

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent of: Nakamura et al.
U.S. Patent No.: 8,139,150 Attorney Docket No.: 39843-0169IP1
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Appl. Serial No.: 11/907,188
Filing Date: October 10, 2007
Title: METHOD AND APPARATUS FOR ENCODING AND
DECODING MULTI-VIEW VIDEO SIGNAL, AND RELATED
COMPUTER PROGRAMS

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**PETITION FOR *INTER PARTES* REVIEW OF UNITED STATES PATENT
NO. 8,139,150 PURSUANT TO 35 U.S.C. §§ 311–319, 37 C.F.R. § 42**

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EXHIBITS

- SAMSUNG-1001 U.S. Patent No. 8,139,150 to Nakamura (“the ’150 Patent”)
- SAMSUNG-1002 Excerpts from the Prosecution History of the ’150 Patent (“the Prosecution History”)
- SAMSUNG-1003 Expert Declaration of Clifford Reader, Ph.D.
- SAMSUNG-1004 Complaint, *Advanced Coding Technologies LLC v. Samsung Electronics Co., Ltd. et al.*, 2:22-cv-00499-JRG, E.D. Tex., filed December 30, 2022
- SAMSUNG-1005 U.S. Patent No. 5,886,736 (“Chen-736”)
- SAMSUNG-1006 *Information Technology – Generic Coding of Moving Pictures and Associated Audio Information: Video. ITU-T Recommendation H.262*, February 2000 (“H.262 Specification”)
- SAMSUNG-1007 *ISO/IEC 13818-1, First Edition*, April 15, 1996 | ITU-T Rec. H.222.0 (1995 E) (“H.222 Specification”)
- SAMSUNG-1008 *Digital Television MPEG-1, MPEG-2 and principles of the DVB system*, Second Edition 2002 (“Digital TV”)
- SAMSUNG-1009 U.S. Patent App. Pub. No. 2009/0185616 A1 (“Pandit”)
- SAMSUNG-1010 Plaintiff’s Disclosure of Asserted Claims and Infringement Contentions, *Advanced Coding Technologies LLC v. Samsung Electronics Co. Ltd. et al.*, 2:22-cv-00499-JRG, E.D. Tex. (May 16, 2023) (Confidentiality Markings Removed w/ ACT’s Permission to treat Public) (“Infringement Contentions”)
- SAMSUNG-1011 U.S. Patent App. Pub. No. 2003/0138051 (“Chen-051”)
- SAMSUNG-1012 U.S. Patent App. Pub. No. 2011/0075997 (“Begen”)
- SAMSUNG-1013 Belle L. Tseng & Dimitris Anastassiou, *Multiviewpoint Video Coding with MPEG-2 Compatibility*, IEEE Transactions on

Circuits & Systems for Video Technology, Vol. 6, No. 4
(August 1996) (“Tseng”)

SAMSUNG-1014 Sherman (Xuemin) Chen, *An Issue Regarding to the B-Picture Coding*, JVT-D125, Joint Video Team (JVT) of ISO/IEC MPEG & ITU-T VCEG, 4th Meeting: Lagenfurt, Austria, July 22-26, 2002 (“JVT-D125”)

SAMSUNG-1015 Overview of MPEG-2 Systems, Technologies and Services on Digital Broadcasting (5), Broadcast Technology No. 11, Summer 2002 (“NHK”), *available at*
<https://www.nhk.or.jp/str/publica/bt/bt11/pdf/le0011.pdf>

SAMSUNG-1016 U.S. Patent App. Pub. No. 2010/0111108 (“Akgul”)

SAMSUNG-1017 Declaration of June Ann Munford

SAMSUNG-1018 U.S. Patent No. 6,963,606 to Yanagihara et al.

SAMSUNG-1019 U.S. Patent No. 5,504,530 to Obikane et al.

SAMSUNG-1020 U.S. Patent No. 5,590,139 to Suzuki et al.

SAMSUNG-1021 ITU-T Rec. H.262 (1995)/Amd.3 (1998 E)

SAMSUNG-1022 Memorandum, Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation (USPTO June 21, 2022) (“Director’s Guidance”)

SAMSUNG-1023 Samsung Stipulation letter regarding IPR grounds in District court litigation.

SAMSUNG-1024 Excerpts of The American Heritage® Dictionary of the English Language, 4th Ed. (2006)

SAMSUNG-1025 Excerpts of Merriam-Webster’s Collegiate® Dictionary, 11th Ed. (2005)

LISTING OF CHALLENGED CLAIM ELEMENTS

Claim 1	
[1.pre.i]	An apparatus for decoding a coded multi-view video signal including coded signals resulting from encoding picture signals corresponding to different viewpoints respectively,
[1.pre.ii]	wherein at least one among the viewpoints is designated as a base viewpoint,
[1.pre.iii]	the base viewpoint corresponding to a picture signal which is encoded without referring to at least one picture signal corresponding to one of the viewpoints except the base viewpoint, and
[1.pre.iv]	wherein the coded multi-view video signal contains coded information representing a desired delay time of the start of decoding a coded signal originating from each of the picture signals corresponding to the viewpoints except the base viewpoint relative to the start of decoding a coded signal originating from the picture signal corresponding to the base viewpoint, the apparatus comprising:
[1.1]	first means for decoding the coded information in the coded multi-view video signal to recover the desired delay times for the coded signals originating from the picture signals corresponding to the viewpoints except the base viewpoint;
[1.2]	second means for decoding the coded signal originating from the picture signal corresponding to the base viewpoint;
[1.3]	third means for decoding the coded signals originating from the picture signals corresponding to the viewpoints except the base viewpoint; and
[1.4]	fourth means for delaying the decoding of the coded signals by the third means relative to the decoding of the coded signal by the second means by time intervals equal to the desired delay times recovered by the first means.

Claim 2	
[2.pre.i]	A method of decoding a coded multi-view video signal including coded signals resulting from encoding picture signals corresponding to different viewpoints respectively,
[2.pre.ii]	wherein at least one among the viewpoints is designated as a base viewpoint,
[2.pre.iii]	the base viewpoint corresponding to a picture signal which is encoded without referring to at least one picture signal corresponding to one of the viewpoints except the base viewpoint, and
[2.pre.iv]	wherein the coded multi-view video signal contains coded information representing a desired delay time of the start of decoding a coded signal originating from each of the picture signals corresponding to the viewpoints except the base viewpoint relative to the start of decoding a coded signal originating from the picture signal corresponding to the base viewpoint, the method comprising the steps of
[2.1]	decoding the coded information in the coded multi-view video signal to recover the desired delay times for the coded signals originating from the picture signals corresponding to the viewpoints except the base viewpoint;
[2.2]	decoding the coded signal originating from the picture signal corresponding to the base viewpoint;
[2.3]	decoding the coded signals originating from the picture signals corresponding to the viewpoints except the base viewpoint; and
[2.4]	delaying the decoding of the coded signals originating from the picture signals corresponding to the viewpoints except the base viewpoint relative to the decoding of the coded signal originating from the picture signal corresponding to the base viewpoint by time intervals equal to the recovered desired delay times.
Claim 3	
[3.pre.i]	A non-transitory computer program stored in a computer readable medium for decoding a coded multi-view video signal

	including coded signals resulting from encoding picture signals corresponding to different viewpoints respectively,
[3.pre.ii]	wherein a least one among the viewpoints is designated as a base viewpoint,
[3.pre.iii]	the base viewpoint corresponding to a picture signal which is encoded without referring to at least one picture signal corresponding to one of the viewpoints except the base viewpoint, and
[3.pre.iv]	wherein the coded multi-view video signal contains coded information representing a desired delay time of the start of decoding a coded signal originating from each of the picture signals corresponding to the viewpoints except the base viewpoint relative to the start of decoding a coded signal originating from the picture signal corresponding to the base viewpoint, the computer program comprising the steps of:
[3.1]	decoding the coded information in the coded multi-view video signal to recover the desired delay times for the coded signals originating from the picture signals corresponding to the viewpoints except the base viewpoint;
[3.2]	decoding the coded signal originating from the picture signal corresponding to the base viewpoint;
[3.3]	decoding the coded signals originating from the picture signals corresponding to the viewpoints except the base viewpoint; and
[3.4]	delaying the decoding of the coded signals originating from the picture signals corresponding to the viewpoints except the base viewpoint relative to the decoding of the coded signal originating from the picture signal corresponding to the base viewpoint by time intervals equal to the recovered desired delay times.
Claim 4	
[4.pre.i]	A method of decoding a coded multi-view video signal including coded signals resulting from encoding picture signals corresponding to different viewpoints respectively,

[4.pre.ii]	wherein at least one among the viewpoints is designated as a base viewpoint,
[4.pre.iii]	the base viewpoint corresponding to a picture signal which is encoded without referring to at least one picture signal corresponding to one of the viewpoints except the base viewpoint, and
[4.pre.iv]	wherein the coded multi-view video signal contains coded information about view dependencies representing which of the picture signals are referred to as reference signals for the encoding of each of the picture signals, the method comprising the steps of:
[4.1]	decoding the coded information in the coded multi-view video signal to recover the view dependencies;
[4.2]	computing a desired delay time of the start of decoding a coded signal originating from each of the picture signals corresponding to the viewpoints except the base viewpoint relative to the start of decoding a coded signal originating from the picture signal corresponding to the base viewpoint in response to the recovered view dependencies;
[4.3]	decoding the coded signal originating from the picture signal corresponding to the base viewpoint;
[4.4]	decoding the coded signals originating from the picture signals corresponding to the viewpoints except the base viewpoint; and
[4.5]	delaying the decoding of the coded signals originating from the picture signals corresponding to the viewpoints except the base viewpoint relative to the decoding of the coded signal originating from the picture signal corresponding to the base viewpoint by time intervals equal to the computed desired delay times.

Samsung Electronics Co., Ltd. (“Petitioner” or “Samsung”) petitions for *Inter Partes* Review (“IPR”) of claims 1-4 (“the Challenged Claims”) of U.S. Patent No. 8,139,150 (“the ’150 Patent”).

I. REQUIREMENTS FOR IPR

A. Grounds for Standing

Petitioner certifies that the ’150 Patent is available for IPR. Petitioner is not barred or estopped from requesting review of the Challenged Claims on the below-identified grounds.

B. Challenge and Relief Requested

Samsung requests institution of IPR and cancellation of the Challenged Claims based on the following grounds:

Ground	Claims	Basis under 35 U.S.C. § 103
1A	2-3	Chen-736
1B	2-3	Chen-736 and Chen-051
1C	2-3	Chen-736 and Tseng
1D	2-3	Chen-736, Tseng, and Chen-051
1E	1	Chen-736 and H.262 Specification
1F	1, 4	Chen-736, H.262 Specification, and Chen-051
1G	1	Chen-736, Tseng, and H.262 Specification

Ground	Claims	Basis under 35 U.S.C. § 103
1H	1, 4	Chen-736, Tseng, H.262 Specification, and Chen-051

Grounds 1A-1H are further supported by the expert testimony of Dr. Clifford Reader. *See* SAMSUNG-1003, ¶¶[1]-[271]. Among other things, Dr. Reader offers an extensive description of relevant background technology and the state of the art before the '150 Patent. *Id.*, ¶¶[30]-[81].

The '150 Patent claims priority to three foreign applications, the earliest of which was filed October 13, 2006. SAMSUNG-1001, Cover (30). As shown below, each prior art reference that forms the basis of Grounds 1A-1H of this Petition pre-dates the '150 Patent's earliest proclaimed priority date (October 13, 2006; "Critical Date"), which Petitioner does not concede. SAMSUNG-1003, ¶¶[92]-[118].

Reference	Filing Date	Publication Date	Prior Art At Least Under Pre-AIA
Chen-736	Oct. 24, 1996	Mar. 23, 1999	§102(a)-(b), (e)
H.262 Specification	---	Feb. 2000	§102(a)-(b)
Chen-051	Jan. 22, 2003	Jul. 24, 2003	§102(a)-(b), (e)
Tseng	---	Aug. 1996	§102(a)-(b)

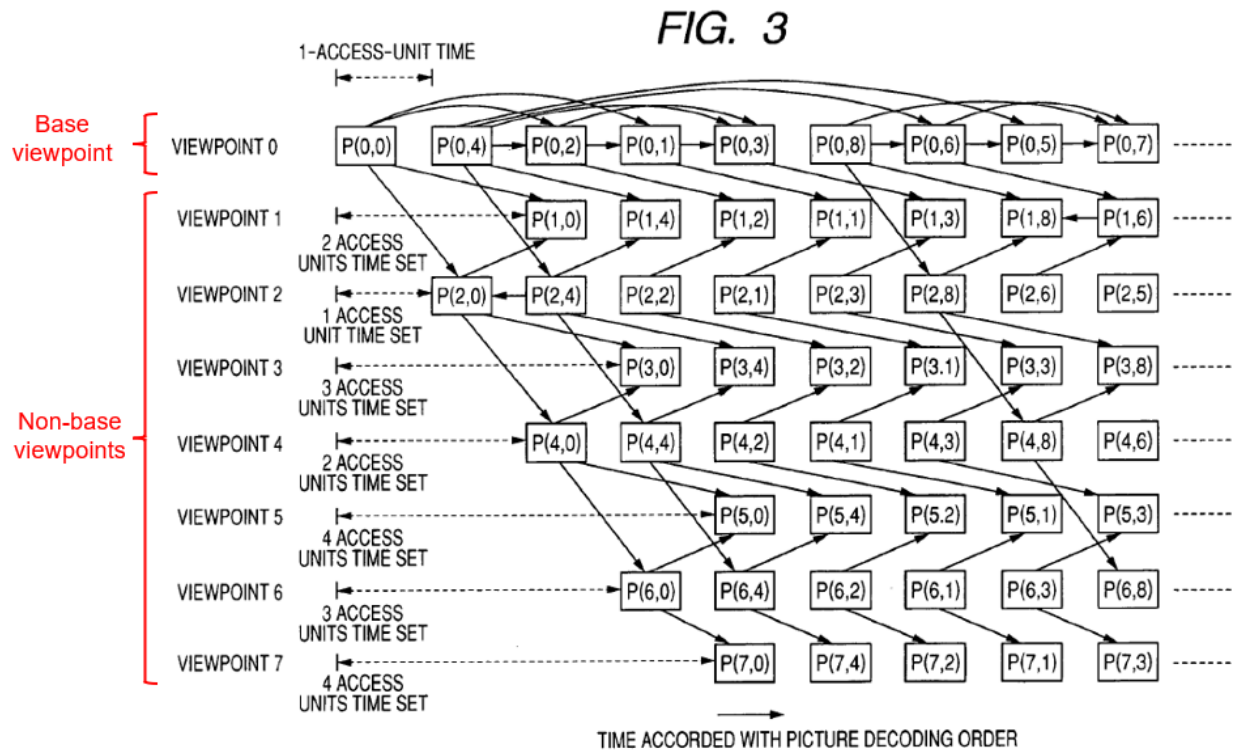
C. Level of Ordinary Skill in the Art

A person of ordinary skill in the art (“POSITA”) relating to the subject matter of the ’150 Patent as of the Critical Date would have had at least a bachelor’s degree in computer science, electrical engineering, computer engineering, or a related field, with 2-3 years of experience in digital video processing, or a related field. SAMSUNG-1003, ¶¶[89]-[90]. Additional graduate education could substitute for professional experience, and *vice versa*. *Id.*

II. THE ’150 PATENT

A. Brief Description

The ’150 Patent describes techniques for processing “a multi-view video signal” that includes “picture signals corresponding to different viewpoints.” SAMSUNG-1001, Abstract. One of the viewpoints is “designated as a base viewpoint” that is “encoded without referring to... the viewpoints except the base viewpoint.” *Id.* The ’150 Patent also describes “a desired delay time of the start of decoding... the viewpoints except the base viewpoint” and that this delay time is “relative to the start of decoding... the base viewpoint.” *Id.*; SAMSUNG-1003, ¶¶[93]-[115]. Figure 3, for example, depicts the respective delays in the start of decoding the non-base viewpoints (Viewpoints 1-7) in a coded multi-view video signal relative to the start of decoding of the base viewpoint (Viewpoint 0), in an embodiment:



SAMSUNG-1001, FIG. 3 (annotated).

B. Prosecution History

The application that issued as the '150 Patent was filed with five claims, including an independent claim 1 directed to “encoding a multi-view video signal” and independent claims 2-5 directed to “decoding a coded multi-view video signal.” SAMSUNG-1002, 238-242. The Examiner issued only one office action, which rejected claim 1 as unpatentable over U.S. Patent No. 6,055,012 to Haskell and U.S. Pub. No. 2007/0171976 to Toma, and which identified claims 2-5 as allowable or otherwise not subject to prior art rejections. SAMSUNG-1002, 34-42; SAMSUNG-1003, ¶¶[116]-[117].

The applicant responded to the first action but did not substantively alter the original language of claims 2-5. SAMSUNG-1002, 25-30. The application was subsequently allowed with reasons for allowance that set forth the Examiner's view that the claim features related to "delaying the decoding of the coded signals... by time intervals equal to the [recovered/computed] desired delay times" were not taught in the considered prior art. SAMSUNG-1002, 9-18. Notably, however, the file history contains no indication that the Examiner ever considered Chen-736, the H.262 Specification, Chen-051, or Tseng. The combinations of these references as described in Grounds 1A-1H demonstrate that the decoding delay features of the Challenged Claims, and indeed the Challenged Claims as a whole, were known and obvious long before the Critical Date of the '150 Patent. SAMSUNG-1003, ¶[118].

C. Claim Construction

All claim terms should be construed according to the *Phillips* standard. *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005); 37 C.F.R. §42.100. Petitioner submits that the claim elements listed below should be construed for purposes of this proceeding, and that the remaining claim terms do not require a formal construction for purposes of demonstrating that the claims are obvious based on Grounds 1A-1H in this Petition. *Wellman, Inc. v. Eastman Chem. Co.*, 642 F.3d 1355, 1361 (Fed. Cir. 2011); SAMSUNG-1003, ¶¶[161]-[163].

Petitioner reserves the right to respond to any constructions offered by Patent Owner or adopted by the Board. Petitioner is not conceding that each challenged claim satisfies all statutory requirements, nor is Petitioner waiving any arguments concerning indefiniteness or claim scope that can only be raised in district court or otherwise outside the context of an IPR. *Mylan Pharm. Inc. v. Horizon Pharma USA, Inc.*, IPR2018-00272, Paper 35, 6-8 (PTAB 2019). The Board has regularly compared indefinite claims to the prior art for purposes of considering unpatentability. *See, e.g., Chicago Mercantile Exchange, Inc. v. 5th Market, Inc.*, CBM2013-00027, Paper 33, 3 (PTAB 2014); *SAP America, Inc. v. Lakshmi Arunachalam*, CBM2013-00013, Paper 61, 29 (PTAB 2014). For this Petition, Petitioner applies prior art in a manner consistent with disclosure of the claimed features in the '150 Patent itself and consistent with Patent Owner's allegations of infringement before the district court. *See* SAMSUNG-1010, App'x-C (pp. 12-82)¹; SAMSUNG-1003, ¶¶[161]-[163].

¹ Patent Owner originally marked its infringement charts "CONFIDENTIAL – OUTSIDE ATTORNEYS EYES ONLY," but then confirmed that the charts rely on publicly available information and that there are no confidentiality-related limitations to sharing them or treating them as public. As a result, Samsung has redacted the confidentiality legend from the charts in exhibit SAMSUNG-1010.

1. “coded multi-view video signal” (claims 1-4)

The claim term “coded multi-view video signal” encompasses a coded video signal for two or more viewpoints, including at least one base viewpoint and at least one non-base viewpoint. SAMSUNG-1003, ¶[164]. This scope is reflected by the words of the claims themselves, which state that “*at least one* among the viewpoints is designated as a base viewpoint”—making clear that the “coded multi-view video signal” can include either a single base viewpoint or multiple base viewpoints. SAMSUNG-1001, 44:48-49². The claims lack a similar clause specifying a minimum number of non-base viewpoints, but rather indicate that the balance of the “different viewpoints” in the multi-view video signal apart from the “at least one” base viewpoint must be non-base viewpoints: “signals corresponding to the viewpoints *except the base viewpoint.*” SAMSUNG-1001, 44:55-56. It follows that any number of non-base viewpoints—including just one—falls within the scope of the claims, which merely require multiple views of which “at least one” is designated as a base viewpoint. SAMSUNG-1003, ¶[164]. The plural form of “viewpoints” in the “viewpoints except the base viewpoint” clause accounts for the possibility of, but does not require, multiple non-base viewpoints (which would be at odds with the structure of the claim as described above). *Id.*

² All emphasis added unless indicated otherwise.

Petitioner's construction is further supported by the specification, which specifically discloses "stereoscopic" video as an example of a coded multi-view video signal. SAMSUNG-1003, ¶[165]. Stereoscopic video includes just two viewpoints (a base viewpoint and a non-base viewpoint). Given the intrinsic evidence that a multi-view video signal encompasses stereoscopic video, the claims are properly understood to require no more than one non-base viewpoint.

Id. To this point, the specification emphasizes that the purported "invention" of the '150 Patent relates to "encoding signals representative of **multi-view video** taken from multiple viewpoints" and identifies stereoscopic video as an example of such "**multi-view video**." SAMSUNG-1001, 1:8-14, 2:38-42, 2:57-59, 3:20-35. Indeed, the specification's discussion of related art in the "Background of the Invention" focuses extensively on **stereoscopic** multi-view video signals. SAMSUNG-1001, 2:38-3:19, 3:20-35 (discussing "[s]tereoscopic video coding called Multi-view Profile" in MPEG-2 video coding), 3:36-50. This understanding is never disturbed throughout the specification's description of example embodiments. *Synqor, Inc. v. Artesyn Techs., Inc.*, 709 F.3d 1365, 1378-79 (Fed. Cir. 2013) ("A claim construction that excludes the preferred embodiment is rarely, if ever, correct...") (internal quotations omitted); SAMSUNG-1003, ¶[165].

Additionally, Patent Owner's own infringement contentions repeatedly refer to alleged stereoscopic video decoding capabilities in Petitioner's accused products

as falling within the scope of the claims. SAMSUNG-1010, 30, 45, 61;
SAMSUNG-1003, ¶¶[166].

2. “picture signal” (claims 1-4)

The claim term “picture signal” refers to a signal that represents at least one picture from a viewpoint. SAMSUNG-1003, ¶[167]. The term “picture signal” thus encompasses a signal that represents even a single picture from a viewpoint. *Id.*

That a “picture signal” can represent even a single picture from a viewpoint is first reflected by the language of the claims themselves, which refer to “*at least one* picture signal corresponding to *one* of the viewpoints.” SAMSUNG-1001, 44:50-52. This language demonstrates that “one” viewpoint can correspond to “at least one,” and hence more than one, picture signal. SAMSUNG-1001, 44:50-52. It follows that a “picture signal” need not be coextensive with all pictures in a corresponding viewpoint, and a picture signal that “corresponds” to a viewpoint need not define the entire viewpoint or otherwise represent all or multiple pictures in the corresponding viewpoint. SAMSUNG-1003, ¶[168].

This understanding of a “picture signal” is also consistent with Patent Owner’s choice to claim a mere “picture signal” (e.g., rather than a “picture *sequence* signal” or the like) and the specification’s description of a “picture signal” as merely “data or signal representing *a* picture.” SAMSUNG-1001, 8:16-

17, 7:63-8:17; SAMSUNG-1003, ¶[169].³

Petitioner's construction is further consistent with Patent Owner's treatment of the claimed "picture signal." . SAMSUNG-1003, ¶[170]. In Patent Owner's infringement contentions, Patent Owner refers to a "cpb_removal_delay" parameter as the "desired delay time of the start of decoding a coded signal originating from each of the picture signals corresponding to the viewpoints except the base viewpoint." SAMSUNG-1010, 17-28. The cpb_removal_delay parameter in H.264 MVC corresponds to access units for individual pictures rather than sequences of pictures or pictures that define all pictures of a viewpoint in its entirety. SAMSUNG-1003, ¶[170].

3. Means-plus-function Elements (claim 1)

Petitioner addresses four means-plus-function claim elements below under

³ Because a "picture signal" can represent even a single picture, the claimed "coded information representing a desired delay time of the start of decoding a coded signal originating from each of the picture signals corresponding to the viewpoints except the base viewpoint" encompasses coded information that represents the desired delay for individual pictures in the non-base viewpoint(s). SAMSUNG-1003, ¶[169]. The desired delay time need not represent a delay in the decoding start time of all pictures in the non-base viewpoint. *Id.*

§112, ¶6 (“§112(6)”). Consistent with the requirements of 37 C.F.R.

§42.104(b)(3), this Petition identifies the “specific portions of the specification” that describe structures that correspond to the recited function of each §112(6) element.

Claim 1 describes an apparatus, not a method. SAMSUNG-1001, 44:45-45:8. Elements [1.1]-[1.4] each refer to a “means for” performing a function, without any recitation of structure. SAMSUNG-1003, ¶¶[171], [176], [181], [186]. As such, the claim element “shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.” 35 U.S.C. §112(6).

With respect to a “Fourth Embodiment” (represented by FIGS. 14 and 15), the ’150 Patent discloses “a multi-view video decoding apparatus” that includes “a computer system 20.” SAMSUNG-1001, 31:39-46, 31:37-34:6, FIGS. 14-15. The computer system 20 includes a “CPU 20B” that “operates in accordance with a control program (a computer program) stored in the ROM 20C or the RAM 20D.” SAMSUNG-1001, 31:56-58. The computer system 20 includes “processors PR(0), PR(1), and PR(2)” that “are assigned to the coded bitstreams S(0), S(1), and S(2), respectively” and that “decode the coded bitstreams S(0), S(1), and S(2) into the decoded view sequences M(0)A, M(1)A, and M(2)A in real time on a parallel processing basis.” SAMSUNG-1001, 31:58-67. According to the specification,

“[e]ach of the processors PR(0), PR(1), and PR(2) operates in accordance with a control program (a computer program) stored in its internal memory.” *Id.*; SAMSUNG-1003, ¶¶[172], [177], [182], [187].

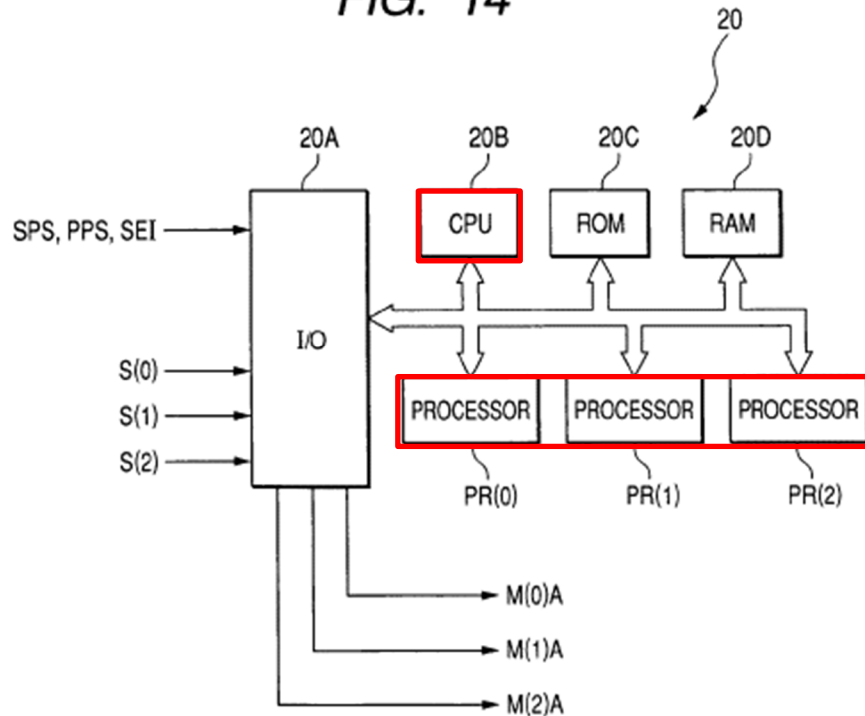
CPU 20B and the viewpoint-specific processors PR(0), PR(1), PR(2) are implemented with a general-purpose processor configured to execute “a computer program” to cause the processor to perform algorithm steps. *Id.* It follows that the corresponding structure for each of the “means for” elements is a processor configured to perform respective algorithm steps for the recited function corresponding to each element. *In re Aoyama*, 656 F.3d 1293, 1297 (Fed. Cir. 2011); *WMS Gaming, Inc. v. Int’l Game Tech.*, 184 F.3d 1339, 1349 (Fed. Cir. 1999); *In re Alappat*, 33 F.3d 1526, 1545 (Fed. Cir. 1994); SAMSUNG-1003, ¶¶[173]-[175].

- (a) **“first means for decoding the coded information in the coded multi-view video signal to recover the desired delay times for the coded signals originating from the picture signals corresponding to the viewpoints except the base viewpoint”**

Either CPU 20B or the viewpoint-specific processors PR(0), PR(1), PR(2) are responsible for decoding the coded information to recover desired delay times depending on how the delay times were coded in the multi-video video signal. SAMSUNG-1003, ¶[173].

An apparatus for decoding a coded multi-view video signal

FIG. 14



SAMSUNG-1001, FIG. 14 (annotated).

The '150 Patent discloses algorithm steps that are performed to achieve the recited function of “decoding the coded information in the coded multi-view video signal to recover the desired delay times for the coded signals originating from the picture signals corresponding to the viewpoints except the base viewpoint.” For example, the '150 Patent discloses that the “segment of the control program for the CPU 20B has a step S201.” SAMSUNG-1001, 32:4-10. The “*step S201 recovers the view dependency counts...*,” and “*the step S204 decodes the coded version of the related view dependency count*” and “*recovers the value of the view dependency count for the present viewpoint.*” SAMSUNG-1001, 32:21-31,

32:52-59, 24:40-59. The '150 Patent discloses that “the desired delay time” can be “represented by the decoded view dependency count.” SAMSUNG-1001, 33:16-18, 12:1-31, 20:53-55, 37:60-67, 41:22-25. The specification does not restrict the “desired delay times” to being represented by “view dependency counts,” however. For example, the specification explains elsewhere that the delay times are computed from information about “the number of viewpoints and the view dependencies” themselves. *Id.*, 36:52-65; SAMSUNG-1003, ¶[174].

Based on the '150 Patent's disclosure, the corresponding structure for the recited “first means” encompasses a processor configured to perform the algorithm steps of decoding coded information in a coded bitstream to recover information representative of desired delay times and identifying the desired delay times from the decoded information.⁴ SAMSUNG-1001, 32:4-10, 32:21-31, 23:60-24:8,

⁴ The '150 patent does not restrict representation of the “desired delay times” to “view dependency counts” and claim 1 does not recite “view dependency counts.” It would be improper to import a requirement for recovering view dependency counts in the corresponding structure/algorithm for the “first means.” *Wenger Mfg., Inc. v. Coating Mach. Sys., Inc.*, 239 F.3d 1225, 1233 (Fed. Cir. 2001) (“Under § 112, ¶ 6, a court may not import... structural limitations from the written

32:52-59, 24:40-59, 33:16-18, 12:1-31, 20:53-55, 37:60-67, 41:22-25;

SAMSUNG-1003, ¶[175]. For the purpose of comparing claim 1 to the prior art grounds in this Petition, Petitioner treats a processor configured to perform this algorithm and equivalents as the corresponding structure for the claimed “first means” limitation. SAMSUNG-1003, ¶[175].

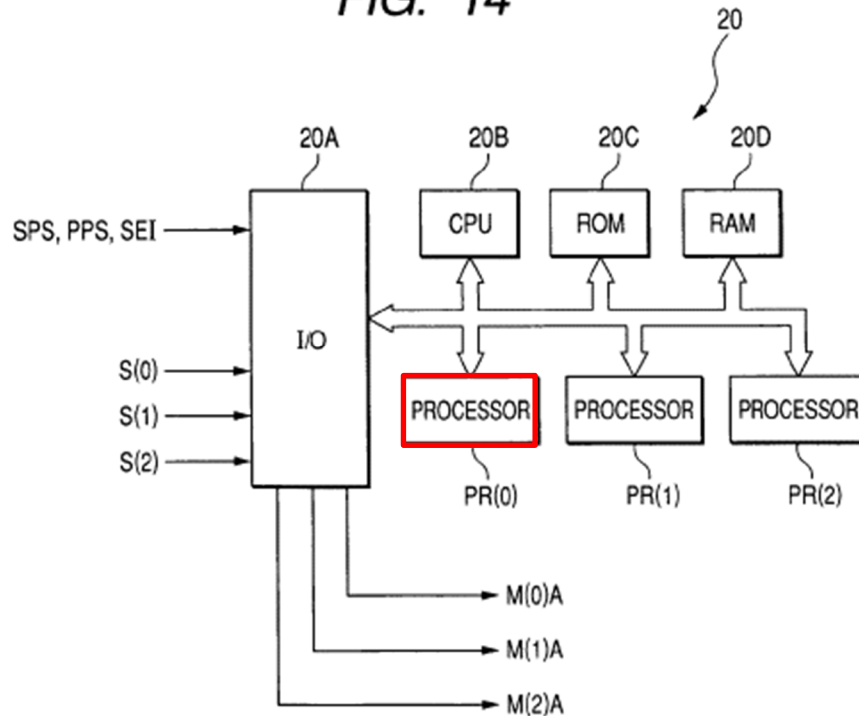
**(b) “second means for decoding the coded signal
originating from the picture signal
corresponding to the base viewpoint”**

Processor PR(0) is responsible for decoding the coded signal originating from the picture signal corresponding to the base viewpoint. SAMSUNG-1001, 31:58-67; SAMSUNG-1003, ¶¶[176]-[177].

description that are unnecessary to perform the claimed function.”); *Micro Chem., Inc. v. Great Plains Chem. Co.*, 194 F.3d 1250, 1258 (Fed. Cir. 1999) (“Nor does the statute permit incorporation of structure from the written description beyond that necessary to perform the claimed function.”).

An apparatus for decoding a coded multi-view video signal

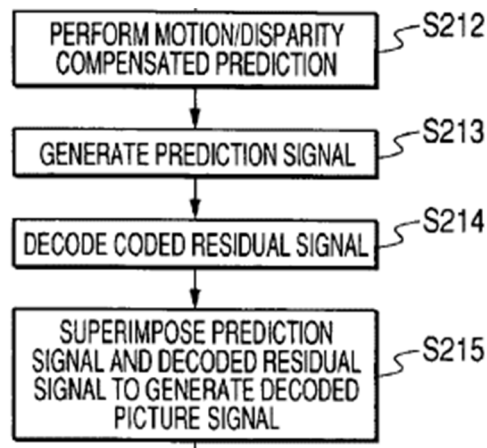
FIG. 14



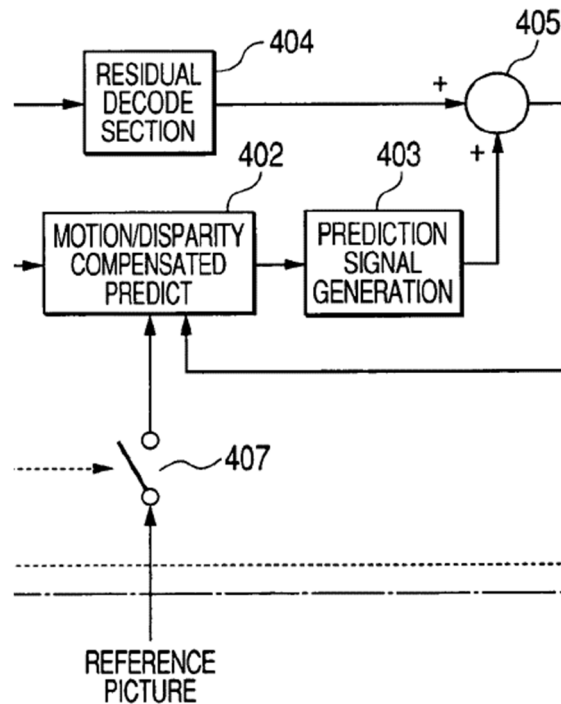
SAMSUNG-1001, FIG. 14 (annotated).

The '150 Patent discloses algorithm steps that are performed to achieve the recited function of “decoding the coded signal originating from the picture signal corresponding to the base viewpoint.” For example, the '150 Patent discloses that the “segment of the control program for each of the processors PR(0), PR(1), and PR(2) has loop points and steps S202-S220.” SAMSUNG-1001, 32:4-10. A “step S212 following the step S211 selectively performs [] motion-compensated prediction from a reference picture or pictures in response to the coding-mode signal and [a] motion vector or vectors.” SAMSUNG-1001, 33:34-46, 29:44-57, 10:10-24. “A step S214 following the step S213 decodes the coded residual signal

into the decoded residual signal through the signal processing inclusive of the inverse quantization and the inverse orthogonal transform.” SAMSUNG-1001, 33:53-56, 30:16-19. “A step S215 subsequent to the step S214 superimposes the decoded residual signal on the final prediction signal to generate a decoded picture signal.” SAMSUNG-1001, 33:58-60, 30:19-23; SAMSUNG-1003, ¶¶[178]-[179]. These steps are depicted in FIGS. 15 and 13, portions of which are shown below.



SAMSUNG-1001, FIG. 15 (cropped)



SAMSUNG-1001, FIG. 13 (cropped).

Based on the '150 Patent's disclosure, the corresponding structure for the recited second means encompasses a processor that performs the algorithm steps of generating a decoded picture signal by performing motion-compensated prediction to generate a prediction signal, decoding a coded residual by performing inverse quantization and inverse orthogonal transform on the coded residual signal, and adding the decoded residual signal to the prediction signal. SAMSUNG-1001, 31:39-46, 31:58-67, 32:4-10, 33:34-46, 29:44-57, 10:10-24, 33:53-56, 30:16-19, 33:58-60, 30:19-23, FIGS. 13, 15; SAMSUNG-1003, ¶[180]. For the purpose of comparing claim 1 to the prior art grounds in this Petition, Petitioner treats a processor configured to perform this algorithm and equivalents as the

corresponding structure for the claimed “second means” limitation. SAMSUNG-1003, ¶[180].

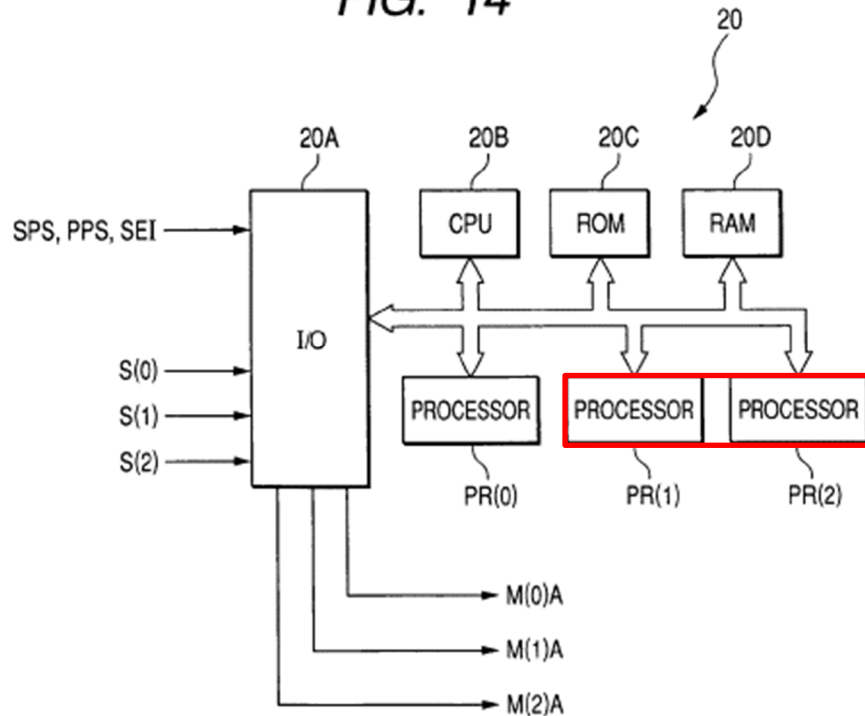
**(c) “third means for decoding the coded signals
originating from the picture signals
corresponding to the viewpoints except the base
viewpoint”**

Processors PR(1) and PR(2) are responsible for decoding the coded signals originating from the picture signals corresponding to the viewpoints except the base viewpoint. SAMSUNG-1001, 31:58-67⁵; SAMSUNG-1003, ¶¶[181]-[182].

⁵ The ’150 Patent discloses in FIGS. 14 and 15 a respective viewpoint processor for each of the coded bitstreams to allow for parallel decoding of bitstreams corresponding to different viewpoints. In the context of stereoscopic video where there is only one non-base viewpoint, the corresponding structure for the “third means” would encompass a single processor configured to perform algorithm steps disclosed in the specification for accomplishing the recited function for the single non-base viewpoint. SAMSUNG-1003, ¶[182].

An apparatus for decoding a coded multi-view video signal

FIG. 14

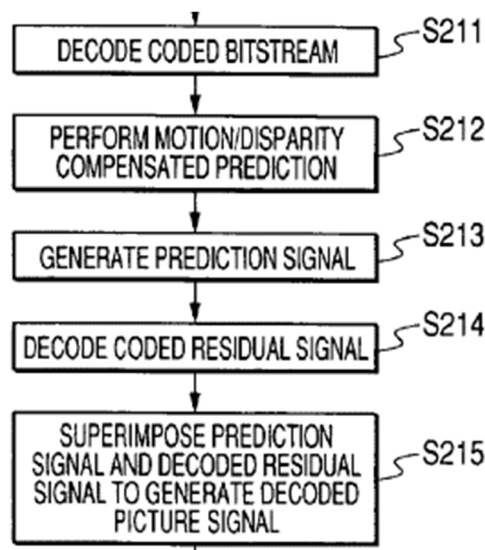


SAMSUNG-1001, FIG. 14 (annotated).

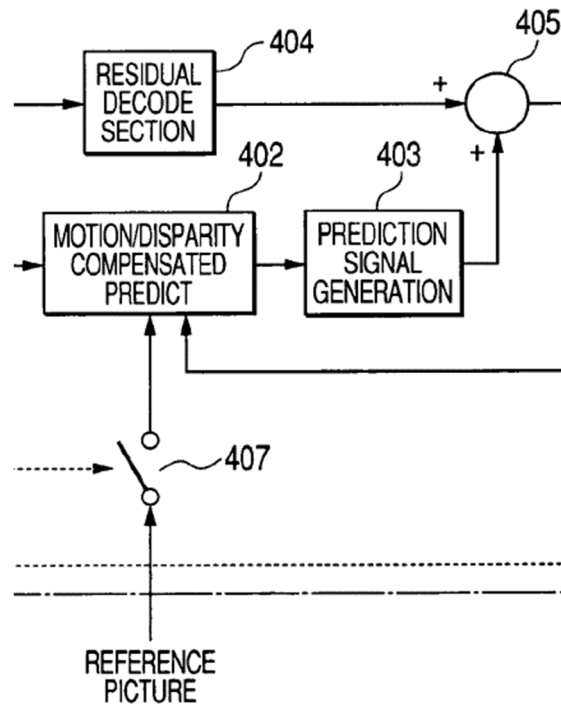
The '150 Patent discloses algorithm steps that are performed to achieve the recited function of “decoding the coded signals originating from the picture signals corresponding to the viewpoints except the base viewpoint.” The '150 Patent discloses that the “segment of the control program for each of the processors PR(0), PR(1), and PR(2) has loop points and steps S202-S220.” SAMSUNG-1001, 32:4-10. A “step S212 following the step S211 selectively performs the motion-compensated prediction from a reference picture or pictures in response to the coding-mode signal and the motion vector or vectors, and thereby generates a motion compensated prediction block (a motion-compensated prediction signal),”

and the “step S212 selectively performs the disparity-compensated prediction from an other-viewpoint reference picture or pictures in response to the coding-mode signal and the disparity vector or vectors, and thereby generates a disparity-compensated prediction block (a disparity compensated prediction signal).”

SAMSUNG-1001, 33:34-44, 29:44-30:15, 10:10-39. “A step S214 following the step S213 decodes the coded residual signal into the decoded residual signal through the signal processing inclusive of the inverse quantization and the inverse orthogonal transform.” SAMSUNG-1001, 33:53-56, 30:16-19. “A step S215 subsequent to the step S214 superimposes the decoded residual signal on the final prediction signal to generate a decoded picture signal.” SAMSUNG-1001, 33:58-60, 30:19-23; SAMSUNG-1003, ¶¶[183]-[184]. These steps are depicted in FIGS. 15 and 13, portions of which are shown below.



SAMSUNG-1001, FIG. 15 (cropped)



SAMSUNG-1001, FIG. 13 (cropped).

Based on the '150 Patent's disclosure, the corresponding structure for the recited "third means" encompasses a processor that performs the algorithm steps of generating a decoded picture signal by performing at least one of motion-compensated prediction or disparity prediction to generate a prediction signal, decoding a coded residual signal by performing inverse quantization and inverse orthogonal transform on the coded residual signal, and adding the decoded signal to the prediction signal. SAMSUNG-1001, 31:39-46, 31:58-67, 32:4-10, 33:34-46, 29:44-30:15, 10:10-39, 33:53-56, 30:16-19, 33:58-60, 30:19-23, FIGS. 13, 15; SAMSUNG-1003, ¶[185]. For the purpose of comparing claim 1 to the prior art grounds in this Petition, Petitioner treats a processor configured to perform this

algorithm and equivalents as the corresponding structure for the claimed “third means” limitation. SAMSUNG-1003, ¶[185].

- (d) **“fourth means for delaying the decoding of the coded signals by the third means relative to the decoding of the coded signal by the second means by time intervals equal to the desired delay times recovered by the first means”**

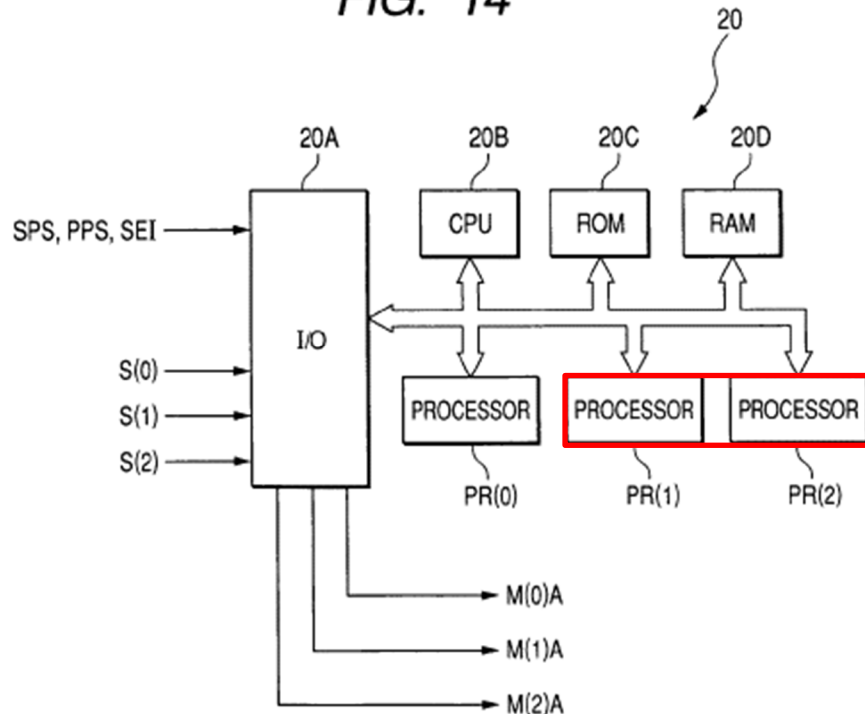
Processors PR(1) and PR(2) delay the decoding of signals in the coded bitstreams S(1) and S(2), respectively. SAMSUNG-1001, 31:58-32:3⁶; SAMSUNG-1003, ¶¶[186]-[187].

⁶ In the context of stereoscopic video where there is only one non-base viewpoint, the corresponding structure for the “fourth means” would encompass a single processor configured to perform algorithm steps disclosed in the specification for accomplishing the recited function for the single non-base viewpoint.

SAMSUNG-1003, ¶[187]. Additionally, the operations for delaying decoding as recited in [1.4]—including step S207—in the ’150 Patent’s fourth embodiment is performed by the respective processor for each viewpoint (e.g., PR(1), PR(2)) rather than a central processor (e.g., CPU 20B) and does not require a centralized decoding management section. SAMSUNG-1001, 32:4-20, 33:13-22; SAMSUNG-1003, ¶[187].

An apparatus for decoding a coded multi-view video signal

FIG. 14



SAMSUNG-1001, FIG. 14 (annotated).

The '150 Patent discloses algorithm steps that are performed to achieve the recited function of “delaying the decoding of the coded signals by the third means relative to the decoding of the coded signal by the second means by time intervals equal to the desired delay times recovered by the first means.” For example, the '150 Patent discloses that the “segment of the control program for each of the processors PR(0), PR(1), and PR(2) has loop points and steps S202-S220.”

SAMSUNG-1001, 32:4-10.

The comparison by the step S207 is to determine whether or not the present moment has reached the end of a desired delay of the start

of the decoding of a coded picture of the viewpoint of interest... When the present moment has reached the end of the desired delay, the program advances from the step S207 to the step S208. Otherwise, the program advances from the step S207 to the step S220.

SAMSUNG-1001, 32:66-33:22, 26:25-28:21; SAMSUNG-1003, ¶[188].

Based on the '150 Patent's disclosure, the corresponding structure for the recited "fourth means" encompasses a processor configured to perform the algorithm steps of (i) determining whether the present moment has reached the end of a desired decoding delay time, and if not (ii) delaying decoding of a coded picture until the present moment has reached the end of the desired decoding delay time.⁷ SAMSUNG-1001, 31:58-67, 32:4-10, 26:25-50, 32:66-33:22, 26:51-28:21;

⁷ Although the specification of the '150 Patent discloses examples in which "[t]he present moment is indicated by the value of the access-unit time counter while the desired delay is represented by the decoded view dependency count," the algorithm is not limited to the details of this specific embodiment. *Wenger*, 239 F.3d at 1233; *Micro Chem.*, 194 F.3d at 1258; SAMSUNG-1003, ¶[189]. Indeed, Patent Owner's infringement contentions in the related litigation involving the '150 Patent analyzes the "fourth means" limitation by pointing to a "cpb_removal_delay" parameter that merely "determines the delay time for

SAMSUNG-1003, ¶[189]. For the purposes of comparing claim 1 to the prior art grounds in this Petition, a processor configured to perform this algorithm and equivalents provides the corresponding structure for the claimed “fourth means” limitation. SAMSUNG-1003, ¶[189].

III. THE CHALLENGED CLAIMS ARE UNPATENTABLE

A. [GROUND 1A] – Chen-736 Renders Obvious Claims 2-3

1. Chen-736

Chen-736, filed in October 1996, demonstrates that the use of decoding delay times in multi-view video coding was known a full decade before the earliest possible priority date of the '150 Patent. SAMSUNG-1005, 1:5-8; SAMSUNG-1003, ¶¶[120]-[135]. Chen-736 specifically describes “a decode time stamp (DTS) and presentation time stamp (PTS)... [that] provide synchronization between the lower layer and enhancement layer pictures” of a multi-view video stream “at the decoder.” SAMSUNG-1005, 4:5-9, 1:8-12; SAMSUNG-1003, ¶¶[131]-[135].

Chen-736 explains that, in the “MPEG MVP system” there are “two video

removing [] coded data from the CPB [coded picture buffer] relative to decoding of the SEI messages.” SAMSUNG-1010, 25-28. Nowhere does Patent Owner point to either an “access-unit time counter” or a “decoded view dependency count” in the infringement contentions. *Id.*

layers which are transmitted in a multiplexed signal.” SAMSUNG-1005, 2:6-7.

These layers include a “base” layer (or a “lower” layer) and an “enhancement” (or “upper”) layer, each of which represent different views of the same object.

SAMSUNG-1005, 2:6-19. As Dr. Reader explains, it is inherent in MPEG-2 MVP that the two layers are tightly coupled to one another and that the pictures in the enhancement layer must be decoded following their corresponding required reference pictures unless this requirement makes one to decode the enhancement layer pictures out of display order. SAMSUNG-1003, ¶¶[67], [135].

Chen calculates and uses the DTS values for frames in the enhancement layer to delay the start of decoding of the enhancement layer frames relative to the start of decoding of base layer frames from a different viewpoint. SAMSUNG-1003, ¶¶[131]-[135].

2. Analysis

[2.pre.i]

To the extent the preamble is limiting, Chen-736 renders it obvious for the reasons addressed with respect to the analyses of [2.pre.i]-[2.pre.iv]. SAMSUNG-1003, ¶¶[190]-[191].

As to [2.pre.i], Chen-736 describes a method of decoding a coded “stereoscopic” (multi-view) video signal that includes both a “lower layer” video signal for a first viewpoint and an “enhancement layer” video signal for a second

viewpoint. SAMSUNG-1005, Abstract, 5:48-6:17, FIGS. 1-2. The “base (e.g., lower) layer represents a left view of a three dimensional object” and “[the] enhancement (e.g., auxiliary, or upper) layer represents a right view of the object.” *Id.*, 2:6-20, 5:49-53. Figure 1, reproduced below, depicts an example video coding system in Chen-736 (referred to as a “coder/decoder structure”) configured to perform methods for encoding and decoding stereoscopic video. *Id.*, 5:24-25, 5:48-6:30; SAMSUNG-1003, ¶[192].

Chen-736 explains that “[t]he encoded enhancement and base layers are [] provided to a system multiplexer 120 for transmission to a decoder, shown generally at 122, as a transport stream” (“*a coded multi-view video signal*”). SAMSUNG-1005, 5:61-64. At the decoder, “[t]he transport stream is demultiplexed at a system demultiplexer 125” and “[t]he encoded enhancement layer data is provided to an enhancement decoder 130, while the encoded lower layer data is provided to a lower decoder 135.” SAMSUNG-1005, 5:62-6:9. Collectively, the encoded lower layer data and the encoded enhancement layer data constitute “*coded signals resulting from encoding picture signals corresponding to different viewpoints*,” as recited in claim 1. SAMSUNG-1003, ¶[193].

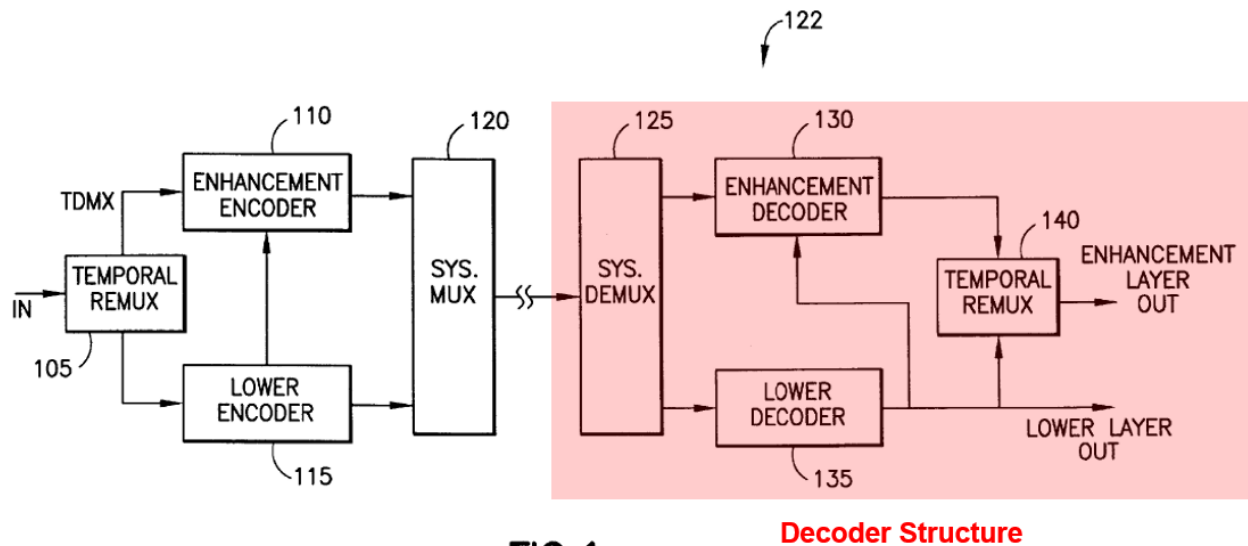


FIG.1

SAMSUNG-1005, FIG. 1 (annotated and color added).

[2.pre.ii]

Chen-736's coded stereoscopic video signal includes a "base layer" (also referred to as a "lower layer") that "represents a left view of a three dimensional object." SAMSUNG-1005, 2:6-19, 2:37-42, 8:38-50, FIGS. 2-5. Chen-736's "left view" constitutes a "*base viewpoint*" as claimed. The "left view" encompasses and thus corresponds to each of the pictures or picture sequences in the base/lower layer of the stereoscopic video signal, as illustrated in FIG. 2 below. SAMSUNG-1003, ¶[194].

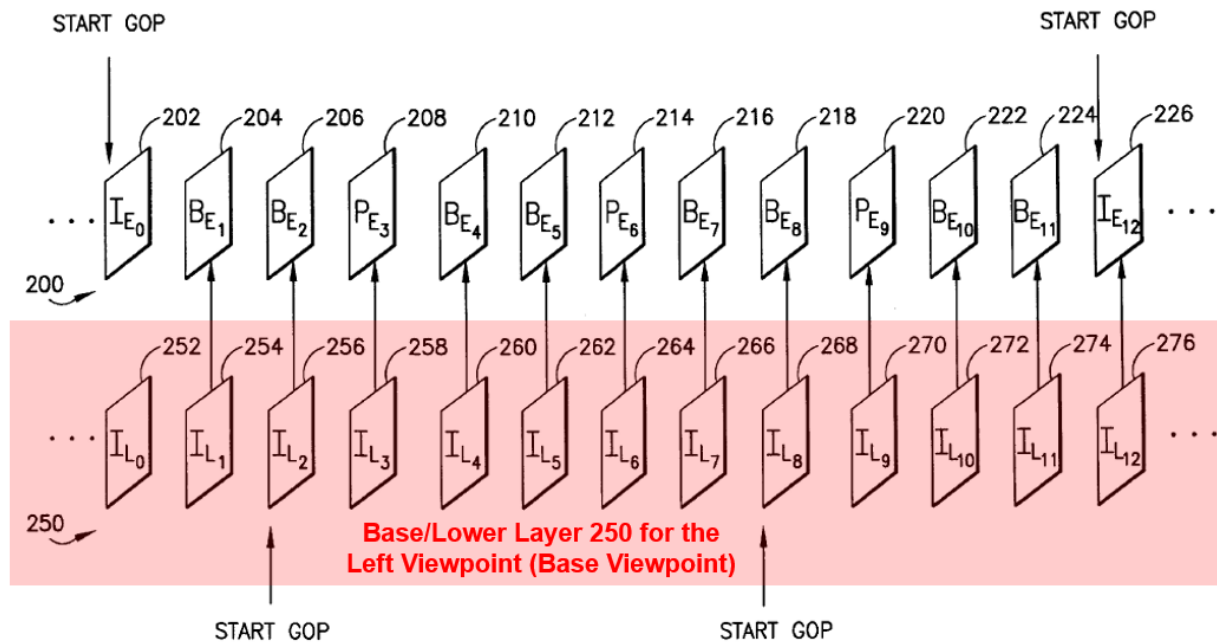


FIG.2

SAMSUNG-1005, FIG. 2 (annotated and color added).

[2.pre.iii]

As discussed above (*supra*, [2.pre.ii]), Chen-736 discloses a left view (“**base viewpoint**”) of a coded stereoscopic video signal that corresponds to each of the pictures or picture sequences in the base/lower layer of the stereoscopic signal. *Supra*, [2.pre.ii]; SAMSUNG-1003, ¶[195]. Each picture or picture sequence coded in the base/lower layer of the stereoscopic video signal represents at least one picture from the left viewpoint and constitutes a “**picture signal**” as claimed. SAMSUNG-1005, 2:6-19, 2:37-42, 8:38-50, FIGS. 2-5; *supra*, Section II.C.2; SAMSUNG-1003, ¶[195].

Chen-736 explains that picture signals in the base/lower layer of the coded stereoscopic video signal are encoded without reference to any picture signals in

the enhancement layer (which corresponds to the “right view” of the stereoscopic signal), and thus “*without referring to at least one picture signal corresponding to one of the viewpoints except the base viewpoint.*” SAMSUNG-1003, ¶[196]. In particular, Chen-736 explains that in MPEG MVP, the base layer can include I-, and optionally P- and B- pictures. SAMSUNG-1005, 2:20-41. “An I-picture completely describes a single picture without reference to any other picture,” and “[i]n the base layer, P pictures are predicted based on previous I or P pictures” while “B-pictures are predicted from the closest earlier I or P picture and the closest later I or P picture.” *Id.* None of these picture types in the base layer are encoded with reference to the enhancement layer. By contrast, “pictures in the enhancement layer can be predicted from pictures in the base layer in a cross-layer prediction process known as disparity prediction.” *Id.*, 2:33-35, 2:43-64; SAMSUNG-1003, ¶[196].

Chen-736 describes a number of example structures for the base/lower layer of the stereoscopic signal that are encoded consistent with the above approach (i.e., not referencing picture signals in the enhancement layer). SAMSUNG-1003, ¶[197]. For instance, Chen-736 discloses a base/lower layer comprised entirely of I-pictures, which are encoded without referencing any other picture. SAMSUNG-1005, 8:38-41, FIG. 2. Elsewhere, Chen-736 discloses examples (e.g., FIG. 3) which include P-pictures in the base/lower layer that are encoded with reference to

[2.pre.iv]

Chen-736 discloses that the transport stream for the coded stereoscopic video signal (“***the coded multi-view video signal***”) encodes two types of parameters used by the decoder to synchronized decoding of pictures in the lower and enhancement layers, namely a “presentation time stamp (PTS)” parameter and a “decoding time stamp (DTS)” parameter. SAMSUNG-1005, 7:17-39, 7:67-8:20, 16:54-19:65. The DTS for a given picture “indicates the time when the picture needs to be decoded by the STD” (system target decoder). *Id.*, 7:47-49. In the context of Chen-736’s system, the DTS parameters encoded in the transport stream for enhancement layer pictures constitute “***coded information representing a desired delay time of the start of decoding a coded signal originating from each of the picture signals corresponding to the viewpoints except the base viewpoint relative to the start of decoding a coded signal originating from the picture signal corresponding to the base viewpoint,***” as recited in claim 2. SAMSUNG-1003, ¶[198].

More specifically, Chen-736’s decoding apparatus includes an “enhancement decoder 130” for decoding encoded enhancement layer data and a “lower decoder 135” for decoding encoded lower layer data. SAMSUNG-1005, 5:62-6:9, FIG. 1. Chen-736’s “enhancement layer decoder structure” includes a “transport level syntax parser 610” configured to parse “compressed enhancement

layer data” (containing “*a coded signal originating from each of the picture signals corresponding to the viewpoints except the base viewpoint*”). SAMSUNG-1005, 19:66-20:13, FIG. 6. Chen-736 also explains that “[a]n analogous structure [to the enhancement layer decoder structure] may be used for the lower layer” (containing “*a coded signal originating from the picture signal corresponding to the base viewpoint*”). SAMSUNG-1005, 20:45. The transport stream includes packetized elementary stream (PES) packets containing the DTS and PTS values. SAMSUNG-1005, 7:17-39, 7:67-8:20, 16:54-19:65; SAMSUNG-1003, ¶[199].

Chen-736 calculates the DTS values for pictures in the enhancement layer (i.e., pictures from the right stereoscopic viewpoint) relative to the DTS values for corresponding picture(s) in the base/lower layer (i.e., picture(s) from the left stereoscopic viewpoint). SAMSUNG-1003, ¶[200]. The DTS for each picture signal in the enhancement layer represents a desired delay time for the start of decoding a coded signal originating from each of the picture signals corresponding to the right viewpoint (“*viewpoints except the base viewpoint*”) relative to the start of decoding a coded signal originating from the picture signal corresponding to the

left viewpoint (“*base viewpoint*”).⁸ SAMSUNG-1003, ¶[200].

For example, in reference to FIG. 2, Chen-736 describes a frame structure in which the base/lower layer consists only of “I” pictures that are not encoded with reference to any other picture in the video sequence. SAMSUNG-1005, 8:38-10:50, FIG. 2. Chen-736 teaches through this example that, “for the *i*th picture

⁸ Although Chen-736’s enhancement layer DTS values are calculated by adding the desired decoding delay (e.g., a whole or half multiple of F) to a DTS value of a corresponding base/lower layer picture (e.g., DTS_{Li}), the enhancement layer DTS value still “represent[s]” the desired decoding delay since it instructs the decoder to delay the start of decoding one or more pictures in the enhancement layer for an amount of time equal to the desired decoding delay after the start of decoding a corresponding lower/base layer picture. SAMSUNG-1003, ¶[200]. The enhancement layer DTS values thus “stand for,” serve as “the equivalent of,” and/or “act the part or role of” the desired decoding delays consistent with the ordinary meaning of “represent.” SAMSUNG-1024, 1480; SAMSUNG-1025, 1057 (“to serve as a sign or symbol of”; “to act the part or role of”); SAMSUNG-1003, ¶[200]. The claims notably do not state that the coded information directly or explicitly provides the values of the desired delay times; they merely require that the coded information “represent[s]” the desired delay times. *Id.*

in... the... enhancement sequences, the DTS and PTS can be determined from DTS_{Li} .” SAMSUNG-1005, 10:4-13. Specifically, the DTS value for the i th picture in the enhancement layer (DTS_{Ei}) is determined by calculating a desired decoding delay time and adding the desired decoding delay time to the corresponding DTS of the i th picture in the lower layer (DTS_{Li}). SAMSUNG-1005, 10:4-13. Here, the desired decoding delay time is equal to “1.5F,” where “F” represents the “the time interval[]... between the presentation of successive pictures” (which is dependent on the frame rate of the video sequence). SAMSUNG-1005, 8:9-13. Accordingly, the value for DTS_{Ei} indicates that the start of decoding of the i th picture in the enhancement layer is to be delayed by 1.5F relative to the start of decoding of the i th picture in the base/lower layer. SAMSUNG-1003, ¶[201]. In other words, DTS_{Ei} represents a desired delay time consistent with the language of [2.pre.iv].

Id.

Furthermore, for the i th picture in either the lower or enhancement sequences, the DTS and PTS can be determined from DTS_{Li} as follows:

$$\begin{aligned} PTS_{Li} &= DTS_{Li} + 1.5F; \\ DTS_{Ei} &= DTS_{Li} + 1.5F; \text{ and} \\ PTS_{Ei} &= PTS_{Li}. \end{aligned}$$

SAMSUNG-1005, 10:4-11 (highlighting added).

Chen-736 similarly describes with respect to examples given in Tables 3-10 and FIGS. 3-5 how DTS_{Ei} can be calculated to represent a delay in the start of

decoding of the i th picture in the enhancement layer (e.g., a picture signal in the right non-base viewpoint) relative to the start of decoding of the i th picture in the lower base/lower layer (e.g., a picture signal in the left base viewpoint) by adding an F-based offset (i.e., the desired delay time) to DTS_{Li} for various other frame structures and scenarios. SAMSUNG-1005, 11:45-51, 12:24-30, 13:29-37, 14:1-10, 14:41-49, 15:28-37, 16:5-13, 16:45-52, Tables 3-10; SAMSUNG-1003, ¶[202].

As another example, Chen-736 describes how the respective DTS_{Ei} values for each enhancement layer picture in a sequence can be calculated to represent a delay relative to a particular lower layer picture that represents the start of decoding a coded signal for a group of pictures (“GOP”) in the lower layer. SAMSUNG-1003, ¶[203]. For example, in the scenario described with respect to Table 2 and FIG. 2, Chen-736 discloses that the decoding start time for each enhancement layer frame can be determined by adding a desired delay time equal to a half-multiple of F to DTS_{L2} , where DTS_{L2} represents the decoding time for I_{L2} , i.e., the first frame in both presentation and decoding order for the GOP in the lower layer. SAMSUNG-1005, 10:10-50. The start of decoding of each picture in the enhancement layer is thus delayed relative to the start of decoding any picture signal in the lower layer for that GOP. *Id*; SAMSUNG-1003, ¶[203].

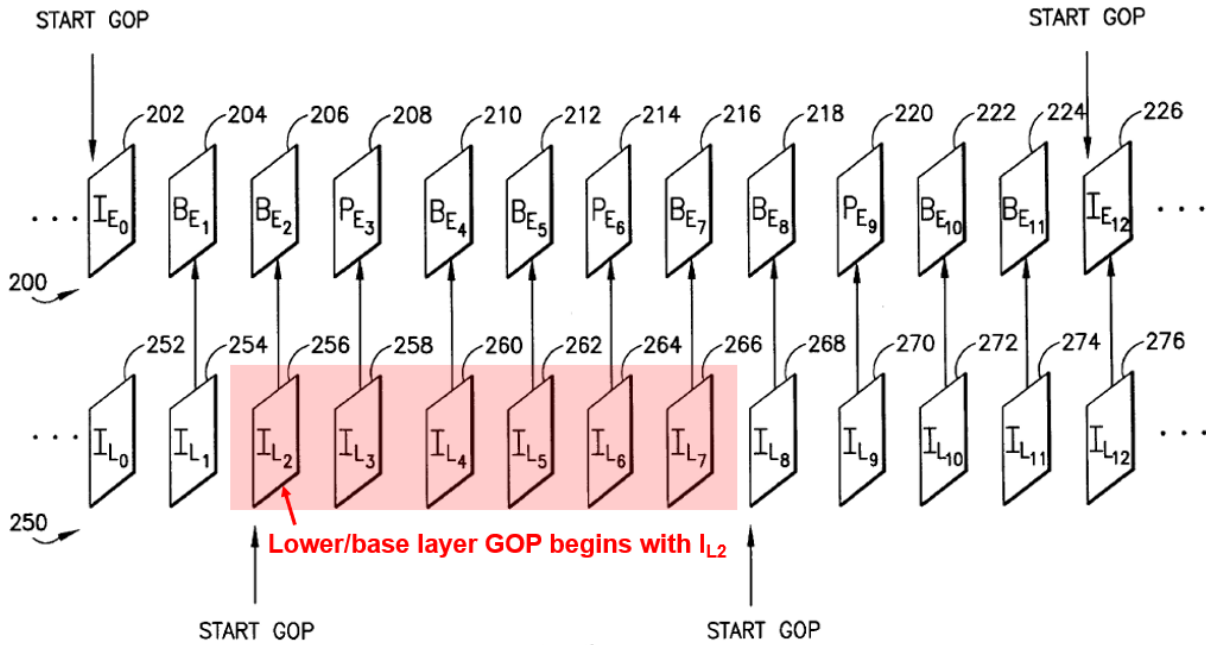


FIG.2

SAMSUNG-1005, FIG. 2 (annotated and color added).

TABLE 2

DTS _{Ei} delay relative to DTS _{L2}	Time, +DTS _{L2}	Decode	Decode	Present	Present
	0	I _{L2}			
0.5F			B _{E2}	I _{L2}	B _{E2}
F		I _{L3}		I _{L3}	
1.5F			P _{E3}	I _{L3}	P _{E3}
2F		I _{L4}		I _{L4}	
2.5F			B _{E4}	I _{L4}	B _{E4}
3F		I _{L5}		I _{L5}	
3.5F			B _{E5}	I _{L5}	B _{E5}
4F		I _{L6}		I _{L6}	
4.5F			P _{E6}	I _{L6}	P _{E6}
5F		I _{L7}		I _{L7}	
5.5F			B _{E7}	I _{L7}	B _{E7}
6F		I _{L8}		I _{L8}	
6.5F			B _{E8}	I _{L8}	B _{E8}
7F		I _{L9}		I _{L9}	
7.5F			P _{E9}	I _{L9}	P _{E9}
8F		I _{L10}		I _{L10}	
8.5F			B _{E10}	I _{L10}	B _{E10}
9F		I _{L11}		I _{L11}	
9.5F			B _{E11}	I _{L11}	B _{E11}
10F		I _{L12}		I _{L12}	
10.5F			I _{E12}	I _{L12}	I _{E12}

SAMSUNG-1005, Table 2 (annotated and color added).

The above examples relate primarily to serial decoding (where the same processor is responsible for decoding both base/lower layer pictures and enhancement layer pictures), although Chen-736 further explains that similar principles can be extended to the context of parallel decoding as well (where separate processors are provided for decoding base/lower layer pictures and enhancement layer pictures, respectively). SAMSUNG-1003, ¶[204]. According to Chen-736, “[w]hen parallel decoding is used, the relationship between the PTS and DTS can be characterized in a more general manner.” SAMSUNG-1005, 16:54-65. For example, in parallel decoding, “DTS and PTS can be determined from DTS_L ” such that DTS_{Ei} can be determined by adding a desired delay time either to DTS_{Li} or to a common DTS for the lower layer frame at the start of the GOP (e.g., DTS_{L2} for I_{L2}). *Id.*, 16:54-19:65, Tables 11-16; SAMSUNG-1003, ¶[204]. Examples of such techniques are illustrated below:

order at the decoder. Thus, for the i th picture in either the lower or enhancement sequences, the DTS and PTS can be determined from DTS_{Li} as follows: $PTS_{Li} = DTS_{Li} + F$; $DTS_{Ei} = DTS_{Li} + F$; and $PTS_{Ei} = PTS_{Li}$.

SAMSUNG-1005, 16:60-67 (highlighting added).

TABLE 11

Pic. No.	Pic. type, lower layer	DTS _L	PTS _L	Pic. type, enhance-ment layer	DTS _E	PTS _E
0	I	DTS _{L0}	DTS _{L0} + F	I, P	DTS _{L0} + F	DTS _{L0} + F
1	I, P	DTS _{L1}	DTS _{L1} + F	I, P, B	DTS _{L1} + F	DTS _{L1} + F
2	I, P	DTS _{L2}	DTS _{L2} + F	I, P, B	DTS _{L2} + F	DTS _{L2} + F
3	I, P	DTS _{L3}	DTS _{L3} + F	I, P, B	DTS _{L3} + F	DTS _{L3} + F

SAMSUNG-1005, 17:1-15 (color added).

TABLE 12

Time, +DTS _{L2}	Decode	Decode	Present	Present
0	I _{L2}	B _{E1}	I _{L1}	B _{E1}
F	I _{L3}	B _{E2}	I _{L2}	B _{E2}
2F	I _{L4}	P _{E3}	I _{L3}	B _{E3}
3F	I _{L5}	B _{E4}	I _{L4}	B _{E4}
4F	I _{L6}	B _{E5}	I _{L5}	B _{E5}
5F	I _{L7}	P _{E6}	I _{L6}	P _{E6}

SAMSUNG-1005, 17:18-26 (color added).

[2.1]

As described above with respect to [2.pre.iv], Chen-736 discloses a transport stream for a coded stereoscopic video signal (“*the coded multi-view video signal*”) that includes coded DTS parameters (“*coded information*”) representing desired delay times for the coded signals originating from the picture signals that correspond to the right stereoscopic viewpoint (“*the viewpoints except the base viewpoint*”). SAMSUNG-1005, 7:17-39, 7:67-8:20, 16:54-19:65; *supra*, [2.pre.iv]; SAMSUNG-1003, ¶[205].

Chen-736 further teaches that the decoder uses DTS parameters encoded in the transport stream to determine appropriate start times for the decoding of pictures in the base/lower and enhancement layers. SAMSUNG-1005, 21:1-4, 7:47-49, 20:49-65, FIG. 6. These teachings specifically indicate that the decoder decodes the coded information in the transport stream to identify the DTS values representing desired delay times for decoding enhancement layer pictures. SAMSUNG-1003, ¶[206]. At the very least, it would have been obvious to a POSITA to implement the decoder such that it would decode the stream and extract DTS parameters from it, thereby enabling the decoder to make use of the DTS parameters to inform decoding times. *Id.*; SAMSUNG-1003, ¶[206].

Through the decoding of the DTS parameters in the transport stream, the decoder recovers the desired delay times since the DTS parameters themselves contain and represent the desired delay times as described above with respect to [2.pre.iv]. *Supra*, [2.pre.iv]; SAMSUNG-1003, ¶[207]. That the decoding of DTS parameters recovers desired decoding delay times is evident from the fact that the DTS parameters specifically instruct and cause the decoder to delay the start of decoding of a coded enhancement layer picture by an amount of time equal to the desired delay time (e.g., 0.5F, F, 1.5F) that the encoder added to the DTS of a referenced base/lower layer picture. SAMSUNG-1005, 10:4-50; SAMSUNG-1003, ¶[207]; *infra*, Ground 1E at [1.1].

Chen-736's DTS parameters are analogous to the "view dependency counts" that the decoder in the '150 Patent specification decodes to recover desired delay times. SAMSUNG-1003, ¶[207]. Relevant to this point, the '150 Patent's "view dependency counts" can be derived from and represent desired delay times but are not coextensive with the delay times themselves. SAMSUNG-1001, 36:63-65 ("The decoding side *derives* desired delays of the start of decoding the coded bitstreams *from* the computed view dependency counts."). Chen-736's extraction and decoding of DTS parameters, like the '150 Patent's decoding of view dependency counts, serves to recover the desired delay times (which are represented by the DTS values). *Id.*; *see also id.*, 14:54-57; SAMSUNG-1003, ¶[207]. The desired delay times are realized by delaying decoding of enhancement layer frames according to delay times represented by the DTS values, further demonstrating recovery of the delay times. *Id.*

Chen-736 also describes an example "enhancement layer decoder structure" that includes a "transport level syntax parser 610" configured to parse the "compressed enhancement layer data." SAMSUNG-1005, 19:66-20:13, FIG. 6; *see supra* [2.pre]; SAMSUNG-1003, ¶[208].

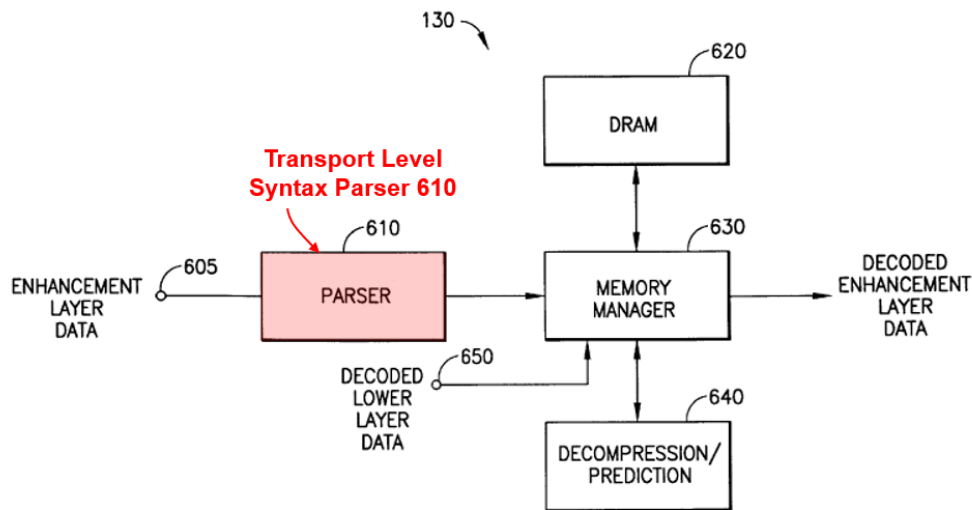


FIG.6

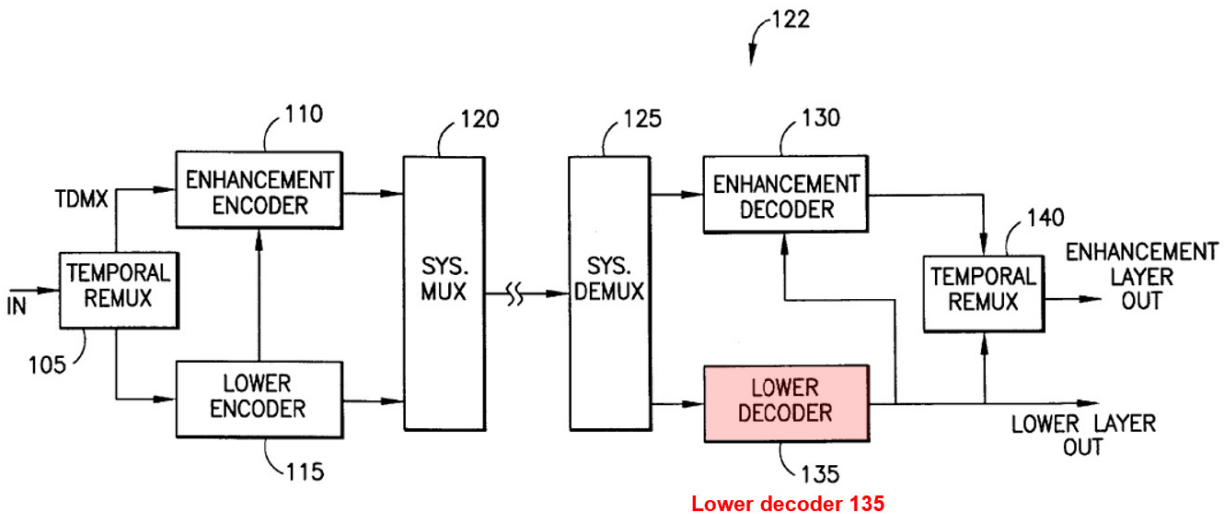
SAMSUNG-1005, FIG. 6 (annotated and color added).

To the extent Chen-736 does not expressly disclose which decoder component(s) are responsible for decoding DTS parameters to recover the desired delay times, Dr. Reader explains that it would have been obvious to a POSITA for the transport level syntax parser 610 to perform this function in conformance with the H.222 normative requirements. SAMSUNG-1003, ¶[209]. DTS parameters are encoded within PES packets (which in turn are encoded in transport packets), and a POSITA knew that PES packets are decoded to recover DTS parameters that are each represented by “a 33-bit number coded in three separate fields.” SAMSUNG-1005, 6:42-53; SAMSUNG-1007, 23-27, 45-49. The DTS parameters for enhancement layer pictures form part of the compressed enhancement layer data and it therefore would have been obvious for these parameters to be decoded by parser 610. SAMSUNG-1003, ¶[209].

[2.2]

Chen-736's "lower decoder" decodes the "encoded lower layer data."

SAMSUNG-1005, 6:1-17, 19:66-20:59, FIGS. 1, 6. The encoded base/lower layer data includes coded signals originating from the encoding of pictures or sequences of pictures (*picture signals*) from the left stereoscopic viewpoint. *Supra*, [2.pre.ii]-[2.pre.iii]. The decoding of base/lower layer data in Chen-736 thus involves decoding a coded signal originating from a picture signal corresponding to the base viewpoint as claimed. SAMSUNG-1003, ¶[210].



SAMSUNG-1005, FIG. 1 (annotated and color added).

Additionally, with reference to the "enhancement layer decoder structure," Chen-736 notes that "[a]n analogous structure may be used for the lower layer." SAMSUNG-1005, 19:66-20:44, FIG. 6; *see supra* [2.pre], *infra* [2.3]. The enhancement layer decoder structure includes decompression/prediction processor

640 to perform decompression/prediction operations in the decoding of enhancement layer pictures. SAMSUNG-1005, 20:5-21, FIG. 6. A POSITA thus understood and found obvious that the lower layer decoder would include analogous decompression/prediction capabilities for decoding the lower layer data. SAMSUNG-1003, ¶[211].

[2.3]

Chen-736's "enhancement decoder" decodes the "encoded enhancement layer data." SAMSUNG-1005, 6:1-17, 19:66-20:59, FIGS. 1, 6. The encoded enhancement layer data includes coded signals originating from the encoding of pictures or sequences of pictures (*picture signals*) from the right stereoscopic viewpoint. *Supra*, [2.pre.i], [2.pre.iv]. The decoding of enhancement layer data in Chen-736 thus involves decoding a coded signal originating from a picture signal corresponding to the viewpoints except the base viewpoint as claimed. SAMSUNG-1003, ¶[212].

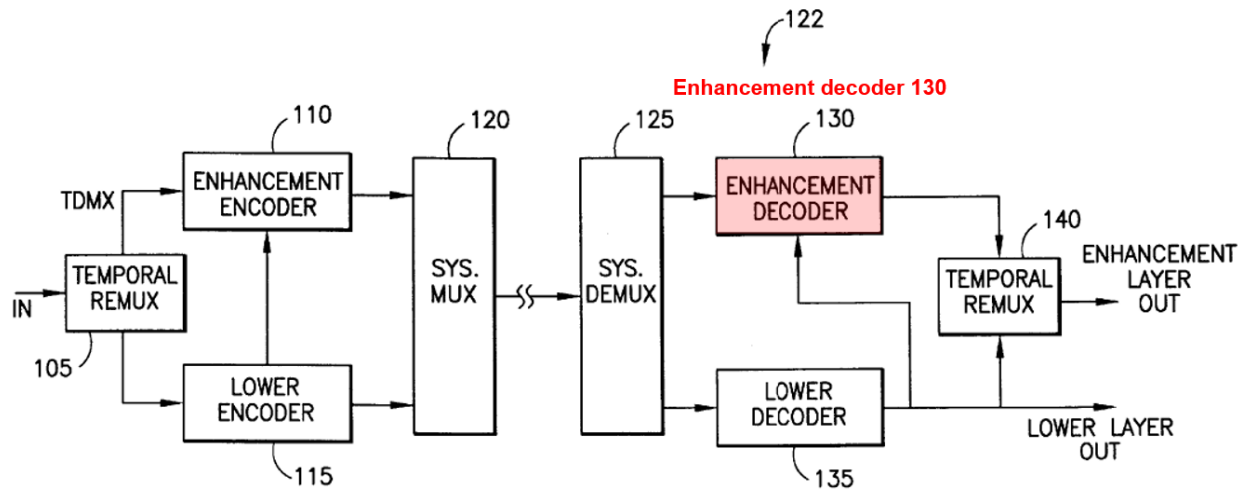


FIG. 1

SAMSUNG-1005, FIG. 1 (annotated and color added).

[2.4]

Chen-736's decoder decodes coded picture signals from the stereoscopic video signal at times indicated by DTS values embedded in the transport stream. SAMSUNG-1005, 7:47-49, 7:22-53. As described above in [2.pre.iv], the DTS values of the enhancement layer pictures represent desired delay times for the start of decoding pictures in the enhancement layer (from the right, non-base viewpoint) relative to the start of decoding pictures in the base/lower layer (from the left, base viewpoint). *Supra*, [2.pre.iv]. Chen-736 further discloses and renders obvious techniques for decoding coded information in the transport stream to extract the enhancement layer DTS values and recover the desired delay times. *Supra*, [2.1]. By decoding pictures in the enhancement layer at the times indicated by the DTS values, which represent the desired delay times, Chen-736 also discloses and

renders obvious [2.4] since the decoder delays the decoding of enhancement layer picture signals relative to corresponding base layer picture signals by time intervals equal to the desired delay times. SAMSUNG-1003, ¶[213]. For example, in the scenario described with respect to Table 2, the start of decoding of the i th enhancement layer picture is delayed by $0.5F$ relative to start of decoding of the i th base/lower layer picture or delayed by a defined half-multiple of F relative to the start of decoding of base/lower layer picture L2 as shown in the left-most column of Table 2. SAMSUNG-1005, 10:14-50, FIG. 2. Chen-736 describes similar principles for delayed decoding of enhancement layer pictures with respect to Tables 3-16 and FIGS. 3-5, for both serial and parallel decoding contexts. *Generally id.*, 10:51-19:65, Tables 3-16, FIGS. 3-5; *supra*, [2.pre.iv]; SAMSUNG-1003, ¶[213].

Additionally, Chen-736's enhancement layer and lower layer decoder structures include a memory which can temporarily store layer data for “***subsequent*** use by the processor 640 in decoding disparity predicted enhancement layer pictures.” SAMSUNG-1005, 19:66-20:44, FIG. 6; SAMSUNG-1003, ¶[214].

[3.pre.i]-[3.4]

Chen-736 discloses and renders obvious each of elements [3.pre.i]-[3.4] for substantially the same reasons as those addressed above with respect to

corresponding elements of claim 2. SAMSUNG-1003, ¶[215].

To the extent the above analysis of claim 2 does not explicitly address claim 3's requirement for the method to be implemented in "[a] non-transitory computer program stored in a computer readable medium," this limitation is disclosed or at least would have been obvious to a POSITA based on the teachings of Chen-736. SAMSUNG-1003, ¶[216]. For example, Chen-736 discloses that it was known that "digital receiver[s] include[] a microcomputer and memory storage."

SAMSUNG-1005, 1:23-26. Chen-736's enhancement layer decoder structure includes a memory 620, a central processing unit 630, and a decompression/prediction processor 640, while the lower layer decoder structure provides analogous capabilities. *Id.*, 19:66-20:59, FIG. 6. A POSITA knew that such hardware and software elements as described in Chen-736 would involve implementing the decoder functionality in a non-transitory computer program stored in a computer-readable medium, especially since such processors are specifically adapted to execute instructions from programs stored in memory.

SAMSUNG-1003, ¶[216]. Moreover, the storage of video decoding programs in a computer-readable medium of a decoder was well known by the Critical Date of the '150 Patent, and it would have been obvious to store instructions/logic for Chen-736's decoding techniques as a computer program on a computer-readable medium to allow for use of the decoding techniques on physical hardware in a

decoding device. SAMSUNG-1003, ¶[216].

Claim Element(s)	Corresponding Claim Element(s)
[3.pre.i]-[3.pre.iv]	[2.pre.i]-[2.pre.iv]
[3.1]	[2.1]
[3.2]	[2.2]
[3.3]	[2.3]
[3.4]	[2.4]

B. [GROUND 1B] – Chen-736 and Chen-051 Render Obvious Claims 2-3

1. Chen-051

Chen-051 discloses a method of transmitting video that uses “differential values to represent decoding and presentation times of pictures,” where the “differential decoding times may be encoded by the use of entropy coding (e.g., UVLC) or by using other methods such as, for example, fixed length codes.” SAMSUNG-1011, [0010]-[0013], [0019]-[0020], [0024], FIG. 1; SAMSUNG-1003, ¶¶[136]-[140]. Chen-051’s method can be applied to “either fixed intervals or variable intervals between pictures” and is compatible with “existing video transport standards” (including “MPEG-2 Systems”). SAMSUNG-1011, [0018]-[0024]. For example, Chen-051 discloses that “decoding times of pictures may be represented by differences between the decoding times of two adjacent pictures in

coded data order” and the decoding time of a “(m+1)-th picture” can be determined by “adding the decoding time of the m-th picture to the inter picture decoding interval or time difference between the m-th picture and the (m+1)-th picture.” SAMSUNG-1011, [0023]-[0024].

Chen-051 also describes, as shown in FIG. 4, “a decoder system” that includes a “system decoder 72” that “parses the video bitstream.” SAMSUNG-1011, [0030]. “A portion of the video bitstream relating to... the decoding intervals are sent to an interval processor 80” that extracts “the decoding intervals from the parsed video bitstream” or “the differential time values from the video bitstream.” *Id.* “Once extracted,... the decoding intervals are sent to the time generator 84. The time generator 84 can generate decoding times... which are then sent to the video decoder 76. The video decoder 76 decodes the video stream according to the received decoding times....” *Id.*; SAMSUNG-1003, ¶[140].

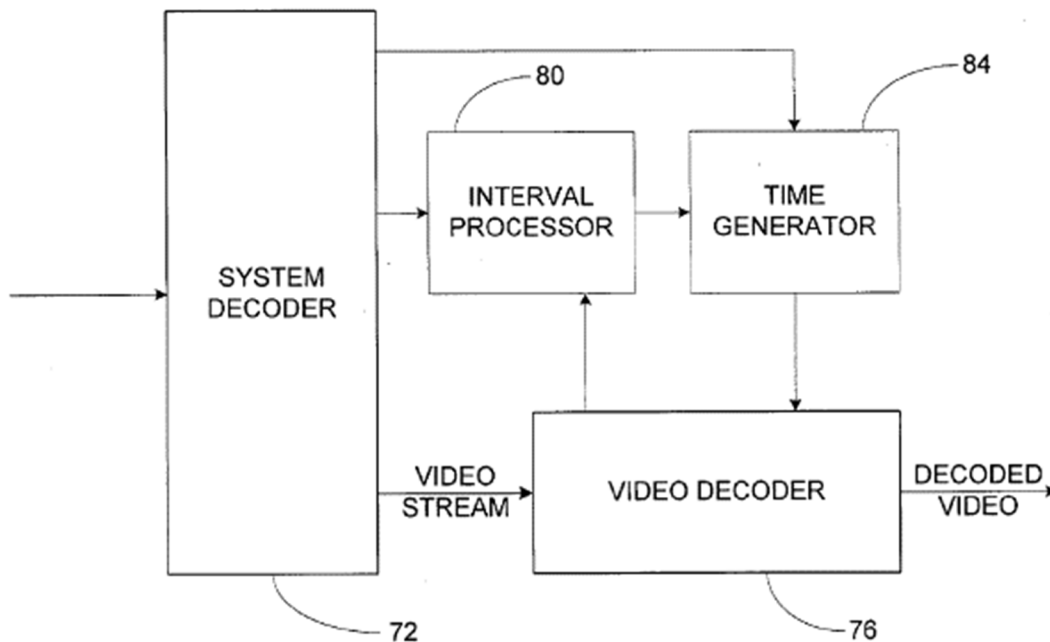


FIG. 4

SAMSUNG-1011, FIG. 4.

2. Combination of Chen-736 and Chen-051

As discussed above in Ground 1A, Chen-736 discloses techniques for generating decoding timestamps (DTS values) for enhancement layer pictures in a stereoscopic video signal by adding a desired delay time to the DTS value of a corresponding base layer picture or a fixed base layer picture (e.g., the base layer picture at the start of a GOP). SAMSUNG-1005, 10:4-50, 16:54-65, 10:4-19:65; *supra*, [2.pre.iv]-[2.1]. Chen-736 does not explicitly describe the syntax that would be used to transmit DTS (or PTS) values, but Chen-051 recognized that conventional syntaxes and approaches to transmitting DTS/PTS values were

cumbersome and inefficient—especially since each timestamp requires 33 bits of data. SAMSUNG-1011, [0007]; SAMSUNG-1003, ¶[217].

Considering these known problems with conventional approaches to encoding and transmitting DTS values, it would have been obvious to apply Chen-051's suggestion for the use of “differential values... to represent picture decoding times” (e.g., rather than absolute or non-differential values) in Chen-736's system. SAMSUNG-1003, ¶[218]. In the Chen-736+Chen-051 combination, it would have been obvious and predictable to encode and transmit the DTS values for at least some (or even all) of the enhancement layer pictures as differential values—and specifically, a differential value representing the desired delay time that Chen-736's encoder would otherwise add as an offset to the DTS for the corresponding (or otherwise fixed or referenced) base/lower layer picture. *Id.* In the combination, the decoder would then determine an absolute decoding time by decoding the bitstream to directly recover the differential value and adding it to the DTS for the corresponding base/lower layer picture, and in a manner consistent with the approach outlined in Chen-051. *Id.*; SAMSUNG-1011, [0030]-[0031]; SAMSUNG-1003, ¶[218].

Multiple reasons would have motivated a POSITA to combine Chen-736 and Chen-051 as described above. SAMSUNG-1003, ¶[219].

First, differentially coding DTS values in the combination would have been

obvious and beneficial to further compress the transmitted video bitstream.

SAMSUNG-1003, ¶[220]. A differential DTS value will ordinarily be smaller than an absolute value such that the differential value can be transmitted with fewer bits or in a smaller data field. *Id.* For example, a value representing only the multiple of the inter-picture time interval F (e.g., ‘1’ for a delay of 1F or ‘1.5’ for a delay of 1.5F) could be transmitted. *Id.*; SAMSUNG-1011, [0007]-[0008]; SAMSUNG-1003, ¶¶[221]-[222].

Second, differentially coding DTS values in the combination would have been obvious and beneficial to support variable inter-picture decoding and display times, as explained in Chen-051. SAMSUNG-1011, [0006]-[0008]; SAMSUNG-1003, ¶[222]-[223].

Third, differentially coding DTS values in the combination would have been obvious since Chen-736 already teaches calculation of DTS values by adding a differential (i.e., the desired delay time) to a base DTS value, and thus Chen-736 already naturally lends itself to differential coding of timestamps. SAMSUNG-1003, ¶[224]. As Dr. Reader explains, Chen-051’s technique for differentially encoding timestamps between successive frames in decoding order naturally extends to the stereoscopic signal decoding described in Chen-736, especially where Chen-736 also proposes successive decoding of corresponding base and enhancement layer pictures (e.g., as shown in Tables 2 and 12 (among others)). *Id.*

SAMSUNG-1003, ¶[224].

Fourth, differentially coding DTS values in the combination would have been obvious as a predictable application of a known technique for differential DTS encoding as taught by Chen-051 to a known system as taught by Chen-736 to achieve entirely predictable results. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 417 (2007) (a supposed invention that “simply arranges old elements with each performing the same function it had been known to perform” is obvious); SAMSUNG-1003, ¶[225].

The combination further would have been obvious and a POSITA would have had a reasonable expectation of success implementing the combination given that Chen-051 describes efficient methods to “represent and... encode decoding times” in the same MPEG-2 standard disclosed in Chen-736. SAMSUNG-1005, 1:52-58, 6:43-53; SAMSUNG-1011, [0007], [0018]. Indeed, Chen-736 and Chen-051 both describe DTS values in similar video coding systems and were proposed in similar contexts by the same inventor/co-inventor (Xuemin Chen). SAMSUNG-1003, ¶[226].

3. Analysis

Ground 1B incorporates the analysis of Ground 1A and renders each element of claims 2 and 3 obvious for the reasons addressed above in Ground 1A, except as provided below. SAMSUNG-1003, ¶[227].

[2.pre.iv], [2.4], [3.pre.iv], and [3.4]

To the extent that the claimed “coded information representing a desired delay time of the start of decoding a coded signal originating from each of the picture signals corresponding to the viewpoints except the base viewpoint” must specify the desired delay time itself or must otherwise be directly expressed as a value that is “relative to the start of decoding a coded signal originating from the picture signal corresponding to the base viewpoint,” these features would be realized by the differential enhancement layer DTS values as described above in the Chen-736+Chen-051 combination. *Supra*, Section III.B.2; SAMSUNG-1003, ¶[228]. Chen-051 discloses that the decoding time of a picture can be expressed using a “decoding interval or time difference” between the picture and a reference picture (an expression of decoding time that is explicitly “*relative to*” the reference picture). SAMSUNG-1011, [0012], [0019], [0023]-[0024]; *supra*, Section III.B.1. In the combination, the encoded differential DTS constitute coded information that defines the desired delay time between the start of decoding an enhancement layer picture signal for the left view (“*a coded signal originating from each of the picture signals corresponding to the viewpoints except the base viewpoint*”) and the start of decoding a corresponding base/lower layer picture signal for the right view (“*relative to the start of decoding a coded signal originating from the picture signal corresponding to the base viewpoint*”). SAMSUNG-1003, ¶[228].

[2.1] and [3.1]

As discussed in [2.1] of Ground 1A, Chen-736 describes an example “enhancement layer decoder structure” that includes a “transport level syntax parser 610” that parses the “compressed enhancement layer data.” SAMSUNG-1005, 19:66-67, 20:1-13, FIG. 6. To the extent that Chen-736 lacks details regarding the functionality of the parser 610, a POSITA would have naturally searched for implementation details. SAMSUNG-1003, ¶[229]. In this search, they would have found a reference that describes parsing a video bitstream, like Chen-051. Similar to Chen-736, Chen-051 describes a “system decoder 72” that “parses the video bitstream.” SAMSUNG-1011, [0030], FIG. 4. In Chen-051, a “portion of the video bitstream relating to... the decoding intervals are sent to an interval processor 80” that extracts “the decoding intervals from the parsed video bitstream” or “the differential time values from the video bitstream.” *Id.* “Once extracted,... the decoding intervals are sent to the time generator 84. The time generator 84 can generate decoding times... which are then sent to the video decoder 76. The video decoder 76 decodes the video stream according to the received decoding times....” *Id.*; SAMSUNG-1003, ¶[229].

Chen-051 further discloses that the “differential decoding times may be encoded by the use of entropy coding (e.g., UVLC) or by using other methods such as, for example, fixed length codes.” SAMSUNG-1011, [0010]-[0013], [0019]-

[0020], [0024], [0029]. Because the decoding intervals or differential time values are encoded, a POSITA understood or found obvious that Chen-051's system decoder 72 or interval processor 80 would decode the encoded time values to recover the differential DTS values (i.e., the desired delay times) and to generate the decoding times. SAMSUNG-1003, ¶[230]. As explained above, a POSITA would have been motivated to transmit encoded differential DTS values, for example, to achieve further compression in PES packets and more efficient transmission of information, as described in Chen-051. SAMSUNG-1011, [0007], [0018]; *supra*, Section III.B.2; SAMSUNG-1003, ¶[230].

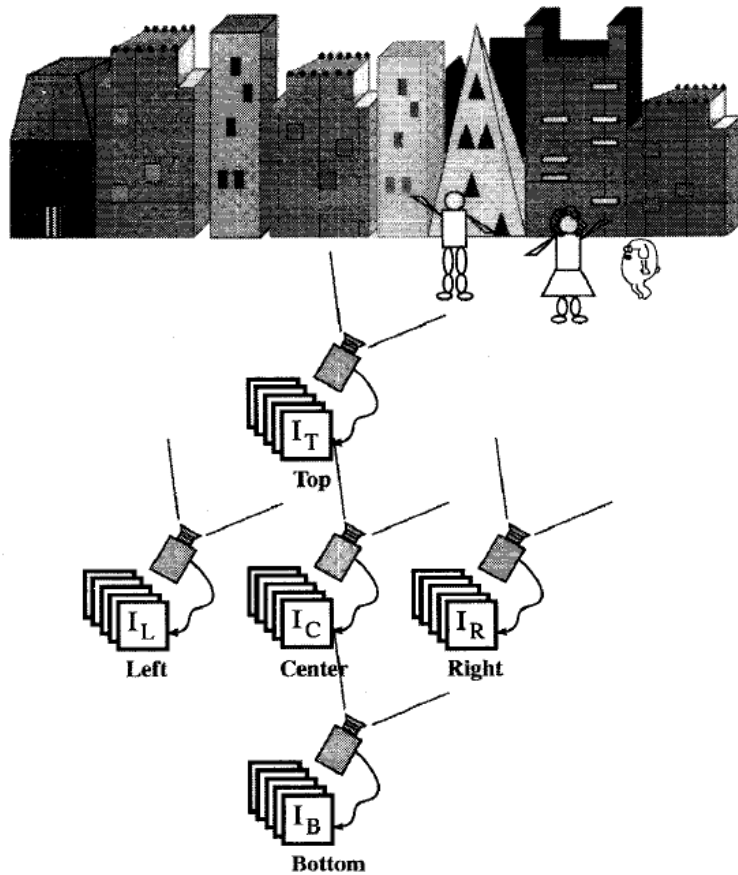
C. [GROUND 1C] – Chen-736 and Tseng Render Obvious Claims 2-3

1. Tseng

Tseng is an IEEE publication titled “Multiviewpoint Video Coding with MPEG-2 Compatibility.” SAMSUNG-1013, 1; SAMSUNG-1003, ¶¶[141]-[149]. Tseng published in 1996—i.e., more than a decade before the Critical Date of the '150 Patent. SAMSUNG-1017, ¶¶[1]-[14]. IEEE publications are commonly accessed and distributed to the public. For example, librarian June Munford explains that Tseng was printed in an IEEE collection shelved at the Penn State University Library and was cited by multiple other papers before the Critical Date. *Id.*; *Ericsson, Inc. v. Intellectual Ventures I LLC*, IPR2014-00527, Paper 41, 11

(PTAB May 18, 2015).

Tseng discloses a “multiviewpoint video” that is a “3-D extension of the traditional movie sequence” where “there are multiple perspectives of the same scene at any one instance in time.” SAMSUNG-1013, 1. Tseng proposes a “novel multiview codec... to complement the MPEG-2 standard” that expands the number of viewpoints past the usual two viewpoints in an MPEG-2 stereoscopic video sequence (“the minimum number of viewpoints is equal to three... and must be extendable in the future”). SAMSUNG-1013, 1-2. Tseng describes an example shown in FIG. 1 of “[o]ne central viewpoint image... from which the other multiview images are predicted” denoted by I_C from viewpoint V_C and “four additional views... at viewpoints $V_X = \{V_L, V_R, V_T, V_B\}$.” SAMSUNG-1013, 2; SAMSUNG-1003, ¶¶[142]-[149].



SAMSUNG-1013, FIG. 1.

2. Combination of Chen-736 and Tseng

Chen-736 describes a decoder for a stereoscopic video picture sequence, shown generally at 122 of FIG. 1. SAMSUNG-1005, 5:44-64. Chen explains that the MPEG-2 Multiview Profile (MVP) “standard and similar systems involve coding of two video layers, including a lower layer and an enhancement layer.” SAMSUNG-1005, 5:44-64, 1:52-2:19, 6:1-4; SAMSUNG-1003, ¶[231].

Tseng recognizes that “MPEG-2 has also been shown to be applicable to two sequences of stereoscopic signals” but had not yet been extended to additional

viewpoints. *Id.* Tseng thus presents “a novel multiview codec... to complement the MPEG-2 standard” to allow for more viewpoints. *Id.* For conformity with the MPEG-2 video coding standard, Tseng’s “multiview profile is to supplement the main profile of MPEG-2 so that all standardized systems are capable of deciphering at least one video sequence from one viewpoint.” SAMSUNG-1013, 2; SAMSUNG-1003, ¶[232].

A POSITA seeking to enhance Chen-736’s system would have found it obvious based on Tseng’s teachings to arrive at a predictable configuration of a video processing system including a lower decoder and an enhancement decoder to supplement the main profile of MPEG-2 and for decoding a multiviewpoint video including more than two viewpoints. SAMSUNG-1005, 5:44-64, 6:1-4; SAMSUNG-1013, 1-4; SAMSUNG-1003, ¶[233]. A POSITA would have been motivated and had a reasonable expectation of success applying Tseng’s suggestion for additional viewpoints to Chen-736 given that Tseng describes the interest in extending 3-D technologies to the existing MPEG-2 standard disclosed in Chen-736. SAMSUNG-1013, 1; *KSR*, 550 U.S. at 421. Moreover, Tseng discloses that its techniques “complement the MPEG-2 standard” like that described in Chen-736. *Id.*; SAMSUNG-1003, ¶[233].

A POSITA would have been motivated to implement Chen-736 based on Tseng’s teachings to beneficially provide the user with the option of “multiple

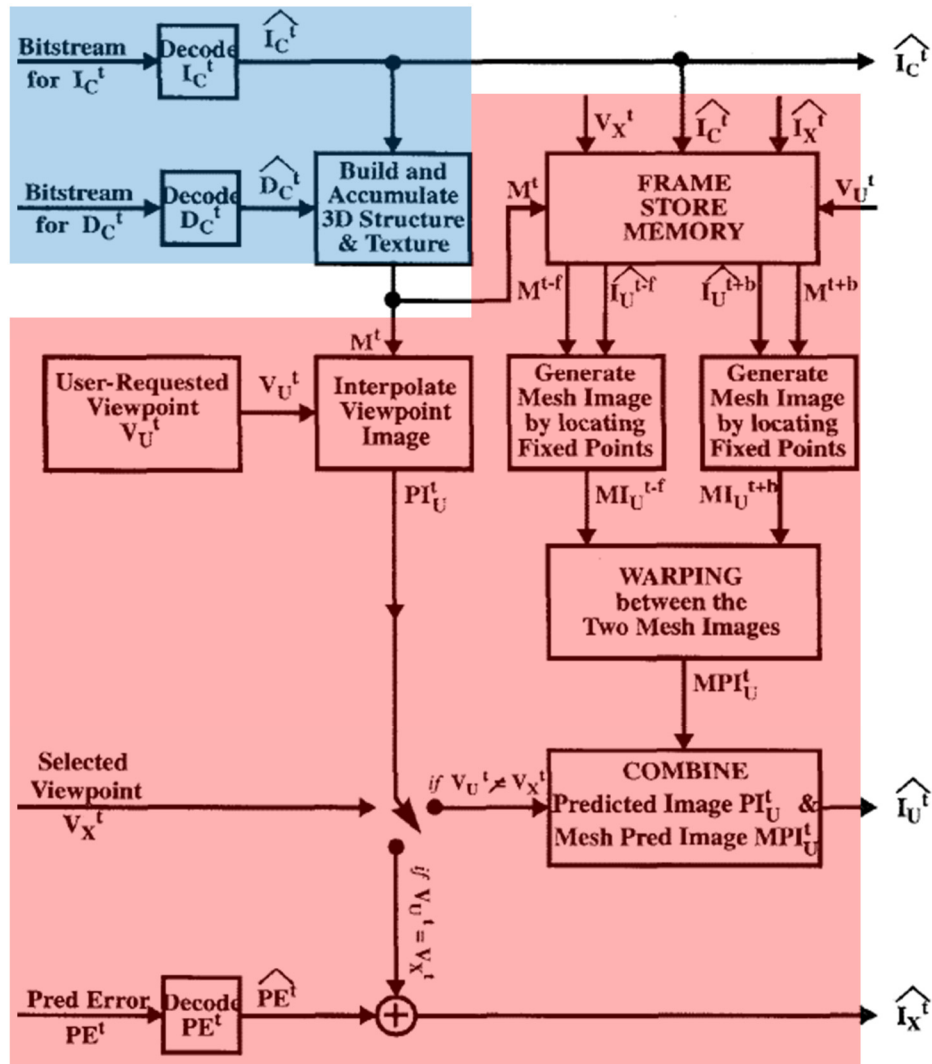
perspectives of the same scene at any one instance in time” which would allow the “user to watch a true 3-D stereoscopic sequence from any perspective the viewer chooses,” for example. SAMSUNG-1013, 1; SAMSUNG-1003, ¶[234]. Tseng also notes that such a system “has practical uses in interactive applications, medical technologies, educational and training demonstrations, remote sensing developments and is a step toward virtual reality.” SAMSUNG-1013, 1.

Moreover, combining Chen-736 and Tseng would have been obvious at least because such a combination would have merely involved (1) combining prior art elements according to known methods to yield predictable results and (2) applying a known technique to a known method ready for improvement to yield predictable results. *KSR*, 550 U.S. at 415-421; SAMSUNG-1003, ¶[235].

In the combined Chen-736+Tseng system, illustrated below, the techniques of Tseng would complement Chen-736’s existing MPEG-2 system, and a POSITA would have been motivated to implement Tseng’s teachings regarding additional enhancement layers to extend Chen-736’s techniques to multiviewpoint video. SAMSUNG-1013, 1-4. An example of Chen-736’s lower decoder and enhancement decoder integrating Tseng’s teachings is shown below. SAMSUNG-1003, ¶[236]. Other configurations are possible in view of Chen-736’s and Tseng’s teachings, as Tseng broadly demonstrates that multi-viewpoint video coding including more than one non-base viewpoint was known and obvious

before the '150 Patent. *Id.*

Lower Decoder



Enhancement Decoder

SAMSUNG-1013, FIG. 4

(cropped, annotated, and color added to show an example of integration of Tseng's teachings into Chen-736's system)

3. Analysis

[2.pre.i]-[3.4]

To the extent that the “*coded multi-view video signal*” requires multiple

“*viewpoints except the base viewpoint*” (i.e., multiple non-base viewpoints), Tseng discloses such a video signal. SAMSUNG-1013, 1-5; SAMSUNG-1003, ¶[237].

For example, Tseng discloses a “multiview system” that includes a “central” viewpoint (“*base viewpoint*” as in [2.pre.ii]-[2.pre.iii], [3.pre.ii]-[3.pre.iii] or lower layer as in Chen-736) and a collection of “additional” viewpoints (e.g., left, right, bottom, and top) (multiple “*viewpoints except the base viewpoint*” as in the ’150 Patent’s claims or enhancement layers as in Chen-736). SAMSUNG-1013, 1-2.

Tseng describes an example shown in FIG. 1 of “[o]ne central viewpoint image... from which the other multiview images are predicted” denoted by I_C from viewpoint V_C and “four additional views... at viewpoints $V_X = \{V_L, V_R, V_T, V_B\}$.” SAMSUNG-1013, 2; SAMSUNG-1003, ¶[237].

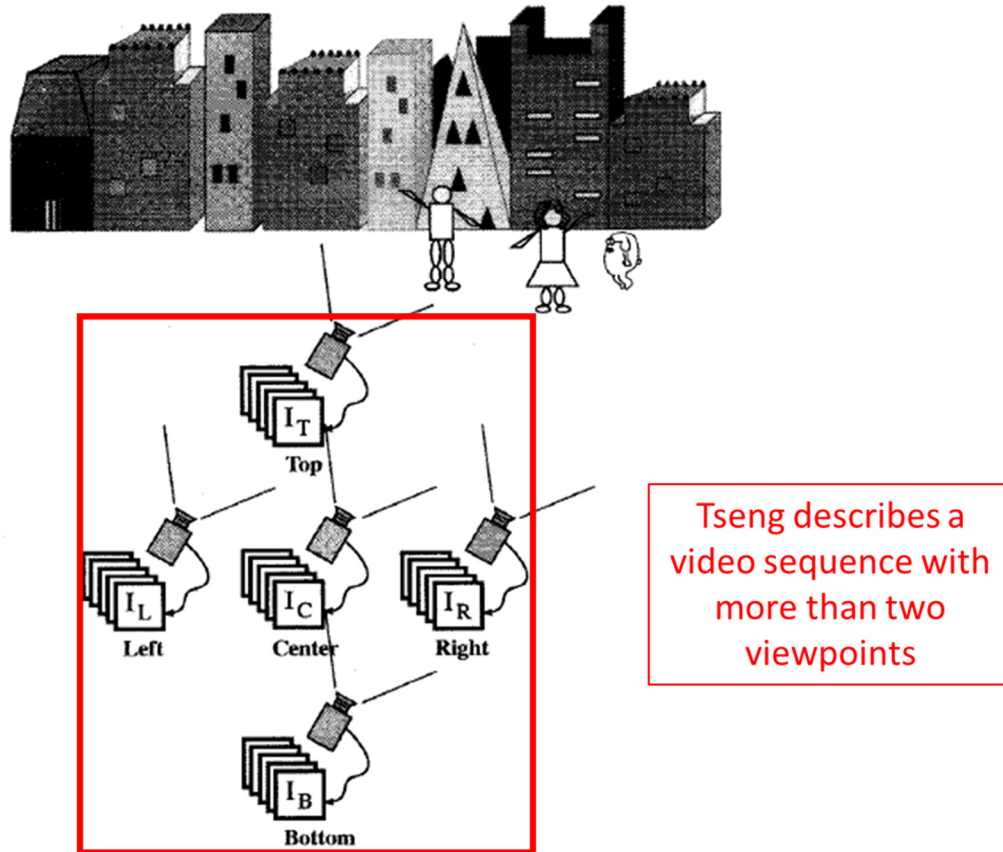
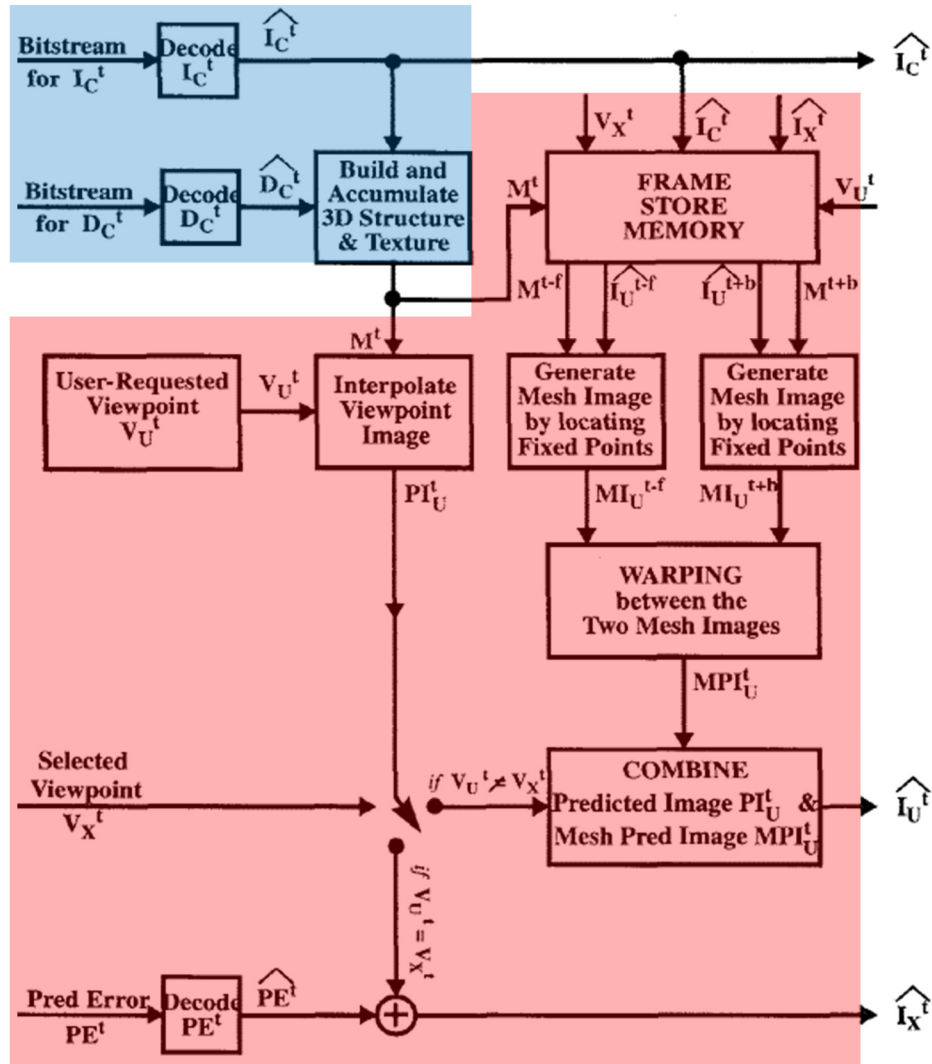


Fig. 1. Camera configuration of multiple viewpoint images.

SAMSUNG-1013, FIG. 1 (annotated).

As discussed above, an example of Chen-736's lower decoder (elements [2.2] and [3.2]) and enhancement decoder (elements [2.3] and [3.3]) incorporating Tseng's teachings are shown below. SAMSUNG-1003, ¶[238]. Other configurations are possible in view of Chen-736's and Tseng's teachings. *Id.*

Lower Decoder



Enhancement Decoder

SAMSUNG-1013, FIG. 4

(cropped, annotated, and color added to show an example of integration of Tseng's teachings into Chen-736's system)

When decoding a noncentral viewpoint image, Tseng notes that “a delay may be required in order to access the future image” needed for reconstruction, and more generally, lower layer pictures must be decoded before enhancement layer pictures such that a delay would be necessary between decoding the central

viewpoint image and a non-central viewpoint image. SAMSUNG-1013, 4; SAMSUNG-1003, ¶[239]. For each noncentral viewpoint, it would have been obvious for the Chen-736+Tseng combined system to encode in the transmitted video stream DTS values representing the desired delay time of the start of decoding of each of the images corresponding to the noncentral viewpoints relative to the start of decoding of the image corresponding to the central viewpoint in a similar manner as described above in [2.pre.iv] of Ground 1A, decode the stream to recover the desired delay times represented by the DTS values for each of the images corresponding to the noncentral viewpoint in a similar manner as described above in [2.1] of Ground 1A, and delay the decoding of the images corresponding to the noncentral viewpoint by time intervals equal to the desired delay times in a manner like that described above in [2.4]. SAMSUNG-1003, ¶[239].

D. [GROUND 1D] – Chen-736, Tseng, and Chen-051 Render Obvious Claims 2-3

1. Combination of Chen-736, Tseng, and Chen-051

It would have been obvious to modify Chen-736 in view of Chen-051 to provide differential DTS coding and to further modify Chen-736 in view of Tseng to provide additional non-base viewpoints for the same reasons discussed in Grounds 1B and 1C above. *See supra*, §§III.B.2, III.C.2; SAMSUNG-1003, ¶[240].

2. Analysis

[2.pre.i]-[3.4]

The Chen-736+Tseng+Chen-051 combination renders these claim elements obvious for substantially the same reasons as those addressed above in Grounds 1B and 1C. *See supra*, §§III.B.3, III.C.3; SAMSUNG-1003, ¶[241].

E. [GROUND 1E] – Chen-736 and H.262 Specification Render Obvious Claim 1

1. H.262 Specification

The H.262 Specification (2/2000 revision) is an International Telecommunication Union (“ITU”) document that describes recommended changes to the MPEG-2 standard and that was approved in February 2000. SAMSUNG-1006, 1-4. These publications were made available to the public via download from the ITU’s website and were also distributed in DVD-ROM format, which was held by and publicly accessible at libraries such as UMBC. SAMSUNG-1017, ¶¶[1]-[6], [15]-[26]; SAMSUNG-1003, ¶¶[150]-[160], FN6. The document itself bears dates indicating that it was published in February 2000 and was cited and submitted to the USPTO by multiple patent applicants before the Critical Date. *Id.* H.262 generally describes “coded representation of video data and the decoding process required to reconstruct pictures.” *Id.* Specifically, this recommendation includes a description of “a multi-view profile” of MPEG-2. *Id.*

2. The combination of Chen-736 and H.262 Specification

Chen-736 incorporates by reference earlier versions of H.262 standard documents, although the standard continued to evolve in the decade between Chen-736's filing date (October 24, 1996) and the Critical Date of the '150 Patent (October 13, 2006). SAMSUNG-1005, 1:52-58, 6:43-53. The H.262 Specification (SAMSUNG-1006) represents a later release of the H.262 standard for which Chen-736's system was designed, and in this context, it would have been obvious to a POSITA as of the Critical Date to turn to the H.262 Specification for additional implementations details related to the H.262 standard referenced in Chen-736. SAMSUNG-1005, 6:45-52; SAMSUNG-1003, ¶[242]. A POSITA would have been motivated and had a reasonable expectation of success applying the teachings of the H.262 Specification with the teachings of Chen-736 considering that Chen-736 specifically contemplates implementations for H.262-based systems and the H.262 Specification discloses details that a POSITA would have turned to and used to implement Chen-736 consistent with the H.262 standard. *KSR*, 550 U.S. at 421.

Moreover, combining Chen-736 and H.262 Specification would have been obvious at least because such a combination would have merely involved (1) combining prior art elements according to known methods to yield predictable results and (2) the use of known technique to improve similar devices (methods, or

products) in the same way. *KSR*, 550 U.S. at 415-421; SAMSUNG-1003, ¶[243].

In the combined Chen-736+H.262 system, syntaxes for the Multi-View Profile described in the H.262 Specification would provide a predictable manner of implementing the multi-view coding techniques disclosed in Chen-736 and would further facilitate synchronization of Chen-736's lower and enhancement layers. SAMSUNG-1006, pp. 40, 42, 60, 67; SAMSUNG-1003, ¶[244]. H.262 Specification's details regarding the structure and operations for implementing a decoder consistent with the H.262 standard also would have been obvious and beneficial to apply in combination with Chen-736 to allow Chen-736's system to facilitate performance of Chen-736's desired motion-compensated and disparity-based predictions and decoding. *Id.*; SAMSUNG-1005, 1:37-51, 2:20-36.

3. Analysis

[1.pre.i] – [1.pre.iv]

To the extent the preamble is limiting, the Chen-736+H.262 combination renders it obvious for the reasons addressed above with respect to [2.pre.i]-[2.pre.iv] in Ground 1A. SAMSUNG-1003, ¶[245]; SAMSUNG-1005, 3:66-4:17 (“apparatus”); *see supra* §III.A.2.[2.pre].

[1.1]

The Chen-736+H.262 combination renders obvious a processor that performs the algorithm steps (*supra*, Section II.C.3(a)) for the function recited in

[1.1]. SAMSUNG-1003, ¶[246]. For example, Chen-736’s “digital receiver includes a microcomputer and memory storage elements” used to “decompress[] and decode[] the data in order to reconstruct the original video and audio signals.” SAMSUNG-1005, 1:17-26. A POSITA understood or would have found it obvious to implement the “transport level syntax parser 610” as discussed above in element [2.1] of Ground 1A using a processor that parses the “compressed enhancement layer data” to extract and decode DTS values embedded in the PES packets (“decoding coded information in a coded bitstream to recover information representing desired delay times”) and identifying desired delay times from the decoded information by using the DTS values to configure the decoder to delay the start of decoding of enhancement layer pictures relative to corresponding base layer pictures by the difference in the DTS values between the enhancement layer pictures and corresponding base layer pictures (i.e., by the desired delay times). SAMSUNG-1005, 19:66-20:13, FIG. 6; *see supra* [2.pre], [2.1]; SAMSUNG-1003, ¶[246].

For example, the desired delay times are represented by and contained in the DTS values. *See supra*, Ground 1A at [2.pre.iv]. The processor in the combination identifies the desired delay times when reading and processing the DTS values to inform decoding start times for pictures in the enhancement layer. *Supra*, Ground 1A at [2.4]. Indeed, the decoding delay implemented by the decoder between

corresponding enhancement layer and lower/base layer pictures demonstrates that the processor must identify the desired delay times, or at least perform operations equivalent to the identifying by implementing the desired delay from the DTS values.⁹ SAMSUNG-1003, ¶[247]. It would have been obvious that Chen-736's operations to decode the DTS values and identify desired delay times from the DTS values are also equivalent to the decoding of view dependency counts and other view dependency information from which desired delay times are derived in various embodiments of the '150 specification, especially since the DTS values similarly specify and cause the decoder to delay decoding of picture signals in the non-base viewpoint by the desired amount. SAMSUNG-1003, ¶[247].

[1.2]

The Chen-736+H.262 combination renders obvious a processor that performs the algorithm steps (*supra*, Section II.C.3(b)) for the function recited in [1.2]. SAMSUNG-1003, ¶[248]. For example, Chen-736's "decompression/prediction **processor 640**" "provides a variety of **processing functions**, such as error detection and correction, motion vector decoding, **inverse**

⁹ In the combinations with Chen-051, the processor recovers and identifies differential DTS values in the enhancement layer that directly provide the desired delay times. *Supra*, Ground 1B (§§III.B.2-3).

quantization, inverse discrete cosine transformation, Huffman decoding and *prediction calculations*, for instance” and “may be used for the lower layer.”

SAMSUNG-1005, 20:13-17, 20:45, FIG. 6. Chen-736 further describes “inter-frame compression schemes... using motion compensation data and block-matching motion estimation algorithms... combined with block-based spatial compression techniques such as the discrete cosine transform (DCT).”

SAMSUNG-1005, 1:37-51. A POSITA understood that the inverse discrete cosine transform is an inverse orthogonal transform. SAMSUNG-1003, ¶[248]; SAMSUNG-1018, 1:16-17; SAMSUNG-1019, 25:61-64; SAMSUNG-1020, 1:30-51, 2:20-42, 2:56-61.

To the extent that Chen-736 lacks details regarding the processing functions performed by the decompression/prediction processor 640 for lower layer data, H.262 describes the “video decoding process” that “specifies the decoding process that a decoder shall perform to reconstruct frames from the coded bitstream.” SAMSUNG-1006, 74. As shown in H.262 Figures 7-1 and 7-5 below, the video decoding process includes the steps of generating a prediction signal by performing motion-compensated prediction from one or more reference pictures and one or more motion vectors (functions in blue box), generating a decoded signal by performing inverse quantization and inverse orthogonal transform on a coded signal (functions in green box), and generating a decoded picture signal by adding

the decoded signal (red line from Figure 7-1 to 7-5) and the prediction signal
(function in red circle). SAMSUNG-1003, ¶[249].

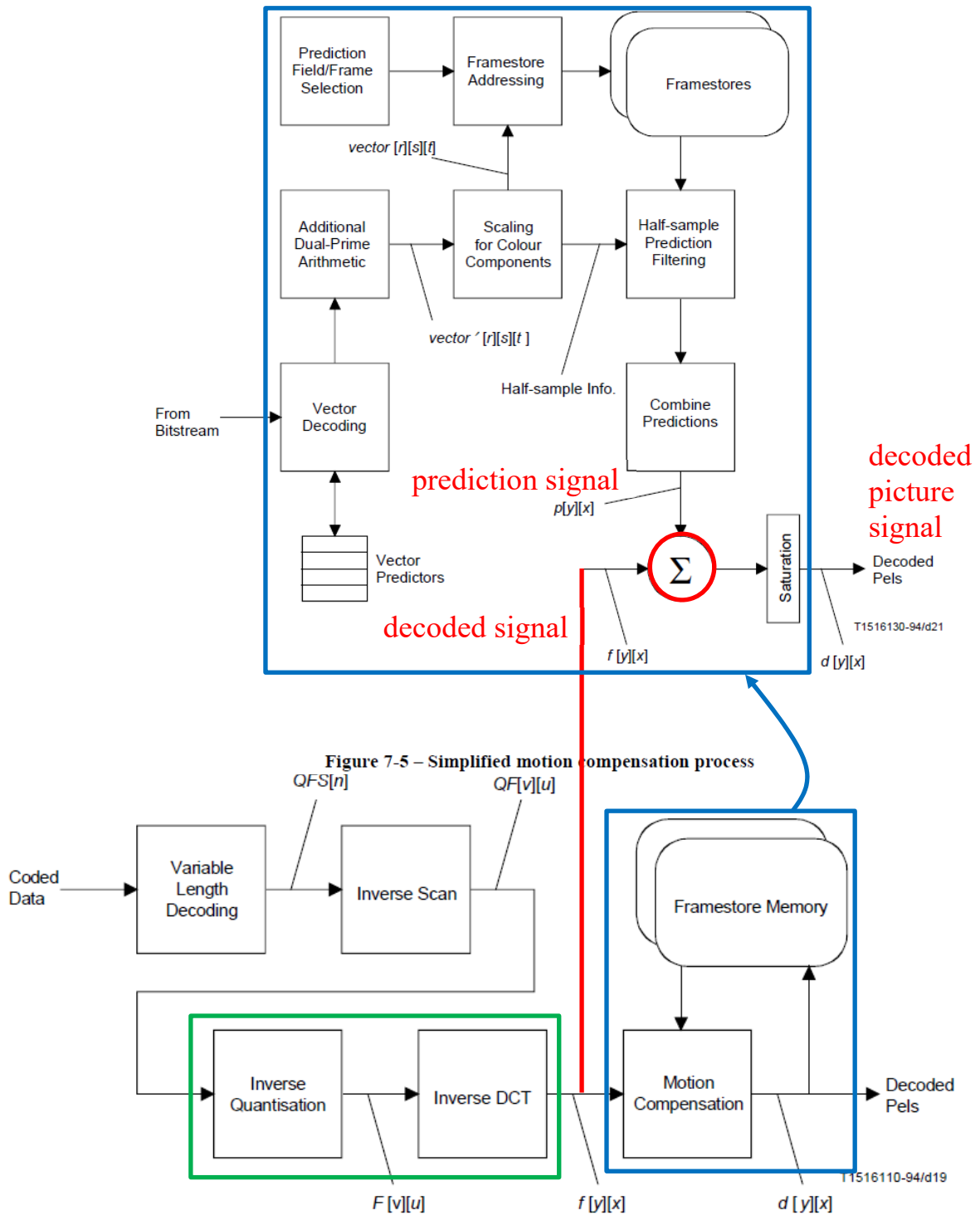


Figure 7-1 – Simplified Video Decoding Process

SAMSUNG-1006, 74, 83 (Figures 7-1 and 7-5 collated and annotated).

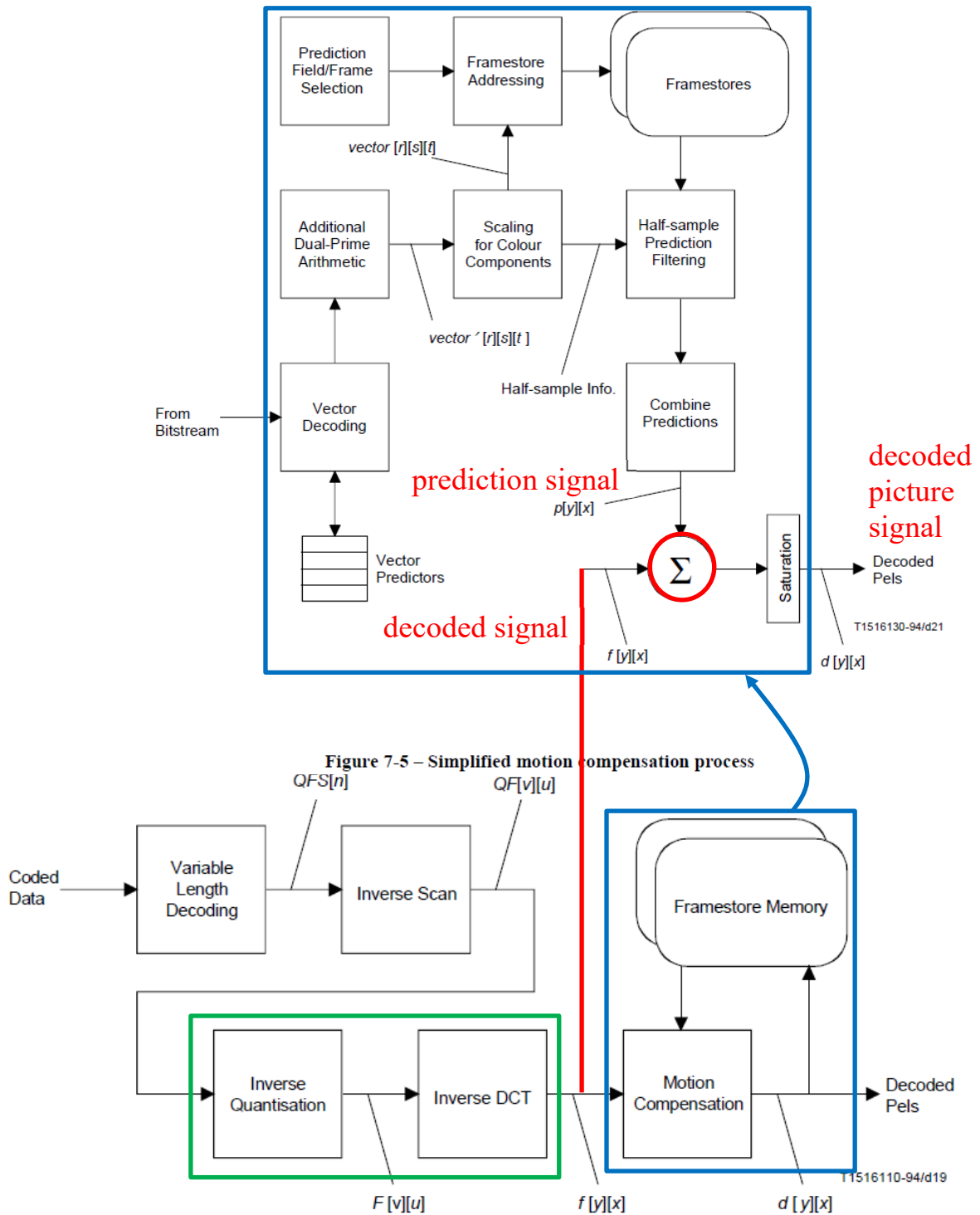
[1.3]

The Chen-736-H.262 combination renders obvious a processor that performs the algorithm steps (*supra*, Section II.C.3(c)) for the function recited in [1.3].

SAMSUNG-1003, ¶[250]. For example, Chen-736's "decompression/prediction *processor* 640" for "enhancement layer data" "provides a variety of *processing functions*, such as error detection and correction, motion vector decoding, *inverse quantization, inverse discrete cosine transformation*, Huffman decoding and *prediction calculations*, for instance." SAMSUNG-1005, 19:64-20:17, FIG. 6.

Chen-736 further describes "inter-frame compression schemes... using motion compensation data and block-matching motion estimation algorithms... combined with block-based spatial compression techniques such as the discrete cosine transform (DCT)." SAMSUNG-1005, 1:37-51. A POSITA understood that the inverse discrete cosine transform is an inverse orthogonal transform. SAMSUNG-1003, ¶[250]; SAMSUNG-1018, 1:16-17; SAMSUNG-1019, 25:61-64; SAMSUNG-1020, 1:30-51, 2:56-61. Further, Chen-736's "memory manager 630 also communicates with a decomposition/prediction processor 640, and receives decoded lower level data via terminal 650 which may be stored temporarily in the memory 620 for subsequent use by the processor 640 in *decoding disparity predicted enhancement layer pictures*." SAMSUNG-1005, 20:8-13, 2:32-34, 5:15-20.

To the extent Chen-736 lacks details regarding the processing functions performed by the decompression/prediction processor 640 for enhancement layer data, H.262 “specifies the decoding process that a decoder shall perform to reconstruct frames from the coded bitstream.” SAMSUNG-1006, 74. As shown in H.262 Figures 7-1 and 7-5 below, the video decoding process includes the steps of generating a prediction signal by performing motion-compensated prediction from one or more reference pictures and one or more motion vectors (functions in blue box), generating a decoded signal by performing inverse quantization and inverse orthogonal transform on a coded signal (functions in green box), and generating a decoded picture signal by adding the decoded signal (red line from Figure 7-1 to 7-5) and the prediction signal (function in red circle). SAMSUNG-1003, ¶[251].



SAMSUNG-1006, 74, 83 (Figures 7-1 and 7-5 collated).

H.262 also discloses that an “enhancement layer is coded using Temporal Scalability tools and *a hybrid prediction of motions and disparity can be utilized in the enhanced layer.*” SAMSUNG-1006, 122. Indeed, the ’150 Patent Background section admits that H.262 includes motion-compensated prediction and disparity-compensated prediction. SAMSUNG-1001, 3:20-35. The Chen-736+H.262 combination therefore discloses and renders obvious [1.3]. SAMSUNG-1003, ¶[252].

[1.4]

The Chen-736+H.262 combination renders obvious a processor that performs the algorithm steps (*supra*, Section II.C.3(d)) for the function recited in [1.4]. SAMSUNG-1003, ¶[253]. For example, Chen-736’s “digital receiver includes a microcomputer and memory storage elements” used to “decompress[] and decode[] the data in order to reconstruct the original video and audio signals.” SAMSUNG-1005, 1:17-26. In Chen-736, the “video DTS... indicates the time when the picture needs to be decoded by the STD” (system target decoder) and “times indicated by the... DTS are evaluated with respect to the current PCR [(program clock reference)] or SCR [(system clock reference)] value.” SAMSUNG-1005, 6:31-7:53; *supra*, Ground 1A at [2.4]. It would have been obvious that the PCR and SCR represent the present or current decoding time.

SAMSUNG-1003, ¶[253]; SAMSUNG-1007, 25, 109.

Through these operations, Chen-736's enhancement layer decoder compares the DTS value for a coded enhancement layer picture (which represents the desired delay time (*see supra*, Ground 1A at [2.pre.iv])) with the PCR/SCR (which represents the present moment) and delays decoding of the corresponding coded picture if the desired delay indicated by the DTS value is greater than the PCR/SCR. SAMSUNG-1003, ¶[254]; SAMSUNG-1007, 30-31, 65, 108-113, 130-131; SAMSUNG-1008, 37 ("The SCR field is used in the decoder to synchronize a 90 kHz system time clock (STC) common to all elementary streams, and which is used as a time base and measuring unit for the DTS and PTS time stamps sent in the packets."). The combination based on Chen-736 thus performs the recited function with a processor programmed to perform the algorithms steps of [1.4], or an equivalent. SAMSUNG-1003, ¶[254]. Also, a POSITA understood or would have found obvious that Chen-736's decoding delay operations are equivalent to the examples in the '150 specification that involve comparison of an "access-unit time counter" to a "decoded view dependency count." *Id.*

**F. [GROUND 1F] – Chen-736, H.262 Specification, and Chen-051
Render Obvious Claims 1 and 4**

**1. Combination of Chen-736, the H.262 Specification, and
Chen-051**

It would have been obvious to modify Chen-736 based on the H.262

Specification for the reasons discussed above in Ground 1E and to further modify Chen-736 based on Chen-051 for the reasons discussed above in Ground 1B. *See supra*, §§III.B.2, III.E.2. Additionally, all of these references are based on the MPEG-2 standard. *Id.*; SAMSUNG-1003, ¶[255].

2. Analysis

[1.pre]-[1.4]

The Chen-736+H.262+Chen-051 combination render these claim elements obvious for substantially the same reasons as those addressed above in the analysis of corresponding elements of Ground 1E, and further using differential DTS values based on Chen-051 as described in Ground 1B. *See supra*, §§III.B.3, III.E.3; SAMSUNG-1003, ¶[256]. Indeed, with differential DTS values, the decoder in the combination directly decodes and recovers the desired delay times as indicated by the differential DTS values and implements delays by the amounts indicated by the differential DTS values. *Id.*

[4.pre.i]-[4.pre.iii]

See supra, §III.A.2.[2.pre.i]-[2.pre.iii]; SAMSUNG-1003, ¶[257].

[4.pre.iv]

H.262 discloses a “layer_id” that “identifies the layers in a scalable hierarchy” where the “base layer [has] a layer_id = 0” and “[e]ach successive layer has a layer_id which is one greater than the layer for which it is an enhancement.”

SAMSUNG-1006, pp. 58, 179. Hence, in the context of the combination with Chen-736, according to H.262, it would have been obvious that the lower/base layer for the left viewpoint would be identified by layer_id=0 and the enhancement layer for the right viewpoint would be identified by layer_id=1. SAMSUNG-1003, ¶[258]. H.262 further explains that layer_id values are coded within the sequence_scalable_extension() fields of a scalable video bitstream like that in Chen-736 and H.262's Multi-view Profile (MPV). SAMSUNG-1006, pp. 24, 39, 58, 67. The layer_id values in the combination thus constitute and render obvious ***“coded information about view dependencies”*** since the difference in layer_id values among the lower/base and enhancement layers indicates that the coding of pictures in the enhancement layer for the right viewpoint (layer_id=1) is dependent on the coding of pictures in the lower/base layer for the left viewpoint (layer_id=0). SAMSUNG-1005, 2:20-37, FIGS. 2-5; SAMSUNG-1006, 15-16 (“base layer: First, independently decodable layer of a scalable hierarchy”; “enhancement layer:... its decoding process can be described by reference to the lower layer”), 122 (“A base layer of MVP is assigned to a left view and an enhancement layer is assigned to a right view.”); SAMSUNG-1003, ¶[258]. Accordingly, layer_id=0 for the lower/base layer would represent that the picture signals in that layer are referred to as reference signals for the encoding of each of the picture signals in the enhancement layer (layer_id=1). *Id.*

[4.1]

In the combination, and based on the teachings of the H.262 Specification, Chen-736's coded multi-view (stereoscopic) video signal would include layer_id values ("***coded information about video dependencies***") that respectively identify the bitstreams for the base/lower layer for the left viewpoint and the enhancement layer for the right viewpoint. *Supra*, [4.pre.iv]; SAMSUNG-1006, 24, 29, 58, 67; *see also* SAMSUNG-1005, 19:66-67, 20:1-13, FIG. 6. A POSITA knew that information encoded in video bitstreams is provided in the bitstream for the purpose of being used by the decoder, and hence it would have been obvious for a decoder that receives the bitstreams to decode the layer_id values and recover the view dependencies. SAMSUNG-1003, ¶[259]. For example, it would have been obvious to decode the layer_id values so that the decoder could properly recognize and distinguish between the respective bitstreams for the lower/base and enhancement layers of the stereoscopic signal. *Id.*

[4.2]

As discussed above (*supra*, §III.B.2), it would have been obvious to modify Chen-736 in view of Chen-051 so that DTS values coded in the bitstream for enhancement layer pictures would be differentially encoded thereby directly providing in the bitstream the desired decoding delay relative to the decoding of a referenced base/lower layer picture. *Supra*, §III.B.2; SAMSUNG-1003, ¶[260].

Chen-051 further teaches that a decoding timestamp (whether differential or absolute) can be omitted from the bitstream for some pictures. SAMSUNG-1011, [0025]. In the combination, it would have been obvious based on Chen-051 to provide decoding timestamps in the bitstream for some pictures but not others. SAMSUNG-1003, ¶[261]. A POSITA would have been motivated to omit timestamps in the bitstream for at least some pictures (including in the enhancement layer) to further compress the bitstream, reduce or eliminate redundant encoding of the same differential DTS for pictures in the enhancement layer, and thereby free up channel bandwidth that could be used more efficiently for transmission of other data. SAMSUNG-1014, pp. 4-6; SAMSUNG-1003, ¶[261].

For pictures that lack a timestamp encoded in the bitstream, Chen-051 teaches that the decoder can derive the appropriate decoding time for the picture using decoding timing information from other pictures in the bitstream. For example, Chen-051 describes how the decoding time for a non-timestamped picture can be derived by referencing a “differential decoding time” of a timestamped “intervening picture,” and adding that differential decoding time (or a multiple thereof) to the absolute DTS of a reference picture. SAMSUNG-1011, [0028], [0030], FIG. 4. Applying Chen-051’s teachings in this regard to Chen-736, in the combination, it would have been obvious for the decoder to determine the

decoding start time for each non-timestamped picture in the enhancement layer by

(i) computing the desired decoding delay time for the decoding picture—i.e., specifically by determining the “differential decoding time” of an intervening (timestamped) enhancement layer picture and similarly applying it as the “differential decoding time” for the non-timestamped picture (since Chen-736 discloses that the desired delay time between DTS_{Ei} and DTS_{Li} is constant for all i in many examples (*see, e.g.*, SAMSUNG-1005, Tables 2, 3, 12)) and (ii) adding the computed differential decoding time (“*desired delay time*”) to the absolute DTS of the corresponding lower/base layer picture consistent with the calculations described in Chen-736. SAMSUNG-1005, 10:8, 10:49, 11:49-50, 16:64. The absolute DTS of the corresponding lower/base layer picture can be transmitted in the bitstream or derived by the decoder. SAMSUNG-1011, [0025]-[0028]; SAMSUNG-1003, ¶[262].

It would have been obvious to implement the decoder in the Chen-736-H.262+Chen-051 combination to perform the above-described operations (including computing desired delay times for the non-timestamped enhancement layer pictures) in response to the recovered “layer_id” values (“*view dependency information*”), especially since the decoder would only ever have need to (and would only) compute the desired delay time for non-timestamped enhancement layer pictures for the right viewpoint and not any base/lower layer pictures for the

left viewpoint. SAMSUNG-1003, ¶[263]. As described above, a POSITA would have found it obvious for the decoder to distinguish pictures in the base/lower layer stream from the enhancement layer stream based on the recovered “layer_id” values, and thus the computation of desired delay times for the non-timestamped enhancement layer pictures would be performed in response to the recovered view dependency information. *Supra*, [4.1]. Indeed, any non-timestamped pictures in the base/lower layer would be derived using values distinct from the “differential encoding time” for enhancement layer pictures that represents the desired decoding delay. SAMSUNG-1003, ¶[263].

[4.3]

See supra, §III.A.2.[2.2]; SAMSUNG-1003, ¶[264].

[4.4]

See supra, §III.A.2.[2.3]; SAMSUNG-1003, ¶[265].

[4.5]

See supra, §III.A.2.[2.4]; SAMSUNG-1003, ¶[266].

**G. [GROUND 1G] – Chen-736, Tseng, and H.262 Specification
Render Obvious Claim 1**

**1. Combination of Chen-736, Tseng, and the H.262
Specification**

It would have been obvious to modify Chen-736 based on Tseng and H.262 for the reasons discussed above in Grounds 1C and 1E, respectively. *See supra*, §§III.C.2, III.E.2; SAMSUNG-1003, ¶[267]. Additionally, all of these references

are based on the MPEG-2 standard. *Id.*

2. Analysis

[1.pre]-[1.4]

The Chen-736+Tseng+H.262 combination renders these claim elements obvious for substantially the same reasons as those addressed above in 1E, and further in the context of a system having multiple non-base viewpoints as described above in Ground 1C based on Tseng. *See, supra*, §§III.C.3, III.E.3; SAMSUNG-1003, ¶[268].

H. [GROUND 1H] – Chen-736, Tseng, H.262 Specification, and Chen-051 Render Obvious Claims 1 and 4

1. Combination of Chen-736, Tseng, the H.262 Specification, and Chen-051

It would have been obvious to modify Chen-736 in view of Tseng, the H.262 Specification, and Chen-051 for the reasons discussed in Grounds 1B, 1C, 1E, and 1F respectively. *See, supra*, §§III.B.2, III.C.2, III.E.2, III.F.1; SAMSUNG-1003, ¶[269]. Additionally, all of these references are based on the MPEG-2 standard. *Id.*

2. Analysis

[1.pre]-[1.4] and [4.pre]-[4.5]

The Chen-736+Tseng+H.262+Chen-051 combination renders these claim elements obvious for substantially the same reasons as those addressed above in Grounds 1B, 1C, 1E, and 1F. *See supra*, §§III.B.3, III.C.3, III.E.3, III.F.2;

SAMSUNG-1003, ¶[270].

IV. PTAB DISCRETION SHOULD NOT PRECLUDE INSTITUTION

A. Discretionary Denial under 325(d) is not warranted

Because the '150 Patent's prosecution did not involve any discussion between the applicant and the Examiner regarding the teachings of the prior art applied in this Petition, the invalidity challenge based on the prior art asserted in this Petition is not the same as, or substantially similar to, art and arguments previously presented to the Office in connection with the '150 Patent. *See, generally, SAMSUNG-1002; supra, Section II.B.* Moreover, even if any of these references were somehow considered to be cumulative, the prosecution history never examined any of the claims in view of the asserted combinations of prior art references applied in this petition. Accordingly, neither condition of the first prong of the *Advanced Bionics* framework is met, and there is no need to reach the second prong to resolve against discretionary denial under Section 325(d). *See, e.g., Oticon Medical AB et. al. v. Cochlear Ltd.*, IPR2019-00975, Paper 15 at 20 (PTAB Oct. 16, 2019) (precedential). To the extent file history contains any prior art teachings or arguments cumulative to those presented in this Petition, the Examiner erred in not recognizing the significance of those teachings or arguments in relation to the unpatentability of claims 1-4.

B. 35 U.S.C. §314(a) – Discretionary Denial is not Merited in view of Petitioner’s *Sotera* Stipulation

In *Apple Inc. v. Fintiv, Inc.*, the Board enumerated six factors to determine whether a petition should be discretionarily denied institution under §314(a). IPR2020-00019, Paper 11 at 2-3 (PTAB “precedential” Mar. 20, 2020) (“*Fintiv*”). In June 2022, the USPTO issued updated discretionary denial guidance in view of the *Fintiv* factors and expressly noted that *the PTAB will not discretionarily deny institution if Petitioner presents a Sotera stipulation.* SAMSUNG-1022, 3, 7-8. Here, Petitioner has eliminated any risk of duplicated effort by voluntarily presenting a *Sotera* stipulation to Patent Owner. SAMSUNG-1023; *Sotera Wireless, Inc. v. Masimo Corp.*, Case IPR2020-01019, Paper 12 (PTAB Dec. 1, 2020). For at least this reason, the Board should not discretionarily deny this petition.

V. CONCLUSION AND FEES

The Challenged Claims are unpatentable. Petitioner authorizes charge of fees to Deposit Account 06-1050.

VI. MANDATORY NOTICES UNDER 37 C.F.R § 42.8(a)(1)

A. Real Party-In-Interest Under 37 C.F.R. § 42.8(b)(1)

Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc. (collectively, “Samsung”) are the real parties-in-interest.

B. Related Matters Under 37 C.F.R. § 42.8(b)(2)

The '150 Patent is the subject of a civil action, *Advanced Coding Technologies LLC v. Samsung Electronics Co., Ltd. et al.*, 2:22-cv-00499-JRG, E.D. Tex., filed December 30, 2022 (SAMSUNG-1004).

Petitioner is not aware of any other disclaimers, reexamination certificates, or IPR petitions addressing the '150 Patent.

C. Lead And Back-Up Counsel Under 37 C.F.R. § 42.8(b)(3)

Petitioner provides the following designation of counsel.

Lead Counsel	Backup counsel
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D. Service Information

Please address all correspondence and service to the address listed above.

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Respectfully submitted,

Dated 12/08/2023

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CERTIFICATION UNDER 37 CFR § 42.24

Under the provisions of 37 CFR § 42.24(d), the undersigned hereby certifies that the word count for the foregoing Petition for *Inter Partes* Review totals 13,987 words, which is less than the 14,000 allowed under 37 CFR § 42.24.

Dated 12/08/2023

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CERTIFICATE OF SERVICE

Pursuant to 37 CFR §§ 42.6(e)(4)(i) *et seq.* and 42.105(b), the undersigned certifies that on December 8, 2023, a complete and entire copy of this Petition for *Inter Partes* Review and all supporting exhibits were provided via Federal Express, to the Patent Owner, by serving the correspondence address of record as follows:

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