoder is unaware until a later point (Step S31) whether that selected frame is an I-frame or a P-frame. Ex. 1006 (Kim) at 5:35-38.

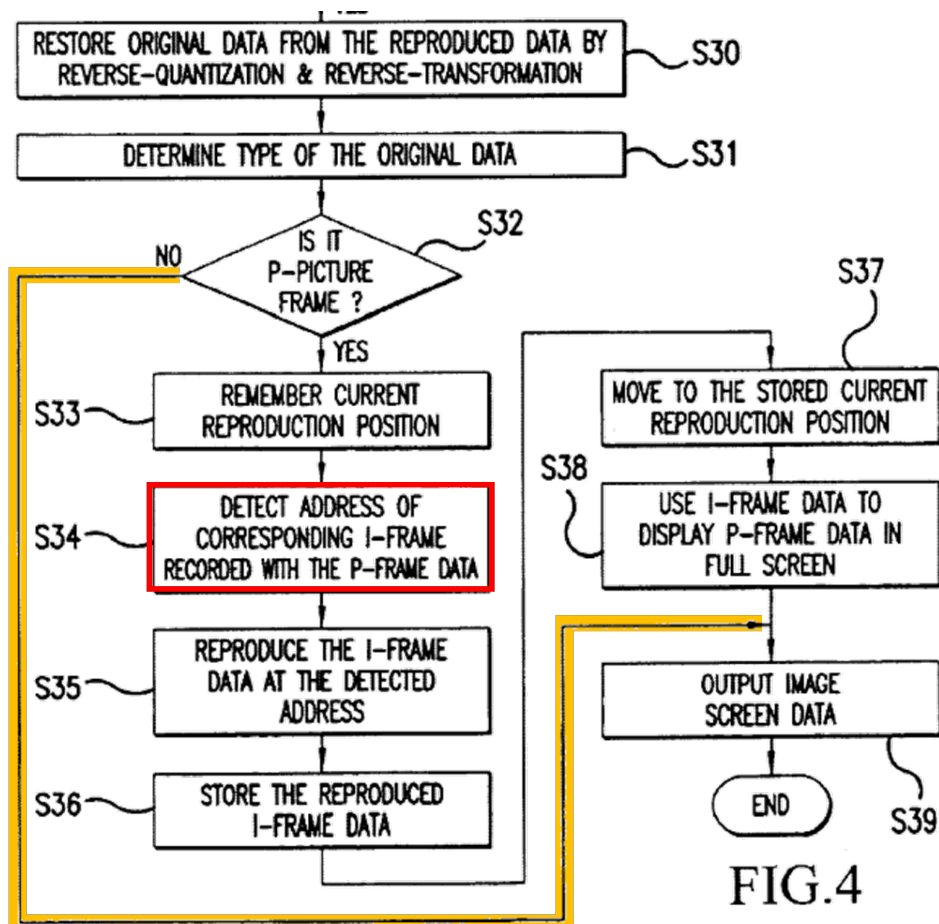
71. According to Kim, if the requested image is a P-frame, the corresponding I-frame address (the IAD of the P-frame) is detected at Step S34, and

then the corresponding I-frame data is decoded *in part* at Step S36. Ex. 1006 (Kim) at 5:39-52. I note that, according to Kim, the I-frame is not completely decoded at this point because the final reverse-transformation and reverse-quantization does not occur until Step S38. Ex. 1006 (Kim) at 5:55-63. In Kim, reverse-transformation and reverse-quantization is a necessary part of the decoding process. Ex. 1006 (Kim) at 5:32-35, 5:55-63. At Step S38 of Kim, the partial P-frame¹ is combined with the partially decoded I-frame data and the moving (motion) vectors, and then the resulting P-frame image is reverse-transformed and reverse-quantized, which completes the decoding of the full P-frame. Ex. 1006 (Kim) at 5:55-65. Thus, according to Kim, when the requested image to decode is a P-frame, only the P-frame is fully decoded because the full I-frame itself is never reverse-transformed and reverse-quantized (only partially decoded I-frame data that are combined with the partial P-frame, prior to reverse transform and reverse quantization).

72. On the other hand, Kim describes that if the requested image is an I-frame, the corresponding coded image data is simply read from the optical disk, decoded and displayed. Ex. 1006 (Kim) at 5:66-6:3. In Kim, when the requested image is an I-frame, Step S34 to “detect address of corresponding I-frame recorded

¹ I use the expression “partial P-frame” herein to refer to the P-frame data after decoding (Kim Step S30) but before combining with partially decoded I-frame data to ultimately reconstruct the full, displayed P-frame.

with the P-frame data” (shown in red below) is skipped (as shown in orange below).



Ex. 1006 (Kim) at Fig. 4 (excerpted and annotations added).

73. Thus, in Kim, the IAD field is only used for the decoding of a P-frame. The IAD of the I-frame is never read or decoded or used for anything, and may be omitted completely, according to Kim. That is why Kim teaches that the IAD of the I-frame may even be absent because it makes no difference to the decoder. Ex. 1006 (Kim) at 4:65-5:1. A POSITA would be familiar with the concept of a “don’t care”

value in such a system, i.e. a value that may be zero or absent, because it is simply not used.

74. This is further confirmed by Kim's claims, which only specify that the step of "detects the address of the corresponding intra-picture frame" occurs "if the restored image data frame is predictive picture frame data" and not "if the original image frame data type is not predictive picture frame data." Ex. 1006 (Kim) at claim 11.

75. As I discuss in greater detail in the following sections of my declaration, Kim does not disclose or teach several limitations of the challenged claims of the '321 Patent, nor does Kim solve or even relate to the '321 Patent's aims of avoiding unnecessary decoding errors and enabling random access from a user-specified point in a video stream.

VIII. THE GROUNDS IN THE PETITION DO NOT RENDER OBVIOUS THE CHALLENGED CLAIMS

1. None of the Challenged Claims 1, 3-4, 6-8, or 10-11 Are Unpatentable in Light of Ground 1—Kim.

76. As I explain in detail below, there are multiple reasons why Kim does not teach or suggest to a POSITA the limitations of independent claims 1, 4, 7, 8, 10, or 11. Therefore, Kim also does not teach or suggest to a POSITA the limitations of dependent claims 3 and 6 either.

a. **1[a]: “encoding into the video sequence an indication of at least one image frame, which is the first image frame, in decoding order, of the independent sequence”**

4[a]: “encode into the video sequence an indication of at least one image frame, which is the first image frame, in decoding order, of the independent sequence”

7[a]: “a computer program code for encoding into the video sequence an indication of at least one image frame, which is the first image frame, in decoding order, of the independent sequence”

77. The Petition and Dr. Havlicek point to Kim’s IAD field of the I-frame as the claimed “indication.” Petition at 16-18; Ex. 1003 (Havlicek Decl.) at ¶ 73.

78. However, there are multiple reasons why a POSITA would have understood that Kim neither teaches nor suggests claims 1[a], 4[a], or 7[a] of the ’321 Patent.

i. Kim’s IAD field of the I-frame is not an “indication” of anything.

79. First, Kim does not disclose or render obvious the claimed “indication” to a person of ordinary skill because the IAD field of an I-frame is not an indication of anything.

80. Both the Petition and Dr. Havlicek agree that Kim discloses that the IAD field of an I-frame “is zero *or absent*.” Ex. 1006 (Kim) at 4:65-5:1 (italics added); Petition at 16; Ex. 1003 (Havlicek Decl.) at ¶ 70. A POSITA reading Kim

would have understood that the reason the value of the IAD field of an I-frame can be zero *or absent* is because it has no meaning, contains no meaningful data and will never be used. Unlike the IAD of a P-frame, which refers to “the position value of the corresponding (or previous) I-frame,” the IAD field of an I-frame has no corresponding meaning or use. Ex. 1006 (Kim) at 4:27-33. This is because the I-frame does not rely on prediction from any other frame and therefore it makes no sense for it to have an associated IAD with any meaning. In fact, while Kim repeatedly describes the IAD of the P-frame as being a “position value” of the corresponding I-frame, Kim never describes that the IAD field *of the I-frame* has any meaning at all. Ex. 1006 (Kim) at 4:27-33, 4:48-52; claims 1-2, 8, 11. A POSITA would understand that Kim allows the value of this field to be “zero or absent” because the encoder and decoder do not care about the value of the IAD field of the I-frame at all.

81. This is confirmed in Kim’s Fig. 3, which I have reproduced below with colored annotations.

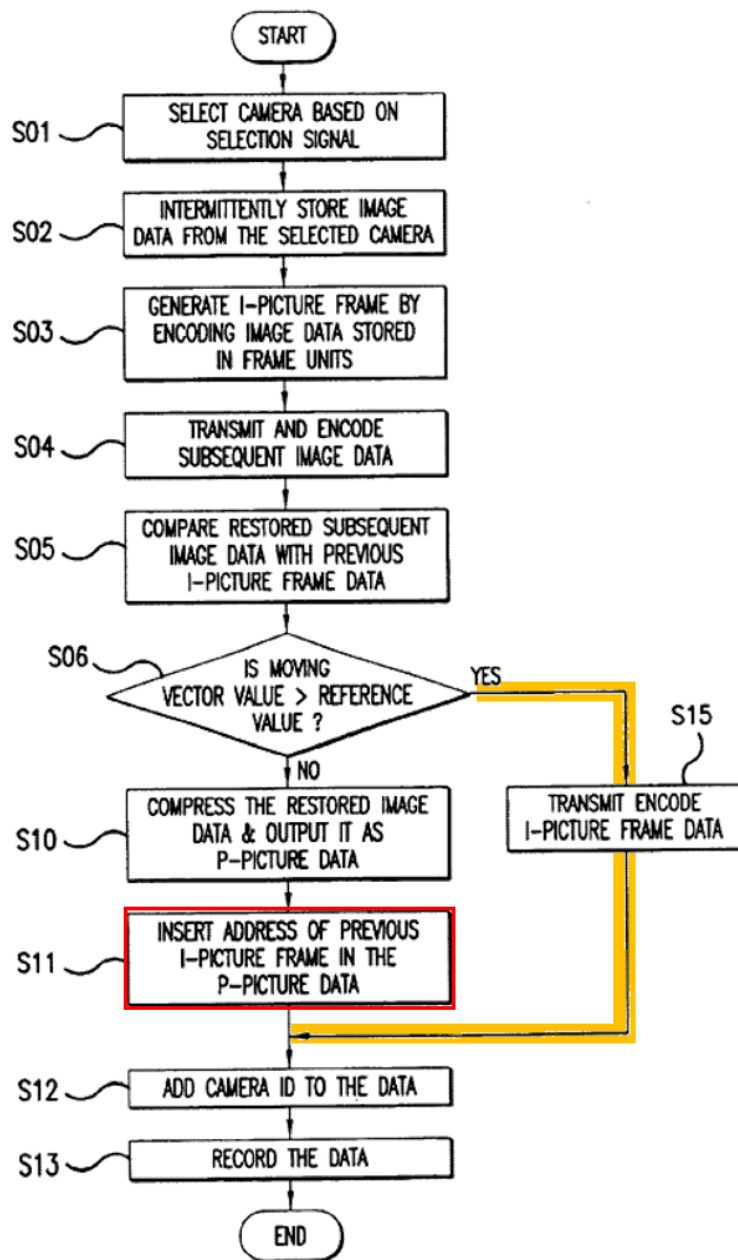


FIG.3

Ex. 1006 (Kim) at Fig. 3 (annotations added).

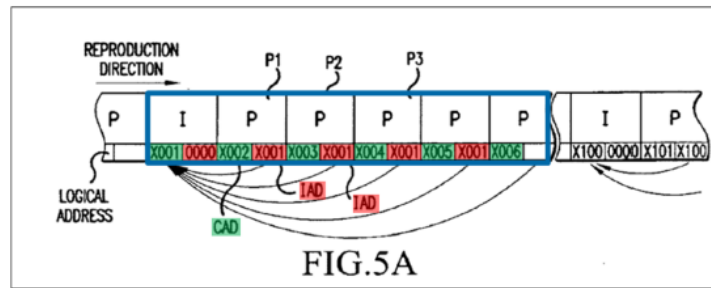
82. As I show in the annotated Fig. 3 above, the process for encoding the second image as an I-frame (shown in orange) skips Step S11 (outlined in red):

“insert address of previous I-picture frame in the P-picture data.” Thus, Kim’s encoder only adds “the position value of the corresponding (or previous) I-frame” to the P-frame data structure, and not to the I-frame data structure. Ex. 1006 (Kim) at 4:15-33.

83. For the I-frames, Kim teaches only that “the address of the corresponding I-picture frame (3) is zero or absent.” Ex. 1006 (Kim) at 4:65-5:1. That is, the IAD field for the I-frame is not a position value or anything else. The IAD for the I-frame has no meaning or use, which is why it is allowed to be entirely absent.

84. I note that although Kim’s Fig. 6 labels the IAD field of the I-frame as the “corresponding I-picture address,” a POSITA would have understood that this cannot possibly be an indication of the I-frame’s address because every I-frame is given the same “zero or absent” value for the IAD. Ex. 1006 (Kim) at 4:34-45 (similar statements about the “address of the I-picture data,” which a POSITA would know could not actually be the address of specific I-frames because data corresponding to different I-pictures could not all be stored at the same “zero or absent” address location). Indeed, the Petition states that the I-frame’s logical address, as shown in Fig. 5A, is the CAD value, not the IAD value:

52.) I-pictures also have a CAD that indicates the picture's current address (EX1006, 4:65-5:1, Figs. 5A, 6 (“physical address”)), but the I-picture's IAD is zero (EX1006, Figs. 5A (showing “0000”), 6 (showing “00000000” for the “corresponding I-Picture address”)). Figure 5A below is annotated to highlight the IAD values in red and CAD values in green.



Petition at 10 (colors and annotations in original).

85. Therefore, a POSITA would have understood that the IAD field of the I-frame has no corresponding meaning at all and is not an indication of anything.

86. I also note that it is not the case that the IAD of the I-frame has no meaning when it is absent but has some meaning when it is present as 0000. The IAD field of the I-frame, no matter what value it takes, has no meaning or use in either Kim's encoding or decoding processes. I further explain the 0000 value from the perspective of a POSITA in paragraph 64.

87. I understand that expert Dr. Omid Kia testified in an ITC Investigation where the '321 Patent was asserted that “[f]or an I-frame, that IAD does not serve any purpose” and “that value serves no function in the decoding.” Ex. 2013 (1380

Public Tr.) at 26 (1733:1-7).

88. I agree with that opinion, and I explain in further detail with respect to the decoding claims 8-11 later in this declaration how Kim describes that the IAD for the I-frame is never used during decoding.

89. I further understand and have been informed by counsel that the same ITC Investigation found that the asserted decoding claims of the '321 Patent were valid over Kim. Ex. 2009 (1380 Public Initial Determination) at 62-63.

90. Neither the Petition nor Dr. Havlicek assert that it would have been obvious to modify Kim in any way to make the IAD field of the I-frame correspond to an indication of anything or be used for any purpose.

ii. Kim's IAD of the I-frame is not an "indication of at least one image frame, which is the first image frame, in decoding order."

91. Second, Kim does not disclose or render obvious the claims because the IAD field of the I-frame is not the required "indication of at least one image frame, which is the first image frame, in decoding order" of the claims.

92. More specifically, an IAD value of 0000 for an I-frame does not indicate the first image frame in decoding order. As Kim explains, the first image data that is decoded is the image data for the frame the user selected (Step S30 of Fig. 4). Ex. 1006 (Kim) at 5:29-34. Kim's method does not use the value of the IAD

for the I-frame to indicate or determine which image frame should be decoded first. The first image frame to be decoded is simply whichever frame the user selects, which may be an I-frame or a P-frame (Steps S21 and S22 of Fig. 4). Ex. 1006 (Kim) at 5:13-32. I further explain the 0000 value from the perspective of a POSITA in paragraph 64.

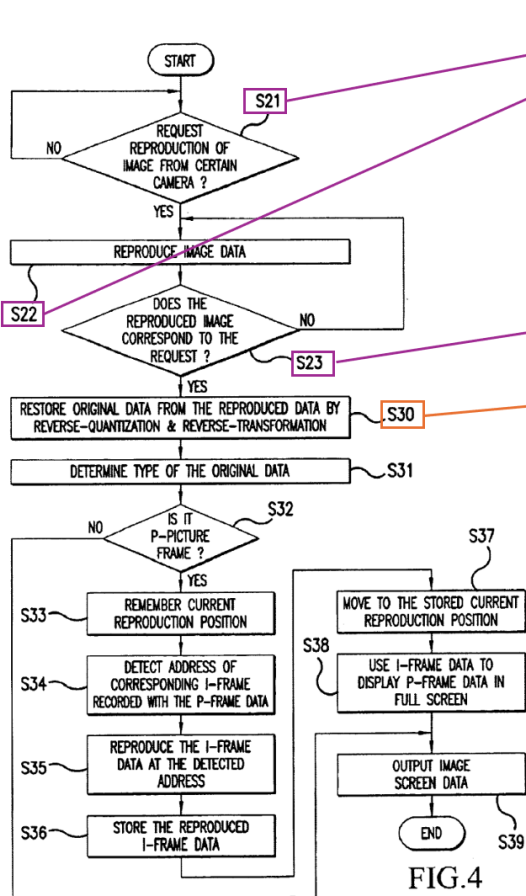


FIG.4

As shown in Steps S21 and S22 of FIG. 4, if the user requests reproduction of an image data from a particular camera or channel among the intermittent image data recorded on the optical disc 1, the controller 150 controls the recording/reproducing unit 140 to reproduce the corresponding image data from the optical disc 1. The image data reproduced from the optical disc 1 is multiplexed data, which is demultiplexed by the de-MUX 131. By demultiplexing, the camera (channel) ID code CHID is separated from the reproduced image data and output to the controller 150. Based on the camera ID code CHID, the controller 150 determines whether or not the reproduced image data corresponds to the selected camera or channel, in Step S23. This ensures that the correct image data is processed to comply with the user's request. If incorrect image data has been reproduced, the controller 150 controls the recording/reproduction unit 140 to reproduce the correct image data from the optical disc 1. In Step S30, the image data corresponding to the user's request is transmitted and decoded in the decoder 111. The decoding process of the decoder 111 involves reverse-quantization and reverse-transformation to restore the original image data prior to data compression carried out during recording. 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. More specifically, if the currently restored image data is detected to be P-picture frame data in Step S32, the controller 150 stores the current reproduction position in Step S33. Then in Step S34, the controller 150 detects the address of the corresponding I-picture frame (e.g., data stored in the area (3) of the bit stream B2 shown in FIG. 6) from the reproduced image data output from the de-MUX 131, and reproduces based on the detected address the corresponding (or previous) I-picture frame data recorded on the optical disc 1 by controlling the recording/reproduction unit 140. In Step S36, the reproduced corresponding I-picture frame data is processed by the reproducing DSP 121, and decoded by the decoder 111 to be stored in the frame memory 101. The controller 150, after Step S36, controls the recording/reproducing unit 140 to move the video heads to the original recording position stored in Step S33.

Ex. 1006 (Kim) at Fig. 4 and 5:1-41 (annotations added).

93. In fact, Kim's decoder fully decodes all of the image data of the

selected frame in Step S30 before determining at a later point (Step S31) whether that selected frame is an I-frame or a P-frame. Ex. 1006 (Kim) at 5:30-38.

94. The situation in which a user selects a P-frame to decode is instructive. If the requested image is a P-frame, Kim's decoder completes decoding of all of the P-frame's coded image data (which only partly represents the full P-frame because the fully reconstructed P-frame includes both the decoded P-frame data (Step S30) and the I-frame data (Step S36)) in Step S30, including reverse-quantization and reverse-transformation of the combined data. Ex. 1006 (Kim) at 5:30-35 ("In Step S30, the image data corresponding to the user's request is transmitted and decoded in the decoder 111. The decoding process of the decoder 111 involves reverse-quantization and reverse-transformation to restore the original image data prior to data compression carried out during recording."). Thus, the IAD of the I-frame does not indicate the first image frame in decoding order because, according to Kim, the first image frame decoded is whatever picture the user selects, as shown by the example of when the user selects a P-frame.

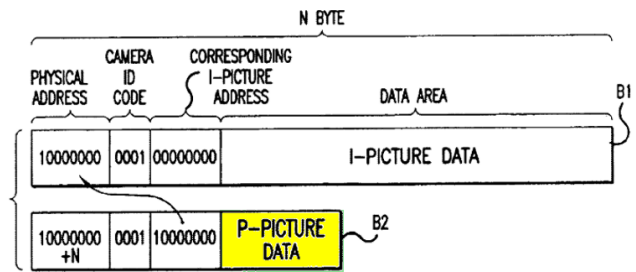
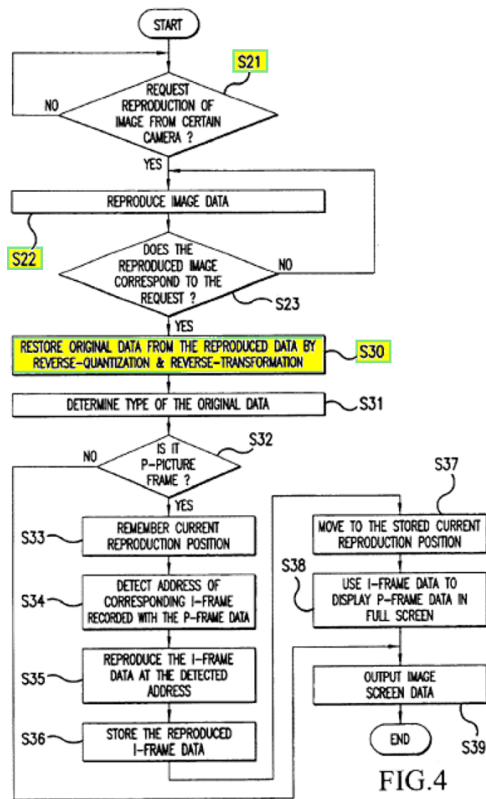


FIG. 6

Ex. 1006 (Kim), Fig. 4 (highlighting added to Steps S20, S21, S30) and Fig. 6 (highlighting added to the corresponding P-frame data that is decoded in Step S30).

95. I understand that Petitioners and Dr. Havlicek may assert that because the P-frame is a predicted frame, there will be portions of the image that rely on image data from a corresponding I-frame. While that is true, according to Kim, all of the P-frame data (i.e. the partial P-frame) is already completely decoded in Step S30 before Kim's decoder even knows whether the frame is a P-frame or I-frame in Steps S31/S32. Ex. 1006 (Kim) at 5:30-38. Moreover, Kim explains how the P-frame is still the first image in decoding order when the P-frame is selected.

96. Specifically, Kim explains that if the decoder determines that the image selected by the user is a P-frame in Step S31, the corresponding I-frame address (the IAD of the P-frame) is detected at Step S34 (shown in red below), and then the corresponding I-frame data is decoded *in part* at Step S36. Ex. 1006 (Kim) at 5:35-52. I note that, according to Kim, the I-frame is not completely decoded at this point because the final reverse-transformation and reverse-quantization does not occur until Step S38. In Kim, reverse-transformation and reverse-quantization is a necessary part of the decoding process. Ex. 1006 (Kim) at 5:32-35.

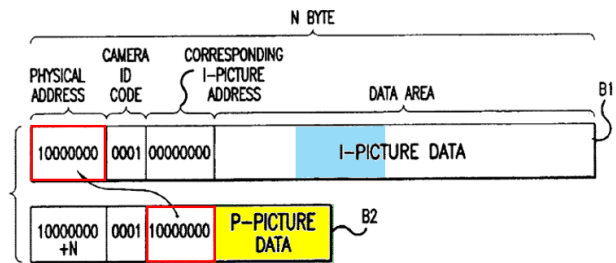
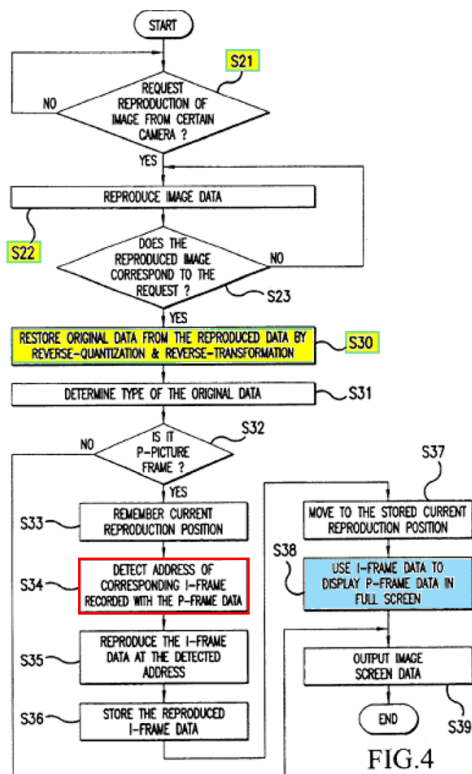


FIG. 6

Ex. 1006 (Kim), Fig. 4 and Fig. 6 (highlighting added).

97. However, only partially decoded I-frame data used to predict the P-frame will be fully decoded according to Kim (illustrated in blue above), as I explained in paragraph 71. That is, at Step S38, the partial P-frame is combined with the partially decoded I-frame and the moving (motion) vectors, and then the resulting P-frame image is reverse-transformed and reverse-quantized, which completes the decoding of the full P-frame. Ex. 1006 (Kim) at 5:55-65. Thus, according to Kim, when the requested image to decode is a P-frame, only the P-frame is fully decoded because the full I-frame itself is never reverse-transformed and reverse-quantized (only partially decoded I-frame data that are combined with the partial P-frame, prior to reverse transform and reverse quantization). Ex. 1006 (Kim) at 5:29-34, 5:41-65.

98. This example of where a user selects a P-frame to decode, illustrates how the IAD field of an I-frame does not indicate the first image frame in decoding order. In Kim's method, the IAD of an I-frame never indicates the first image frame in decoding order. In other words, even if an I-frame was selected by the user such that the I-frame is decoded first, the IAD of the I-frame still indicates nothing and has no purpose during decoding, just as it indicated nothing and had no purpose in the case when the P-frame was selected first. This is why the IAD of the I-frame can be entirely absent. Ex. 1006 (Kim) at 4:65-5:1. As I explain in further detail with respect to the decoding claims below, in Kim, the IAD of the I-frame is never

decoded and is never used. Therefore, it does not indicate the first image frame in decoding order, as the claim requires.

99. When a user selects a P-frame, the P-frame is at least *partly* decoded before retrieving I-frame data, with the retrieved I-frame data used to complete the P-frame decoding. Thus, an I-frame's IAD field, regardless of whether it is "zero or absent," cannot indicate the *first* frame in decoding order, as the first decoded data is a partial P-frame. There is no interpretation of Kim's disclosure in which the corresponding I-frame data (for the P-frame) can be the first frame in decoding order, or can be decoded prior to the selected P-frame data. In other words, Kim describes the decoding steps as follows: (a) partial decode of P-frame, (b) partial decode of I-frame data, then (c) finish decode of P-frame, including reverse-transformation and reverse-quantization. In no instance does step (b) ever precede step (a). Nor could it (in Kim's method), as the decoder must first decode the partial P-frame (step S30) before determining the type of the selected frame (step S31) then later detecting the address of the corresponding I-picture data (step S34), Ex. 1006 (Kim) at 5:29-48. In other words, according to Kim's disclosure, step S34 and the steps thereafter (detect and partially decode I-frame data) **cannot** be carried out before steps S30 and S31.

100. As I explained above (paragraphs 61 and 69), Kim's process only ever decodes and displays one image and does not relate to video streaming. Kim

describes intermittent time lapse technology for security systems for banks and museums. Ex. 1006 (Kim) at 1:14-19, 6:17-20 (“only the desired images can be selectively reproduced with high display quality”).

101. I understand that expert Dr. Omid Kia testified in an ITC Investigation where the ’321 Patent was asserted that “[i]t is the user that selects the picture to decode” and not the value of the IAD of the I-frame. Ex. 2013 (1380 Public Tr.) at 23-24 (1730:10-1731:2).

102. Although Kim does not describe such a scenario, were Kim’s Figure 4 to be repeatedly applied to decode and display a sequence of images—as suggested on pages 11-12 of the Petition—Kim still does not describe that the IAD of the I-frame is an “indication of at least one image frame, which is the first image frame, in decoding order.” Assume there is an I-frame, I1, and the following steps are performed: (a) Decode a first image and assume it is a P-frame, P6. Retrieve and decode partial P6, determine type (P), retrieve and decode corresponding I1 data, display P6. (b) Decode a second image, P7 frame. Retrieve and decode partial P7, determine type (P), retrieve and decode corresponding I1 data, display P7. (c) Decode a third image, P8: Retrieve and decode partial P8, determine type (P), retrieve and decode corresponding I1 data, display P8. In this and any other example, the only point at which I1 is the first frame in the sequence, in decoding order, is if the user *happens* to pick I1. Thus, any address of I1 (e.g. IAD=0000) is irrelevant

and is not an “indication” that I1 is the first frame. I further explain the 0000 value from the perspective of a POSITA in paragraph 64.

103. Neither the Petition nor Dr. Havlicek resolve this fundamental problem with Kim, namely that there is no “encoding into the video sequence an indication of at least one image frame, which is the first image frame, in decoding order, of the independent sequence.”

104. Neither the Petition nor Dr. Havlicek assert that it would have been obvious to modify Kim in any way to make the IAD of the I-frame correspond to the claimed “indication of at least one image frame, which is the first image frame, in decoding order, of the independent sequence.”

iii. Kim does not have a “video sequence.”

105. Third, Kim does not disclose or render obvious “encoding into the video sequence an indication” because there is no teaching or suggestion of a video sequence in Kim.

106. Kim describes intermittent time lapse recording that requires “mov[ing] and stop[ping] the tape repeatedly” to capture time lapsed single images rather than a video sequence. Ex. 1006 (Kim) at 1:57-60. Critically, the purpose of Kim’s described technique is that “only the desired images can be selectively reproduced with high display quality.” Ex. 1006 (Kim) at 6:17-20. In other words,

Kim only teaches the selective encoding and decoding of individual images at a time, and not encoding or decoding of the video sequence of the '321 Patent.

107. I understand that expert Dr. Omid Kia testified in an ITC Investigation where the '321 Patent was asserted that Kim does not disclose or suggest recording or playback of continuous video. Ex. 2013 (1380 Public Tr.) at 19 (1726:1-23). Rather, Kim only describes decoding a single image instead of a video sequence. Ex. 2013 (1380 Public Tr.) at 20 (1727:5-20).

108. Dr. Havlicek agrees that Kim teaches only time lapse recording and reproduction. Ex. 1003 (Havlicek Decl.) at ¶ 55. Critically, neither the Petition nor Dr. Havlicek ever explain how the encoding and decoding of a single image can satisfy the claimed video sequence of claim 1[a], 4[a], or 7[a]. Petition at 16-18, 26, 29; Ex. 1003 (Havlicek Decl.) at ¶¶ 69-74, 94-95, 108-109.

109. Although neither the Petition nor Dr. Havlicek actually assert that it would have been obvious to modify Kim to encode a video sequence, Dr. Havlicek does imply such an assertion elsewhere in his declaration. Ex. 1003 (Havlicek Decl.) at ¶¶ 60-62. However, Dr. Havlicek points to a Sony Time Lapse VCR without any explanation as to why a POSITA would have looked to such a reference to combine with or modify Kim. Ex. 1003 (Havlicek Decl.) at ¶ 61. Moreover, Dr. Havlicek's reasoning that "[i]t would have been impractical to require users to select video

frames one by one that were captured over an extended period” directly contradicts the teachings of Kim. Ex. 1003 (Havlicek Decl.) at ¶ 62. Kim expressly teaches that “only the desired images can be selectively reproduced with high display quality.” Ex. 1006 (Kim) at 6:17-20. Therefore, a POSITA would not have been motivated to modify Kim to encode a video sequence. Further, the device identified by Dr Havlicek in EX1013 records “from 0.88 to 10 fields per second,” i.e. at regular time intervals ranging between around 1.1 seconds to 0.1 seconds between fields. In contrast, Kim’s invention is directed to “intermittently recording image data” (Ex. 1006 (Kim) at 2:3-6, 2:58-60, 3:47-48), i.e. recording at **intermittent** rather than regular time intervals.

110. Furthermore, modifying Kim to repeatedly encode and decode images comprising a moving video sequence would have required more effort, processing power, memory, and cost and would have been less efficient and unnecessary for the applications Kim targeted, which only need individual time lapse images rather than a video sequence. Ex. 1006 (Kim) at 1:14-20.

111. Kim’s Fig. 5B further confirms that Kim does not teach or suggest a video sequence. Fig. 5B shows a data stream of images takes from three different cameras (CHID: camera (channel) ID code 0, 1, 2). Ex. 1006 (Kim) at 4:56-58.

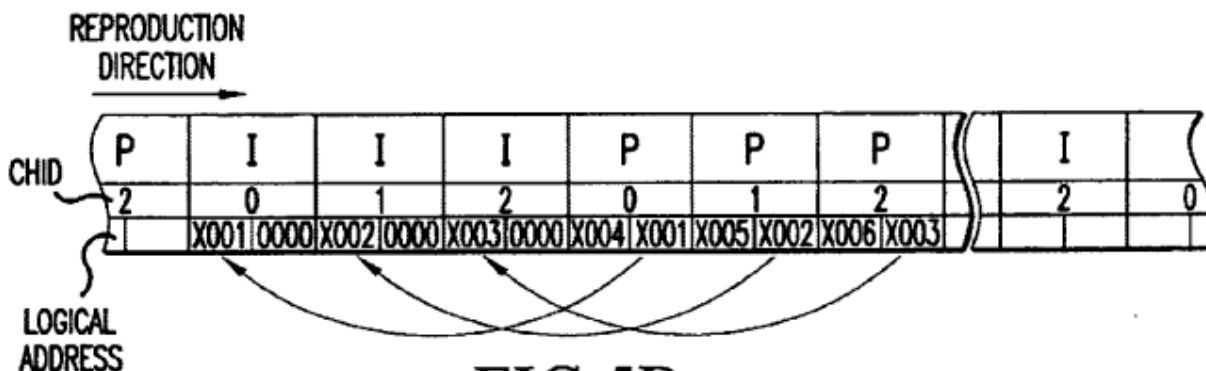


FIG.5B

Ex. 1006 (Kim) at Fig. 5B.

112. Given that the “Reproduction Direction” in Fig. 5B is from left to right, if the stream was treated as a video sequence, every frame would hop to a different camera and cycle through each of the three different cameras before returning to the next frame for a particular camera. Such a disjointed set of images would not make sense to a viewer, and POSITA would have understood that Kim did not teach or suggest that any such disjointed set of images would comprise a video sequence.

113. I understand that expert Dr. Omid Kia similarly testified in an ITC Investigation where the ’321 Patent was asserted that modifying Kim to apply to a video sequence would result in a “very time-consuming” implementation that is “very process intensive” as compared to Kim’s actual teaching of “single image retrieval.” Ex. 2013 (1380 Public Tr.) at 20-21 (1727:21-1728:21).

b. 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”

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”

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”

114. The Petition and Dr. Havlicek point to the IAD of the I-frame as the claimed “indication.” Petition at 33-34; Ex. 1003 (Havlicek Decl.) at ¶ 122.

115. However, there are multiple reasons why a POSITA would have understood that Kim neither teaches nor suggests claims 8[a], 10[a], or 11[a] of the ’321 Patent.

i. Kim’s IAD field of the I-frame is not an “indication” of anything.

116. First, Kim does not disclose or render obvious the claimed “indication” to a person of ordinary skill because the IAD field of an I-frame is not

an indication of anything.

117. As I previously discussed in, for example, paragraphs 68, 73, 80, 83, 84, and 99, both the Petition and Dr. Havlicek agree that Kim discloses that the IAD of an I-frame “is zero *or absent*.” Ex. 1006 (Kim) at 4:65-5:1 (*italics added*); Petition at 34; Ex. 1003 (Havlicek Decl.) at ¶ 122. A POSITA reading Kim would have understood that the reason the value of the IAD field of an I-frame can be zero *or absent* is because it has no meaning and will never be used. Unlike the IAD of a P-frame, which refers to “the position value of the corresponding (or previous) I-frame,” the IAD field of an I-frame has no corresponding meaning or use. Ex. 1006 (Kim) at 4:27-33. This is because the I-frame does not rely on prediction from any other frame and therefore it makes no sense for it to have an associated IAD field with any meaning. In fact, while Kim repeatedly describes the IAD of the P-frame as being a “position value” of the corresponding I-frame, Kim never describes that the IAD field *of the I-frame* has any meaning at all. Ex. 1006 (Kim) at 4:27-33, 4:48-52; claims 1-2, 8, 11. A POSITA would understand that Kim allows that value to be “zero or absent” because the IAD of the I-frame has no meaning or use, and the encoder and decoder do not care about the value of the IAD of the I-frame at all.

118. This is confirmed in Kim’s Fig. 4, which I have excerpted and reproduced below with colored annotations.

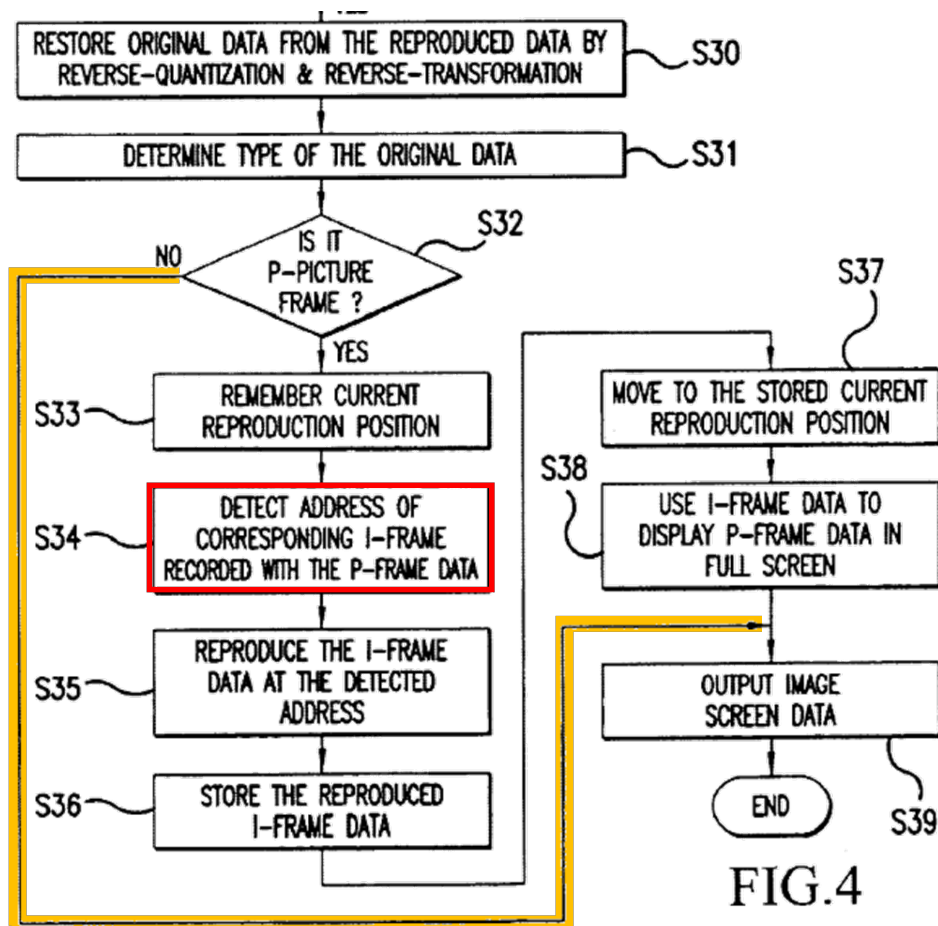


FIG.4

Ex. 1006 (Kim) at Fig. 4 (excerpted and annotations added).

119. As I show in the annotated Fig. 4 above, the process for decoding an I-frame (shown in orange) skips Step S34 (outlined in red): “detect address of corresponding I-frame recorded with the P-frame data.” Thus, Kim’s decoder never detects the IAD for the I-frame. It only detects the IAD for the P-frame. Kim explains that when the requested image is an I-frame, the corresponding coded image data is simply read from the optical disk, decoded and displayed. Ex. 1006 (Kim) at 5:66-

6:3.

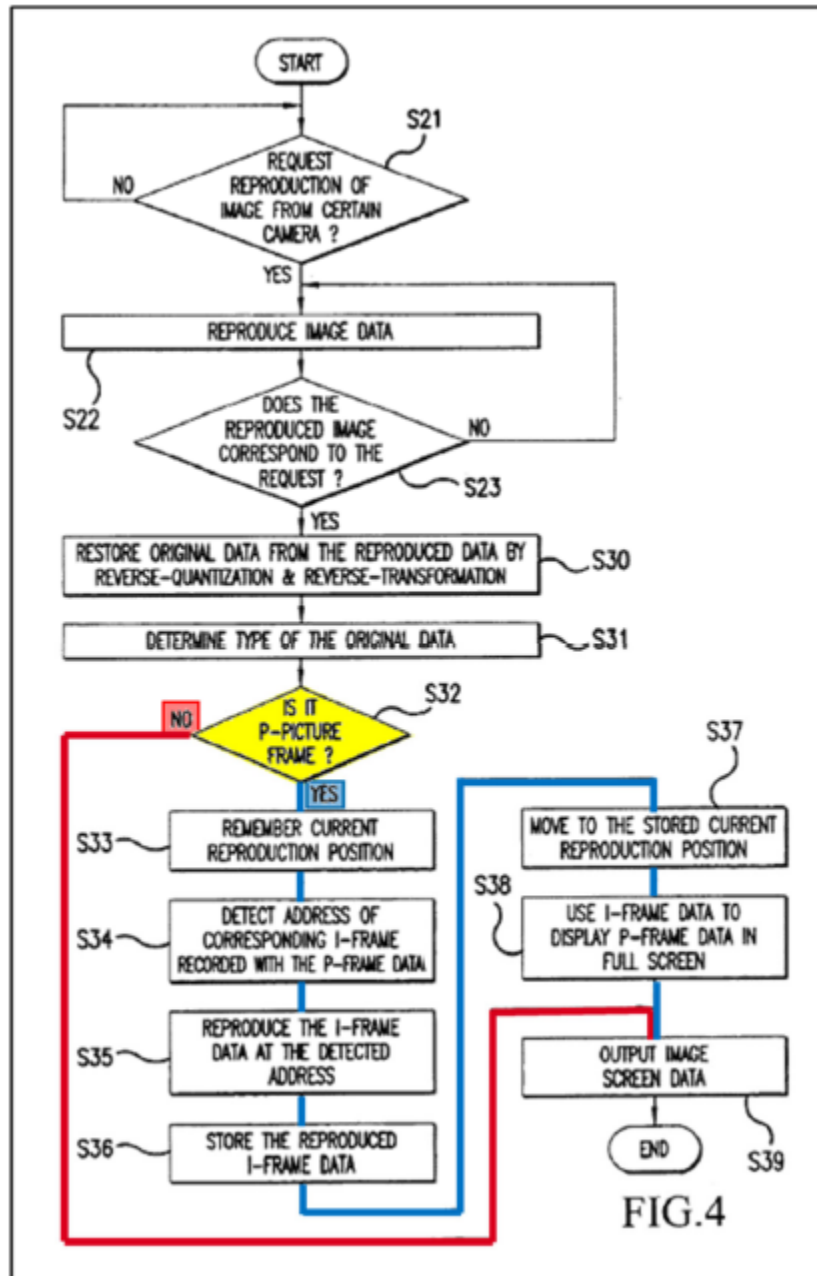
120. Kim never describes any step where the IAD of the I-frame is ever decoded, read, or used for anything. That is why Kim teaches that the IAD of the I-frame may even be absent because it makes no difference to Kim's decoder. Ex. 1006 (Kim) at 4:65-5:1.

121. This is further confirmed by Kim's claims, which only specify that the step of "detects the address of the corresponding intra-picture frame" occurs "if the restored image data frame is predictive picture frame data" (P-frame) and not "if the original image frame data type is not predictive picture frame data" (I-frame). Ex. 1006 (Kim) at claim 11.

122. Both the Petition and Dr. Havlicek agree with me that Step S34 of the decoding process to read the IAD only happens for the P-frame. No such step is performed if the selected frame is an I-frame, as shown from the excerpt from the Petition below:

As shown below in Kim's Figure 4, Kim sets forth two paths for decoding the disclosed bitstream depending on whether the requested image corresponds to an I-picture or a P-picture. (EX1003, ¶¶59-62.) When an I-picture is requested, the I-picture is simply decoded and output as an image signal. (EX1006, 5:66-6:3, Fig. 4 ("no" path annotated in red).) When the request is directed to a P-picture, the system "detects the address of the corresponding I-picture frame...and reproduces based on the detected address [of that] I-picture." (EX1006, 5:38-48; Fig. 4 ("yes" path annotated in blue).)

Petition at 10; Ex. 1003 (Havlicek Decl.) at ¶ 59.



Petition at 11 (colors and annotations in original); Ex. 1003 (Havlicek Decl.) at ¶ 59.

123. As both the Petition and Dr. Havlicek highlight in red, when the requested image is an I-frame, Kim's decoder skips Step S34 and does not detect the IAD of the I-frame. In other words, Step S34 which involves detecting the IAD, only

124. I note that although Kim’s Fig. 6 labels the IAD of the I-frame as the “corresponding I-picture address,” a POSITA would have understood that this cannot possibly be an indication of the I-frame’s actual address because every I-frame is given the same “zero or absent” value for the IAD. Ex. 1006 (Kim) at 4:34-45 (similar statements about the “address of the I-picture data,” which a POSITA would know could not actually be the address of a specific I-frame because data corresponding to different I-pictures could not all be stored at the same “zero or absent” address location). Indeed, the Petition states that the I-frame’s logical address, as shown in Fig. 5A, is the CAD value, not the IAD value:

FIG. 5A

Nokia Exhibit 2012, p. 59
Snap/Hisense v. Nokia
IPR2025-01014

125. Therefore, a POSITA would have understood that the IAD field of the I-frame has no corresponding meaning at all and is not an indication of anything.

126. I also note that it is not the case that the IAD field of the I-frame has no meaning when it is absent but has some meaning when it is present as 0000. The IAD of the I-frame, no matter what value it takes, has no meaning or use in either Kim's encoding or decoding processes. I further explain the 0000 value from the perspective of a POSITA in paragraph 64.

127. I understand that expert Dr. Omid Kia testified in an ITC Investigation where the '321 Patent was asserted that "[f]or an I-frame, that IAD does not serve any purpose" and "that value serves no function in the decoding." Ex. 2013 (1380 Public Tr.) at 26 (1733:1-7).

128. I further understand and have been informed by counsel that the same ITC Investigation found that the asserted decoding claims 8 and 10 of the '321 Patent were valid over Kim.

129. Neither the Petition nor Dr. Havlicek assert that it would have been obvious to modify Kim in any way to make the IAD field of the I-frame correspond to an indication of anything or be used for any purpose.

ii. Kim's IAD field of the I-frame is not an "indication of at least one image frame, which is the first image frame, in decoding order."

130. Second, Kim does not disclose or render obvious the claims because the IAD field of the I-frame is not the required "indication of at least one image frame, which is the first image frame, in decoding order" of the claims.

131. More specifically, an IAD field value of 0000 for an I-frame does not indicate the first image frame in decoding order. As Kim explains, the first image data that is decoded is the image data for the frame the user selected (Step S30 of Fig. 4). Ex. 1006 (Kim) at 5:29-34. There is no consideration of the value of the IAD field for the I-frame to indicate which image frame should be decoded first. In fact, as I stated above, the IAD field for the I-frame is never read or used at all in Kim's method. The first image frame to be decoded is simply whichever frame the user selects (Steps S21 and S22 of Fig. 4). Ex. 1006 (Kim) at 5:13-32. I further explain the 0000 value from the perspective of a POSITA in paragraph 64.

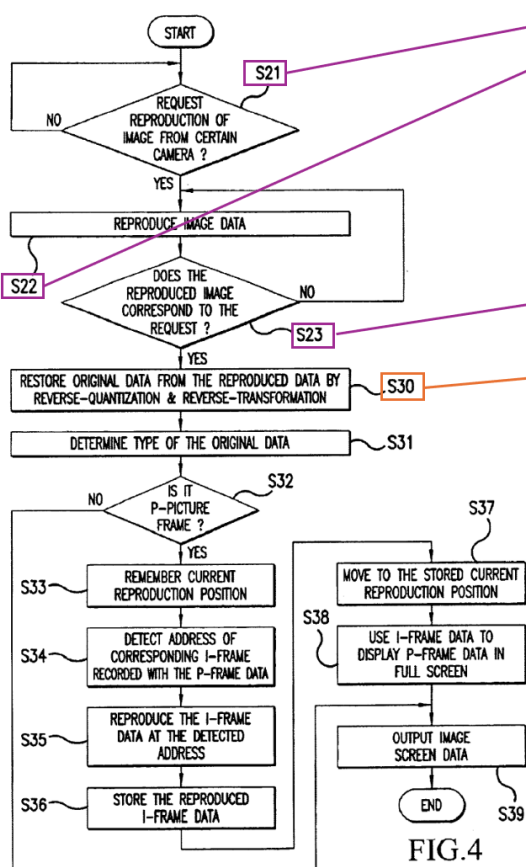


FIG.4

As shown in Steps S21 and S22 of FIG. 4, if the user requests reproduction of an image data from a particular camera or channel among the intermittent image data recorded on the optical disc 1, the controller 150 controls the recording/reproducing unit 140 to reproduce the corresponding image data from the optical disc 1. The image data reproduced from the optical disc 1 is multiplexed data, which is demultiplexed by the de-MUX 131. By demultiplexing, the camera (channel) ID code CHID is separated from the reproduced image data and output to the controller 150. Based on the camera ID code CHID, the controller 150 determines whether or not the reproduced image data corresponds to the selected camera or channel, in Step S23. This ensures that the correct image data is processed to comply with the user's request. If incorrect image data has been reproduced, the controller 150 controls the recording/reproduction unit 140 to reproduce the correct image data from the optical disc 1. In Step S30, the image data corresponding to the user's request is transmitted and decoded in the decoder 111. The decoding process of the decoder 111 involves reverse-quantization and reverse-transformation to restore the original image data prior to data compression carried out during recording. 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. More specifically, if the currently restored image data is detected to be P-picture frame data in Step S32, the controller 150 stores the current reproduction position in Step S33. Then in Step S34, the controller 150 detects the address of the corresponding I-picture frame (e.g., data stored in the area (3) of the bit stream B2 shown in FIG. 6) from the reproduced image data output from the de-MUX 131, and reproduces based on the detected address the corresponding (or previous) I-picture frame data recorded on the optical disc 1 by controlling the recording/reproduction unit 140.

In Step S36, the reproduced corresponding I-picture frame data is processed by the reproducing DSP 121, and decoded by the decoder 111 to be stored in the frame memory 101. The controller 150, after Step S36, controls the recording/reproducing unit 140 to move the video heads to the original recording position stored in Step S33.

Ex. 1006 (Kim) at Fig. 4 and 5:1-41 (annotations added).

132. In fact, Kim's decoder fully decodes all of the image data in Step S30 before determining at a later point (Step S31) whether that selected frame is an I-frame or a P-frame. Ex. 1006 (Kim) at 5:30-38.

133. As I explained previously in, for example, paragraphs 71 and 93 through 97, the example where a user selects a P-frame to decode is instructive. If the requested image is a P-frame, Kim's decoder fully decodes all of the P-frame's image data (which is only part of the full P-frame as I discussed in paragraph 94) in

Step S30, including reverse-quantization and reverse-transformation. Ex. 1006 (Kim) at 5:30-35 (“In Step S30, the image data corresponding to the user’s request is transmitted and decoded in the decoder 111. The decoding process of the decoder 111 involves reverse-quantization and reverse-transformation to restore the original image data prior to data compression carried out during recording.”). Thus, the IAD of the I-frame does not indicate the first image frame in decoding order because the first image frame decoded is whatever picture the user selects, as shown by the example of when the user selects a P-frame.

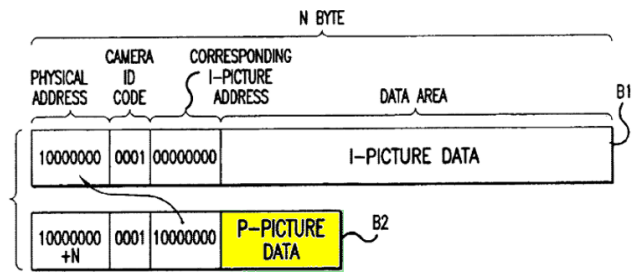
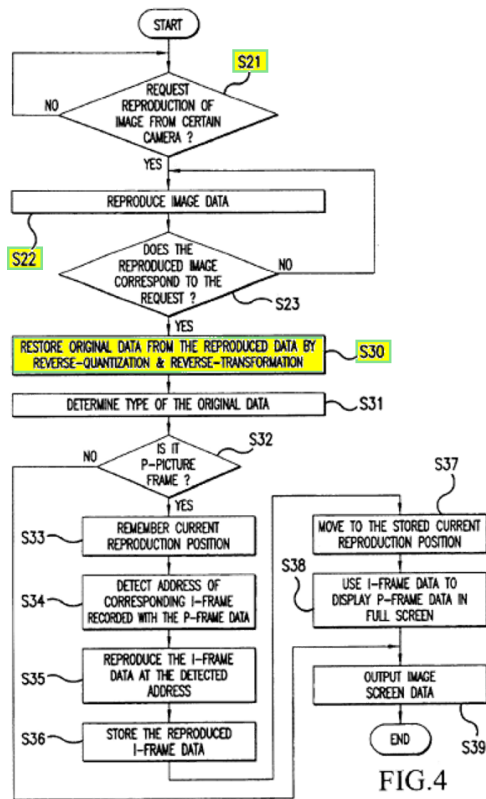


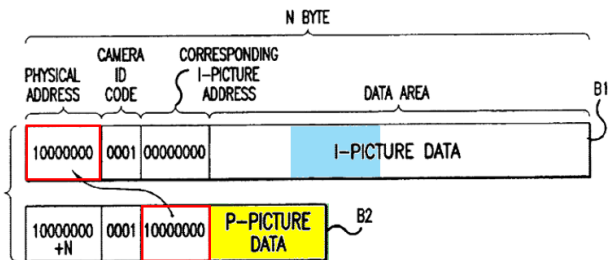
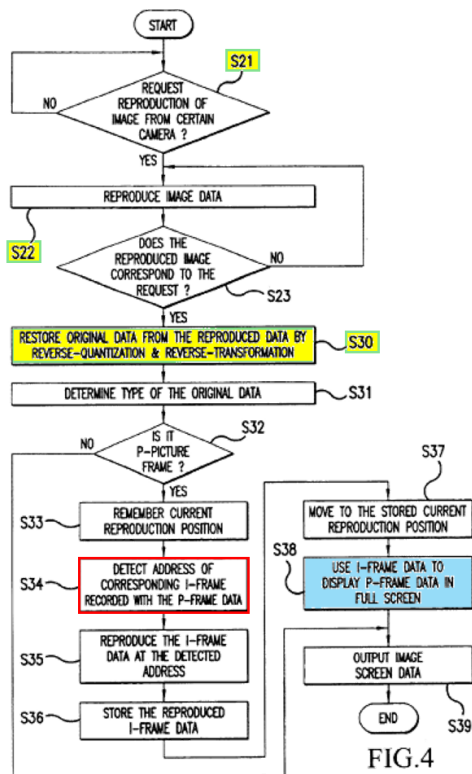
FIG.6

Ex. 1006 (Kim), Fig. 4 (highlighting added to Steps S20, S21, S30) and Fig. 6 (highlighting added to the corresponding partial P-frame that is decoded in Step S30).

134. I understand that Petitioners and Dr. Havlicek may assert that because the P-frame is a predicted frame, there will be portions of the image that rely on image data from a corresponding I-frame. While that is true, the coded P-frame data is already fully decoded (comprising only a partial P-frame at this point) before Kim's decoder even knows whether the frame is a P-frame or I-frame. Ex. 1006 (Kim) at 5:30-38 (explaining that the partial P-frame is decoded, including reverse

quantization and reverse transform, to restore the original image data prior to compression). Moreover, Kim explains that the P-frame is still the first image in decoding order when the P-frame is selected.

135. Specifically, Kim explains that if the decoder determines that the image selected by the user is a P-frame in Step S31, the corresponding I-frame address (the IAD of the P-frame) is detected at Step S34 (shown in red below), and then the corresponding I-frame data is decoded *in part* at Step S36 (shown in blue below). Ex. 1006 (Kim) at 5:35-52. I note that, according to Kim, the I-frame is not completely decoded at this point (Step S36) because the final reverse-transformation and reverse-quantization does not occur until Step S38. In Kim, reverse-transformation and reverse-quantization is a necessary part of the decoding process. Ex. 1006 (Kim) at 5:32-35.



Ex. 1006 (Kim), Fig. 4 and Fig. 6 (highlighting added).

136. However, according to Kim, the I-frame data is at most partially decoded because the full I-frame itself is never reverse-transformed and reverse-quantized when the requested image to decode is a P-frame. That is, at Step S38, the partial P-frame is combined with the partially decoded I-frame data and the moving (motion) vectors, and then the complete P-frame image is reverse-transformed and reverse-quantized, which completes the decoding of the full P-frame. Ex. 1006 (Kim) at 5:55-65. Thus, when the requested image to decode is a P-frame, only the P-frame is fully decoded because the full I-frame itself is never reverse-transformed

and reverse-quantized (only the parts that are used to predict the P-frame).

137. This example in which a user selects a P-frame to decode illustrates that the IAD of an I-frame does not indicate the first image frame in decoding order. It is not merely an example of when the IAD of an I-frame does not indicate the first image frame in decoding order. Rather, it shows that the IAD field of an I-frame never indicates the first image frame in decoding order. In other words, even if an I-frame was selected by the user and therefore the I-frame is decoded first, the IAD field of the I-frame still indicates nothing and has no meaning to the decoding process, just as it indicated nothing in the case when the P-frame was selected first. This is why the IAD field of the I-frame can be entirely absent. Ex. 1006 (Kim) at 4:65-5:1. Therefore, the IAD field of the I-frame does not indicate the first image frame in decoding order, as the claim requires.

138. I understand that expert Dr. Omid Kia testified in an ITC Investigation where the '321 Patent was asserted that “[i]t is the user that selects the picture to decode” and not the value of the IAD of the I-frame. Ex. 2013 (1380 Public Tr.) at 23-24 (1730:10-1731:2).

139. Neither the Petition nor Dr. Havlicek address this fundamental problem with Kim and that there is no “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.”

140. Neither the Petition nor Dr. Havlicek assert that it would have been obvious to modify Kim in any way to make the IAD field of the I-frame correspond to the claimed “indication of at least one image frame, which is the first image frame, in decoding order, of the independent sequence.”

iii. Kim’s IAD field of the I-frame is never “decod[ed] from the video sequence”

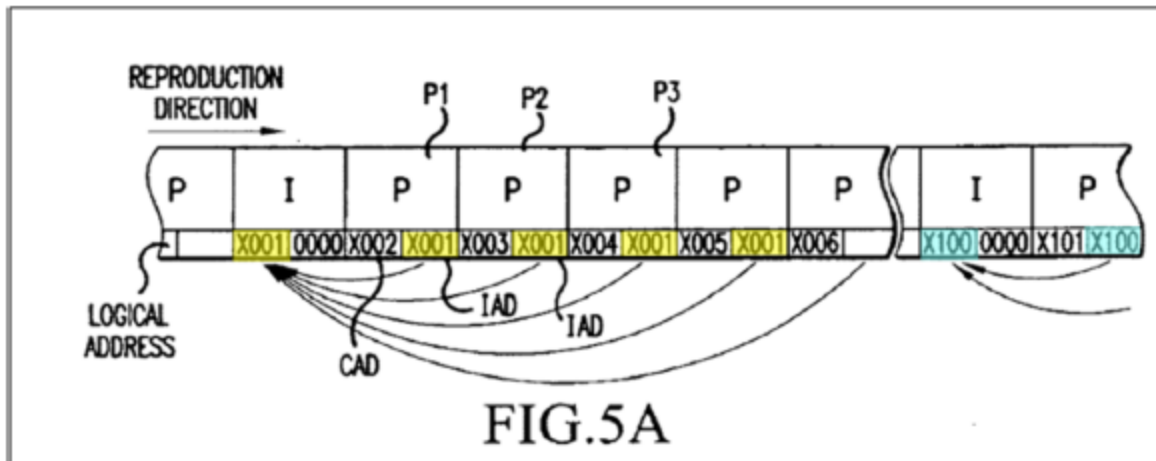
141. Third, even if the IAD field of the I-frame was the claimed indication (which I have explained why it is not), Kim’s decoder never discloses or renders obvious “decoding from the video sequence an indication of at least one image frame, which is the first image frame, in decoding order, of an independent sequence.”

142. As I explained above in, for example, paragraphs 71, 72, 96, 119, 122, 123, and 135, Kim’s decoding process, shown in Fig. 4, teaches that Step S34 to detect the IAD is only performed for a P-frame. That step is skipped for an I-frame. Ex. 1006 (Kim) at 5:66-6:3. Both the Petition and Dr. Havlicek appear to agree with me that Kim’s decoding process only detects the IAD for the P-frame and not for the I-frame. Petition at 10-11; Ex. 1003 (Havlicek Decl.) at ¶ 59.

143. Dr. Havlicek states that a “POSITA would have understood that the decoder disclosed in Kim decodes the IAD of the image frames.” Ex. 1003 (Havlicek

Decl.) at ¶ 123. While he cites to Fig. 4 and the same passages that I refer to above, Dr. Havlicek makes no distinction or recognition that Kim teaches that only the IAD field *of the P-frames* is ever read and that the critical Step S34 is skipped for I-frames. He makes no attempt to explain why a POSITA would have understood Kim's decoder to decode the IAD of the I-frames when he admits that Kim expressly teaches *not* to decode the IAD of the I-frames. Ex. 1003 (Havlicek Decl.) at ¶ 59. Neither the Petition nor Dr. Havlicek address this fundamental problem with Kim.

144. Dr. Havlicek also cites to Fig. 5A, stating that a "POSITA would have understood that decoding the bitstream in Figure 5A would include decoding the components of that bitstream, including the IAD values." Ex. 1003 (Havlicek Decl.) at ¶ 123. However, his own annotated figure shows that there are no arrows pointing to or from the IAD field of the I-frame. There is simply no evidence or description in Kim that the IAD field of the I-frame is ever used for anything. There is nothing to support Dr. Havlicek's opinion that a POSITA would have understood the IAD of the I-frame is decoded. In fact, all of the evidence and disclosures in Kim expressly state the opposite. A POSITA would not be motivated to decode or use the IAD field of the I-frame, first because it is "zero or absent" (i.e. a "don't care" value) and second because this would involve an unnecessary decoding and processing step that has no use or benefit within Kim's method.



Ex. 1003 (Havlicek Decl.), ¶ 122.

145. Even the Board acknowledged in a previous proceeding that “Kim discloses that ‘the image data corresponding to the user’s request is transmitted and decoded’ by a decoder” and then “[a]fter decoding the image data, Kim’s controller uses the IAD in the image data, e.g. to ‘detect[] the address of the corresponding I-picture frame’ *if the image data is a P-picture.*” IPR2025-01068, Paper No. 10 at 58 (bold and italics added).

146. Neither the Petition nor Dr. Havlicek assert that it would have been obvious to modify Kim in any way to make the decoder perform Step S34 for an I-frame or otherwise decode the IAD of the I-frame as the claim requires. Given that the IAD field of the I-frame serves no functional purpose, it would be a waste of processing power and design effort to make such a modification, i.e. to perform a decoding process for a data field that has no purpose and is not required for

successful decoding and display of image frames.

iv. Kim does not have a “video sequence.”

147. Fourth, Kim does not disclose or render obvious “decoding from the video sequence” because there is no teaching or suggestion of a video sequence in Kim.

148. Kim describes intermittent time lapse recording that requires “mov[ing] and stop[ping] the tape repeatedly” to capture time lapsed single images rather than a video sequence. Ex. 1006 (Kim) at 1:57-60. Critically, the purpose of Kim’s described technique is that “only the desired images can be selectively reproduced with high display quality.” Ex. 1006 (Kim) at 6:17-20. In other words, Kim only teaches the select encoding and decoding of individual images at a time, and not the video sequence of the ’321 Patent.

149. I understand that expert Dr. Omid Kia similarly testified in an ITC Investigation where the ’321 Patent was asserted that Kim does not disclose or suggest recording or playback of continuous video. Ex. 2013 (1380 Public Tr.) at 19 (1726:1-23). Rather, Kim only describes decoding a single image instead of a video sequence. Ex. 2013 (1380 Public Tr.) at 20 (1727:5-20).

150. Dr. Havlicek agrees that Kim teaches only time lapse recording and reproduction. Ex. 1003 (Havlicek Decl.) at ¶ 55. Critically, neither the Petition nor

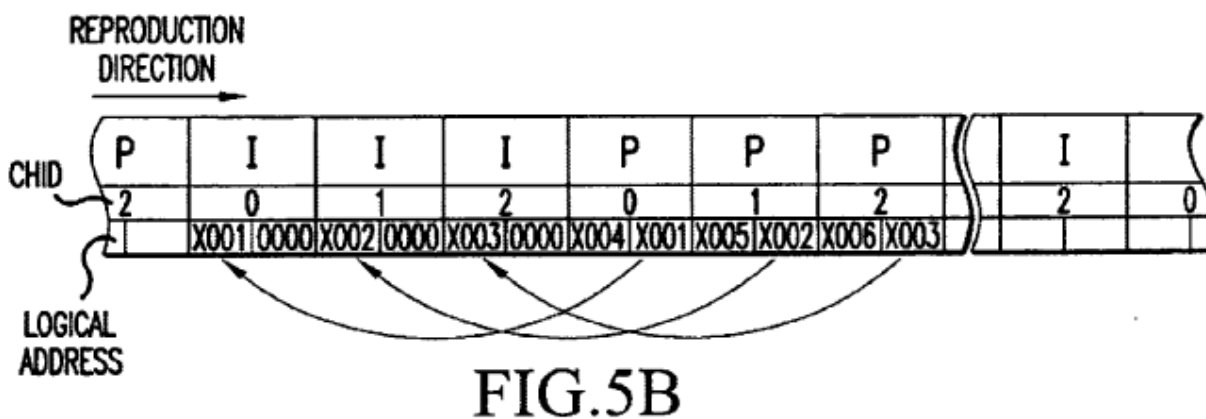
Dr. Havlicek ever explain how the encoding and decoding of a single image can satisfy a video sequence of claim 8[a], 10[a], or 11[a]. Petition at 31-35, 50, 54; Ex. 1003 (Havlicek Decl.) at ¶¶ 117-125, 158, 173.

151. Although neither the Petition nor Dr. Havlicek actually assert in claims 8[a], 10[a], or 11[a] that it would have been obvious to modify Kim to decode a video sequence, Dr. Havlicek does imply such an assertion elsewhere in his declaration. Ex. 1003 (Havlicek Decl.) at ¶¶ 128-129. However, Dr. Havlicek points to a Sony Time Lapse VCR and concludes, without any explanation, that “a POSITA would have appreciated the practical importance of that capability to time lapse video applications.” Ex. 1003 (Havlicek Decl.) at ¶ 128 (referring back to Section IX(A)(1)). Dr. Havlicek fails to explain what that “practical importance” might be. More importantly, his opinion directly contradicts the teachings of Kim. Kim expressly teaches that “only the desired images can be selectively reproduced with high display quality.” Ex. 1006 (Kim) at 6:17-20. Therefore, a POSITA would not have been motivated to modify Kim to decode a video sequence, as that is the opposite of what Kim teaches.

152. Furthermore, modifying Kim to repeatedly decode images into a video sequence would have required more effort, processing power, memory, and cost. Such a modification would have been less efficient and unnecessary for the applications Kim targeted, which only require decoding of individual, intermittently

captured time lapse images rather than a video sequence. Ex. 1006 (Kim) at 1:14-20.

153. Kim's Fig. 5B further confirms that Kim does not teach or suggest a video sequence. Fig. 5B shows a data stream of images takes from three different cameras (CHID: camera (channel) ID code 0, 1, 2). Ex. 1006 (Kim) at 4:56-58.



Ex. 1006 (Kim) at Fig. 5B.

154. Given that the “Reproduction Direction” in Fig. 5B is from left to right, if the stream was treated as a video sequence, every frame would hop to a different camera and cycle through each of the three different cameras before returning to the next frame for a particular camera. Such a disjointed set of images would not make sense to a viewer, and POSITA would have understood that Kim did not teach or suggest that any such disjointed set of images would comprise a video sequence.

155. I understand that expert Dr. Omid Kia testified in an ITC Investigation in which the '321 Patent was asserted, that modifying Kim to decode a video sequence would result in a “very time-consuming” implementation that is “very process intensive” as compared to Kim’s actual teaching of “single image retrieval.” Ex. 2013 (1380 Public Tr.) at 20-21 (1727:21-1728:21).

c. **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”**

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”

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”

156. Kim does not disclose or render obvious “*starting the decoding* of the video sequence from *said first image frame* of the independent sequence” because Kim teaches starting decoding from the user-selected frame. Ex. 1006 (Kim) at 5:12-38, Fig. 4.

157. A POSITA would understand that “said first image frame” is the frame that the claimed “indication” of the previous element refers to (for example, 8[a]:

“indication of at least one image frame, which is the first image frame, in decoding order, of an independent sequence”). Therefore, this element requires starting the decoding from that first frame that was indicated by the “indication” of the previous element.

158. As I explained above in Section VIII(1)(b)(i)-(ii) (paragraphs 116-140), any IAD field of an I-frame does not indicate the first image frame in decoding order because the first image frame to be decoded is simply whichever frame the user selects. Ex. 1006 (Kim) at 5:13-32, Fig. 4 (Steps S21 and S22).

159. While there may be certain circumstances where the decoder will start decoding from an I-frame because the user happens to select an I-frame, it would never be because the alleged indication (IAD of the I-frame) indicated to do so. Kim’s decoder always starts decoding from the user-selected picture. Section VIII(1)(b)(i)-(ii).

160. I understand that expert Dr. Omid Kia testified in an ITC Investigation in which the ’321 Patent was asserted that “[i]t is the user that selects the picture to decode” and not the value of the IAD of the I-frame. Ex. 2013 (1380 Public Tr.) at 23-24 (1730:10-1731:2).

161. Thus, for the same reasons as I explained previously in Section VIII(1)(b)(i)-(ii), Kim does not disclose or render obvious “*starting the decoding of*

the video sequence from *said first image frame* of the independent sequence.”

d. **8[d]: “resetting the identifier value for the indicated first image frame of the independent sequence”**

10[d]: “reset the identifier value for the indicated first image frame of the independent sequence”

11[d]: “a computer program code for resetting the identifier value for the indicated first image frame of the independent sequence”

162. Kim does not disclose or render obvious “resetting the identifier value for the indicated first image frame of the independent sequence” for multiple reasons.

163. First, for the same reasons I explained above, there is no “indicated first image frame of the independent sequence.”

164. Second, the claims require that the *decoder* reset the identifier value, but Kim teaches at most that the *encoder* sets the alleged identifier value. Kim never teaches a decoder resetting any identifier values, as the claims require.

165. Specifically, the Petition states that “Kim’s Fig. 5A shows that the IAD component of each logical address is reset to zero for each I-picture.” Petition at 45; Ex. 1003 (Havlicek Decl.) at ¶ 146. However, Fig. 5A shows “a digital data stream *compressed and recorded* on the optical disk” by Kim’s *encoder*, not its decoder. Ex. 1006 (Kim) at 2:49-51. Kim makes clear that the IAD values are

generated only by the encoder. Ex. 1006 (Kim) at 4:34-45 (“the address of the I-picture data received from the encoder 110”), Fig. 3. There is no disclosure or suggestion in Kim that the *decoder* ever sets or resets the IAD field of the I-frame.

166. Indeed, both the Petition and Dr. Havlicek agree that a “POSITA would have understood that the *encoder* disclosed in Kim encodes the IAD of the image frames.” Petition at 17 (*italics added*); Ex. 1003 (Havlicek Decl.) at ¶ 72. And, as Dr. Havlicek admits, “a POSITA would know that [a decoder] does not change the image number set by the encoder” and that “a POSITA would not expect a decoder to receive an identifier value set by the encoder and then modify that value.” Ex. 1003 (Havlicek Decl.) at ¶ 149.

167. A decoder simply reading a value that was set or reset by the encoder does not satisfy the claims, which clearly require the *decoder* to perform the resetting. As the ’321 Patent specification states, “when activated at a random point, the *decoder preferably sets* the identifier of the first image frame, preferably an I-frame, of the independently decodable sub-sequence.” ’321 Patent at 11:26-40 (*bold and italics added*). Both the Petition and Dr. Havlicek quote this same passage. Petition at 46; Ex. 1003 (Havlicek Decl.) at ¶ 149.

168. In the aforementioned previous ITC Investigation, the expert for the patent challenger, Dr. Eli Saber, testified at trial that he agreed it “would not meet

the claim limitation to just read a value that was reset by an encoder, because the claim requires that the resetting be done by the decoder.” Ex. 2013 (1380 Public Tr.) at 12-13 (1065:19-1066:3).

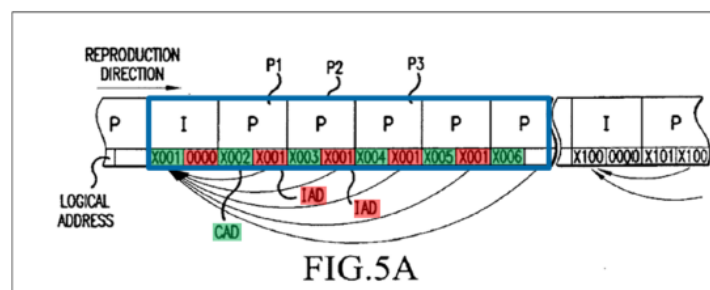
169. In that same trial, after Dr. Saber presented the same arguments as this Petition regarding Fig. 5A and resetting the IAD of the I-frame, expert Dr. Omid Kia explained (just as I did above) that the Kim teachings are related to the encoder, not the decoder, in contrast to the claims. Ex. 2013 (1380 Public Tr.) at 10 (1038:3-18), 25-26 (1732:11-1733:9).

170. Considering the same arguments presented in this Petition, the judge in that previous ITC Investigation concluded that “[t]here is really no dispute that ... the alleged ‘identifier value’ in Kim is set/reset by the encoder and the decoder simply reads or derives it from the bitstream.” Ex. 2009 (1380 Public ID) at 62-63. I agree with the judge’s conclusion that “Kim does not teach a decoder resetting the IAD value.” Ex. 2009 (1380 Public ID) at 63.

171. Dr. Havlicek additionally asserts that because “Kim’s decoder stores I-pictures in frame memory” that “it would have been obvious to a POSITA for Kim’s decoder to store the IAD along with the I-picture so the decoder could determine whether the I-picture needed to decode a given P-picture is already present in the frame memory.” Ex. 1003 (Havlicek Decl.) at ¶ 150; Petition at 47. However,

both Petition and Dr. Havlicek state that the I-frame's logical address needed to decode a given P-frame, as shown in Fig. 5A, is the *CAD value*, not the IAD value:

52.) I-pictures also have a CAD that indicates the picture's current address (EX1006, 4:65-5:1, Figs. 5A, 6 ("physical address")), but the I-picture's IAD is zero (EX1006, Figs. 5A (showing "0000"), 6 (showing "00000000" for the "corresponding I-Picture address")). Figure 5A below is annotated to highlight the IAD values in red and CAD values in green.



Petition at 10 (colors and annotations in original); Ex. 1003 (Havlicek Decl.) at ¶ 58.

172. As I explained above in, for example, paragraphs 68, 80, 83, 85, 86, 117, 125, and 126, there is no meaning or use in Kim for the IAD field of the I-frame. Dr. Havlicek offers no explanation why it would be obvious to store the value of the IAD field of the I-frame given that it is never used. Storing a value that is never used is a waste of time, memory, processing power, and resources. A POSITA would not have been motivated to do such a thing.

173. I understand that expert Dr. Omid Kia similarly testified in an ITC Investigation in which the '321 Patent was asserted that "[f]or an I-frame, that IAD

does not serve any purpose ... So it would not be obvious to add functionality that was not there.” Ex. 2013 (1380 Public Tr.) at 25-26 (1732:19-1733:9).

174. Therefore, it would not have been obvious to a POSITA for a decoder to reset the “0000” value of an IAD of an I-frame repeatedly for the same reasons that I described above in, for example, paragraphs 64, 68, 80, 83, 85, 86, 117, 125, and 126, including at least because Kim’s decoder never reads, decodes, or uses the IAD of an I-frame for any purpose. Resetting the value would be a waste of resources, processing power, and memory and would achieve no purpose within Kim.

175. Considering the same arguments presented in this Petition, including “that the decoder reading a ‘reset’ value from a bitstream and storing it locally meets the resetting limitation,” the judge in the previous ITC Investigation rejected that the claims were anticipated or rendered obvious, in view of the testimony from Dr. Kia that I refer to above in, for example, paragraphs 87, 101, 127, 138, and 173. Ex. 2009 (1380 Public ID) at 63.

176. As a final note, it appears that the Petition and Dr. Havlicek do not believe that claims 8, 10, and 11 actually require the *decoder* to perform those limitations. Petition at 45; Ex. 1003 (Havlicek Decl.) at 149 (“that the language in claim 8 requires the *decoder* to do the resetting ... mischaracterizes the ’321 patent

and what element 8[d] requires.”).

177. However, claim 8 is a “method for *decoding*,” claim 10 is a “video *decoder* ... causing the video *decoder* to at least,” and claim 11 is a “computer program products ... for *decoding*.”

178. In the previous ITC Investigation, the expert for the patent challenger, Dr. Eli Saber, testified at trial that he agreed the claims require the decoder to reset the identifier. Ex. 2013 (1380 Public Tr.) at 5 (601:8-10 (“Q: According to the claims, what has to perform the resetting step? A: The decoder.”)), 12-13 (1065:12-1066:3 (“Q: It would not meet the claim limitation to just read a value that was reset by an encoder, because the claim requires that the resetting be done by the decoder, right, sir? A: That’s correct.”)). Expert Dr. Omid Kia also agreed that the “claims are required to perform that [resetting] step at the decoder.” Ex. 2013 (1380 Public Tr.) at 25 (1732:15-18).

179. In the ’321 Patent, the decoder resets the identifier in order to solve the problems with random access that I described previously in the Background section of this declaration. The solution of the ’321 Patent explains that “this [random access problem] can be avoided in the decoder by defining an initiation image in an independently decodable Group of Pictures GOP that is activated at the random point of the video file, and the number of the initiation image is set to zero

.... Consequently, when activated at a random point, the *decoder preferably sets* the identifier of the first image frame, preferably an I-frame, of the independently decodable sub-sequence.” ’321 Patent at 11:26-40 (bold and italics added).

180. Kim has no reason to teach or suggest the solution of the ’321 Patent because Kim has nothing to do with random access during streaming video. Kim’s single image reproduction for a time lapse recording on an optical disk is not related to the same problem or solution of the ’321 Patent.

181. The Petition is incorrect that “the only time that the patent describes ‘reset[ting]’ the identifier value ... it is referring to an *encoding* process.” Petition at 46 (italics in original). Both the Petition and Dr. Havlicek quote the same passage in the ’321 Patent that I identify above, that states “when activated at a random point, the *decoder preferably sets* the identifier of the first image frame, preferably an I-frame, of the independently decodable sub-sequence.” ’321 Patent at 11:26-40 (bold and italics added); Petition at 46; Ex. 1003 (Havlicek Decl.) at ¶ 149.

182. As with other arguments Petitioners raise in their Petition, the judge in the previous ITC Investigation already considered and rejected this argument in view of the same evidence and testimony above (cited in, for example, paragraphs 170 and 175), and concluded that “claims 8 and 10 require the decoder, not the encoder, to perform the resetting step.” Ex. 2009 (1380 Public ID) at 62.

183. I agree with the judge's determination that Kim does not teach or render obvious the claims of the '321 Patent for all of the reasons I explain above.

2. None of the Challenged Claims 2, 5, and 9 Are Unpatentable In Light of Ground 2—Kim with Adolph.

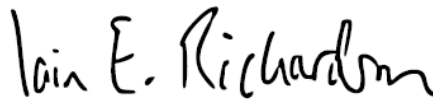
184. For the reasons I explained above, Kim does not teach or suggest to a POSITA the limitations of independent claims 1, 4, 7, 8, 10, or 11. Neither Petitioners nor Dr. Havlicek assert that combination with Adolph overcomes any of the shortcomings of Kim with respect to any of the independent claims 1, 4, 7, 8, 10, or 11. Therefore, Kim also does not teach or suggest to a POSITA the limitations of dependent claims 2, 5, and 9 either.

IX. SIGNATURE

This Declaration represents the opinions that I have formed to date based on the material currently available to me. I reserve the right to revise, supplement, and/or amend my opinions stated in this Declaration based on new information that becomes available to me and on my continuing analysis of the materials available to me.

I declare that all statements made herein of my knowledge are true, and that all statements made on information and belief are believed to be true, and that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine, imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Dated: October 7, 2025

A handwritten signature in black ink that reads "Iain E. Richardson". The signature is written in a cursive, flowing style. Below the signature is a horizontal line.

Dr. Iain Richardson