

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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

v.

NOKIA TECHNOLOGIES OY,  
Patent Owner.

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Case IPR2024-00725  
Patent 8,204,134

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**DECLARATION OF DR. OMID KIA**

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## **I. INTRODUCTION**

1. My name is Dr. Omid Kia I have been retained by Patent Owner Nokia Technologies Oy (“Patent Owner”) to provide expert opinions in connection with this *inter partes* review.

2. I am being compensated for my work in this matter at my standard consulting rate of \$425 per hour. I am also being reimbursed for all incurred expenses. My compensation is not contingent upon the outcome of this action. I have no other interests in this action or with any of the parties.

3. My opinions are also based upon my education, training, research, knowledge, and personal and professional experience.

## **II. QUALIFICATIONS**

4. My qualifications for forming the opinions set forth in this report are listed in this section and in my CV. *See* Ex. 2002. My CV also includes a list of my publications.

5. I am currently a senior systems engineer, serving as subject matter expert at Coastal Communication Consultants, Inc. (hereinafter referred to as “CCCi”). In this capacity, I serve as an expert in all of CCCi’s imaging initiatives along with high-technology research and development. I also serve as an expert in all of CCCi’s activities pertaining to remote sensing, surveillance, and image/signal processing problems.

6. Prior to joining CCCi, I served as the Chief Image Scientist at Northstrat Inc. (hereinafter referred to as “Northstrat”) and Senior Staff Scientist at ITT Exelis, Space Sciences Division (hereinafter referred to as “ITT Exelis”) in a similar capacity. Northstrat expanded their business into product-based services and as such utilized my innovative approach to develop high technology products that carried a service-based revenue model. ITT Exelis (now part of Harris Corporation) was a leader in Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (“C4ISR”) related products and systems and information and technical services, supplying military, government, and commercial customers in the United States and globally. ITT Exelis was a pure-play aerospace, defense, and information solutions company with strong positions in enduring and emerging global markets, some 20,000 employees, and 2010 revenues of about \$6 billion.

7. Prior to joining ITT, I served as the Chief Scientist at Imaging Sciences International, Inc. where my efforts catapulted the company into the leading Cone Beam Computed Tomography (CBCT) provider in the world. The application of CBCT was targeted for the general dental market with first adopters including Implantologists but later to other providers. After the purchase of Imaging Sciences International, Inc. by Danaher Corporation the new business unit

continued Danaher's efforts to expand into other dental fields, for which I also served as the Subject Matter Expert for all efforts involving digital imaging.

8. Prior to joining Imaging Sciences, I researched and developed numerous medical and consumer technologies, all involving digital imaging. These activities included hardware and software design throughout the entire image chain.

9. In brief, and with particular relevance to the subject matter of this Investigation, my background and qualifications to be an expert witness in this matter are as follows. I received my Ph.D. degree in Electrical Engineering from the University of Maryland at College Park in 1997. My thesis addressed the compression and processing of images and has content spanning image processing, compression and communication theory and application.

10. Immediately after my graduation, I continued work in media compression and processing at the Compression Group in the Information Technology Laboratory of the National Institutes of Standards and Technology. In this role, I continued my research and expanded on similar topics across several media forms. In particular, I served as the United States Government ambassador to the MPEG standardization group. I also expanded on my thesis research topic to exploit compressed-domain processing of media for images, video and multimedia content. I worked with engineers who utilized the MPEG standardization body's

source code for performance, quality and testing. There were at least three individuals in my immediate compression group and about 10 individuals working in other companies that contributed to the source code. These individuals were degreed with a Bachelor's degree in either Electrical Engineering or Computer Science and had direct experience with image processing, compression and communications as it pertains to encoding and decoding of images. At least two individuals in my immediate group were recent graduates who were performing a cross-country internship from France who were interested in pursuing advanced degrees and part of their education process had to perform actual work to gain relevant experience. These individuals had a bachelor's degree in either Electrical Engineering or Computer Science with one to two years working experience on compression algorithms that was being studied in my group that included image compression and transmission. I was also personally involved with testing the MPEG 4 encoding and decoding reference software.

11. Since 1999, I have held technical leadership positions in image and signal processing fields for delivery of highly technical solutions to the market. In particular, I have worked with X-ray imaging for medical diagnostic, security scanning, and non-destructive testing purposes.

12. From 1999 to 2001, I served as the Chief Technical Officer at IMACOM, a medical imaging company that manufactured and sold Fluoroscopy

and Radiography systems. From 2002 to 2003, I served as the president at Sigma Vision, a company that specialized in radiography for veterinary, security, and non-destructive testing. I worked with hardware and software engineers that provided technical support in development and maintaining of the imaging machines produced by the company. A large part of the system was to integrate our high-performance camera, high-performance real-time processing electronics, command and control module with the rest of the hospital systems such as the Radiography machine, Radiological Information Systems (RIS) and Hospital Information Systems (HIS). Specifically, the versatile and configurable camera with a variety of operating modes was tightly integrated with the real-time processing electronics, and through the control of the host computer, the system implemented the various modes of the operation of the existing Radiography machine. The engineers working with me had bachelor's degrees in Electrical Engineering and Computer Science with hands-on experience in various aspects of the system, some of which was at least one to two year equivalent experience in image processing, compression, and communications.

13. From 2004 to 2009, I served as the Chief Scientist and Director of Digital X-Ray Development at Imaging Sciences International, Inc. (hereinafter referred to as "ISII"), a company that marketed a broad scope of imaging and workflow solutions for the dental market. In this capacity I was the lead scientist in

evaluating, designing and using of a variety of imaging systems with specific performance requirements.

14. Since 2009 I have served at ITT Exelis, Northstrat and now at Coastal Communication Consultants as a senior scientist responsible for government contracts as Chief Engineer and Chief Scientist. Also at ITT Exelis, I served as one of the leading experts in image and computer vision related activities. In particular I designed the camera processing for a large field of view, multi-sensor camera with field-steerable mirrors to be used in an Unmanned Aerial Vehicle (UAV). I also served as the video processing subject matter expert to address all aspects of video coding and decoding as it pertains to image quality, channel model, display, format, indexing, error recovery and transmission.

15. In these capacities, I have worked on many aspects of digital imaging for optical, hyperspectral, radiofrequency, X-rays in active or passive modes, including algorithm development, software development, hardware development, receptor development, and system design. I have also implemented image and video processing baselines for various products including performance criteria such as image quality, processing and communication requirements.

### **A. Materials Considered**

16. My opinions are based on my education, training, research, knowledge, and personal and professional experience. In connection with this report, I have reviewed the following:

- Ex. 1001 – U.S. Patent No. 8,204,134 (“the ’134 patent”)
- Ex. 1002 – File History of the ’134 patent
- Ex. 1003 – Declaration of Dr. Joseph P. Havlicek (“Havlicek”)
- Ex. 1005 – U.S. Patent No. 5,835,672 (“Yagasaki”)
- Paper 1 – Petition for Inter Partes Review of U.S. Patent No. 8,204,134

### **III. PERSON OF ORDINARY SKILL IN THE ART (POSITA)**

17. I understand that the meanings of terms are to be construed from the standpoint of a person of ordinary skill in the relevant art.

18. I understand that factors that may be considered in determining the level of ordinary skill in the art may include: (A) type of problems encountered in the art; (B) prior art solutions to those problems; (C) rapidity with which innovations are made; (D) sophistication of the technology; and (E) educational level of active workers in the field. In a given investigation, every factor may not be present, and one or more factors may predominate.

19. A person with ordinary skill in the art would have at least a bachelor's degree in electrical engineering, computer engineering, or a related field, with about two years of experience in video decoding or encoding technologies. More work or practical experience may qualify one not having the requisite education as a person with ordinary skill in the art, while a higher level of education could offset less experience.

20. I understand that Petitioner takes the position that a person with ordinary skill in the art 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 and/or image processing or coding. Additional experience can substitute for the level of education, and vice-versa.

21. I agree with the level of ordinary skill in the art for the Challenged Patent that I propose, although the proposed definitions are very similar. I met and exceeded Nokia's level of skill in the art as of the conception date of the '134 Patent. I also met and exceeded Petitioner's level of ordinary skill in the art as of the conception date of the '134 Patent. Accordingly, no matter which level of skill in the art is applied, my analysis and conclusions in this report remain unchanged.

#### **IV. LEGAL STANDARD FOR PATENTABILITY**

22. I use the legal principles below, of which I have been informed by counsel, as a guide in formulating my opinions.

##### **A. Claim Interpretation**

23. My opinions concern what I believe the person of ordinary skill in the art would have understood the meaning of certain claim terms to be based on the patent documents.

24. I have been informed that assessing the validity of a patent claim requires a two-step analysis. The first step involves the proper interpretation or construction of the claim language in order to determine its scope and meaning. The second step requires comparing the claim, as properly construed, to the alleged prior art to determine whether the limitations of the claim are met by the prior art.

25. My methodology for determining the meaning of claims phrases was first to study the patent carefully. In particular, I studied the claims themselves, followed by the background, detailed specification, figures, and other patent content. Next, I reviewed the prosecution history looking for any clarifications or limitations that might be attached to claim terms. In some circumstances, I looked at other documents, such as references applied by the patent office.

26. I understand that in an inter partes review, claim terms are to be given their ordinary and customary meaning as understood by a person of ordinary skill in

the art in the context of the entire disclosure at the time of the invention. I understand that one must be careful not to read a specific embodiment appearing in the written description into the claim if the claim language is broader than the embodiment. I further understand that any special definition for a claim term must be set forth with reasonable clarity, deliberateness, and precision.

27. I have been informed that this standard is the same as that used in United States district courts, in which claim terms are given their ordinary and customary meaning as would be understood by a person of ordinary skill in the art at the time of the invention having taken into consideration the language of the claims, the specification, and the prosecution history of record under the *Phillips* claim construction standard.

## **B. Prior Art**

28. It has been explained to me by Counsel that information which satisfies one of the categories of prior art set forth in 35 U.S.C. § 102 (pre-AIA) may be used in an invalidity analysis under §§ 102 or 103. If information is not properly classified as prior art under one of the subsections of § 102 of the Patent Code, then it may not form the basis of an anticipation or obviousness determination.

## **C. Anticipation**

29. It has been explained to me by Counsel that a patent claim is invalid due to anticipation under 35 U.S.C. § 102 if each and every element of the patent

claim is disclosed in a single asserted prior art reference. I am informed that such disclosure may be either explicit or inherent. I also understand that a disclosure of an asserted prior art reference can be “inherent” if the missing element is necessarily present or is the inevitable outcome of the process and/or thing that is explicitly described in the asserted prior art reference.

30. I further understand that, in order to be an anticipatory prior art reference, the prior art reference also must be enabling such that it teaches one of ordinary skill in the art how to make or carry out the claimed invention without undue experimentation.

#### **D. Obviousness**

31. I further have been informed that a patent claim is invalid under AIA 35 U.S.C. § 103 if it would have been obvious to a person of ordinary skill in the art in view of the prior art at the time the application was filed. In other words, even though the claimed invention may not be identically disclosed or described in a single prior art reference, a patent claim is invalid for obviousness if the differences between the claimed invention and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains.

32. I have been informed that the following factors are used in making an obviousness determination: (i) the scope and content of the prior art are to be

determined; (ii) the differences between the prior art and the claims at issue are to be ascertained; and (iii) the level of ordinary skill in the pertinent art resolved.

33. I understand that whether there are any relevant differences between the prior art and the claimed invention is to be analyzed from the view of a person of ordinary skill in the art at the time of the invention. I have been informed, for purposes of this IPR proceeding, to assume that the alleged date of invention for the challenged claims is January 23, 2002.

34. In analyzing the relevance of the differences between the claimed invention and the prior art, I understand that I must consider the impact, if any, of such differences on the obviousness or non-obviousness of the invention as a whole, not merely some portion of it.

35. The person of ordinary skill faced with a problem is able to apply his or her experience and ability to solve the problem and also look to any available prior art to help solve the problem.

36. I understand that a reference may be modified and/or combined with one or more other references and/or with the knowledge of one of ordinary skill in the art if such person of ordinary skill in the art would have found the modification and/or combination obvious. In other words, I understand that I do not need to look for precise teaching in the prior art directed to the subject matter of the claimed invention. I understand that I may take into account the inferences and creative steps

that a person of ordinary skill in the art would have employed in reviewing the prior art at the time of the invention.

37. In determining whether a piece of prior art could have been combined with other prior art or with other information within the knowledge of a person having ordinary skill in the art, it is my understanding that the following are examples of approaches and rationales that may be considered to support a conclusion of obviousness:

- Combining prior art elements according to known methods to yield predictable results;
- Simple substitution of one known element for another to obtain predictable results;
- Use of a known technique to improve similar devices, methods, or products in the same way;
- Applying a known technique to a known device, method, or product ready for improvement to yield predictable results;
- Applying a technique or approach that would have been “obvious to try” (choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success);
- Known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations would have been predictable to a person having ordinary skill in the art; or

- Some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention.

38. I understand that if the claimed invention combined elements known in the prior art and the combination yielded results that were predictable to a person of ordinary skill in the art at the time of the invention, then this evidence would make it more likely that the claim was obvious.

39. I understand that an invention would have been obvious if a person of ordinary skill in the art, facing the wide range of needs created by developments in the field, would have seen an obvious benefit to the solutions tried by the applicant. When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, it would be obvious to a person of ordinary skill to try the known options. If a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique would have been obvious.

40. I understand that a key inquiry is whether any improvement allegedly achieved by a claimed invention is more than the predictable use of prior art elements according to their established functions.

41. I understand that a claimed invention may be obvious if some teaching, suggestion, or motivation exists that would have led a person of ordinary skill in the art to combine the invalidating references. I also understand that this suggestion or motivation may come from sources such as explicit statements in the prior art, or from the knowledge of a person having ordinary skill in the art. Alternatively, any need or problem known in the field at the time and addressed by the patent may provide a reason for combining elements of the prior art.

42. I also understand that when there is a design need or market pressure, and there are a finite number of predictable solutions, a person of ordinary skill may be motivated to apply both his skill and common sense in trying to combine the known options in order to solve the problem.

43. I understand that a reason to modify or combine prior art may support an obviousness determination, provided there is a reasonable expectation of success. I further understand that whether a proposed modification or combination of the prior art has a reasonable expectation of success is determined at the time the invention was made.

44. On the other hand, if the combination of known elements yielded unexpected or unpredictable results, or if the prior art teaches away from combining the known elements, then this evidence would make it more likely that the claim that

successfully combined those elements was not obvious. I understand that hindsight must not be used when comparing the prior art to the invention for obviousness.

45. I am also aware that before concluding a claim is obvious, secondary considerations of non-obviousness, to the extent they exist, must be considered, such as: long-felt need, failure of others, copying by others, praise by others in the industry, licensing of the claimed invention, departure from accepted principles, widespread recognition by those in the art of the invention's significance, and commercial success. I understand that there must be a demonstrated nexus between the claimed invention and these secondary considerations for them to be considered.

## **V. OVERVIEW OF THE '134 PATENT**

46. The '134 Patent, titled "Grouping of Image Frames in Video Coding," relates generally to "the grouping of multimedia files, particularly video files and particularly in connection with streaming." Ex. 1001 at 1:13-15.

47. During streaming, transmission of multimedia data and/or data contents are controlled by having the bit rate of the transmission substantially correspond to the playback rate of the terminal device. *Id.* at 1:32-42. If a telecommunications network is used in the transmission, it can cause a bottleneck in the data transfer and, in that case, the bit rate of the transmission should substantially correspond to the bandwidth available in the telecommunications network. *Id.* The multimedia data and/or data contents are typically very large and

their transfer to the terminal device can be time-consuming and, in the case of downloading, can require a significant amount of storage memory capacity. *Id.* at 1:42-54.

48. The '134 Patent explains video files in multimedia files as follows:

The video files in multimedia files comprise a great number of still image frames, which are displayed rapidly in succession (of typically 15 to 30 frames per s[econd]) to create an impression of a moving image. The image frames typically comprise a number of stationary background objects, determined by image information which remains substantially unchanged, and few moving objects, determined by image information that changes to some extent. The information comprised by consecutively displayed image frames is typically largely similar, i.e. successive image frames comprise a considerable amount of redundancy. The redundancy appearing in video files can be divided into spatial, temporal and spectral redundancy. Spatial redundancy refers to the mutual correlation of adjacent image pixels, temporal redundancy refers to the changes taking place in specific image objects in subsequent frames, and spectral redundancy to the correlation of different colour components within an image frame.

*Id.* at 1:55-2:4.

49. “To reduce the amount of data in video files, the image data can be compressed into a smaller form by reducing the amount of redundant information in the image frames.” *Id.* at 2:5-7. “[W]hile encoding, most of the currently used video encoders downgrade image quality in image frame sections that are less

important in the video information.” *Id.* at 2:7-10. Further, redundancy can be “reduced by efficient, lossless coding of compression parameters known as VLC (Variable Length Coding).” *Id.* at 2:10-14.

50. Many video coding methods use the above-described temporal redundancy of successive image frames. *Id.* at 2:15-17. In that case, motion-compensated temporal prediction is used—i.e., contents of some (typically most) of the image frames in a video sequence are predicted from other frames in the sequence by tracking changes in specific objects or areas in successive image frames. *Id.* at 2:17-2. However, issues may arise with this method: “If a frame is lost, frames dependent on it can no longer be correctly decoded.” *Id.* at 2:31-33.

51. Each video frame can be divided into macroblocks that comprise color components (such as Y, U, V) of all pixels of a rectangular image area. *Id.* at 2:56-58. Macroblocks can be further grouped into slices, which are groups of macroblocks that are typically selected in the scanning order of the image. *Id.* at 2:65-67. “Temporal prediction is typically carried out in video coding methods block or macroblock-specifically, instead of image-frame-specifically.” *Id.* at 2:67-3:2.

52. “To allow for flexible streaming of video files, many video coding systems employ scalable coding in which some elements or element groups of a video sequence can be removed without affecting the reconstruction of other parts

of the video sequence.” *Id.* at 3:3-7. “Scalability is typically implemented by grouping the image frames into a number of hierarchical layers.” *Id.* at 3:7-8. The hierarchical layers typically include a base layer and one or more enhancement layers that include image frames. *Id.* at 3:8-18. “The frames are typically numbered according to an arithmetical series.” *Id.* at 3:19-20.

53. The ’134 Patent further describes controlling the transmission bit rate, including without limitation leaving out or removing frames having high information content from the transmission, including less scalability layers in the transmission, or using different video sequence coding methods for the transmission:

In streaming, transmission bit rate must be controllable either on the basis of the bandwidth to be used or the maximum decoding or bit rate value of the recipient. Bit rate can be controlled either at the streaming server or in some element of the telecommunications network, such as an Internet router or a base station of a mobile communications network. The simplest means for the streaming server to control the bit rate is to leave out B-frames having a high information content from the transmission. Further, the streaming server may determine the number of scalability layers to be transmitted in a video stream, and thus the number of the scalability layers can be changed always when a new group of pictures GOP begins. It is also possible to use different video sequence coding methods. Correspondingly, Bframes, as well as

other P-frames of the enhancement layers, can be removed from the bit stream in a telecommunications network element.

*Id.* at 3:21-36.

54. However, the '134 Patent identifies a number of drawbacks with the above approach, including without limitation that a group of pictures (GOP) employing reference picture selection cannot necessarily be decoded independently, and the adjusting of scalability or coding method in the streaming server or a network element becomes difficult because the video sequence must be decoded, parsed, and buffered for a long period of time to allow any dependencies between different image groups to be detected. *Id.* at 3:37-61.

55. The '134 Patent further describes issues with discontinuity in image numbering and signaling to the decoder:

A further problem relates to the insertion of a video sequence in the middle of another video sequence, which has typically led to discontinuity in image numbering. The numbering of video sequence images is typically used for detecting the loss of image frames. However, if a separate video sequence, such as a commercial, is inserted into a video sequence, the separate video sequence is typically provided with separate image numbering, which is not in line with the ascending image numbering of the original video sequence. The receiving terminal may therefore interpret the deviating image numbering as a signal of lost image frames and start unnecessary

actions to reconstruct the image frames suspected as lost or to request a re-transmission thereof.

A similar problem is encountered when buffering and indexing reference pictures in the encoder and the decoder. As a part of the indexing, the encoder may intentionally remove a plurality of image frames, which are unnecessary as reference image frames for the temporal prediction process of any remaining image frames. Again, there is no process for informing the decoder a reason for the removal: for example, if a plural number of image frames are removed, the receiving terminal may unnecessarily interpret these intentional removals as protocol errors.

*Id.* at 3:62-4:17.

56. The '134 Patent further describes these issues as follows:

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. When 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.

*Id.* at 11:9-23.

57. To address these issues and others, the '134 Patent discloses a decoding method; a video decoder; and a computer program product, stored on a non-transitory computer readable medium and executable in a data processing device. *See, e.g., id.* at Claims 1-22, 4:21-5:4. For example, the decoder is configured to treat the image frames, which the encoder or another network element has removed, as intentionally removed. *See, e.g., id.* at 4:21-24.

58. The '134 Patent further discloses that the decoding method, video decoder, and computer program product decode a compressed video sequence. *See, e.g., id.* at 4:31-33. Image frames are entered into a buffer memory in connection with the decoding. *Id.* The compressed video sequence includes an indication informing an intentional discontinuity in the numbering of the image frames, which indication is decoded from the compressed video sequence. *See, e.g., id.* at 4:33-36, 4:41-45. The missing image frames cause discontinuities in the numbering of the image frames. *See, e.g., id.* at 4:45-47. In response to the indication, the buffer memory is configured to provide a number of image frames corresponding to at least one discontinuity in the numbering of the image frames.

*See, e.g., id.* at 4:36-40. The image frames in the buffer memory are used in the decoding process. *See, e.g., id.* at 4:36-45.

59. The number of image frames in the buffer memory can be used in place of image frames that do not exist at a decoder due to the at least one discontinuity in the numbering of the image frames. *See, e.g., id.* at 4:41-45.

60. After the buffer memory has been configured to provide the number of image frames corresponding to the discontinuities in the numbering of the image frames, the entering of the image frames comprised by the video sequence into the buffer memory can be continued from the correct image frame number. *See, e.g., id.* at 4:48-53.

61. A number of filler frames corresponding to the discontinuities in the numbering of the image frames can be entered into the buffer memory. *See, e.g., id.* at 4:54-56. The filler frames can be designated by an identifier indicating that the filler frames do not belong to the actual video sequence. *See, e.g., id.* at 4:56-59.

62. Configuring the buffer memory to provide a number of image frames corresponding to the discontinuities in the numbering of the image frames can also be carried out by memory indications, whereby no data is entered into the buffer memory. *See, e.g., id.* at 4:60-64.

63. The number of image frames in the buffer memory can also be used in sliding window buffering of image frames. *See, e.g., id.* at 19:58-20:1.

64. One benefit of the above approach is that it provides the decoder with a configuration to treat the gaps in the image frame numbering as intentional, whereby the decoder does not first perform unnecessary error correction actions and instead initially treats any discontinuities as intentional, with the ability to recognize unintentional losses at a later time. *See, e.g., id.* at 4:65-5:1. Another benefit of this approach is that the buffer memories of the encoder (or another network element) and the decoder can be kept in synchronism, which enables a fluent operation of the process of reference picture selection. *See, e.g., id.* at 5:1-4. Other benefits include, without limitation, redundant image frame removal, removal of frames unnecessary for reference, transmission bit rate management, buffer memory management, efficiency increases, avoidance of unnecessary error correction actions, insertion of a video sequence (such as a commercial) in the middle of another video sequence, and others. *See, e.g., id.* at 1:32-42, 2:5-33, 3:21-36, 3:62-4:17, 4:21-28, 4:60-5:4, 5:56-67, 6:61-7:12, 11:9-23, 20:34-56.

## **VI. PROSECUTION HISTORY OF THE '134 PATENT**

65. On January 25, 2006, U.S. Patent Application No. 11/338,996 (“’996 Application”) was filed which would result in the ’134 Patent. Ex. 1002 at 2-3. The ’996 Application claims priority through U.S. Patent Application No. 10/306,942

(filed November 29, 2002), which is now U.S. Patent No. 7,894,521, and Finnish Patent Application No. 20020127 (filed January 23, 2002). *Id.* at 2-3; 50. The '996 Application was filed with 31 claims including independent claims 1, 10, 18, 26, 28, and 30. *Id.* at 38-42. Claim 1, as filed, is reproduced below for reference.

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>1. A method for decoding a compressed video sequence, wherein image frames are entered into a buffer memory in connection with the decoding, the method comprising:</p> <p>decoding from the video sequence an indication related to at least one discontinuity of numbering of the image frames;</p> <p>configuring, in response to the indication, the buffer memory to provide a number of image frames corresponding to a discontinuity in the numbering of the image frames; and</p> <p>using the image frames in the buffer memory in the decoding process.</p> |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

66. On June 17, 2010, the Examiner issued a Non-Final Office Action rejecting claims 10-31 under 35 U.S.C § 101. *Id.* at 1349-1378.

67. The Examiner further rejected claims 26-29 under 35 U.S.C § 112(a) for allegedly failing to comply with the enablement requirement, as shown below.

Claims 26-27 are rejected under 112, 1<sup>st</sup> paragraph as being a single component (video encoder) claim, i.e., where a single component (video encoder) recitation does not appear in combination with another recited component, is subject to an undue breadth rejection. The single component which covered every conceivable ways for achieving the stated purpose was held nonenabling for the scope of claim because the specification disclosed at most only those known to the inventor. See MPEP §2164.08(a).

Claims 28-29 are rejected under 112, 1<sup>st</sup> paragraph as being a single component (device) claim, i.e., where a single component (device) recitation does not appear in combination with another recited component, is subject to an undue breadth rejection. The single component which covered every conceivable ways for achieving the stated purpose was held nonenabling for the scope of claim because the specification disclosed at most only those known to the inventor. See MPEP §2164.08(a).

*Id.* at 1357.

68. The Examiner further rejected claims 1-5 based on Non-Statutory Double Patenting over claim 17 of co-pending Application No. 10/306942. *Id.* at 1357-1373. Examiner also rejected claim 6 based on Non-Statutory Double Patenting over claim 18 of co-pending Application No. 10/306942. *Id.* The Examiner also rejected claims 10-14 based on Non-Statutory Double Patenting over claim 17 of co-pending Application No. 10/306942. *Id.* The Examiner also rejected claim 15 based on Non-Statutory Double Patenting over claim 18 of co-pending Application No. 10/306942. *Id.* Examiner also rejected claims 30-31 based

on Non-Statutory Double Patenting over claim 17 of co-pending Application No. 10/306942. *Id.* The Examiner also rejected claims 18-22 based on Non-Statutory Double Patenting over claim 17 of co-pending Application No. 10/306942 in view of Langberg (US 5,852,630). *Id.* The Examiner also rejected claim 23 based on Non-Statutory Double Patenting over claim 18 of copending Application No. 10/306942. *Id.*

69. The Examiner further rejected claims 26-29 under 35 U.S.C. § 103(a) as being obvious over U.S. Patent No. 7,103,669 (“Apostolopoulos”). *Id.* at 1373-1377. Notably, the Examiner admitted that Apostolopoulos does not disclose a “discontinuity.” *Id.* at 1374. The Examiner also noted that claims 7-9 would be allowable if rewritten in independent form. *Id.* at 1377.

70. In response, Applicants filed a response to the Non-Final Office Action on September 10, 2010. *Id.* at 1678-1687. In the office action response, Applicants amended claims 1-25 and canceled claims 26-31. *Id.* In response to the Section 101 rejections for claims 10-17, Applicants argued as follows:

With respect to the § 101 rejection of claims 10-17, Applicant respectfully traverses The Office action incorrectly asserts that the claimed video decoder is “pure software”. While the specification refers to embodiments involving computer readable media storing program code (*e.g.*, claim 18), the claimed video decoder is a device constituting statutory subject matter. The term “decoder” is well-known in the art to refer to a device or circuit. Notably, the specification illustrates structural components of the decoder (*e.g.*, demultiplexer 116 and decompressor 118), and independent claim 10 recites that the video decoder is connected to a buffer memory. Paragraph [0095] teaches examples of a decoder including a low bit rate video decoder as described in the ITU-T recommendation H.263 or H.26L. Moreover, paragraph [0096] describes positioning of the decoder that would not be possible if it was “pure software”. Contrary to the assertion, the claimed video decoder is a device constituting statutory subject matter. Applicant accordingly requests that the rejection be withdrawn.

*Id.* at 1685-1686.

71. In response to the Section 101 rejections for claims 18-25, Applicants argued as follows:

With respect to the § 101 rejection of claims 18-25, the claims have been amended to indicate that the claimed computer readable medium is non-transitory in accordance with the Examiner’s suggestion. Applicant notes that non-transitory computer readable media comprise all computer readable media, with the sole exception being a transitory, propagating signal. Since an interpretation of the claims is now limited to statutory subject matter, Applicant submits that the rejection has been overcome and accordingly requests that the rejection be withdrawn.

*Id.* at 1686.

72. In response to the Non-Statutory Double Patenting rejections, Applicants argued as follows:

With respect to the provisional rejections of claims 1-6, 10-15, and 18-23 under the judicially-created doctrine of obviousness-type double patenting over co-pending and commonly-owned patent application no. 10/306,942 (hereinafter “the ‘942 application”), Applicant will consider filing a Terminal Disclaimer once the instant application is in condition for allowance or the ‘942 application issues as a patent. However, Applicant respectfully asserts that, in view of the amendments to the claims and arguments made above, the Examiner is compelled to withdraw the rejections of the claims. Once withdrawn, the only rejection remaining in the instant application would be the provisional obviousness-type double patenting rejection. In view of MPEP § 804 I(B), Applicant respectfully requests that the provisional obviousness-type double patenting rejection be withdrawn and that the instant application be permitted to issue as a patent.

*Id.*

73. On December 9, 2010, the Examiner issued a Final Office Action rejecting claims 1-6, 10-15, and 18-23. *Id.* at 1776-1798. In response to Applicants’ arguments under Section 101, the Examiner withdrew the rejections for claims 18-25 but maintained the rejections for claims 10-17. *Id.* The Examiner also maintained their Non-Statutory Double Patenting rejections. *Id.* The Examiner also noted that claims 7-8, 16-17, and 24-25 would be allowable if rewritten in independent form. *Id.* In response, Applicants filed a response to the Final Office Action on January 31, 2011. *Id.* at 1812-1821. In the response to the office action, Applicants amended paragraph 97 of the specification, amended claim 10, and explained how the claimed invention differs from the prior art. *Id.*

74. In response to the Section 101 rejections to claims 10-17, Applicants argued as follows:

With respect to the § 101 rejection of claims 10-17, Applicant respectfully maintains that the claimed decoder is directed to statutory subject matter. While the specification refers to embodiments involving computer readable media storing program code (*e.g.*, claim 18), the claimed video decoder is a device constituting statutory subject matter. The cited portion at page 6, paragraph [0015] makes no mention of a software only embodiment. The term “decoder” is well-known in the art to refer to a device or circuit. Notably, the specification illustrates structural components of the decoder (*e.g.*, demultiplexer 116 and decompressor 118), and independent claim 10 recites that the video decoder is connected to a buffer memory. Paragraph [0095] teaches examples of a decoder including a low bit rate video decoder as described in the ITU-T recommendation H.263 or H.26L. Moreover, paragraph [0096] describes positioning of the decoder that would not be possible if it was only software. However, paragraph [0097] has been amended to remove an interpretation of the claimed decoder as being software only. Since the claimed decoder is directed to statutory subject matter, Applicant requests that the rejection be withdrawn.

*Id.* at 1820.

75. In response to the Non-Statutory Double Patenting rejections, Applicants submitted a terminal disclaimer to overcome co-pending Patent Application No. 10/306,942. *Id.*

76. On February 18, 2011, the Examiner issued another Non-Final Office Action rejecting claims 1, 3, 5-7, 9-10, 12, and 14-16 under 35 U.S.C §102(e) as allegedly being anticipated by Apostolopoulos. *Id.* at 1828-1844. The Examiner also rejected claims 18 and 20-25 under 35 U.S.C §103(a) as allegedly being

obvious over Apostolopoulos in view of U.S. Patent No. 5,852,630 (“Langberg”).  
*Id.* The Examiner also rejected claims 4, 8, 13, and 17 under 35 U.S.C §103(a) as allegedly being obvious over Apostolopoulos. *Id.* The Examiner also noted that claims 2, 11, and 19 would be allowable if rewritten in independent form. *Id.*

77. In response, Applicants filed a response to the Non-Final Office Action on May 17, 2011. *Id.* at 2093-2101. In the office action response, Applicants amended claims 1, 2, 10, 11, 18, and 19 and explained how the claimed invention differs from the prior art. *Id.* In response to the Section 102 and 103 rejections, Applicants argued as follows:

Consistent with the indication of allowable subject matter on page fourteen of the Office action, independent claims 1, 10, and 18 have been amended to include elements indicated as being directed to allowable subject matter in respective claims 2, 11, and 19. Therefore these changes do not introduce new matter. Each of the independent claims recites that an indication related to an intentional discontinuity of numbering in the image frames is decoded from the compressed video sequence. This is not recited with respect to the buffer memory configuration since the buffer memory is configured to take into account both intentional discontinuities and errors in the compressed video sequence. U.S. Patent No. 7,103,669 to Apostolopoulos (hereinafter “Apostolopoulos”) fails to teach or suggest each of the now-claimed elements of the independent claims since Apostolopoulos discusses only allowable subject matter, each of claims 1-25 is believed to be patentable over the asserted references.

Thus, based upon the Examiner’s acknowledgement that elements now included in each of the pending claims are not found in Apostolopoulos, either alone or as modified, each of the prior art rejections would be improper. Applicant accordingly requests that each of the § 102(e) and § 103(a) rejections be withdrawn.

*Id.* at 2100-2101.

78. On August 9, 2011, the Examiner issued another Non-Final Office Action rejecting claims 1-3, 5-7, 9-12, and 14-16 under 35 U.S.C §102(e) as allegedly being anticipated by Apostolopoulos. *Id.* at 2125-2141. The Examiner also rejected claims 18-25 under 35 U.S.C §103(a) as allegedly being obvious over Apostolopoulos in view of Langberg. *Id.* The Examiner also rejected claims 4, 8, 13, and 17 under 35 U.S.C §103(a) as allegedly being obvious over Apostolopoulos. *Id.* In response, Applicants filed a response to the Non-Final Office Action on November 7, 2011. *Id.* at 2428-2436. In the office action response, Applicants amended claims 1, 10, and 18, cancelled claims 2, 11, and 19, and explained how the claimed invention differs from the prior art. *Id.* In response to the Section 102 and 103 rejections, Applicants argued as follows:

Applicant respectfully traverses the §§ 102(e) and 103(a) rejections based on the teachings of U.S. Patent No. 7,103,669 to Apostolopoulos (hereinafter “Apostolopoulos”); however, in the interests of advancing prosecution and in a *bona fide* attempt to advance the application to allowance, the independent claims have been amended to clarify particular aspects of the claimed invention. For example, the independent claims have been amended to characterize that the decoded indication informs an intentional discontinuity of numbering of the image frames. Support for these changes may be found in the original specification, for example, in original (and previously allowed) claims 2, 11, and 19; and at paragraph [0017]; therefore, the changes do not introduce new matter. Since neither Apostolopoulos nor Langberg teaches or suggests at least an indication that informs an intentional discontinuity of numbering, as now claimed in the independent claims, the rejections would be improper. Applicant accordingly requests that the rejections be withdrawn.

*Id.* at 2435.

79. On January 9, 2012, the Examiner issued another Final Office Action rejecting claims 1, 3, 5, 9-10, and 14 under 35 U.S.C §102(e) as allegedly being anticipated by Apostolopoulos. *Id.* at 2440-2453. The Examiner further rejected claims 6-7, 15-16, 18, and 20-24 under 35 U.S.C §103(a) as allegedly being obvious over Apostolopoulos in view of Langberg. *Id.* The Examiner further rejected claims 4 and 13 under 35 U.S.C §103(a) as allegedly being obvious over Apostolopoulos. *Id.* The Examiner also noted that claims 8, 17, and 25 would be allowable if rewritten in independent form. *Id.* In response, Applicants filed a response to the Final Office Action on March 5, 2012. *Id.* at 2462-2471. In the office action response, Applicants explained how the claimed invention differs from the prior art. Applicants argued as follows:

Applicant respectfully traverses each of the rejections (§§ 102(e) and 103(a)) based on the teachings of U.S. Patent No. 7,103,669 to Apostolopoulos (hereinafter “Apostolopoulos”) because Apostolopoulos does not teach or suggest each of the asserted claim elements. For example, Apostolopoulos has not been shown to teach or suggest at least configuring, in response to the indication, the buffer memory to provide a number of image frames corresponding to at least one discontinuity in the numbering of the image frames, as claimed in each of the independent claims. While the Examiner alleges that the frame memory provides a diversity frame to the state recovery 526, Apostolopoulos does not mention the term “diversity frame.” Also, the frame supplied to the state recovery 526 is used to average, interpolate, or estimate a missing odd frame based on image data from even frames (Col. 11, lines 4-23) – it does not correspond to the discontinuity in the numbering of the image frames, as claimed. Notably, state recovery block 526 is no buffer memory, but is instead an operational block for recovering an odd frame (such as P5) missing from a sequence of even frames. Apostolopoulos is directed to creating a full frame version of the odd frame (*e.g.*, P5) missing between two even frames (*e.g.*, P4 and P6), wherein extensive data processing and calculations are needed. Thus, Apostolopoulos does not teach or suggest a buffer memory, which provides a number of image frames corresponding to a discontinuity in the numbering of the image frames, as claimed. Without correspondence to each of the claimed elements, the rejections are in error.

*Id.* at 2469.

80. On March 19, 2012, the Examiner issued a Notice of Allowance and provided the following reasons for allowance:

The present invention describes a method for decoding a compressed video sequence, wherein image frames are entered into a buffer memory in connection with the decoding, the method comprising decoding from the compressed video sequence an indication informing an intentional discontinuity of numbering of the image frames; configuring, in response to the indication, the buffer memory to provide a number of image frames corresponding to at least one discontinuity in the numbering of the image frames; and using the image frames in the buffer memory in the decoding process. The closest prior art, Apostolopoulos (US 7,103,669 B2) discloses a video communication system that employ multiple state encoding and path diversity but fails to disclose decoding from the compressed video sequence an indication informing an intentional discontinuity of numbering of the image frames; configuring, in response to the indication, the buffer memory to provide a number of image frames corresponding to at least one discontinuity in the numbering of the image frames, this distinct features has been added to independent claims 1, 10 and 18, thus rendering claims 1, 3-10, 12-18, and 20-25 allowable.

*Id.* at 2489.

## VII. PRIOR ART REFERENCES

### A. U.S. Patent No. 5,835,672 (“Yagasaki,” Ex. 1005)

81. Yagasaki “relates to an apparatus and method for coding a video signal derived from a motion picture film source in which the video signal includes duplicate pictures.” Ex. 1005 at 1:8-12; *see id.* at Figs. 1-22. More specifically, Yagasaki states that “duplicate pictures are detected in the input video signal, and each duplicate picture is eliminated from the input video signal to provide an

encoder input signal.” *Id.* at 3:26-30. However, “a skip-picture flag is included in the coded signal in lieu of each eliminated duplicate picture, and a reference picture code identifying a field to be copied to provide each eliminated duplicate picture is also included in the coded signal.” *Id.* at 3:32-36. Therefore, at the decoder, “the skip picture flag and the reference picture code are extracted from the coded video signal” and “the picture indicated by the reference picture code is copied in response to the skip picture flag to restore an eliminated duplicate picture to the output video signal.” *Id.* at 3:60-67.

82. Yagasaki further describes that the skip picture flag relates to temporal references. For example, Yagasaki describes that the skip picture flag indicates whether the picture is a duplicate picture, where a duplicate picture is one with little or no temporal change relative to another picture. *See, e.g., id.* at 8:49-52, 16:58-62, 17:9-22, 19:15-29, 19:44-65, 21:23-33. In one embodiment, Yagasaki describes a temporal\_reference code that increments for each consecutive picture. *Id.* at 19:17-25. In the embodiment where the temporal\_reference code is used, every picture includes a temporal\_reference code (even the pictures with skipped duplicate content). For example, Yagasaki describes that, in the encoded and decoded signals, both the skip-picture flag and the temporal\_reference code are included together for each picture. *See id.* at 21:27-33 (“The skip picture flag SPC . . . and the temporal\_reference are included together with the signal for each

picture”). The decoder input signal is fed into the decoder, which extracts from the decoder input signal the skip picture flag, the processing unit flag, the prediction mode code, the reference picture code, and the temporal reference code for each picture, each of which was encoded at the encoder. *See, e.g., id.* at 16:58-62, 17:9-22, 19:15-29, 19:44-63, 21:23-33.

83. Overall, Yagasaki is directed to a data compression technique and does not disclose any intentional discontinuities in temporal reference codes or any other numbering of frames.

## **VIII. CLAIM CONSTRUCTION**

84. I understand from Counsel that the claims are to be construed in light of the specification as would be read by a POSITA at the time the application was filed. I understand that the claim terms are given their ordinary and customary meaning as would be understood by a POSITA in the context of the entire disclosure. For the purposes of this report and the arguments made herein regarding institution, I have relied on the ordinary and customary meanings of the claim terms. If instituted, I reserve the right to address constructions of the claim terms, if needed.

## IX. THE PETITIONER’S ARGUMENTS

### A. Ground 1 – Yagasaki Does Not Render Obvious Claims 1-5, 9-12, and 16-19

85. Independent claim 1[b] recites: “configuring, in response to the indication, the buffer memory to provide *a number of image frames corresponding to at least one discontinuity in the numbering of the image frames.*” Independent claim 9[b] recites similar language: the video decoder being configured to “configure, in response to the indication, the buffer memory to provide *a number of image frames corresponding to at least one discontinuity in the numbering of the image frames.*” Independent claim 16[b] recites similar language: the computer program product comprising “a computer program code for configuring, in response to the indication, the buffer memory to provide *a number of image frames corresponding to at least one discontinuity in the numbering of the image frames.*”

86. Claims 1[b], 9[b], and 16[b] recite configuring the buffer memory to provide a number of image frames in a buffer memory that correspond to at least one discontinuity in the *numbering* of the received image frames (e.g., a missing number of an image frame), which results from an intentional discontinuity and/or an error in a video sequence. Configuring the buffer memory to provide image frames to the video sequence to address any discontinuity in the frame numbering “allows the buffer memories of the encoder and the decoder to be kept preferably in synchronism.” Ex. 1001 at 20:49-51.

87. As disclosed, the provided number of image frames, such as the filler frames (*see e.g.*, Claim 5), can be re-interpreted as an unintentional gap allowing the decoder to perform error correction (*see, e.g.*, Claim 8). For example, “[i]f during decoding a reference to an image number is detected which is then found to indicate a filler frame located in the buffer, error correction actions are initiated in the decoder to reconstruct the actual reference image, for example by asking the encoder to re-transmit the reference image in question.” *Id.* at 20:51-56.

88. Dr. Havlicek states that “in response to a skip-picture flag (*‘an indication’*; 1[a]), Yagasaki’s system ‘provide[s] the picture indicated by the reference picture code as a picture of the decoder output signal VO1.’” Ex. 1003 at ¶102. Dr. Havlicek further states:

In sum, in response to the skip-picture flag, variable-length decoder 1202 causes field memories 1207 through 1210 to provide a picture—indicated by a reference picture code—to decoder output signal VO1. Yagasaki, 15:7-11, 19:38- 65, Figures 14, 21. The reference picture code “indicates, when the picture is a skip picture, the picture that is to be used as the reference picture for reproducing the skip picture.” Yagasaki, 16:29-31. The picture indicated by the reference picture code is thus “*a number of image frames*,” i.e., one frame. The picture indicated by the reference picture code further corresponds to the skip picture (“*at least one discontinuity in the numbering of the image frames*”; 1[a]) because it “replace[s]...the skip picture[]...eliminated in the coding process.” Yagasaki, 15:12-14.

Ex. 1003 at ¶105.

89. I disagree with Dr. Havlicek’s conclusions for the following reasons.

**1. Yagasaki fails to disclose “a number of image frames corresponding to at least one discontinuity in the numbering of the image frames”**

90. Dr. Havlicek opines:

Yagasaki thus teaches, in response to the skip-picture flag (“*the indication*”), causing field memories 1207 through 1210 (“*configuring...the buffer memory*”) to provide a picture (“*a number of image frames*”) to replace the skipped picture (“*corresponding to [the] discontinuity*”).

Ex. 1003 at ¶106.

91. But Dr. Havlicek does not address the complete claim language when he conflates a “skipped picture” with the “discontinuity.” That is, he rewords the claim language to say, “*corresponding to [the] discontinuity*” when the actual claim language is “corresponding to ***at least one discontinuity in the numbering*** of the image frames.” The claim language requires that there be at least one discontinuity in the numbering of the image frames. As I explain below, a skipped picture does not correspond to at least one discontinuity in the numbering of the image frames, particularly where Yagasaki teaches that the “temporal\_reference codes” (the alleged “numbering of the image frames”) are not discontinuous.

92. Dr. Havlicek’s opinion is solely based on the idea that Yagasaki removes a duplicate picture, adds a skip picture flag into the location of the

removed duplicate picture, and the decoder receives a discontinuity. This, however, overlooks the teachings of Yagasaki relating to the temporal\_reference code.

93. In Yagasaki, an eliminated duplicate picture does not correspond to at least one discontinuity in the numbering of the image frames. Yagasaki describes that a skip-picture flag is included in a coded signal in lieu of each eliminated duplicate picture (i.e., the picture is not actually removed from the sequence, but simply coded in a very compressed manner), which a POSITA would understand refers to the duplicate picture content. *See* Ex. 1005 at Abstract, 3:18-24, 3:31-35, 3:57-62, 4:10-15, 4:36-40, 4:62-5:8, 5:57-64. However, eliminated duplicate picture content within a frame is not the same as the numbering of the image frame or the image frame itself. *Id.* In Yagasaki, the content of a duplicate picture may be eliminated, but the picture itself is still coded into the bitstream (albeit in a very compressed manner using the skip-picture flag) and, thus, the picture still exists in the coded bitstream and its image frame numbering remains in the form of the temporal\_reference code. *Id.*

94. To support his arguments, Dr. Havlicek points to the “temporal\_reference code” as the numbering for each image frame. Ex. 1003 at ¶92. Even if I accept this premise as true, Yagasaki does not disclose at least one discontinuity in the temporal\_reference code (the alleged numbering of the image

frames). Instead, Yagasaki discloses that each encoder and decoder signal includes at least the skip-picture flag that replaced the eliminated duplicate picture as well as the temporal\_reference code (the alleged image frame number). Ex. 1005 at 4:29-41, 4:61-5:10.

95. Yagasaki discloses that “[t]he temporal-- reference code is a 10-bit code that indicates the display sequence of the picture in a group of pictures (GOP).” *Id.* at 19:20-22. The temporal\_reference code is generated by incrementing a counter by one for each consecutive picture in the coder with counter starting at zero for each GOP. *Id.* at 19:22-27. Thus, based on Dr. Havlicek’s mapping and Yagasaki’s disclosure, the alleged frame numbering in Yagasaki, the temporal\_reference code, remains continuous regardless of whether a picture or skip-picture flag is transmitted.

96. Moreover, in Yagasaki, the encoder adds the skip-picture flag in lieu of a duplicate picture, along with a temporal\_reference code before transmitting the encoded signal to the decoder. *Id.* at 4:29-41. However, because every skip-picture flag also includes a temporal\_reference code, there are no discontinuities in the numbering of the video sequence. In other words, the temporal\_reference code never increments by more than 1 because every frame slot includes a temporal\_reference code with each skip-picture flag. *Id.* at 19:22-27. The decoder is then configured to process the information from the encoded signal (e.g., a skip-

picture flag and its associated temporal\_reference code) in order to reproduce the data content within the duplicate picture frames for a particular temporal\_reference code. *Id.* at 4:61-5:16.

97. Additionally, the Yagasaki encoder output signal VC1 includes at least all of the following for each picture: (1) the skip-picture flag SPC; (2) the processing unit flag PUC; (3) the prediction mode code PMC; (4) the reference picture code RFC; and (5) *the temporal\_reference code*. Ex. 1005 at 16:58-62, 19:15-29, 21:23-33. Similarly, the decoder input signal VD3 includes at least all of the same flags and codes for each picture, including the temporal\_reference code. *Id.* at 17:9-19, 19:44-63, 21:23-33. Therefore, in the encoded and decoded signals, both the skip-picture flag and the temporal\_reference code are included together for each picture. *Id.* at 21:27-33 (“The skip picture flag SPC . . . and the temporal\_reference are included together with the signal for each picture”), 16:29-31, 16:58-62, 19:15-29, 21:23-33. Thus, even when duplicate picture content is eliminated and replaced by a skip-picture flag, the continuously incremented temporal\_reference code is still included for each picture ensuring there can be no discontinuity in the temporal\_reference codes (i.e., the alleged numbering of the

image frames). Therefore, in Yagasaki, there is not at least one discontinuity in the numbering of the image frames.<sup>1</sup>

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<sup>1</sup> I'll note that Dr. Havlicek's citation to MPEG-1 and MPEG-2/H.262's reference to "a discontinuity in the value of temporal\_reference" due to the encoder skipping a frame has no bearing on the disclosures of Yagasaki. *See* Ex. 1003 at ¶¶99. Dr. Havlicek does not allege any combination of Yagasaki with H.262 or that a POSITA would have been motivated to modify Yagasaki or combine Yagasaki with the disclosures of H.262. Even so, a POSITA would not have combined H.262 with Yagasaki at least because H.262 allegedly refers to skipping an entire layer of frames and all of the information in those frames, including the temporal reference, whereas Yagasaki teaches continuous temporal references. Yagasaki does not teach skipping an entire layer of frames but rather requires that the skip-picture flag, reference picture code, and temporal\_reference code for each picture be transmitted and received in order for the invention to work. The invention in Yagasaki therefore cannot work in, and is inconsistent with the context of H.262's discussion of skipping an entire layer of frames wholesale. That is, if an entire layer of frames is skipped according to Dr. Havlicek's citation to MPEG-1 and MPEG-2/H.262, there would be no skip-picture flag of Yagasaki for that skipped frame, which is what Dr. Havlicek relies upon for the "indication" of this claim

98. For at least these reasons, it is my opinion that Yagasaki does not disclose “at least one discontinuity in the numbering of the image frames.”

**2. Dr. Havlicek’s assertion that Yagasaki’s skip-picture flag informs a “discontinuity” fails**

99. Dr. Havlicek asserts “[a]s I discuss above in Section VIII.1.a(ii), in response to a skip-picture flag (‘an indication’; 1[a]), Yagasaki’s system ‘provide[s] the picture indicated by the reference picture code as a picture of the decoder output signal VO1.’” Ex. 1003 at ¶102.<sup>2</sup> Dr. Havlicek also asserts that Yagasaki’s skip-picture flag informs a discontinuity of numbering of the decoded

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element. There is no path for a POSITA to understand if the skipped frame in MPEG-1 and MPEG-2/H.262 is Yagasaki’s duplicate frame or the identification of a duplicate frame in skipped frames of MPEG-2 and MPEG-2/H.262. There are no possible indications informing an intentional discontinuity of numbering of the image frames in either Yagasaki, MPEG-1, or MPEG-2/H.262.

<sup>2</sup> Dr. Havlicek erroneously points to “1[a]” when he is addressing the recitations of 1[b]. As is clear in the claims and confirmed by the prosecution history, “intentional” discontinuity is not recited in Claims 1[b], 9[b], and 16[b] “since the buffer memory is configured to take into account both intentional discontinuities and errors in the compressed video sequence.” Ex. 1003 at ¶103.

pictures stored in field memories 1207 through 1210. *See* Ex. 1003 at ¶106. Dr. Havlicek is incorrect on both accounts.

100. Yagasaki discloses a process that uses a skip-picture flag to trigger the decoder to use a reference picture code to restore picture content. *See, e.g.,* Ex. 1005 at 5:61-65. Yagasaki discloses coding a duplicate picture by replacing the duplicate picture with a skip-picture flag and other relevant information (e.g., a picture reference code and a temporal reference code) during encoding and compression. Ex. 1005 at 4:8-15; *See, also id.* at Abstract, 3:18-24, 3:31-35, 3:57-62, 4:10-15, 4:36-40, 4:62-5:8, 5:57-64. Yagasaki discloses that the encoder uses the skip-picture flag to inform the decoder to identify and use a corresponding reference picture code to restore the data content of an image frame with the data content from another picture frame. *Id.* at 16:53-62. A POSITA would understand that Yagasaki uses the skip-picture flag to preserve each image frame and then restores additional data content in the preserved frames at the decoder to avoid discontinuities in numbering.

101. Just as there is no discontinuity in temporal\_reference codes in the video sequence, there is no discontinuity in temporal\_reference codes in the field memories. Dr. Havlicek himself explains that “a POSITA would have understood that Yagasaki discloses, in response to the skip-picture flag, copying into field memories 1207 through 1210 (‘entering into the buffer memory’) the picture

indicated by the reference picture code.” *See* Ex. 1003 at ¶144 (“Yagasaki copies reference frame P2 (or I0) into the buffer position of P4 because . . . P4 may subsequently be identified as a reference picture for calculating another picture in the video sequence.”) *See id.* at ¶120. The picture indicated by the reference picture code is then copied into the field memories in response to the skip-picture flag. Ex. 1005 at Fig. 15 and 15:17-29 (describing copying the frame, which a POSITA would understand to mean copying the frame into the field memory).

102. To the extent Dr. Havlicek is correct that “[e]ach decoded picture in field memories 1207 through 1210 is therefore associated with a temporal\_reference code” (which was discussed above as being continuous), then there would be no discontinuity in temporal\_reference codes in the field memories. *Id.* at ¶93. This is because the picture content along with the temporal\_reference code for any skipped pictures would be stored in the field memories along with the other pictures and temporal\_reference codes.

**3. Dr. Havlicek’s reliance on temporal\_reference codes is of no moment.**

103. Even though there would be no discontinuity in temporal\_reference codes in the field memories under Dr. Havlicek’s theory that each decoded picture in field memories 1207 through 1210 is associated with a temporal\_reference code, Yagasaki does not actually disclose that the temporal\_reference codes are stored in the field memories for any of the pictures at all. Dr. Havlicek cites to Yagasaki at

19:18-30 and Fig. 20. *Id.* Instead, Yagasaki at 19:18-30, merely discusses the generation of temporal\_reference codes and not that they are stored in the field memories with the picture content. And there are no arrows in Fig. 20 from the Temporal/Reference Generator 1020 to any of the field memories. Indeed, Dr. Havlicek acknowledges that there is an entire functioning embodiment that does not include temporal\_reference codes at all; therefore, there is no need to store temporal\_reference codes in the field memories and there is no need to store temporal\_reference codes if there was never any to begin with. *See id.* at ¶¶55-63; Ex. 1005 at Figs. 12, 14, 13:7-15:10. Dr. Havlicek states that a “POSITA would have understood field memories 1207 through 1210 to have a small capacity,” therefore it would not make any sense to store values in the field memory that are unnecessary for Yagasaki to reproduce the skipped picture content. *See Ex. 1003 at ¶109.*

104. Thus, in my opinion, either all of the image frames are stored in the field memories with temporal\_reference codes or all of the image frames are stored in the field memories without temporal\_reference codes. In either case, there will be no discontinuity of numbering of the image frames. There are no circumstances under which some of the image frames are stored in the field memories with temporal\_reference codes, while other image frames are stored in the field memories without temporal\_reference codes.

105. Even if there was at least one discontinuity in numbering of the image frames (which there is not for the reasons I explained above), the skip-picture flag would not be an indication informing an intentional discontinuity of numbering of the image frames because the skip-picture flag is not used to configure the decoder to treat any discontinuity as intentional. *See* Ex. 1005 at 5:61-65. There is no disclosure or teaching in Yagasaki that a skip-picture flag would inform the decoder to treat at least one discontinuity in temporal\_reference codes, let alone configure the buffer memory to treat all discontinuities in numbering as intentional. The “skip-picture flag” of Yagasaki is directed to a different problem, and provides a different solution.

106. Indeed, Yagasaki is directed to compressing digital video signals for transmission and storage. *Id.* at 1:14-2:63, 2:66-3:6 (“[I]t is a principal object of the present invention to provide a method and a apparatus for coding with high efficiency an input video signal derived from a motion picture source using 2-3 pulldown; a method and a decoding apparatus for decoding a coded signal, as counterparts to the above-mentioned coding method and apparatus, and recording of a recording signal coded by the above-mentioned coding method.”). Yagasaki describes a technique to detect duplicate picture content, represent the duplicate picture content using less data (such as with flags and codes), and decode the data at a decoder. *See id.* at Abstract, 3:18-5:64. However, Yagasaki is not directed to

configuring, in response to the skip-picture flag, the buffer memory to provide a number of image frames corresponding to at least one discontinuity in the temporal\_reference code. Yagasaki does not create any discontinuity in the temporal\_reference codes (the alleged numbering of the image frames), and the skip-picture flag does not inform the decoder to treat all discontinuities as intentional.

107. The purpose of Yagasaki is to present a compression technique that represents duplicate picture content using fewer bits. Yagasaki retains every image frame number and intends to reproduce the content within each image frame for display. Yagasaki does not teach removing image frames or sub-sequences, or a discontinuity in the image frame numbering.

**4. Dr. Havlicek fails to demonstrate that a picture indicated by the reference picture codes is a number of image frames.**

108. Dr. Havlicek relies on “[t]he picture indicated by the reference picture code [that] further corresponds to the skip picture (*“at least one discontinuity in the numbering of the image frames”*; 1[a]) because it “replace[s]...the skip picture[]...eliminated in the coding process.” Ex. 1003 at ¶105.<sup>3</sup> However, as I

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<sup>3</sup> Dr. Havlicek erroneously points to “1[a]” when he is addressing the recitations of 1[b]. As is clear in the claims and confirmed by the prosecution history,

described above, Yagasaki describes a technique to detect duplicate picture content, represent the duplicate picture content using less data (such as with flags and codes) while still preserving each image frame, and decode the data at a decoder. *See, e.g.*, Ex. 1005 at Abstract, 3:18-5:64. That is, each image frame persists in Yagasaki even when duplicate picture data is transmitted using less data and is later restored.

109. As discussed above, the purpose of Yagasaki is to present a compression technique that represents duplicate picture content using fewer bits. *Id.* at 1:8-10. Yagasaki defines a duplicate picture as a picture with little or no temporal change relative to another picture. *Id.* at 8:51-53; *see also id.* at 11:5-6. Dr. Havlicek appears to agree. Ex. 1003 at ¶67. But Yagasaki does not eliminate entire image frames when it identifies a duplicate picture. Instead, Yagasaki uses skip-picture flags and other relevant information in place of duplicate pictures or duplicate picture content. *See, e.g., id.* at Abstract, 3:18-24, 3:31-35, 3:57-62, 4:10-15, 4:36-40, 4:62-5:8, 5:57-64.

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“intentional” discontinuity is not recited in Claims 1[b], 9[b], and 16[b] “since the buffer memory is configured to take into account both intentional discontinuities and errors in the compressed video sequence.” Ex. 1003 at ¶103.

110. At the decoder, the picture content is restored as part of the already existing image frames. Ex. 1005 at 4:61-5:16. For example, in Yagasaki, a reference picture code is also included with the temporal\_reference code. *See id.* at 16:58-62, 19:15-29, 21:23-33. The reference picture code “indicates, when the picture is a skip picture, the picture (field or frame) that will be used as the reference picture for reproducing the skip picture.” *See id.* at 16:29-31. Therefore, when the decoder receives the skip-picture flag, and the reference picture code, the decoder knows that the reference picture code should be reproduced and the reference picture code is used to restore eliminated picture content, which results in actual picture content. Yagasaki explains that the reference picture code indicates, when a picture is a skip picture, the picture field that will be used as the reference picture for reproducing the skip picture. *Id.* at 7:31-34; *see also id.* at 8:65-67.

111. As such, Yagasaki’s decoder is configured to use the data content from the picture indicated by the reference picture code to restore an eliminated duplicate frame. *Id.* at 5:62-64. Yagasaki’s process preserves and restores the data content of a duplicate picture frame with the data content from another picture frame. Through this process, Yagasaki retains every image frame and intends to reproduce the content within each image frame at the decoder for display. For at least these reasons, Yagasaki does not disclose providing a number of image frames corresponding to at least one discontinuity in the numbering of the image

frames, that the number of image frames are, for example, filler frames (*see e.g.*, claim 5) or memory indications (*see e.g.*, claim 7) that are not from the video sequence. *See* Ex. 1005 at 20:34-45.

112. Dr. Havlicek does not offer any opinions that a POSITA would have been motivated to modify Yagasaki in any way that would render this element obvious.

113. Therefore, it is my opinion that Yagasaki fails to disclose or render obvious this element for at least the reasons I explain above.

## **X. CONCLUSION**

114. In signing this declaration, I recognize that this declaration will be filed as evidence in a contested case before the Patent Trial and Appeal Board of the United States Patent and Trademark Office. I also recognize that I may be subject to cross-examination in the case.

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

Executed this 30th day of July, 2024.

Respectfully submitted,



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Dr. Omid Kia