

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SNAP INC.,
Petitioner,

v.

NOKIA TECHNOLOGIES OY,
Patent Owner.

Case IPR2025-01338
Patent 7,724,818

**DECLARATION OF DR. OMID KIA IN SUPPORT OF PATENT OWNER
PRELIMINARY RESPONSE**

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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. 2012. 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. (“Northstrat”) and Senior Staff Scientist at ITT Exelis, Space Sciences Division (“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 proceeding, 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 (NIST). 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 years 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. ("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.

16. In all, I have over 25 years of experience working with video decoding and encoding technologies.

A. Materials Considered

17. My opinions are based on my education, training, research, knowledge, and personal and professional experience. In connection with this

report, I have reviewed all of the materials in this *inter partes* review, including the Petition and exhibits, all the materials in the previous IPR2024-00572, and all of the materials cited in this declaration, including but not limited to the following:

- Ex. 1001 – U.S. Patent No. 7,724,818 (“the ’818 Patent” or “’818Pat.”)
- Ex. 1002 – Certified File History of the ’818 Patent (“’818FH”)
- Ex. 1003 – Declaration of Dr. Eli Saber (“Saber”)
- Ex. 1008 – U.S. Patent No. 6,646,578 (“Au”)
- Ex. 1012 – H.26L over IP and H.324 Framework (“VCEG-N52”), available at https://www.itu.int/wftp3/av-arch/videosite/0109_San/VCEG-N52.doc (excerpted from ’818FH)
- Ex. 1021 – U.S. Patent No. 6,539,059 (“Sriram”)
- Ex. 2013 – Coding of Parameter Sets (“JVT-C078”)
- Ex. 2014 – Coding of Parameter Sets Annex A – Slice Layer Changes Relative to JVT WD2r7 (“JVT-C078 Annex A”)
- Ex. 2015 – Draft Report of Fairfax Meeting (“JVT-C001d3”)
- Ex. 2016 – Modifications to High-Level Syntax and Semantics (“JVT-D094”)
- Ex. 2017 – Draft Report of Klagenfurt Meeting (“JVT-D001d0”)

- Ex. 2018 – High-Level Syntax, Semantics, and Decoder Process (“JVT-D145”)
- Ex. 2019 – IPR2024-00572, Ex. 2009, Declaration of Miska Hannuksela
- Ex. 2020 – IPR2024-00572, Ex. 2010, Declaration of Ye-Kui Wang
- Ex. 2021 – *Certain Video Capable Electronic Devices, Including Computers, Streaming Devices, Televisions, and Components and Modules Thereof*, Inv. No. 337-TA-1380, Respondents’ Joint Notice of Prior Art (Mar. 22, 2024)
- Ex. 2022 – IPR2024-00572, Ex. 2017, Deposition Transcript of Dr. Eli Saber
- Ex. 2023 – IPR2024-00572, Ex. 2014, Transcript of ITC Investigation No. 337-TA-1380, Evidentiary Hearing, September 9-13, 2024 (Open Sessions)
- Ex. 2024 – IPR2024-00572, Ex. 2042, Excerpt of Opening Expert Witness Report of Dr. James Storer Regarding Invalidity of U.S. Patent Nos. 7,724,818 and 8,077,991
- Ex. 2025 – IPR2024-00572, Ex. 2025, H.265 Standard (12/2016)

- Ex. 2026 - IPR2024-00572, Ex. 2036, Initial Determination on Violation of Section 337 and Recommended Determination on Remedy and Bond, Investigation No. 337-TA-1380

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

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

19. 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.

20. For the '818 Patent, 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 and 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.

21. 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 encoding/decoding. Additional experience can substitute for the level of education, and vice-versa. Petition at 8.

22. I agree with the level of ordinary skill in the art for the '818 Patent that I propose above, although the proposed definitions are very similar. I met and exceeded my proposed definition for the level of skill in the art as of the conception date of the '818 Patent. I also met and exceeded Petitioner's level of ordinary skill in the art as of the conception date of the '818 Patent. Accordingly, no matter which level of skill in the art is applied, my analysis and conclusions in this report remain unchanged.

IV. LEGAL STANDARDS

23. I am not an attorney and do not have opinions on the law. I have been informed by counsel of the legal principles below, which I used as a guide in formulating my opinions.

A. Claim Interpretation

24. 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.

25. 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.

26. My methodology for determining the meaning of claim terms and 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.

27. I understand that in an *inter partes* review, such as this proceeding, 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 of the patent into the claims if the claim language is broader than the example embodiment. I further understand that any special definition for a claim term must be set forth with reasonable clarity, deliberateness, and precision.

28. 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.

1. Lexicography and/or Disclaimer

29. I have been informed and understand that a patentee can act as its own lexicographer by defining a term, in the patent specification or prosecution history, to have specific meaning, and that in such a case, the specific meaning given by the patentee will govern.

30. I have also been informed and understand that statements made to the patent office by the patentee or its legal representative during prosecution can serve to illuminate, or possibly narrow the proper scope of claim terms, and that such statements must be considered when construing the claim terms. This is sometimes referred to as disclaimer or disavowal. I have taken into account these principles in my analysis.

2. Means-Plus-Function

31. I have been informed and understand that certain claim terms can be so-called “means-plus-function” terms. I understand that a “means-plus-function” term is one that is expressed as a means or step for performing a specified function

without the recital of structure, material, or acts in support of that function in the claim. I understand that for means-plus-function terms the term is construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.

32. I also understand that when a term uses the words “means” or “step,” a presumption arises that the term is a means-plus-function term. Furthermore, I understand that if a term does not recite the words “means” or “step,” a presumption arises that the term is not a means-plus-function term. However, I understand that this presumption is overcome where the claim term fails to recite sufficiently definite structure or else recites function without reciting sufficient structure for performing that function. Further, I understand that the essential inquiry is not merely the presence or absence of the words “means” or “step;” rather, the inquiry is whether the words of the claim would be understood by persons of ordinary skill in the art to connote structure or a class of structures.

33. I understand that if a given term is a means-plus-function term, the claimed function must first be identified, and then the corresponding structure, material, or acts described in the specification that performs the claimed function must be identified second. In addition, I understand that the disclosed structure in the specification is deemed to be corresponding structure if the specification or

prosecution history clearly links or associates that structure to the claimed function and the disclosure must be sufficient to achieve the claimed function.

B. Prior Art

34. 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

35. It has been explained to me by Counsel that a patent claim is only 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” only 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.

36. 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

37. I further have been informed that a patent claim is only invalid under 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 may be 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.

38. 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.

39. 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. As I explain in great detail in this declaration, the claims of the '818 Patent were invented by Drs. Miska Hannuksela and Ye-Kui Wang at least as early as May 1, 2002, although they did not file for a patent until April 30, 2003. My opinions on obviousness in this declaration are the same whether the priority date is May 1, 2002, or April 30, 2003.

40. 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.

41. 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 and would have been motivated to make such a modification or combination. I understand that it is appropriate to consider whether some teaching, suggestion, or motivation would have led a person of ordinary skill in the art to make such a modification or combination. I further 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. I understand that the relevant inquiry is not whether a modification or combination *could* have been made, but whether a person of ordinary skill *would* have been motivated to do so.

42. In determining whether a piece of prior art would 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:

- 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.

43. 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 may make it more likely that the claim was obvious.

44. On the other hand, if there was not a reasonable expectation of success in making a particular modification or combination, if the combination of known elements yielded unexpected or unpredictable results, or if the prior art teaches away from making a particular modification or combination, 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.

E. Objective Indicia of Non-Obviousness

45. I am also aware that before concluding a claim is obvious, objective indicia of non-obviousness (also called secondary considerations of non-obviousness), to the extent they exist, must be considered, such as: commercial success, long-felt but unresolved need, failure of others, copying by others, praise by others in the industry, licensing of the claimed invention, unexpected results, departure from accepted principles, widespread recognition by those in the art of the invention's significance, industry acceptance, and skepticism by others.

46. I understand that there must be a demonstrated correlation or relationship between the claimed invention and these secondary considerations for them to be considered (which I am informed is sometimes referred to as a nexus). I am also informed and understand that nexus is presumed if the evidence relates to an embodiment of the claims.

F. Priority (Conception, Reasonable Diligence, and Reduction to Practice)

47. I understand that a patent may claim the benefit of the filing day of an earlier filed application (which may be U.S. or foreign) if the earlier filed application provides adequate disclosure of the patent's claims. I understand that the disclosure requirement is satisfied if a person of ordinary skill in the art could clearly conclude that the inventor invented the claimed subject matter as of the earlier filing date sought. I understand that the earlier filed application does not need to describe the claimed subject matter in precisely the same terms as found in the claims at issue.

48. I have also been informed by counsel that a patent may be entitled to an earlier priority date than the earliest filed application based on evidence of conception, reduction to practice, and reasonable diligence in between. In such a case, a patent would be entitled to priority as of its conception date or earliest date from which there was diligence to reduction to practice.

49. I have been informed and understand that conception is the formation, in the mind of the inventor or inventors, of a definite and permanent idea of a complete and operative invention as set forth in the claims. I understand that it is not required that the inventor recognize the invention in the exact same terms as recited in the claims.

50. I have been informed and understand that reduction to practice may be constructive or actual. I understand that constructive reduction to practice may be

found by the filing of a patent application. I understand that an actual reduction to practice requires an embodiment or performance of a process that meets all of the limitations of the claims and a determination (or understanding) that the invention would work for its intended purpose.

51. I have been informed and understand that it is not required that the inventor be the one to reduce the invention to practice and that the reduction to practice may be performed on behalf of the inventor or with express or implied authorization.

52. I have been informed and understand that there must be reasonable diligence in reducing an invention to practice. I understand that the inventor's diligence does not need to be perfectly continuous, but rather need only be reasonably continuous. In other words, the inventor (or those on his or her behalf) is not required to work on reducing the invention to practice every day, and there can be reasonable periods of inactivity, which I understand may be a fact specific inquiry.

53. I understand that diligence can be satisfied by an inventor's authorization or oversight of a non-inventor working to reduce the invention to practice.

54. I have further been informed that acts by others working explicitly or implicitly at the inventor's request will be treated as the inventor's own acts. In other

words, the inventor does not have to expressly request or direct a non-inventor to perform work to reduce the invention to practice. I understand that if the non-inventor is authorized to reduce the invention to practice, then even without an express directive or request from the inventor, such work performed by the non-inventor will be treated as the inventor's own acts.

55. I have been informed and understand that the invention cannot be suppressed, abandoned, or concealed.

V. PROSECUTION HISTORY

56. On April 30, 2003, U.S. Patent Application No. 10/426,928 ("928 Application") was filed which would result in the '818 Patent. Ex. 1002, 2-12. The '928 Application was filed with 23 claims including independent claims 1, 6, 10, 11, 12, 14, 15, 16, 20, 21, 22, and 23. Ex. 1002, 46-52. Claim 1, as filed, is reproduced below for reference.

Claims:

1. A method for encoding sequences of pictures into a bitstream, wherein parameters are defined in a parameter set and each picture comprises information of one or more slices, the method comprising:
 - defining parameters in a sequence parameter set;
 - defining parameters in a picture parameter set; and
 - defining at least one picture parameter in a slice header, the picture parameter remaining unchanged at least in all slice headers of one picture.

57. On January 11, 2007, the Examiner issued a Non-Final Office Action rejecting claims 1-23 under 35 U.S.C § 102(e) as allegedly being anticipated in

view of U.S. Patent Application Publication No. 2004/0010802A1 (“Visharam”). Ex. 1002, 108-113. In response, Applicants filed a response to the Non-Final Office Action on April 13, 2007. Ex. 1002, 133-145. In the office action response, Applicants argued that Visharam disclosed that a parameter set identifier is constant throughout a video sequence and that the parameter set identifier is referenced by each slice unit. Ex. 1002, 142-145. As such, Applicants argued that Visharam fails to disclose a “picture parameter set,” as required by the claims. Ex. 1002, 142-145.

58. On July 13, 2007, the Examiner issued a Final Office Action maintaining the previous rejections against claims 1-23 under 35 U.S.C § 102(e) in view of Visharam. Ex. 1002, 162-169. In response, Applicants filed a response to the Final Office Action on November 9, 2007. Ex. 1002, 177-191. Applicants distinguished the claims from Visharam by explaining that “[o]ne of the underlying concepts of the present invention is the idea of splitting the parameter set structure into multiple parameter set structures according to the persistency and target of parameters.” Ex. 1002, 186-191. Applicants further explained that “the invention includes the concepts of sequence parameter sets and picture parameter sets, wherein the selection of a correct parameter set for each parameter depends on the probable and allowed changing rate of a parameter.” Ex. 1002, 186. Applicants stated that this concept “allows the present invention to achieve one of its stated

goals; namely, to provide a more efficient method to transmit parameters relating to picture information.” Ex. 1002, 186. Applicants argued that Visharam fails to disclose this concept, and therefore, fails to disclose the method of claim 1 where there are separate parameters defined for a sequence of pictures and for a picture. Ex. 1002, 186-191.

59. On January 31, 2008, the Examiner issued another Non-Final Office Action maintaining their previous rejections against claims 1-23 under 35 U.S.C § 102(e) in view of Visharam. *Id.* at 332-337. In response, Applicants filed a response to the Office Action on June 4, 2008. Ex. 1002, 341-356. In the office action response, Applicants argued that Visharam does not disclose that the parameter sets are included in the slice headers. Ex. 1002, 350-353. Applicants further argued that Visharam also did not disclose that a slice header may contain a picture parameter that remains unchanged at least in slice headers of one picture. Ex. 1002, 350-353.

60. On October 8, 2008, the Examiner issued yet another Non-Final Office Action rejecting claims 20-23 under 35 U.S.C § 101 because the claims allegedly defined a software program comprising machine executable steps stored on a readable medium but did not define a computer-readable medium or memory. Ex. 1002, 359-366. The Non-Final Office Action also rejected claims 1, 6, 10-16, and 20-25 under 35 U.S.C § 103(a) in view of Visharam and U.S. Patent No.

7,227,901 (“Joch”). Ex. 1002, 359-366. In response, Applicants filed a response to the Non-Final Office Action on February 12, 2009. Ex. 1002, 371-382. In the response to the office action, Applicants amended claims 20-23 to recite a “computer readable medium.” Ex. 1002, 371-382. Applicants argued that neither Visharam nor Joch disclose that the picture parameter remains unchanged at least in all slice headers of one picture. Ex. 1002, 380-382. In particular, Applicants explains that the `pic_parameter_set_id` depicted in the slice header of Figure 1 of Joch is not a picture parameter. Ex. 1002, 381. Applicants explained that instead, `pic_parameter_set_id` is only a reference to picture parameter set. Ex. 1002, 381. Joch’s `pic_parameter_set_id` is a reference to a picture parameter set, but the reference itself does not contain picture parameter values that are used for decoding as required by the claims. Ex. 1002, 381. As such, Applicants argue that Joch does not disclose or suggest that the slice header includes at least one picture parameter and that the picture parameter remains unchanged at least in in all slice headers of one of the pictures as recited by the claims. Ex. 1002, 381.

61. On June 5, 2009, the Examiner issued another Non-Final Office Action that rejected claims 1-9 under 35 U.S.C § 101 as allegedly failing to fall within one of the four categories of invention and rejected claims 20-23 as allegedly being directed to non-statutory subject matter. Ex. 1002, 388-398. The Non-Final Office Action also maintained its previous rejections under 35 U.S.C §

103(a) in view of Visharam and Joch. Ex. 1002, 388-398. In response, Applicants filed a response to the Non-Final Office Action on October 7, 2009. Ex. 1002, 401-412. In the response to the office action, Applicants amended the claims to address the claim rejections under 35 U.S.C § 101. Ex. 1002, 410. Applicants also explained that Joch's `pic_parameter_set_id` is not a picture parameter value that controls the decoding of VCL data. Ex. 1002, 411-412. As such, Applicants argued that, for at least this reason, the combination of Visharam and Joch fails to disclose or suggest defining at least one picture parameter value in a slice header, the picture parameter value remaining unchanged at least in all slice headers of one picture, as recited by the claims. Ex. 1002, 411-412.

62. On January 26, 2010, the Examiner issued a Notice of Allowance without providing further comments. Ex. 1002, 420.

63. Based on my review of the prosecution history, Applicants distinguished and disclaimed parameter sets as well as references (or pointers) to parameter sets from the "picture parameter value" of the claims." Ex. 1002, 381; 411.

64. As discussed above, the Examiner rejected claims in view of prior art Visharam and Joch. Ex. 1002, 363-366. One of the original claim elements was "at least one picture parameter in a slice header, the picture parameter remaining unchanged at least in all slice headers of one picture." Ex. 1002, 372. Applicants

argued that the relied upon “pic_parameter_set_id depicted in the slice header of Figure 1 of Joch is not a picture parameter. Instead, it is only a reference to a picture parameter set which should be the same in all slice headers of one picture. Therefore, Joch cannot disclose or suggest that the slice header includes at least one picture parameter, and that picture parameter remains unchanged in all slice headers of one picture, as recited in claim 1.” Ex. 1002, 381.

65. However, the Examiner maintained the rejection, stating that “To the examiner the pic_parameter_set_id in the slice header is a picture parameter set comprising picture parameter.” Ex. 1002, 392.

66. In response, Applicants amended the claims to change “picture parameter” to “picture parameter value.” Ex. 1002, 402 (emphasis in original).

67. Applicants then traversed the rejection explaining that neither Visharam nor Joch disclosed or suggested the claims as amended. Ex. 1002, 411.

68. More specifically, the Applicants distinguished Visharam by stating that “Visharam only discloses that a parameter set defines a group of parameter values that control the decoding of VCL data ... Therefore, a parameter set is not a parameter that controls the decoding of the VCL data but the parameter inside the parameter set can be.” Ex. 1002, 411. Therefore, the Applicants made it unambiguously clear to a POSITA that a parameter set is excluded from the scope of the meaning of “picture parameter value.”

69. Applicants further explained that “using this analogy, the index of the parameter set, i.e. `pic_parameter_set_id` of Joch is not a picture parameter value that controls the decoding of the VCL data.” Ex. 1002, 411. In other words, the value of a reference or pointer to a picture parameter set (e.g., Joch’s `pic_parameter_set_id`) represents a location or identifier for where information (e.g., a parameter set) is stored. As such, a reference or pointer itself is not a picture parameter value that controls the decoding of the VCL data. Therefore, the Applicants made it unambiguously clear to a POSITA that a reference or a pointer to a parameter set is excluded from the scope of the meaning of “picture parameter value.”

70. In sum, it is clear to a POSITA based on the Applicants’ statements during prosecution that the Applicants disclaimed parameter sets and references to a parameter set (e.g. pointers) from the meaning of the claim term “picture parameter value.”

VI. CLAIM CONSTRUCTION

71. As explained above, a person of ordinary skill would have understood that Applicants disclaimed parameter sets and references to parameter sets (e.g., pointers) from the claimed “picture parameter value” during prosecution.

72. I understand that Dr. Saber has also proposed constructions for the “means for” elements of Claims 22 and 23, as reproduced below from his declaration.

Limitation (Function Emphasized)	Corresponding Structure
22[a]: “means for <i>defining parameter values in a sequence parameter set for a sequence of pictures.</i> ”	“an encoder as described in the ’818 patent specification in figure 3 and equivalents thereof.”
22[b]: “means for <i>defining parameter values in a picture parameter set for a picture.</i> ”	“an encoder as described in the ’818 patent specification in figure 3 and equivalents thereof.”
22[c]: “means for <i>defining at least one picture parameter value in a slice header, the picture parameter value remaining unchanged at least in all slice headers of one picture.</i> ”	“an encoder as described in the ’818 patent specification in figure 3 and equivalents thereof.”
23[a]: “means for <i>recognizing a sequence parameter set for a sequence of pictures and forming at least one sequence parameter pertaining to a sequence using the parameter set for a picture.</i> ”	“a decoder as described in the ’818 patent specification in figure 4 and equivalents thereof.”
23[b]: “means for <i>recognizing a picture parameter set and forming at least one</i>	“a decoder as described in the ’818 patent specification in figure 4 and

<i>first picture parameter value pertaining to a picture using the parameter set.”</i>	equivalents thereof.”
23[c]: “means for <i>forming at least one second picture parameter value using information of a slice header</i> , the at least one second picture parameter value remaining unchanged at least in all slice headers of one picture.”	“a decoder as described in the ’818 patent specification in figure 4 and equivalents thereof.”
23[d]: “means for <i>using the at least one second picture parameter value in decoding</i> .”	“a decoder as described in the ’818 patent specification in figure 4 and equivalents thereof.”

Ex. 1003, ¶59.

73. I do not have any opinion at this time whether Dr. Saber’s proposed constructions are correct. For the purposes of this proceeding, I have applied Dr. Saber’s proposed constructions in my analysis of Claims 22 and 23 in this declaration.

74. Otherwise, a person of ordinary skill would have understood the remaining terms in the claims of the ’818 Patent by their plain and ordinary meaning, which I have applied in my analysis here.

VII. THE ’818 PATENT

75. In video coding, a video is made up of a sequence of pictures, where each picture can be made up of one or more slices, and in turn each slice can be

further broken down into one or more macroblocks. Ex. 1001, 1:51-55. Different parameters are used in video coding that correspond to sequences, pictures, and slices respectively. Ex. 1001, 4:26-28, 5:15-29. For example, some parameters do not change across an entire video sequence – such as the profile or version used. Ex. 1001, 4:247-26, 7:64-8:41. Other parameters such as the number of slices in a given picture, or the picture size in some embodiments, do not change across a given picture. Ex. 1001, 8:43-9:6. Other parameters such as the relevant prediction mode can be changed frequently, sometimes from slice to slice. Ex. 1001, 4:21-24, 9:8-63.

76. Prior to the '818 Patent, conventional video coding standards involved a structure for a bitstream consisting of sequence layers, picture layers, slice layers, and macroblock layers. Ex. 1001, 2:6-13. Information related to the slice layer and below was conveyed in slice headers, while picture and sequence level parameters were included together in a single parameter set. Ex. 1001, 2:51-56. One significant problem that the '818 Patent inventors recognized with this single parameter set concept was that in order to be able to change even a single parameter, encoders would either have to send an entirely new, updated parameter set (which would contain mostly repeated unchanged parameters) or instead encoders and decoders would have to pre-store multiple parameter sets (which again would contain mostly repeated unchanged parameters). *See* Ex. 1001, 6:54-

57. Transmitting, receiving, and storing multiple parameter sets with repetitive information was wasteful, overburdening, and caused latency and reliability issues. Ex. 1001, 3:17-28. Further, since the parameter sets were transmitted frequently to accommodate changes in users watching video, the redundant transmission was inefficient and very costly from a bit-rate point of view. Ex. 1001, 3:17-28.

77. The '818 Patent addresses this technological limitation by “split[ting] the parameter set structure [in]to multiple parameter set structures according to the persistency and target of the parameters.” Ex. 1001, 4:15-19. “According to the invention, there exist at least two kinds of parameter sets: one for the sequence (sequence parameter set) and one for the pictures (picture parameter set).” Ex. 1001, 4:3-5. By taking this unconventional approach of placing those parameters that may change in every slice or are likely to change in every picture into the slice header, placing those that are allowed to change in every picture but unlikely to change in every picture in a picture parameter set, and placing the parameters that will not change in the video sequence in a sequence parameter set, the '818 Patent allows for less parameter data to be sent over the bitstream, as the less frequently changing parameters are not sent as often. Ex. 1001, 4:15-31, 6:50-59, 7:39-42. This inventive multiple parameter set concept provides a specific technological improvement to video coding technology, i.e., it “improves compression efficiency.” Ex. 1001, 3:56-58, 6:50-59. The invention of the '818 Patent is a novel

and more granular data structure than previously known or used, and it resulted in improved functionality over prior systems.

78. The '818 Patent recognizes the technological problems with the conventional technology at the time utilizing a single parameter set concept, and solved the technological limitation by splitting the parameter set structure into multiple parameter sets based on the persistency and target of the parameters. Ex. 1001, 4:15-19. The ability of the multiple parameter set concept disclosed in the '818 Patent to define parameters in a sequence parameter set, in a picture parameter set, and in a slice header based on persistency was a significant advancement over the existing technology of the time.

79. Additionally, there is an important reason for including at least one parameter that is likely to change in every picture (i.e., a picture parameter value) in the slice header, instead of in the picture parameter set, which contributes to the novel technological solution of the '818 Patent. *See, e.g.*, Ex. 1001, Abstract, 4:15-31, 4:46-48. If every picture parameter whose value was likely to change in every picture were included in a picture parameter set, there would need to be a different picture parameter set for every picture, which would reduce the efficiency and compression benefits of having split the parameters into the different types of parameter sets. That is, the full picture parameter set containing mostly repeated values would need to be transmitted and received for each picture. This problem is

solved by including at least one parameter that is likely to change to every picture (i.e., a picture parameter value) in the slice header instead of in the picture parameter set.

80. An additional characteristic of having multiple types of parameter sets is that the one or more slices of a picture use the same picture parameter set and the picture parameter sets of a given sequence use the same sequence parameter set. *See, e.g., Ex. 1001, 6:60-7:4, 7:58-60.* In this way, the parameter sets are “hierarchical” or “nested.”

81. These hierarchical parameter set structures (sequence parameter set, picture parameter set, and at least one picture parameter value in the slice header) increase efficiency and enhance compression. *See, e.g., Ex. 1001, 6:50-59, 3:55-60.* This novel invention of defining hierarchical or nested parameter set structures was not well-understood, routine, or conventional, nor was it simply comprised of well-understood, routine, and conventional activities previously known to the industry. *Ex. 1001, 6:50-59, 3:55-60.* Likewise, the ordered combination of elements, including defining hierarchical or nested parameter set structures was not well-understood, routine, or conventional. *Ex. 1001, 6:50-59, 3:55-60.* This unique technological improvement, defining parameters in a sequence parameter set for a sequence of pictures, defining parameter values in a picture parameter set for a picture, and defining at least one picture parameter value in a slice header, where

the picture parameter value remains unchanged at least in all slice headers of one picture, is recited in every claim of the '818 Patent, with dependent claims further specifying the particular way in which various structures may reference one another. *See, e.g.*, Ex. 1001, cls. 7-8, Table 2.

82. The novel invention of the '818 Patent improved the efficiency and bandwidth consumption as compared to conventional video coding technology, such as VCEG-N52's single parameter set concept. For example, the Au reference, on which Dr. Saber relies, states that the H.264 sequence and picture parameter sets that the '818 Patent invented "allows efficient transmission of infrequently changing data." Ex. 1008 (Au), 8:9-11. In a previous IPR proceeding, IPR2024-00572 for the '818 Patent, Dr. Saber agreed with this at his deposition. Ex. 2022, 97:8-98:15, 37:1-18, 38:15-39:7.

83. The value of the '818 Patent was further recognized when it was incorporated into the follow-on H.265 Standard. *See* Ex. 2003, 33 (finding the '818 Patent claims "essential to the H.264 and H.265 standards"). Dr. Saber agreed at his deposition that later standards would "carry over features that are relevant, efficient, effective, et cetera." Ex. 2022, 29:20-30:7, 30:20-32:3.

84. For example, the H.265 Standard lists 96 parameters between its sequence parameter set and picture parameter set. Ex. 2025 (H.265 Standard (12/2016)), 52-56. With VCEG-N52's single parameter set, if even one parameter

needs to be changed or updated, all 96 parameters have to be transmitted again. However, with the '818 Patent, if, for example, a picture parameter value needs to be changed, only 45 parameters would need to be transmitted (the picture parameter set), which saves more than half of the bandwidth and resources required.

Prior Art - VCEG-N52	Single Parameter Set (96 parameters)
818 Patent	Picture Parameter Set (45 parameters)

85. Certain claims of the '818 Patent were asserted in an ITC proceeding (337-TA-1380) last year against Amazon. In that ITC proceeding, Amazon asserted all of the same prior art references that are asserted in this IPR. Ex. 2021. Amazon elected not to pursue Au at trial (Ground 1 here), and instead focused on the VCEG-N52/Sriram combination (Ground 2 here). Ex. 2003, 35. Following the trial, the Administrative Law Judge (ALJ) Elliot found that the asserted claims of

the '818 Patent were essential to the H.264 and H.265 Standards. Ex. 2003, 33.

The ALJ also determined that the '818 Patent was entitled to an earlier priority date of April 27, 2002, and/or May 1, 2002, based on the efforts of the inventors Dr. Hannuksela and Dr. Wang to propose and then incorporate their invention into the H.264 Standard. Ex. 2003, 36-42.

86. The ALJ found that, with respect to the asserted combination of VCEG-N52 with Sriram, the combination fails to render obvious the claims. Ex. 2003, 44-47. The ALJ found that VCEG-N52 did not disclose separate sequence and picture parameter sets. Ex. 2003, 44. And the ALJ then considered Amazon's arguments that "Sriram taught using smaller data structures" and the testimony of Amazon's expert that "Sriram discloses 'this notion of breaking up of parameter sets.'" Ex. 2003, 44-46. However, the ALJ then agreed with me that Sriram "does not disclose the concept of breaking [parameter sets] apart so as to avoid any sort of redundant transmissions," and that a POSITA would not have been motivated to break up the single parameter set of VCEG-N52. Ex. 2003, 46-47. Therefore, the ALJ concluded that the combination of VCEG-N52 with Sriram could not render obvious the '818 Patent claim limitations, which require a sequence parameter set and picture parameter set. Ex. 2003, 46-47.

87. I agree with the ALJ's determination that the '818 Patent is not rendered obvious by any of the prior art asserted in the previous ITC proceeding,

which includes the same Au and the combination of VCEG-N52 and Sriram that are relied on in the Petition. I am informed and understand that the ITC uses a higher legal standard for patentability than the Board uses, and I have no legal opinions on the differences between those standards. As a POSITA, my opinions below explain in detail how the '818 Patent is properly entitled to an earlier conception date and how none of the prior art renders obvious the Challenged Claims to a POSITA.

VIII. STANDARDIZATION HISTORY OF THE '818 PATENT

88. Around the 2001 timeframe, video coding experts from two different groups, ITU-T Study Group 16 (VCEG) and ISO/IEC JTC 1 SC 29 / WG 11 (MPEG), joined together to form the Joint Video Team (JVT), with the goal of creating an advanced video coding specification, which would later become known as the H.264 Standard. The JVT held standardization meetings for multiple years, during which video coding experts from around the world would propose ideas for the new H.264 Standard and vote on incorporation of the best concepts to be adopted into the H.264 Standard.

89. Prior to JVT standardization meetings, conventional video coding standards consisted of several layers, including a sequence layer, a group of pictures (GOP) layer, a picture layer, a slice layer, a macroblock layer, and a block layer. Ex. 1001, 2:6-12. The bitstream for each layer would typically be comprised

of a header and associated data for each layer, which included parameters associated with each layer that were used for video decoding. Ex. 1001, 2:6-12.

90. As the JVT group was determining how best to transmit parameters necessary for video decoding, they departed from the conventional use of slice headers for each layer, and instead considered transmitting “headers at slice layer and below, but it does not include picture, GOP, or sequence headers.” Ex. 1001, 2:49-51. The higher layer information that was previously transmitted in slice headers would instead be sent in a structure known as a parameter set. Ex. 1001, 2:51-56.

91. Inventors Miska Hannuksela and Ye-Kui Wang submitted a proposal to the third JVT meeting on May 1, 2002 as JVT-C078 and accompanying JVT-C078 Annex A. *See, e.g.*, Ex. 2013; Ex. 2014; Ex. 2019, Ex. 2020.

92. In this proposal, Miska Hannuksela and Ye-Kui Wang recognized the benefits of transmitting parameter sets “reliably and out-of-band at the session set-up time” while also recognizing that sometimes parameter sets must instead be conveyed in-band in PUPs or Parameter Update NAL packets. Ex. 2013, 1-2. The inventors of the ’818 Patent also recognized that in those situations, a single parameter set concept as disclosed in VCEG-N52 would have several drawbacks. In particular:

- When there are many parameter set instances need to be transmitted in the session beginning, the out-of-band method may become overburdened or the session beginning latency will be too long.
- For systems lacking feasible mechanisms for reliable out-of-band transmission of parameter sets, in-band transport of PUPs is not reliable.
- For broadcast applications, since the parameter sets information should be transmitted frequently to allow new users join during the broadcast process, redundant transmission of all the active parameter set instances is costly from bit-rate point of view.

Ex. 2013, 2.

93. To combat these problems, Miska Hannuksela and Ye-Kui Wang proposed using multiple parameter set structures, rather than the single parameter set structure of VCEG-N52. Miska Hannuksela and Ye-Kui Wang proposed using multiple parameter set structures be used, with the justification being:

- Certain parameter values must remain unchanged throughout an independent GOP or within a picture. For example, the number of picture “slots” in the multi-picture buffer must not be changed during an independent GOP. Otherwise, it would be unclear how the multi-picture buffering process operates. A decoder implementation has to ensure that all the slices of a particular picture refer to the same picture parameter set. Similarly, all the

slices of an independent GOP must refer to the same independent GOP parameter set. Otherwise, decoders should infer data loss or corruption. Obtaining the same functionality with one joint parameter set requires that the decoder checks that individual parameter values remain the same within a picture or an independent GOP.

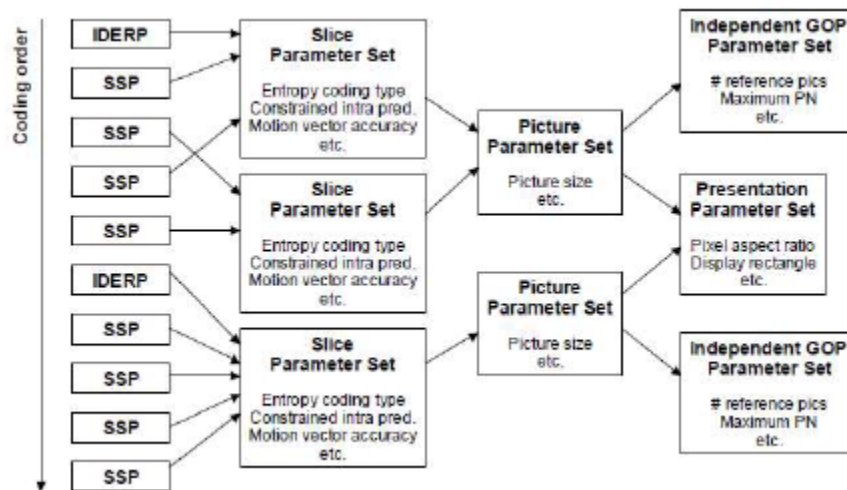
- A compact syntax for parameter sets is advantageous to save bits in PUPs. Thus, it makes sense to separate independent GOP and picture parameter sets from more frequently updated slice parameter sets.
- Display-related parameter values do not affect decoding of a coded video stream.

Ex. 2013, 2.

94. The '818 Patent likewise notes one of the benefits of splitting “the parameter set structure to multiple parameter set structures according to the persistency and target of parameters. In particular, the invention includes the concepts of sequence parameter set and picture parameter set. The selection of a correct parameter set for each parameter depends on the probable and allowed changing rate of the parameter. Parameters whose value may change in every slice or whose value is likely to change in every picture, are included in the slice header. If it is probable that a parameter remains unchanged in multiple pictures but is allowed to change in every picture, such parameter is included in a picture

parameter set. Such parameters which are not allowed to change in a coded video sequence are included in the sequence parameter set. Some non-restrictive examples of such parameters are picture order count, frame number and identifier of an independently decodable picture.” Ex. 1001, 4:15-31.

95. Both the '818 Patent and JVT-C078 identically disclose a Figure showing the hierarchical parameter sets.



Ex. 2013, 3; Ex. 1001, Fig. 1.

96. Initially, JVT-C078 was partially adopted. Ex. 2015, 29.

JVT-C078 [Hannuksela, Nokia] Coding of Parameter Sets
Proposed syntax and semantics of parameter set update NAL packets (PUPs). Four parameter set structures are used: independent GOP, picture, slice, and presentation parameter set.

The group decided to have only the independent GOP parameter set. Some of the proposed parameters were considered potentially unnecessary.
Parameters proposed for the presentation parameter set were decided to be carried with the Supplemental Enhancement Information.

Parameter set identifier signaling agreed (section 3.3 of the contribution).

Adopted.

Ex. 2015, 29.

97. Miska Hannuksela, Ye-Kui Wang, and Young-Kwon Lim submitted another proposal to the next JVT meeting taking place in Klagenfurt, Austria on July 22-26, 2002. Ex. 2016. JVT-D094 again put forward the multiple parameter set concept disclosed in JVT-C078, this time further explaining the previously disclosed picture parameter set concept of JVT-C078. Ex. 2016, § 2. In addition to the independent GOP parameter set that was already adopted at the Fairfax meeting, JVT-D094 (proposed at the following JVT meeting in Klagenfurt) further discloses an exemplary picture parameter set syntax structure and slice header syntax structure, where the slice header could include both a `parameter_set_id` and a `picture_parameter_set_id`. Ex. 2016, 7.

98. After the adoption of JVT-C078's independent GOP parameter set at the Fairfax meeting, and JVT-C078's disclosure of using multiple parameter sets, other proposals were made to the Klagenfurt meeting that disclosed parameter set concepts as well. Based on these proposals, the JVT adopted additional aspects of the JVT-C078. Ex. 2017, 32.

JVT-D094 P2.0/3.1 [Hannuksela+] Modifications to High-Level Syntax and Semantics

"The contribution proposes replacement of the picture header with the picture parameter set. Furthermore, the contribution proposes an addition to the parameter set, a simplification to the definition of the first byte of the NAL unit syntax, and straightforward changes to the slice header syntax. It also presents a high-level architecture description of the JVT codec."

Similar to D066 regarding picture header issue but contains issues regarding:

- Parameter Sets & Picture Header
- NAL Unit Types
- SEI Messages
- Constraints on Order of NAL Units

Covered in high-level syntax output.

Ex. 2017, 32.

99. The “high-level syntax output” refers to JVT-D145.

9. Wrap-up of meeting

Disposition of NB Comments D149
High-level syntax JVT-D145
Frame/Field JVT-D018r1
JVT-D152/M8591 – request to MPEG re verification testing

Ex. 2017, 50 (highlights in original).

100. JVT- D145 is titled “High-Level Syntax, Semantics, and Decoder Process” and is listed as the Output of a Breakout Group, with one of the inventors of the ’818 Patent, Miska Hannuksela, listed as the contact.

Error! No text of specified style in document.

Joint Video Team (JVT) of ISO/IEC MPEG and ITU-T VCEG		Document JVT-D145
4th Meeting: Klagenfurt, Austria, 22-26 July, 2002		File: JVT-D145.doc
		Generated: 2002-07-25
<i>Title:</i>	High-Level Syntax, Semantics, and Decoder Process	
<i>Status:</i>	Output of a Breakout Group	
<i>Contact:</i>	Miska M. Hannuksela	
<i>Purpose:</i>	Proposal	

Ex. 2018, 1.

101. JVT- D145 shows that the Independent GOP parameter set from JVT-C078 that was adopted at the Fairfax meeting is included in the high-level syntax.

7.3.2 Raw and encapsulated byte sequence payloads

7.3.2.2 Independent GOP parameter set RBSP syntax

[Ed.Note: Should aspect_ratio_info follow video_signal_type ? Should sar_width, sar_height be e(v) ?]

igop_parameter_set_rbsp() {	Category	Descriptor
profile	0	u(8)
level	0	u(8)
igop_parameter_set_id	0	ue(v)
log2_max_frame_num_minus4	0	ue(v)
poc_coding_type	0	ue(v)
if (poc_coding_type == 1)		
log2_max_poc_minus4	0	ue(v)
else if (poc_coding_type == 2) {		
expected_delta_for_non_stored_picture		se(v)
num_frames_in_poc_cycle		ue(v)
for (i = 0; i < num_frames_in_poc_cycle; i++)		
expected_delta_poc		se(v)
}		
num_of_reference_pictures	0	ue(v)
required_frame_num_update_behaviour	0	u(1)
frame_width_in_MBs_minus1	0	ue(v)
frame_height_in_MBs_minus1	0	ue(v)
aspect_ratio_info	0	b(8)
if(aspect_ratio_info == "Extended SAR") {		
sar_width	0	u(8)
sar_height	0	u(8)
}		
video_signal_type	0	u(1)
if(video_signal_type) {		
video_format	0	u(3)
video_range	0	u(1)
colour_description	0	u(1)
if(colour_description) {		
colour_primaries	0	b(8)
transfer_characteristics	0	b(8)
matrix_coefficients	0	b(8)
}		
}		
constrained_intra_prediction_flag	0	u(1)
num_units_in_tick	0	u(32)
time_scale	0	u(32)
motion_vectors_over_picture_boundaries	0	u(1)
fixed_frame_rate	0	u(1)
rbbsp_trailing_bits()	0	
}		

Ex. 2018, 2.

102. JVT- D145 likewise identifies picture parameter set syntax as disclosed in both the JVT-C078 proposal and the JVT-D094 proposal.

7.3.2.x Picture parameter set Rbsp syntax

picture_parameter_set_rbsp() {	Category	Descriptor
picture_parameter_set_id	0	ue(v)
igop_parameter_set_id	0	ue(v)
frame_cropping_flag	0	u(1)
if (frame_cropping_flag) {		
frame_cropping_rect_left_offset	0	ue(v)
frame_cropping_rect_right_offset	0	ue(v)
frame_cropping_rect_top_offset	0	ue(v)
frame_cropping_rect_bottom_offset	0	ue(v)
}		
entropy_coding_mode	0	ue(v)
motion_resolution	0	ue(v)
num_slice_groups_minus1	0	ue(v)
if(num_slice_groups_minus1 > 0) { /* use of Flexible MB Order */		
mb_allocation_map_type	0	ue(v)
if(mb_allocation_map_type == 0)		
for(i=0; i<=max_slice_group_id; i++)		
run_length	0	ue(v)
else if(mb_allocation_map_type == 2)		
for(i=0; i<num_mbs_in_picture; i++)		
slice_group_id	0	u(v)
}		
num_ref_pic_active_fwd_minus1	0	ue(v)
num_ref_pic_active_bwd_minus1	0	ue(v)
slice_qp_minus26 /* relative to 26 */	0	se(v)
slice_qp_s_minus26 /* relative to 26 */	0	se(v)
rbsp_trailing_bits()	0	
}		

Ex. 2018, 3.

103. JVT- D145 likewise discloses slice header syntax as disclosed in both the JVT-C078 proposal and the JVT-D094 proposal.

7.3.3 Slice header syntax

slice_header() {	Category	Descriptor
picture_parameter_set_id	4	ue(v)
frame_num	4	u(v)
picture_structure	4	ue(v)
first_mb_in_slice	4	u(v)
slice_coding_type	4	ue(v)
if (poc_coding_type == 1)		
coded_poc	4	u(v)
else if (poc_coding_type == 2)		
delta_poc	4	se(v)
num_ref_pic_active_override_flag	4	u(1)
if (num_ref_pic_active_override_flag) {		
if (slice_coding_type == Inter slice_coding_type == Bipred) {		
num_ref_pic_active_fwd_minus1	4	ue(v)
if (slice_coding_type == Bipred)		
num_ref_pic_active_bwd_minus1	4	ue(v)
}		
}		
rps_layer()		
slice_qp_delta	4	se(v)
if (slice_coding_type == SP slice_coding_type == SI) {		
if (slice_coding_type == SP)		
sp_for_switch_flag	4	u(1)
slice_qp_s_delta	4	se(v)
}		
if (slice_coding_type == Bipred) {		
/* Adaptive Bi-predictive weighting parameters? */		
}		
}		

Ex. 2018, 4 (highlights in original).

104. JVT- D145 also includes additional semantic description of the Independent GOP parameter set, picture parameter set, and slice headers. *See* Ex. 2018.

105. At the Klagenfurt meeting, JVT-D145, which included the concepts disclosed in the JVT-C078, was put forward for approval by the JVT's parent bodies.

10.2. Summary Information Report and Action Requests from the JVT

The Joint Video Team (JVT) organization reports the following action requests and information to its ISO/IEC MPEG and ITU-T VCEG parent bodies and to its participants:

10.2.1. The JVT forwards the following documents to its parent bodies for information and approval

Title	No.	TBP	Available
Text of Final Committee Draft of Joint Video Specification (ITU-T Rec. H.264 ISO/IEC 14496-10 AVC)	JVT-D157 (WG11 N4920)	Y	02/08/08
Disposition of NB Comments for Committee Draft of Joint Video Specification (ITU-T Rec. H.264 ISO/IEC 14496-10 AVC)	JVT-D149 (WG11 N4916)	Y	02/08/08
Description of Profiles and Levels of Draft Joint Video Specification	JVT-D154	Y	
Description of Specific Actions Taken on the Drafting of Joint Video Specification	JVT-D156	Y	
High-Level Syntax Design Description	JVT-D145	Y	
HRD/VBV Buffer Model Design Description	JVT-D146	Y	
Motion Prediction, B-Picture Direct Mode, and ABP Design Description	JVT-D155	Y	
Preliminary Plan for Verification Testing of Joint Video Specification	JVT-D158	Y	
Reference Encoding Method Description JM 4	JVT-D147	Y	02/08/09

Ex. 2017, 56-57.

106. At the same Klagenfurt meeting, the JVT adopted a draft specification (JVT-D157) that included the High-Level Syntax Design Description of JVT-D145. Ex. 2017, 58.

10.2.4. The JVT adopted a text of its joint draft for technically-aligned standardization approval by the parent bodies, including in particular a recommendation for approval in ISO/IEC as a Final Committee Draft [JVT-D157 / N4920]. This includes the changes recorded in the Disposition of WG11 NB ballot comments as recorded in JVT-D149 / N4916 and the specific actions detailed in other JVT output documents.

Ex. 2017, 58.

IX. PRIOR ART REFERENCES

A. VCEG-N52 (“VCEG-N52,” Ex. 1012)

107. VCEG-N52 is titled “Video Coding Experts Group (VCEG), VCEG-N52, H.26L over IP and H.324 Framework” and relates to a single parameter set concept for transport of H.26L over IP and H.324 networks. Ex. 1012, 1. VCEG-N52 discloses that its “main design consideration is to distinguish clearly between such media information that has to be transported in real-time and non-real-time information, which is transported by means other than the media RTP stream.” Ex. 1012, 1. To accomplish its purpose, VCEG-N52 discloses that “any information that is concerned with more than a single slice is conveyed out of band” and that “all information traditionally conveyed in the picture header and the higher header layers, such as the picture size, entropy coding method, optional modes ... and similar are never sent in the RTP stream.” Ex. 1012, 1.

108. With regards to implementation, VCEG-N52 teaches a single parameter set concept, where all parameters (including sequence, GOP, picture, and slice layer parameters) are grouped together in a single parameter set. *See e.g.*, Ex. 1012, 8 (“Note: in the following it is distinguished between parameters of four different syntax levels . . . Within this framework, however, each parameter set, as referenced by the slice header, uses one location which contains information of all

four syntax levels. In other words, all storage spaces for parameter sets contain information of all the sequence, GOP, picture and slice layers.”).

109. VCEG-N52 further teaches a process using single parameter sets to decode each slice. Ex. 1012, 2-3. Notably, VCEG-N52 does not disclose distinct sequence parameter sets and picture parameter sets, but rather discloses a single parameter set that would be used to decode a slice. In VCEG-N52, each slice could utilize a different single parameter set. Under this setup, approximately X factorial number of parameter sets would be required, where X is the number of parameters needed to decode each slice, in order to account for possible changes in each parameter. If transmitted in band, this would be extremely bandwidth intensive and time consuming. If transmitted out of band, an out of band communication network would be required, including bandwidth, which is not feasible in many types of video compression and transmission protocols and setups.

B. U.S. Patent No. 6,539,059 (“Sriram,” Ex. 1021)

110. United States Patent No. 6,539,059 is titled “Apparatus and method for efficiently scalable digital video decoding,” and lists as inventors Parthasarathy Sriram, Subramania I. Sudharsanan, and Amit Gulati. Ex. 1021, Abstract. Sriram relates to decoding Motion Compensated-Discrete Cosine Transform (MC-DCT) video streams by splitting the video stream into multiple video streams to be processed in parallel. Ex. 1021, Abstract, 4:59-5:8. According to Sriram, “[a]ll the

known video standards have some syntactic elements to allow the bit stream to be split into multiple independent parts. For example, an MPEG-2 video bit stream can use slice headers to identify portions of a video frame which can be independently processed.” Ex. 1021, 1:44-49. However, according to Sriram, “a wide range of parameters are shared with the rest of the video frame” and “[t]herefore, it is important to efficiently share parameters in a video bit stream that has been split into independent parts.” Ex. 1021, 1:49-57.

111. To accomplish its goals, Sriram describes a process that involves extracting parameters “from the picture, sequence, and GOP headers which are needed for processing an individual MB” (Ex. 1021, 12:64-66), and “[a]ll the Slice and Macroblock Header extraction is done by the function getBDIQ_M().” *See* Ex. 1021, 10:57-59, *see also* Ex. 1021, 9:10-22, 9:29-30 (“The ExtPicHeader() function extracts the video sequence, group of picture, and picture level header information.”). Sriram then discloses creating “data structures” at the decoder based on information extracted from the headers included in the bitstream. *See, e.g.,* Ex. 1021, 9:10-22, 9:29-30, 10:57-59, 12:64-66; Petition, 50.

112. There are at least two important features of Sriram, which I will also discuss in more detail below along with numerous other notable distinctions. First, Sriram requires the input bitstream to have parameters organized in headers at the different layers (sequence header, picture header, slice header). Ex. 1021, 9:29-30

(“The ExtPicHeader() function extracts the video sequence, group of picture, and picture level header information.”), 9:57-60, 12:64-66. All of the video formats discussed by Sriram have higher-layer headers. *See also*, Ex. 1021, 5:42-45 (“the invention is equally applicable to other MC-DCT formats, including: MPEG-1, MPEG-4, H.261, and H.263.”). The single parameter set concept of VCEG-N52 was not even invented for another year and a half later.

113. Second, Sriram explains that based on the different headers in the bitstream, new secondary data structures are created based on their access pattern by the decoder such that the video stream can be split up into independent sub-processes and processed in parallel, rather than being grouped according to the persistency of parameters as discussed in the '818 Patent. *See, e.g.*, Ex. 1021, 6:22-29 (“These secondary data structures were defined according to their access pattern in the low level code and not according to the order in which they were created in the bit stream. For example, the picture level parameters used only by the variable length decoding routine are combined into one data structure, parameters used only by the motion compensation routine are combined into another data structure and so on.”), Ex. 1021, 5:61-66 (listing several factors all related to code level processing, and not frequency of updating in the bitstream). Therefore, Sriram’s data structures are organized to efficiently process relevant portions of the video stream and not for the purposes of efficient transmission of the '818 Patent.

X. OPINIONS ON GROUNDS

A. Ground 1 – Au

1. Au is not prior art

114. I understand that Petitioner is asserting that Au's priority date is November 11, 2003. Petition, 2. As discussed above and confirmed by the ITC proceeding, the '818 Patent has a priority date of May 1, 2002, or July 17, 2002, both of which predate Au. For at least this reason, Au does not qualify as prior art to the '818 Patent.

2. Au is not "by others/another"

115. During his deposition in the previous IPR concerning this patent, IPR2024-00572, Dr. Saber confirmed that the portions of the disclosure he relies on from Au are simply describing the H.264 Standard at the time Au was written in November 2002. Ex. 2022, 93:17-96:18, 97:8-21. Dr. Saber further admitted that the H.264 Standard by November 2002 was derived from the proposals that had been adopted into the standard by that time. Ex. 2022, 45:14-46:9, 46:14-47:1.

116. As discussed above, the inventors of the '818 Patent are the ones that invented and incorporated the features identified by and relied upon by Dr. Saber into the H.264 Standard. Ex. 2019, ¶¶3-4; Ex. 2020, ¶¶3-4.

117. Although there are some very minor differences between the particular parameters shown in the corresponding parameter sets and slice header in Au as compared to JVT-C078 (or JVT-D094), these changes are not significant

as compared to the novel data structures and relationships that the '818 Patent inventors created and described in their adopted proposals JVT-C078, JVT-C078 Annex A, and JVT-D094. There are only very minor differences between the parameters that are present in the relied upon portions of Au; however, conceptually there are no significant differences between what was invented and disclosed by the '818 Patent inventors in their adopted proposals and the portions of Au that are being relied on by Petitioner.

118. As such, according to the test that I am informed of by counsel, the concepts and elements identified by Petitioner in Au do not qualify as being “by another” and therefore do not qualify as prior art under § 102.

B. Ground 2 – The Combination of VCEG-N52 and Sriram Does Not Render Obvious the Challenged Claims of the '818 Patent

119. It is my opinion that a POSITA would not have been motivated to combine the asserted references (VCEG-N52 with Sriram) in the first place.

120. Indeed, at the ITC proceeding, the ALJ agreed with me that the proposed combination of VCEG-N52 with Sriram would not render obvious the claims of the '818 Patent. Ex. 2003, 44-47; Ex. 2023 (Kia Tr.), 1718:17-1725:17.

1. No motivation to combine VCEG-N52 and Sriram

121. VCEG-N52 was the status of the conventional technology that had the very problem that the '818 Patent inventors identified and then solved with their claimed invention. Ex. 1001, 2:49-3:4, 6:50-7:5. There are numerous reasons why

a POSITA would not have been motivated to combine VCEG-N52 with another reference, such as Sriram, that would result in a complete undoing of fundamental teachings of VCEG-N52.

122. First, Dr. Saber relies on the same erroneous logic that the ALJ in the ITC proceeding already considered and rejected. Specifically, Dr. Saber opined that a POSITA would have been motivated to “extend[] VCEG-N52’s parameter set concept with Sriram’s multiple parameter sets.” Ex. 1003, ¶196. However, Sriram does not disclose or suggest anything about “multiple parameter sets” because parameter sets did not exist at the time Sriram was written. Dr. Saber at his deposition agreed with me. Ex. 2022, 142:17-143:6.

123. Dr. Saber bases his opinions on the same faulty logic and non-existent disclosures that Amazon’s other expert, Dr. Storer, did at the ITC trial. In the ITC, Dr. Storer based his opinions for why he believed a POSITA would apply Sriram’s data structures to VCEG-N52 on the allegation that “Sriram discloses this notion of breaking up parameter sets.” Ex. 2003, 45. But the ALJ correctly recognized that Sriram “does not disclose the concept of breaking [parameter structures] apart so as to avoid any sort of redundant transmissions.” Ex. 2003, 46. The ALJ found that Sriram only teaches “swapping out instances of the parameter with a pointer to that same parameter,” which “is unrelated to reducing redundant transmissions” and such that “the Sriram’s transmissions appear to be the same in number.” Ex. 2003,

46. Therefore, the ALJ correctly concluded that a POSITA would not have been motivated to combine the asserted references. The same applies here. Dr. Saber bases his opinions on “Sriram’s multiple parameter sets” (Ex. 1003, ¶196), which he admits do not actually exist. Ex. 2022, 142:17-143:6. Therefore, Dr. Saber’s underlying rationale for combining the references is false.

124. Second, I understand that Dr. Saber previously admitted at his deposition that he has no opinions on whether a POSITA would have even known about both VCEG-N52 and Sriram. Ex. 2022, 139:3-14. In that case, Dr. Saber also went on to explain that he was not asked to, and therefore, did not analyze when VCEG-N52 or Sriram would have ever been available or known to a POSITA. Ex. 2022, 138:13-17. In this proceeding, Dr. Saber still has not indicated that he has performed such analysis on whether VCEG-N52 or Sriram would have ever been available or known to a POSITA. Therefore, Dr. Saber does not provide any opinion that at any point in time a POSITA would have been aware of both VCEG-N52 and Sriram such that a POSITA would have ever been motivated to combine them in the way that Petitioner asserts. In my opinion, a POSITA would not (and could not) have been motivated to combine references that they were not aware of existed.

125. Third, Dr. Saber opines that “VCEG-N52 and Sriram both focus on efficiently processing parameters” and getting “bandwidth savings during

transmission.” Ex. 1003, ¶¶194-195. But, as Dr. Saber agreed, nothing in either VCEG-N52 nor Sriram actually suggests a separate sequence parameter set and picture parameter set as a potential means of accomplishing the alleged goals. Ex. 2022, 135:21-136:3, 142:17-20. Moreover, Dr. Saber’s proposed combination does not result in bandwidth savings during transmission, but rather *increases* the data bandwidth required. Dr. Saber shows in his declaration how the single parameter set of VCEG-N52 uses 4 fields to carry its parameter data. Ex. 1003, ¶196.

```

<AttributeValue> ::= ( <ParameterSetNumber>* ) <ParameterName> <ParameterValue>

<ParameterSetNumber> ::= int

<ParameterName> ::= ( MaxPicID | PixAspectRatio | DisplayWindowOffsetTop | DisplayWindowOffsetBottom |
DisplayWindowOffsetRight | DisplayWindowOffsetLeft | XsizeMB | YsizeMB | EntropyCoding
MotionResolution | SliceType )

<ParameterValue> ::= string

```

Ex. 1003, ¶196 (highlights in original).

126. Dr. Saber then shows that his proposed combination now requires *12 fields* to accomplish the same task. Ex. 1003, ¶197. This includes adding *new* data fields (such as additional parameter set numbers and parameter set identifiers) that were not previously required. Ex. 2022, 151:12-154:22, 157:2-9.

```

<SeqAttributeValue> ::= ( <SeqParameterSetNumber>* ) <SeqParameterName> <SeqParameterValue>

<SeqParameterSetNumber> ::= int

<SeqParameterName> ::= (MaxPicID | PixAspectRatio )

<SeqParameterValue> ::= string


<GOPAttributeValue> ::= ( <GOPParameterSetNumber>* ) <GOPParameterName> <GOPParameterValue>

<GOPParameterSetNumber> ::= int

<GOPParameterName>      ::=      (SeqParameterSetIdentifier      |      DisplayWindowOffsetTop      |
DisplayWindowOffsetBottom | DisplayWindowOffsetRight | DisplayWindowOffsetLeft | XsizeMB | YsizeMB
)

<GOPParameterValue> ::= string


<PicAttributeValue> ::= ( <PicParameterSetNumber>* ) <PicParameterName> <PicParameterValue>

<PicParameterSetNumber> ::= int

<PicParameterName> ::= (GOPParameterSetIdentifier | horizontal_size | vertical_size | code_picture_width |
code&_pictureheight | pict_type | pictstruct | progframe | prog_seq | chroma_format | framepred_dct | conceal_my
| repeatfirst | topfirst | secondfield | EntropyCoding | MotionResolution )

<PicParameterValue> ::= string

```

Ex. 1003, ¶197.

127. Dr. Saber previously admitted that adding additional parameter fields in his proposed combination of VCEG-N52 with Sriram would result in an increase in the amount of data required. Ex. 2022, 157:2-9.

128. More specifically, Dr. Saber's proposed combination *triples* the number of data carrying fields and therefore directly contradicts Sriram's teaching

to “significantly reduce[] the number of fields ... and reduce[] the data bandwidth requirements.” Ex. 1021, 6:29-33.

129. A POSITA would not have been motivated to combine VCEG-N52 with Sriram when the combination goes against the explicit teachings of Sriram, which Petitioner and Dr. Saber rely on to motivate a POSITA. This would create new problems for a POSITA to try to solve in attempting to combine the two contrasting solutions disclosed by VCEG-N52 versus Sriram because the POSITA would have to add additional fields that did not previously exist and which Sriram specifically instructs against doing.

130. Fourth, Dr. Saber admitted that his statements in his declaration that “[i]n the combination, each level of parameters would need to be transmitted only once, as part of the related parameter set, as opposed to being included in every parameter set” are based on hindsight rather than any problem that a POSITA would have been motivated to solve at the time. Ex. 1003, ¶194. That is, Dr. Saber stated at his deposition that a POSITA would not have viewed VCEG-N52’s repeated and redundant transmission of parameters that have not changed values as a problem at all. Ex. 2022, 132:7-134:16. Rather, Dr. Saber admitted that only the ’818 Patent inventors recognized that a single parameter set structure repeatedly sending parameters that remain unchanged was a problem. Ex. 2022, 135:4-10, 132:22-133:22. As a result, a POSITA would not have been motivated to look to

improve VCEG-N52 because there was not a problem with the way VCEG-N52 updated parameters in its single parameter set structure.

131. Only by following the path laid out by the inventors in the '818 Patent, would a POSITA have reached the same conclusion that the inventors did. I am informed by counsel that such a rationale is called “hindsight” and is not permitted as a valid reason to combine or modify references.

132. Fifth, Dr. Saber agreed with me that the whole purpose of VCEG-N52 was to consolidate the parameters at the different levels of the bitstream into a single parameter set. Ex. 2022, 128:18-129:3. VCEG-N52 itself explains that the advantage of doing so is “making more transmissions (e.g. of picture headers) unnecessary.” Ex. 1012, 8. Petitioner and Dr. Saber’s proposal to break up the parameter sets of VCEG-N52 therefore runs contrary to the entire stated purpose of VCEG-N52. A POSITA would not have been motivated to break apart the single parameter set that VCEG-N52 created to produce more transmissions and defeat the whole purpose of VCEG-N52’s single parameter set in the first place. A POSITA would not have motivated to modify VCEG-N52 in such a way that would completely undo its fundamental objective.

133. Sixth, VCEG-N52 is fundamentally incompatible with the teachings of Sriram. VCEG-N52 eliminates the sequence header, GOP header, and picture header and replaces them with a single parameter set. Ex. 1012, 1; Ex. 2022,

125:22-126:4, 128:18-129:3. VCEG-N52 discloses that by eliminating headers and conveying traditional header information out of band, “[t]he results of the capability exchange can be used directly for establishing knowledge of the parameters thus making more transmissions ... unnecessary.” Ex. 1012, 8. VCEG-N52 therefore intentionally eliminates sequence and picture headers, which had been used in all of the previous video coding standard, such as H.263, MPEG-1, and MPEG-2. Both Dr. Saber and Dr. Storer (previous expert from the ITC proceeding) agree with me that by the time of VCEG-N52, the community of video coding experts had moved away from headers to the single parameter set concept. Ex. 2022, 129:15-130:7; Ex. 2024 (Storer Rep.), ¶183.

134. And both Dr. Saber and Dr. Storer agree with me that headers are fundamentally very different than parameter sets. Ex. 2024, ¶349; Ex. 2022, 120:15-121:17. For example, headers must be transmitted in-band at pre-defined locations in the bitstream, unlike parameter sets which can be transmitted at any time and are transmitted out-of-band in VCEG-N52 specifically to avoid breaking up the bitstream. Ex. 2022, 115:20-117:1, 40:5-18, 125:6-21.

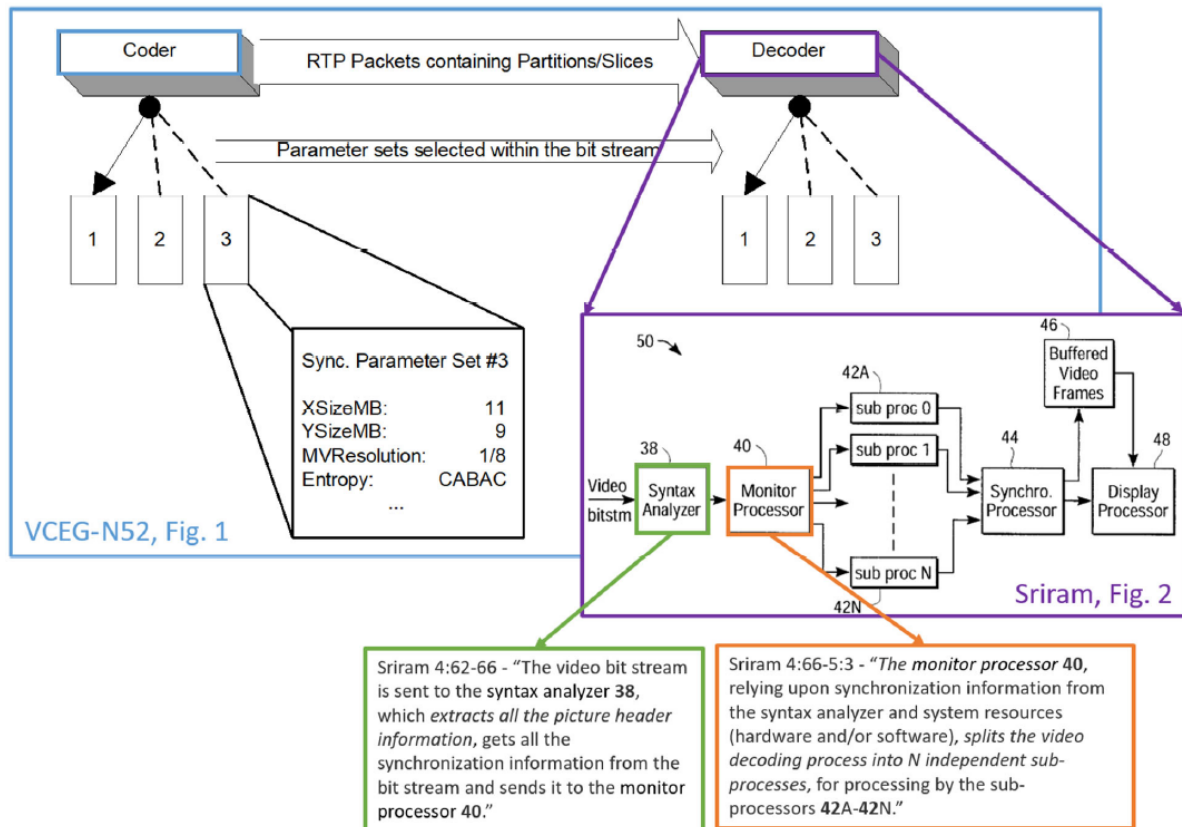
135. However, Sriram requires the very same sequence and picture headers eliminated by VCEG-N52 in order to function correctly. Ex. 1021, 12:64-66; Ex. 2022, 141:6-143:6, 145:12-146:8. In particular, Sriram requires sequence and picture headers to extract the data it uses to create data structures. Ex. 2022, 141:6-

143:6, 145:12-146:8; Ex. 1021, 12:64-66. A POSITA reading VCEG-N52's elimination of sequence and picture headers would not have looked to combine VCEG-N52 with a reference like Sriram that required the very sequence and picture headers that VCEG-N52 eliminated. VCEG-N52 eliminates sequence and picture headers, but Sriram cannot operate without them. Given that VCEG-N52 proposed to completely remove sequence and picture headers and Sriram specifically uses those headers, these references disclose polar opposite solutions. Therefore, these references cannot operate together.

136. Seventh, a POSITA would not have been motivated to apply Sriram's teachings of the *decoder* to the *encoder* of VCEG-N52. Dr. Saber admitted at his deposition that Sriram does not teach or suggest changing the bitstream at the encoder or changing anything about the transmissions from an encoder to a decoder. Ex. 2022, 146:9-18.

137. Sriram teaches creating data structures at the *decoder* after extracting the headers received in the bitstream for the purpose of parallel processing sections of video that can be independently decoded at the *decoder*. Ex. 2022, 147:10-16; Ex. 1021, Abstract, Fig. 1, 18:1-23, 1:43-57. I have provided a diagram below that illustrates how Dr. Saber fails to explain how the decoder processing of Sriram (shown in PURPLE below) would be compatible with the encoder parameter sets of VCEG-N52 (shown in BLUE below). That is, Sriram describes the decoder

receiving the bitstream and extracting the header information at the syntax analyzer 38 (shown below in GREEN), so that the monitor processor 40 (shown below in ORANGE) can split the video stream and create the smaller data structures for sharing parameter data. *See, e.g., Ex. 1021, 4:59-5:27, Fig. 2, claim 1.*



138. Dr. Saber asserts that extending VCEG-N52's parameter set concept with Sriram's multiple parameter sets would involve only routine engineering tasks that would yield predictable results. Ex. 1003, ¶196. I disagree with Dr. Saber's assertion that the proposed modification, which requires heavily modifying the operation of the encoder to be compatible with Sriram's decoder, would only involve routine engineering tasks. Dr. Saber is oversimplifying the engineering

process for designing systems with multiple components that require interoperation with each other. For example, a POSITA would understand that changing aspects of the encoder impacts other aspects of the encoder and its operation. As such, a POSITA would not expect that making arbitrary changes to the encoder would yield predictable effects to the encoder or the entire system. Dr. Saber does not provide any rationale for a POSITA to consider migration of processing paths to a completely different communication path.

139. The point of Sriram is to split the received bitstream at the decoder for independent processing of the streams. Ex. 1021, 1:43-57. Sriram does not teach or suggest applying such a technique at the encoder, nor does Dr. Saber provide any reason why a POSITA would attempt to apply Sriram's decoder technique to the encoder. A POSITA would not have been motivated to do so because splitting the bitstream and creating smaller data structures at the encoder would increase the number of transmissions needed, which is exactly contrary to what VCEG-N52 teaches. Ex. 1012, 8 (explaining that one of the advantages of the single parameter set concept is "making more transmissions (e.g. of picture headers) unnecessary."). Therefore, a POSITA would not have been motivated to modify VCEG-N52's *encoder* based on Sriram, which does not teach or suggest making any kind of modifications to the encoder or its transmissions. Ex. 2022, 146:9-18.

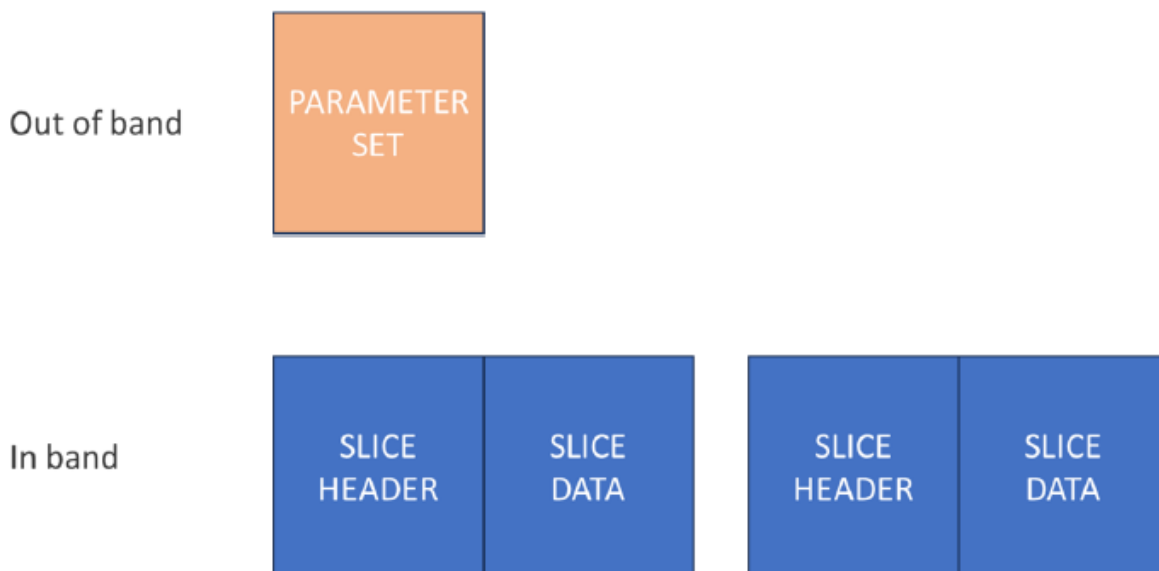
140. Nor would a POSITA have had a reasonable expectation of success of applying the header extraction techniques of Sriram’s *decoder* to the parameter set of VCEG-N52 at the *encoder*. As I explained above, all of the experts agree that headers have “different architectures and serve different functions” than parameter sets. Ex. 2024, ¶349; Ex. 2022, 120:15-121:17. Dr. Saber presents no particularized explanation for how a POSITA would know how to achieve such a combination of disparate techniques without a POSITA having to perform undue experimentation to figure it out on their own.

141. When using headers, such as those used in the H.263 standard, packetized data is always transmitted by first sending a header followed by the coded data representative of the coding layer. As I illustrate below, a sequence header would be followed by picture header, which would be followed by a slice header, which would be followed by the slice data. If there are multiple slices, there will be multiple slice headers and slice data. If there are multiple pictures in the sequence, there will be multiple picture headers followed by slice headers and slice data.



142. The decoder of Sriram would know exactly where to expect the sequence header and picture header in the bitstream and therefore could extract information according to the methods described there.

143. In contrast, VCEG-N52 eliminates the sequence and picture headers and instead transmits all of the information associated with the picture and higher layers within a single parameter set out of band. *See, e.g., Ex. 1012, 8.* I illustrate this design below.



144. The parameter set concept is markedly different than the header concept and is enabled by the low-level packetized data package called Network Abstraction Layer (NAL). In the NAL design, an encoder transmits different types of NALs as complete and distinct packages of parameters to both configure the decoder for decoding and video data such as slice data to be processed by the decoder.

145. One of the main differences between using headers is how often the encoder transmits parameter set data. For headers, parameter sets associated with the respective header are always present in the headers and are always transmitted, while parameter sets in NAL units are transmitted only as needed. Using parameter sets in NAL units, the encoder has the freedom to implement a solution best suited for the application they are intended for, such as broadcast video, video teleconference or on-demand video streaming among other applications that require different types of parameter set management. Transmission of parameter sets in NAL units allows a flexibility to the encoder that does not exist with headers as described above.

146. This means that the methods of Sriram will not work with VCEG-N52 and would render VCEG-N52 inoperable. Sriram expects the information to be included in headers as I have illustrated above, and does not provide any method or ability to extract parameters out of a single consolidated parameter set transmitted out of band (that was not introduced until about a year and a half later). A POSITA would not have had any reasonable expectation of success in applying Sriram's method of header extraction to VCEG-N52, where there are no sequence headers or picture headers or any demarcation of sequence parameters versus picture headers within the new single parameter set.

147. The structure and use of headers compared to parameter sets are markedly different, and Dr. Saber offers no explanation how a POSITA would have overcome these differences without undue experimentation.

148. For at least these reasons, a POSITA would not have been motivated to combine VCEG-N52 and Sriram as suggested by Petitioner and Dr. Saber.

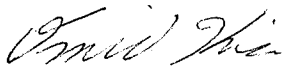
XI. CONCLUSION

149. 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 5th day of November, 2025.

Respectfully submitted,



Dr. Omid Kia