

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

UNIFIED PATENTS INC.,
Petitioner,

v.

GE VIDEO COMPRESSION, LLC,
Patent Owner.

IPR2019-00617
Patent 9,729,891 B2

Before JONI Y. CHANG, JOSIAH C. COCKS, and
MICHELLE N. WORMMEESTER, *Administrative Patent Judges*.

CHANG, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining No Challenged Claims Unpatentable
35 U.S.C. § 318(a)

I. INTRODUCTION

Unified Patents Inc. (“Petitioner”) filed a corrected Petition requesting an *inter partes* review of claims 1–3, 6, 7, 10–13, 16, 17, 20–22, 25, 26, and 28–30 (“the challenged claims”) of U.S. Patent No. 9,729,891 B2 (Ex. 1001, “the ’891 patent”). Paper 7 (“Pet.”). GE Video Compression, LLC (“Patent Owner”) filed a Preliminary Response. Paper 8 (“Prelim. Resp.”). Upon consideration of the Petition and Preliminary Response, we instituted an *inter partes* review as to all of the challenged claims and all of the grounds of unpatentability asserted in the Petition. Paper 9 (“DI”).

Subsequent to institution, Patent Owner filed a Response (Paper 13, “PO Resp.”) and Petitioner filed a Reply (Paper 17, “Pet. Reply”). Patent Owner also filed a Sur-reply (Paper 23, “Sur-reply”). An oral hearing was held on March 5, 2020, and a transcript has been entered into the record as Paper 26 (“Tr.”).

This Final Written Decision is entered pursuant to 35 U.S.C. § 318(a). For the reasons that follow, Petitioner has not demonstrated by a preponderance of the evidence that claims 1–3, 6, 7, 10–13, 16, 17, 20–22, 25, 26, and 28–30 of the ’891 patent are unpatentable.

A. *Related Matters*

The parties indicate that they are unaware of any other proceedings involving the ’891 patent. Pet. 5; Paper 3, 1.

B. *The ’891 Patent*

The ’891 patent is related to sample array coding (e.g., picture or video coding), describing systems and methods for entropy encoding and

decoding a video stream. Ex. 1001, 1:15–16, 1:47–67. The '891 patent explains that “the code efficiency in terms of compression rate, increases with an improvement of the probability estimation: the better the probability estimation matches the actual symbol statistics, the better the compression rate.” *Id.* at 7:34–38. To improve the coding efficiency and reduce processing, the disclosed invention uses probability estimates from nearby portions of an image within a video stream. *Id.* at 1:47–67.

C. Illustrative Claim

Of the challenged claims, claims 1, 11, 20, and 28 are independent. Claims 2–3, 6, 7, and 10 depend from claim 1; claims 12, 13, 16, and 17 depend from claim 11; claims 21, 22, 25, and 26 depend from claim 20; and claims 29 and 30 depend from claim 28. Claim 1 is illustrative:

1. A decoder for reconstructing a sample array from an entropy-encoded data stream, comprising:

[a] an entropy decoder configured to entropy decode a plurality of slice subsets in the entropy-encoded data stream so as to reconstruct different portions of the sample array, each slice subset comprising entropy-encoded data for a corresponding portion of the sample array, and the different portions forming rows of blocks of the sample array, each row having a same number of blocks,

[b] wherein the entropy decoder is configured to:

perform, for each slice subset, entropy decoding along a respective entropy coding path leading in parallel along the rows of the blocks, using a first probability estimation by:

[b1] *initializing the first probability estimation before decoding a first block of a first row corresponding to the slice subset based on a second probability estimation of a second*

block of a second row, the second row spatially-neighboring the first row and corresponding to a preceding slice subset, wherein entropy decoding of the preceding slice subset begins before the entropy decoding of the slice subset, and

[b2] *adapting the first probability estimation* along the entropy coding path using a previously-decoded part of the slice subset.

Ex. 1001, 31:64–32:22 (bracketed matter and emphasis added).

D. Prior Art Relied Upon

Petitioner relies upon the references listed below. Pet. 4–5.

Pateux WO 2011/042645 A1 Apr. 14, 2011 (Ex. 1004)¹

Huang US 9,467,699 B2 Oct. 11, 2016 (Ex. 1006)

Detlev Marpe et al., *Context-Based Adaptive Binary Arithmetic Coding in the H.264/AVC Video Compression Standard*, 13 IEEE TRANSACTIONS ON CIRCUITS & SYS. FOR VIDEO TECH., 620–636, (July 3003) (Ex. 1015, “Marpe”).

E. Asserted Grounds of Unpatentability

Petitioner asserts the following grounds of unpatentability (Pet. 7):

Claims Challenged	35 U.S.C. §	Reference(s)/Basis
1–3, 10–13, 20–22, 28–30	103	Pateux, the knowledge of a person having ordinary skill in the art (“PHOSITA”)
1–3, 6, 7, 10–13, 16, 17, 20–22, 25, 26, 28–30	103	Huang, Marpe

¹ Our citation to the written disclosure of Pateux is to the English translation in Exhibit 1005, referring to the page number added by Petitioner on the lower right corner. Figures of Pateux are provided in Exhibit 1004.

II. ANALYSIS

A. Level of Ordinary Skill in the Art

In determining the level of ordinary skill in the art, various factors may be considered, including the “type of problems encountered in the art; prior art solutions to those problems; rapidity with which innovations are made; sophistication of the technology; and educational level of active workers in the field.” *In re GPAC, Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995) (citation omitted). Petitioner asserts that a person with ordinary skill in the art would have had (1) at least an undergraduate degree in computer science, computer engineering, electrical engineering, or a similar technical field; (2) a working knowledge of video coding techniques; and (3) two or more years of experience, or with a graduate degree in those fields, one or more years of experience, in analysis, design, or development related to video encoding, with additional education substituting for experience and vice versa. Pet. 8; Ex. 1003 ¶ 27. Patent Owner generally agrees with Petitioner’s assessment. Prelim. Resp. 23; Ex. 2002 ¶ 19; *see generally* PO Resp. Therefore, we apply Petitioner’s assessment regarding the general knowledge of a person with ordinary skill in the art. We further note that the prior art of record in the instant proceeding reflects the appropriate level of ordinary skill in the art. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1354–55 (Fed. Cir. 2001) (often “the prior art itself reflects an appropriate level” of ordinary skill in the art).

B. Claim Construction

In an *inter partes* review proceeding, a patent claim shall be construed using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. § 282(b). 37 C.F.R. § 42.100(b) (2019). This rule adopts the same claim construction standard used by Article III federal courts, which follow *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc), and its progeny. Under that standard, the words of a claim are generally given their “ordinary and customary meaning,” which is the meaning the term would have to a person of ordinary skill at the time of the invention, in the context of the entire patent including the specification. *See Phillips*, 415 F.3d at 1312–13.

In light of the parties’ arguments and evidence, we find that it is necessary to construe only the terms identified below expressly in this proceeding. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)) (noting that “we need only construe terms ‘that are in controversy, and only to the extent necessary to resolve the controversy’”).

1. “slice subset”

Claim 1 recites:

an entropy decoder configured to entropy decode a plurality of *slice subsets* in the entropy-encoded data stream so as to reconstruct different portions of the sample array, *each slice subset* comprising *entropy-encoded data* for a corresponding portion of the sample array, and the different portions *forming*

rows of blocks of the sample array, each row having a same number of blocks.

Ex. 1001, 31:66–32:6 (emphases added).

Petitioner asserts that a person of ordinary skill in the art would have understood the claim term “slice subset” as “entropy slice.” Pet. 12. Patent Owner agrees with Petitioner’s interpretation. Prelim. Resp. 8 n.4; *see generally* PO Resp.; Ex. 2002 ¶ 18. Petitioner’s proposed claim construction is consistent with the claim language “each slice subset comprising entropy-encoded data . . . and the different portions forming rows of blocks of the sample array, each row having a same number of blocks.” It is also consistent with the Specification. Figure 2 is reproduced below.

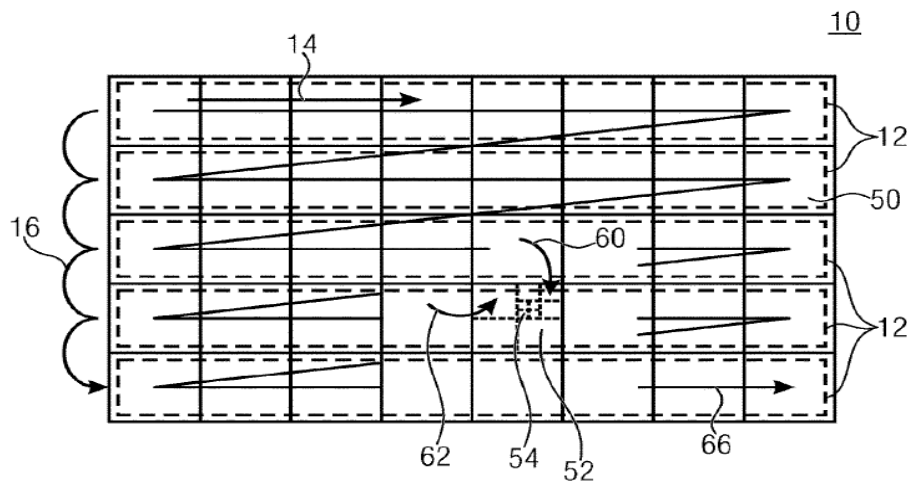


Figure 2 above shows an exemplary subdivision of sample array 10 into different portions 12. Ex. 1001, 9:2–3. Each portion corresponds to an entropy slice, and includes a row of coding units 50. *Id.* at 9:4–6.

In light of the Specification, we adopt Petitioner’s proposed claim construction, interpreting the claim term “slice subset” as “entropy slice.”

2. “initializing” and “adapting the first probability estimation”

Claim 1 recites:

wherein the entropy decoder is configured to:

[(b) the “coding” element:] perform, *for each slice subset, entropy decoding along a respective entropy coding path* leading in parallel along the rows of the blocks, *using a first probability estimation* by:

[(b1) the “initializing” element:] *initializing the first probability estimation before decoding a first block of a first row* corresponding to the slice subset based on a second probability estimation of a second block of a second row, the second row spatially-neighboring the first row and corresponding to a preceding slice subset, wherein entropy decoding of the preceding slice subset begins before the entropy decoding of the slice subset, and

[(b2) the “adapting” element:] *adapting the first probability estimation along the entropy coding path* using a previously-decoded part of the slice subset.

Ex. 1001, 31:66–32:22 (bracketed matter and emphases added).

Independent claims 11, 20, and 28 each require similar claim elements.² By virtue of their dependency, each of dependent claims 2–3, 6, 7, 10, 12, 13, 16, 17, 21, 22, 25, 26, 29, and 30 also requires these elements. Both parties analyze claim 1 as representative. PO Resp. 2–57; Pet. Reply 1–16; Sur-reply 1, 4–24. In our analysis below, we also analyze claim 1 as representative.

² Claims 1 and 11 recite “decoding,” whereas claims 20 and 28 recite “encoding.” We use the term “coding” in this Decision to refer to either decoding or encoding.

During this trial, Petitioner maintains that the claim term “a first block,” as recited in the “initializing” element, distinguishes the block from “a second block” and is simply *the block that is currently being decoded* as the decoding proceeds “along a respective entropy coding path.”

Pet. 18–19; *id.* at 3–4, 22; Pet. Reply 5–6. Petitioner argues that “‘a first block’ allows that each row can have *more than one* ‘first block’ as decoding proceeds ‘along a respective entropy coding path.’” Pet. Reply 5–6 (emphasis added). In addition, Petitioner construes the “initializing” element to encompass “initialization of a probability estimate *for each block* of a slice *on a block-by-block basis* with each block’s probability estimate being adapted after it is initialized.” *Id.* at 1 (emphases added).

Patent Owner disagrees with Petitioner and argues that “a first block” means the *very first* block of the slice subset in order to be consistent with the entire claim and Specification. PO Resp. 6–56. Patent Owner also argues that initialization is only carried out *once for each entropy slice*. *Id.*

Upon consideration of the parties’ contentions and supporting evidence in the entire trial record, we agree with Patent Owner’s claim construction and adopt it as our own. Based on the entirety of the trial record, we find that Petitioner’s proposed claim construction is inconsistent with the claim language and Specification. We address each of Petitioner’s arguments in turn.

At the outset, we recognize that the U.S. Court of Appeals for the Federal Circuit (“the Federal Circuit”) “has repeatedly emphasized that an indefinite article ‘a’ or ‘an’ in patent parlance carries the meaning of ‘one or more’ in open-ended claims containing the transitional phrase ‘comprising.’”

Baldwin Graphic Sys., Inc. v. Siebert, Inc., 512 F.3d 1338, 1342 (Fed. Cir. 2008) (quoting *KCJ Corp. v. Kinetic Concepts, Inc.*, 223 F.3d 1351, 1356 (Fed. Cir. 2000)). But, the Federal Circuit also has held that an exception to that general rule arises, as here, where the language of the claims themselves, the specification, or the prosecution history necessitate a departure from the rule. *Id.*; *Abtox Inc. v. Exitron Corp.*, 122 F.3d 1019 (Fed. Cir. 1997); *Insituform Techs., Inc. v. Cat Contracting, Inc.*, 99 F.3d 1098 (Fed. Cir. 1996).

In our analysis below, like the court in *Abtox*, we “seek the meaning of the claim terms by examining their fuller context.” *Abtox*, 122 F.3d at 1024. We also review the Specification because it “supplies additional context for understanding whether the claim language limits the patent scope to a single unitary [first block] or extends to encompass a device with multiple [first blocks].” *Id.*; *see also Insituform*, 99 F.3d at 1105–06. And, the Specification is the “single best guide to the meaning of a disputed term” and “[u]sually, it is dispositive.” *Phillips*, 415 F.3d at 1315.

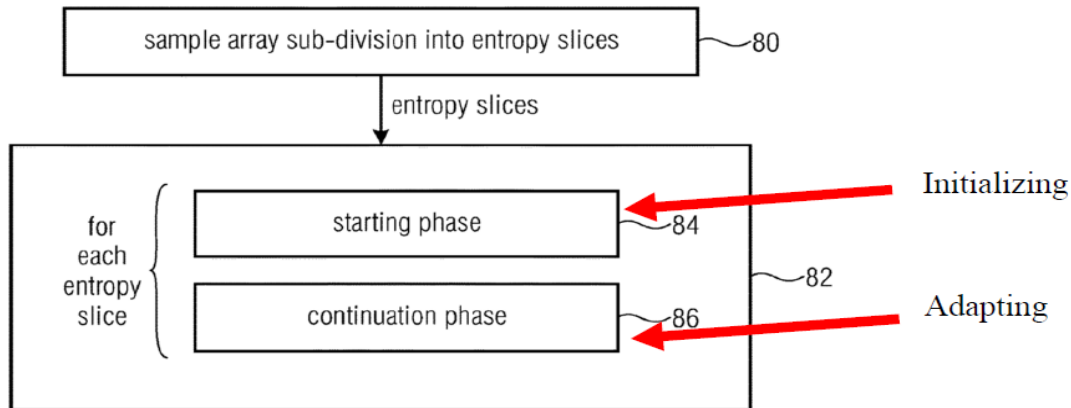
Here, nothing in the text of claim 1 suggests that more than one “first block” in each slice subset is being coded, or that the initialization is performed more than once for each slice subset. Petitioner improperly presumes that initialization is performed repeatedly “along a respective entropy coding path” for each block in the slice subset. *See e.g.*, Pet. Reply 2–3.

Dr. Lippman conceded during his cross-examination that “along the entropy coding path” is not recited in the “initializing” element, but instead it is recited only in the “decoding” element and the “adapting” element.

Ex. 2019, 44:16–46:11. Dr. Kamp agrees that “along the entropy coding path” is not recited in the “initializing element,” and testifies that this “is clear indication that *initializing* is only carried out *once per slice subset*, and that it is carried out *prior to* decoding (or encoding) *the very first block* of the slice subset.” Ex. 2002 ¶ 33 (emphases added). We credit Dr. Kamp’s testimony as it is supported by the claim language and Specification.

Indeed, the Specification consistently uses the term “first block” to refer to the very first block in an entropy slice. *See, e.g.*, Ex. 1001, 10:30–35, 11:42–49, 12:34–45, 16:18–29, 17:57–60, 18:43–51, 23:18–63. The Specification also consistently describes that initialization occurs *only once* at the starting phase *before* coding (encoding or decoding) *the very first block* of each entropy slice. *See, e.g., id.* at 3:65–4:2 (“the dependency on probability estimations as used in the entropy coding of a spatially neighboring, in entropy slice order preceding entropy slice may involve *the initialization* of the probability estimations *at the beginning of entropy coding* the predetermined entropy slice” (emphases added)), 4:15–22 (“This process is accelerated by *initializing* the probability estimations *at the beginning of entropy coding* the current/predetermined entropy slice” (emphases added)), 8:45–54, 9:50–62, 10:19–25, 12:34–45 (“the decoder 40 . . . is configured to perform, for an entropy slice 90 such as the n-th, an *initialization* of its probability estimations 94 *before decoding the first segment* 92 corresponding to the *first coding unit/first block* 50” (emphases added)).

Figure 3 is reproduced below with Patent Owner's annotations added.
PO Resp. 25.



Annotated Figure 3 above illustrates a flow diagram of the functionalities of an encoder, and is similar to Figure 7 that illustrates a flow diagram of functionalities of a decoder. *Id.* at 4:66–66, 14:30–33, 14:47–53, Figs. 3, 7. The Specification describes that “[f]or each entropy slice, the entropy coding may be structured into a starting phase 84 and a continuation phase 86.” *Id.* at 9:51–53; 14:47–53. Starting phase 84 involves “*the initialization of the probability estimations as well as the triggering of the actual entropy coding process* for the respective entropy slice.” *Id.* at 9:53–56; 10:30–32 (emphases added). “The actual entropy coding is then performed during the continuation phase 86.” *Id.* at 9:56–57 (emphasis added). “The entropy coding during phase 86 is performed along the respective entropy coding path 14.” *Id.* at 9:57–59. During continuation phase 86, the probability estimations used in entropy coding are continuously *updated* “along the entropy coding path 14 so that the probability estimations *increasingly better adapt* the actual symbol statistics of the respective entropy slice 90.” *Id.* at 10:19–25 (emphasis added).

In short, the Specification consistently describes that the initialization of the first probability estimations occurs *only once* for each entropy slice at the starting phase *before coding the very first block* of the entropy slice, not repeatedly for each block as Petitioner contends.

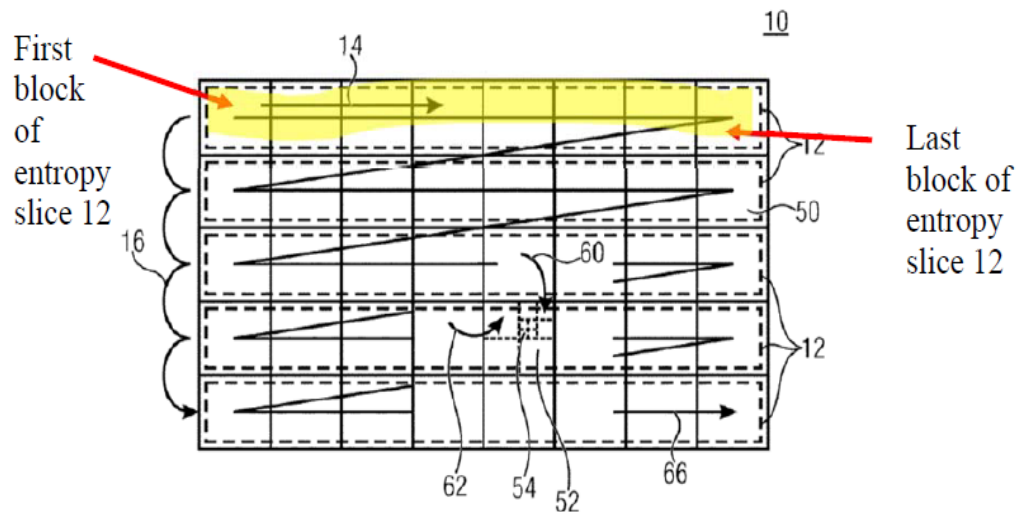
Petitioner improperly presumes that “[b]oth sub-components of the claimed entropy decoding process (i.e., initializing and adapting) are expressly required to be performed ‘*along a respective entropy coding path.*’” Pet. Reply 2 (emphasis added). As discussed above, Dr. Lippman conceded that “along the entropy coding path” is not recited in the “initializing” element. Ex. 2019, 44:16–46:11. Nothing in the Specification indicates that both initializing and adapting are required to be performed “along a respective entropy coding path.” *See, e.g.*, Ex. 1001, 9:50–10:57.

Moreover, Petitioner’s argument that “Claim 1 certainly *permits*, if not requires, that the ‘initializing’ element is iteratively performed as part of the decoding process ‘along a respective entropy coding path’” is misplaced. Pet. Reply 2–3 (emphasis added). As our reviewing court has explained, “[t]he correct inquiry [for construing claim terms] in light of the specification is not whether the specification proscribes or precludes some broad reading of the claim term . . . [a]nd it is not simply an interpretation that is not inconsistent with the specification,” but rather “[i]t is an interpretation that corresponds with what and how the inventor describes his invention in the specification, i.e., an interpretation that is consistent with the specification.” *In re Smith Int’l, Inc.*, 871 F.3d 1375, 1382–83 (Fed. Cir. 2017) (citation and internal quotation marks omitted).

Therefore, in the context of the '891 patent, the “initializing” element indicates that initialization occurs *only once* for each slice subset and it must be performed *before coding the very first block* of the slice subset.

This is consistent with other claim elements that require coding and adapting along an entropy coding path. For example, the “decoding” element of claim 1 requires decoding each slice subset “along a respective entropy coding path . . . using a first probability estimation.” Ex. 1001, 32:7–10. The “adapting” element requires “adapting the first probability estimation along the entropy coding path.” *Id.* at 32:20–22.

The Specification consistently discloses that the very first block of the entropy slice is the first block to be coded within the entropy slice. Figure 2 is reproduced below with annotations added by Patent Owner. PO Resp. 10.



Annotated Figure 2 above shows a schematic diagram of a partitioning of sample array 10 into entropy slices 12, having rows of blocks 50. *See* Ex. 1001, 4:63–65; 6:5–22, 9:2–19. As shown, the first slice 12 (highlighted in yellow) includes a single first block (left red arrow), which is the very first block in the slice. For each slice 12, respective entropy coding

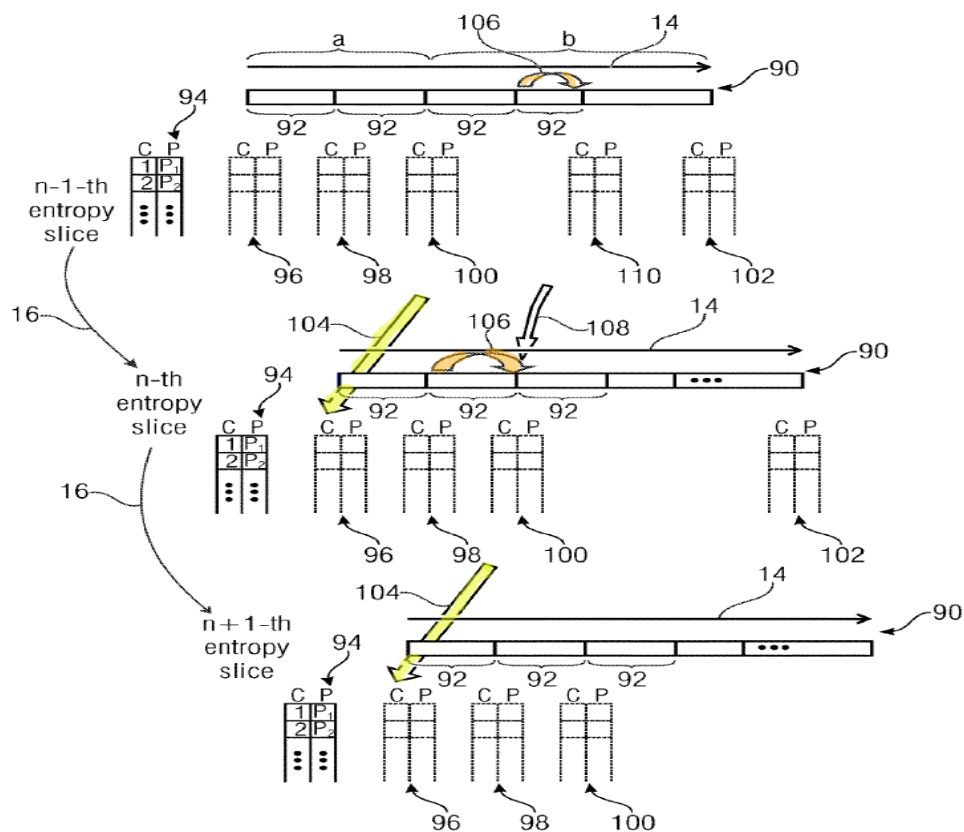
path 14 runs along the row direction, in parallel to each other from left to right, so that *coding starts from the very first block* to the last block in the row. *Id.* at 9:16–26, 10:15–64.

Further, we are not persuaded by Petitioner’s argument “a first block” distinguishes the block from “a second block” and is simply the block that is currently being decoded as the decoding proceeds “along a respective entropy coding path.” Pet. 18–19; Pet. Reply 5–6. The “initializing” element recites “a first block of a first row corresponding to the slice subset” and “a second block of a second row.” As Patent Owner explains, the terms “a first block” and “a second block” are used to identify each block’s position or order in the respective row or slice, consistent with their plain and ordinary meanings. PO Resp. 11–12. Specifically, “a first block” means the very first block in the entropy slice, and “a second block” means the number two block in the respective entropy slice. This is consistent with the claim language and Specification.

As Patent Owner explains, Patentee used the article “a” before “first block” and “second block” when first introducing each claim term to satisfy the requirement that claim terms have proper antecedent basis. PO Resp. 13. Moreover, Patentee expressly defines the relationship between “first and “second” when these terms are used in a manner different from their plain and ordinary meaning. For example, claim 1 expressly defines the relation between the first and second *rows*—namely, “the second row spatially-neighboring the first row and corresponding to a preceding slice subset.” Ex. 1001, 32:14–19. This express definition for the first and second *rows*

does not imply that the claimed first and second *blocks* should not be given their plain and ordinary meanings consistent with the Specification.

Furthermore, the Specification discloses that initialization occurs only once at the starting phase before coding the *very first block* of the current entropy slice based on the probability estimations of the *second block* of the preceding entropy slice. Ex. 1001, 9:50–10:57, 12:34–45, Fig. 4. Figure 4 of the '891 patent is reproduced below with our highlighting added.



Highlighted Figure 4 above illustrates initialization 104 (yellow) and adaptation 106 (orange) with respect to $n-1^{\text{th}}$, n^{th} , and $n+1^{\text{th}}$ entropy slices 90, which correspond to three consecutive slices 12 of sample array 10. *Id.* at 10:10–57. The Specification describes that, along entropy coding path 14,

each entropy slice 90 is segmented into a sequence of segments 92, each of which corresponds to a respective coding units/blocks 50. *Id.* at 10:15–18.

The Specification clearly discloses that, for each entropy slice, *initialization* 104 occurs only once during starting phase 84 before coding the very first segment (block) of the slice. In particular, the Specification discloses that, during starting phase 84, probability estimations 94 (“the first probability estimation”) is initialized (as shown by arrow 104) only once prior to coding *first segment* 92 (the left-most segment or the very first block) of n^{th} entropy slice 90 based on the probability estimations of *second segment* 92 of the preceding $n-1^{\text{th}}$ slice (“second probability estimation of a second block of a second row, the second row spatially-neighboring the first row and corresponding to a preceding slice subset”). *Id.* at 10:19–57. Probability estimations 94, as initialized, prior to coding first segment 92 is denoted by initial state 96. *Id.* at 10:31–38, 10:46–51.

The Specification further discloses *adaptation* 106, in which “[t]he probability estimations used in entropy coding the entropy slice 90 are continuously *updated* during the continuation phase 86 along the entropy coding path 14 so that the probability estimations increasingly better *adapt* the actual symbol statistics of the respective entropy slice 90.” *Id.* at 10:19–38 (emphases added). The state after coding the first segment is denoted by state 98. *Id.* Probability estimations 94, as adapted after coding the first two segments is denoted by state 100. *Id.* at 10:26–28, 10:34–35.

In short, the Specification discloses initialization occurs *only once* at starting phase *before coding the very first block* of the entropy slice based on the probability estimation of *the second block* of the preceding entropy slice.

This is consistent with the claim language of the “initializing” element, as construed by Patent Owner.

Therefore, we are not persuaded by Petitioner’s argument that “a first block” distinguishes the block from “a second block” and is simply the block that is currently being decoded as the decoding proceeds “along a respective entropy coding path.” Pet. 18–19; Pet. Reply 5–6.

In view of the foregoing, we determine that the term “a first block” does not encompass *more than one* “first block” because “a first block,” as recited in the “initializing” element, refers to *the very first block* of the slice subset, consistent with the entire claim and the Specification. As such, the text of claim 1 itself and the Specification necessitate a departure from the general rule that “an indefinite article ‘a’ or ‘an’ in patent parlance carries the meaning of ‘one or more’ in open-ended claims containing the transitional phrase ‘comprising.’” *See Baldwin*, 512 F.3d. at 1342; *Abtox*, 122 F.3d at 1024; *Insituform*, 99 F.3d at 1105–06. Consequently, we are not persuaded by Petitioner’s argument that “‘a first block’ allows that each row can have *more than one* ‘first block’ as decoding proceeds ‘along a respective entropy coding path.’” Pet. Reply 5–6 (emphasis added).

In sum, consistent with the claim language and Specification, we interpret the claim term “a first block” as “the very first block of the entropy slice,” and construe the “initializing” element to require that, for each entropy slice, the initialization of the first probability estimation is performed *only once prior to coding the very first block* of the slice, not repeatedly for each block as Petitioner alleges.

In addition, we do not agree with Petitioner’s proposed claim construction that interprets the “initializing” element to encompass “*initialization* of a probability estimate for each block of a slice *on a block-by-block basis* with each block’s probability estimate being adapted after it is initialized.” Pet. Reply 1 (emphases added). We address below each of Petitioner’s arguments regarding its “block-by-block” claim construction.

First, Petitioner advances several arguments that rely upon Figure 9 of the '891 patent (reproduced below).

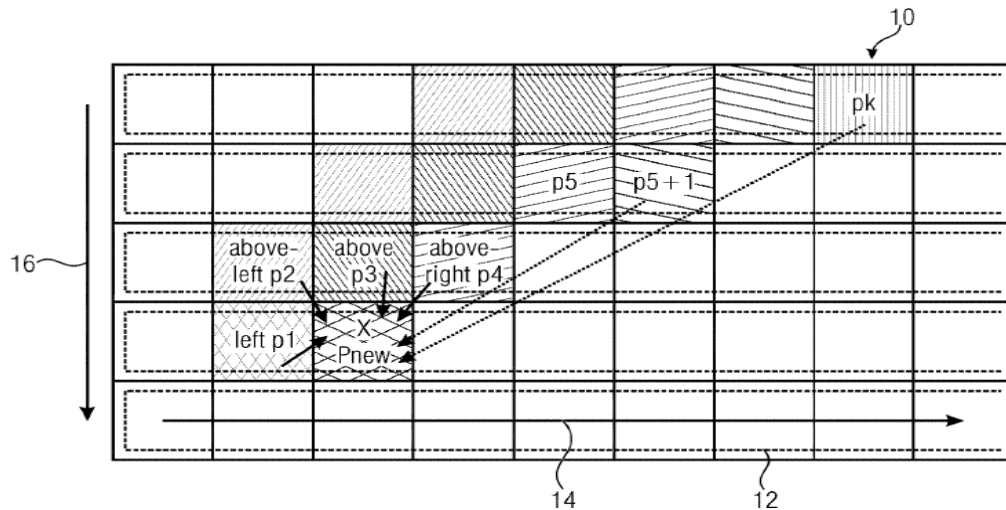


Figure 9 above shows sample array 10 divided into rows of coding units called largest coding unit (LCU). Ex. 1001, 5:11–12, 15:5–10. As shown, Pnew of current coding unit x is computed using probability estimations p1–pk of nearby preceding units. *Id.* at 15:16–31.

In this regard, Petitioner argues that “[e]ach of the arrows pointing to P_{new} indicates that probability estimates from previously entropy coded blocks are being used to *initialize* and then further adapt the probability estimate for P_{new},” and that “the block P_{new} in Figure 9 has its probability

(P) *initialized* using the probability estimates from specified adjacent blocks.” Pet. 3–4 (citing Ex. 1001, 10:19–23, 15:3–31, Fig. 9), 18–19 (citing Ex. 1001, 4:22–27) (emphases added). Petitioner also argues that “[t]he ’891 specification, in Fig. 9 and repeatedly throughout, recognizes that there must be an *initialized* probability estimation for each block in a slice before the probability estimation for that block can be adapted.” Pet. Reply 14 (emphasis added). Dr. Lippman testifies that “[a]s shown in Figure 9, the probabilities p2, p3, p4 etc. used to *initialize* the probability of Pnew in Figure 9 are in a preceding and spatially neighboring row, as required by Claim Element 1(c).” Ex. 1003 ¶ 40 (emphasis added).

We are not persuaded by Petitioner’s arguments and Dr. Lippman’s testimony. Petitioner admits that the calculation of Pnew as shown in Figure 9 is directed to *adaptation*, not initialization. Pet. Reply 9–10. Petitioner and Dr. Lippman improperly conflate adaptation with initialization.

Indeed, the portions of the Specification relied upon by Petitioner and Dr. Lippman are directed to *adaptation*, not initialization (Ex. 1001, 10:19–23, 15:3–31): (1) “the probability estimations used in entropy coding the entropy slices 90 are continuously *updated* during the *continuation phase* 86 along the entropy coding path 14 so that the probability estimations increasingly better *adapt* the actual symbol statistics” (*id.* at 10:19–23 (emphases added)); (2) “the above-discussed probability *adaptation* 106 is briefly discussed again with respect to FIG. 9” (*id.* at 15:3–4 (emphasis added)); (3) “the probability *adaptation* is not only performed from any preceding LCUs of the current entropy slice, but also from LCUs of entropy

slices preceding an entropy slice order” (*id.* at 15:20–23 (emphasis added)); and (4) new probability estimation P_{new} of current coding unit x is *computed* using probability estimations p_1 – p_k of nearby preceding units (*id.* at 15:16–31). In short, those cited portions of the Specification describe adaptation, not initialization, and they do not support Petitioner’s position that *initialization* is performed repeatedly block-by-block.

In addition, the sentence cited by Petitioner—“Low-delay coding may nevertheless be enabled by using, in initializing the probability estimations for the predetermined/current entropy slices, the probability estimations used at the neighboring part thereof” (Ex. 1001, 4:22–27)—does not support Petitioner’s arguments that “the block P_{new} in Figure 9 has its probability (P) *initialized* using the probability estimates from specified adjacent blocks.” Pet. 19. That cited sentence does not describe Figure 9’s adaptation, but rather Figure 4’s initialization. Ex. 1001, 4:22–27.

Indeed, the next sentence after the cited sentence states that “[t]his process is accelerated by *initializing* the probability estimations *at the beginning of entropy coding* the current/predetermined entropy slice.” *Id.* at 4:15–19 (emphases added). As discussed above, Figure 4’s accompanying description discloses initializing probability estimations occurs *only once at starting phase before coding the very first block* of the slice based on the probability estimation of the second block of the preceding slice (a neighboring row). *Id.* at 10:30–38, 10:53–57, 12:34–45, Fig. 4. Therefore, the cited sentence does not support Petitioner’s argument that “the block P_{new} in Figure 9 has its probability (P) *initialized* using the probability

estimates from specified adjacent blocks” or its position that initialization occurs repeatedly for each block. Pet. 19.

For the foregoing reasons, Petitioner’s arguments and Dr. Lippman’s testimony related to Figure 9 are conclusory and not supported by the Specification. Moreover, they narrowly focus on Figure 9, ignoring other portions of the Specification, including Figures 3 and 4 that disclose initializing the probability estimations only once at the starting phase before coding the very first block of the entropy slice (*see, e.g.*, Ex. 1001, 9:50–10:57, Figs. 3, 4).

Second, Petitioner argues that “the ’891 Patent expressly says that Figure 9 and its accompanying description *does* relate to the initialization of probability estimates” and that “Petitioner and its expert, Dr. Lippman, utilized Figure 9 because it disclosed both initialization of first probability estimations and the adaptation of those estimations.” Pet. Reply 13. To support that argument, Petitioner directs our attention to the following sentence: “In *the above description*, the usage of the second LCU of the upper line was also presented, i.e. the usage of the second LCU for probability estimation *initialization*” (Ex. 1001, 16:12–14 (emphases added)). *Id.* Petitioner argues that “[t]he reference to the ‘above description’ is the description of Figure 9, *Id.* at 15:2–16:29.” *Id.*

Petitioner’s arguments are conclusory and unsupported. Nothing in the Specification suggests that the P_{new} calculation shown in Figure 9 applies to initialization, as Petitioner alleges. Ex. 1001, 15:2–16:29. Petitioner already admits that the calculation of P_{new} as shown in Figure 9 is directed to *adaptation*, not initialization. Pet. Reply 9–10. The sentence

cited by Petitioner does not describe any specific features (e.g., P_{new}, p₁, p₂, p₃, p₄, p₅, p₅₊₁, or p_k) illustrated in Figure 9. The first sentence of Figure 9's accompanying description states that "the above-discussed probability *adaptation* 106 is briefly discussed again with respect to FIG. 9." *Id.* at 15:3–4 (emphasis added).

The phrase "the above description" relied upon by Petitioner does not necessarily refer to the P_{new} description of Figure 9, but rather Figure 4's initialization description. The cited sentence states that "the usage of the *second LCU of the upper line* was also presented, i.e. the usage of *the second LCU for probability estimation initialization*." *Id.* at 16:12–14 (emphases added). Figure 4's accompanying description discloses initializing the probability estimations only once at the starting phase before coding the very first block of the slice *based on the probability estimation of the second block of the preceding entropy slice*. *Id.* at 10:30–38, 10:53–57, 12:34–45.

The cited sentence also does not support Petitioner's position that initialization is performed repeatedly block-by-block. *Id.* In fact, in the very same paragraph, the Specification discloses that the probabilities "are re-initialized *at the beginning of each line* of LCUs" and that the "initialization of the probabilities of *the first LCU of each line* is occurred with the probabilities obtained after the second LCU of the previous line." Ex. 1001, 16:12–29 (emphases added). This is consistent with other portions of the Specification, which describe that initialization occurs *only once* in the starting phase *before* coding the very first block of each slice, not repeatedly block-by-block. *Id.* at 3:65–4:2, 4:15–22, 8:45–54, 9:50–62, 10:19–25, 12:34–45.

Therefore, the cited sentence does not support Petitioner's arguments that "the '891 Patent expressly says that Figure 9 and its accompanying description *does* relate to the initialization of probability estimates" and that "Petitioner and its expert, Dr. Lippman, utilized Figure 9 because it disclosed both initialization of first probability estimations and the adaptation of those estimations." Pet. Reply 13.

Third, citing to Dr. Lippman's cross-examination testimony (Ex. 2016, 30:1–31:2, 42:22–43:25, 48:6–25), Petitioner argues that "Dr. Lippman well articulated that multiple probability estimations can be *initialized* for a given slice as decoding proceeds along the decoding path, and each of those probability estimations are, in turn, adapted as part of the decoding process." Pet. Reply 16 (emphasis added). The first cited passage of Dr. Lippman's cross-examination testimony states:

Q. . . . Are you aware of encoding or decoding in which an image or a - - a frame is separated into blocks that are encoded or decoded and they're reinitialize each time - -

A. *They could be. . . .*

Q. . . . Are you aware of *any system* that operated in that manner?

A. Well, functionally, that's exactly what you do when you adapt coding. You initialize and add an adaptation to it.

Ex. 2016, 30:1–31:2 (emphasis added).

Dr. Lippman's testimony is vague. It is unclear whether Dr. Lippman was testifying the functionality of the '891 patent's invention, or speaking generally from his experience. As discussed above, the Specification of the '891 patent consistently describes that the initialization occurs *only once* at

the starting phase *before coding the very first block* of each slice, not repeatedly for each block. Ex. 1001, 3:65–4:2, 4:15–22, 8:45–54, 9:50–62, 10:19–25, 12:34–45.

The remaining cited passages of Dr. Lippman’s testimony are directed to the calculation of Pnew in Figure 9. Ex. 2016, 42:22–43:25, 48:6–25. As discussed above, Petitioner admits that the calculation of Pnew in Figure 9 is related to *adaptation*, not initialization. Pet. Reply 9–10. Once again, Petitioner and Dr. Lippman improperly conflate adaptation with initialization.

Therefore, we are not persuaded by Petitioner’s argument that “Dr. Lippman well articulated that multiple probability estimations can be *initialized* for a given slice as decoding proceeds along the decoding path, and each of those probability estimations are, in turn, adapted as part of the decoding process.” *Id.* at 16 (emphasis added).

Fourth, Petitioner argues that the ’891 patent denigrates initializing merely once at the beginning for each entropy slice because the coding efficiency and accuracy would be decreased and parallelization would be lost. Tr. 7:8–25; Ex. 1017, 3, 4 (Petitioner’s Demonstratives) (citing Ex. 1001, 8:29–40, 8:45–54). However, the cited passages of the Specification do not support Petitioner’s position that initialization is performed repeatedly for each block because the cited passages merely point out the problems related to two situations that are different from the claimed invention.

Notably, the first situation is associated with initializing once at the beginning of coding *a sample array*. Ex. 1001, 8:29–40. In contrast,

claim 1 requires initializing once at the beginning of coding *a slice subset*. Petitioner conflates “sample array” with “slice subset.” *See id.* at Fig. 2.

The second situation is associated with coding “each entropy slice *completely independent of each other* by firstly initializing the probability estimation once with then continuously updating the probability estimation for each entropy slice *individually*.” *Id.* at 8:46–50 (emphases added). In contrast, claim 1 requires certain *dependencies*, including initializing the first probability estimation based on a probability estimation of the second block of a preceding slice (a neighboring row).

Petitioner also ignores other portions of the Specification, which disclose dependencies that overcome those stated problems. For example, the Specification indicates that “[i]n order to overcome the just-mentioned problems . . . , the following encoding scheme may be used, which is now described with respect to FIG. 3” and that “in order to avoid the above-outlined penalty which would result from entropy coding each entropy slice completely independent of each other, . . . dependency [is described] more clearly, reference is made to FIG. 4.” Ex. 1001, 8:55–59, 9:63–10:57 (“By doing so, entropy coding the sequence of entropy slices 90 along the entropy slice order 16 may be parallelized with a degree of parallelization”), 10:65–11:3 (“Accordingly, the entropy coding of the entropy slices 90 could be performed in parallel in a pipelined scheduling.”).

As discussed above, the descriptions of Figures 3 and 4 (reproduced above) disclose that starting phase 84 involves “the initialization of probability estimations as well as the triggering of the actual entropy coding process for the respective entropy slice.” *Id.* at 9:53–56; 10:30–32. During

continuation phase 86, the probability estimations used in entropy coding are continuously *updated* “along the entropy coding path 14 so that the probability estimations *increasingly better adapt* the actual symbol statistics of the respective entropy slice 90.” *Id.* at 10:19–25 (emphasis added). The Specification further discloses that the initialization is performed once at starting phase before coding the *very first block* of the slice based on the probability estimation of the *second block of the preceding entropy slice*. *Id.* at 10:30–38, 10:53–57, 12:34–45.

Therefore, Petitioner’s argument that the ’891 patent denigrates initializing merely once at the beginning for each slice is unavailing. Tr. 7:8–25.

Fifth, although Petitioner concedes that dependent claims 4 and 5 and the Pnew calculation in Figure 9 are directed to *adaptation*, Petitioner argues that “[e]ach block must have a ‘first probability estimation’ ‘initialized,’ or the required adaption of the ‘first probability estimation’ would not have the necessary starting value against which to operate.” Pet. Reply 9–11.

Petitioner improperly presumes that initialization must be performed repeatedly each time when the probability estimations are updated or adapted. Petitioner again narrowly focuses on Figure 9’s adaptation disclosure, ignoring Figure 4’s initialization disclosure. As discussed above, the Specification discloses that initialization *occurs only once* at the starting phase *before coding the very first block* of the current entropy slice based on the probability estimations of the *second block* of the preceding entropy slice. Ex. 1001, 9:50–10:57, 12:34–45, Fig. 4. The Specification further discloses that “[t]he probability estimations used in entropy coding the

entropy slice 90 are continuously *updated* during the continuation phase 86 along the entropy coding path 14 so that the probability estimations increasingly better *adapt* the actual symbol statistics of the respective entropy slice 90.” *Id.* at 10:19–38 (emphases added).

Therefore, we are not persuaded by Petitioner’s argument that “[e]ach block must have a ‘first probability estimation’ ‘initialized,’ or the required adaption of the ‘first probability estimation’ would not have the necessary starting value against which to operate.” Pet. Reply 10–11.

Sixth, Petitioner argues that because “[m]ore than one ‘first probability estimation’ may be used in performing entropy decoding along the entropy code path,” “each block in turn may have its own first probability estimation initialized and subsequently adapted.” Pet. Reply 3–5. Petitioner also avers that “the specification repeatedly speaks in terms of multiple initialized probability estimates per slice.” *Id.* at 11–14 (citing Ex. 1001, 4:15–28, 8:29–40, 10:46–53).

However, Petitioner erroneously links multiple probability estimations to multiple blocks of an entropy slice. The Specification clearly explains that each probability estimation is associated with one specific *symbol*, not a *block* as Petitioner alleges. Notably, the Specification discloses that, in entropy coding, the sequence of syntax elements is converted into a sequence of symbols s_i , which are coded in an entropy-coded data stream using “a probability estimation p_i for each of the symbols.” Ex. 1001, 7:18–50 (emphasis added); *see also id.* at 8:43–45; 10:12–15.

The cited portions of the Specification do not support Petitioner's argument. Pet. Reply 11–12 (citing Ex. 1001, 4:15–28, 8:29–40, 10:46–53).

For example, one of the cited passages discloses:

Naturally, it would be possible for entropy coding state 44 to entropy code all information, i.e. *all syntax elements/ symbols s_i , relating to sample array 10 with initializing the probability estimations merely once at the beginning* thereof, and then continuously updating the probability estimations by adaptor 78.

Id. at 8:29–40 (emphasis added). This sentence is consistent with the Specification that consistently discloses each probability estimation p_i is for a syntax element s_i , not for a block. *See, e.g., id.* at 7:18–50; 10:12–15. Also, this sentence states that “initializing the probability estimations *merely once at the beginning*,” which does not support Petitioner's position that initialization is performed repeatedly block-by-block. *Id.* at 8:29–40.

Moreover, the Specification discloses that “the probability estimations used in entropy coding the entropy slices 90 are continuously updated during the continuation phase 86 along the entropy coding path 14 so that *the probability estimations increasingly better adapt the actual symbol statistics* of the respective entropy slice 90—i.e. the probability estimations are associated with the respective entropy slice.” *Id.* at 10:19–25 (emphases added). The term “first probability estimation” is recited in all three claim elements: the “coding” element, the “initializing” element, and the “adapting” element. To the extent that the claim term “a first probability estimation” is interpreted as “one or more” first probability estimations, each of the first probability estimations is associated with one specific symbol, not with a separate block. And, the first probability estimations would be

the same for initializing, as well as coding and adapting along the entropy coding path for all of the blocks in the slice subset. *Id.*

Therefore, we are not persuaded by Petitioner's argument that "each block in turn may have its own first probability estimation initialized and subsequently adapted," and that "the specification repeatedly speaks in terms of multiple initialized probability estimates per slice." Pet. Reply 3–5, 11–14.

Seventh, Petitioner argues that individual blocks are initialized because the Specification discloses that "for this very first part / block (the leftmost in each entropy slice in the figure) the adoption [sic] equals the initialization describe above." *Id.* at 6–7 (quoting Ex. 1001, 17:58–60) (the text "[sic]" is added by Petitioner). According to Petitioner, the Specification contains a typographical error—namely, "adoption" should have been "adaption." *Id.*; Tr. 15:24–16:1. Petitioner avers that "[i]n order to 'adapt the first probability estimation' for the second block from the left in a row, it is a fundamental prerequisite that there must actually be an initialized 'first probability estimation' for the second block from the left." Pet. Reply 6–7.

However, Petitioner's arguments are conclusory and not supported by the claim language or Specification. Petitioner improperly conflates "adapting" with "adopting." Claim 1 recites "adapting the first probability estimation," not adopting. Ex. 1001, 32:20–22. As Patent Owner explains, "[t]hat's not a typo in the patent," because "[y]ou adopt them, which means you use them," and "[w]hen you set it, you're adopting it." Tr. 25:12–21. In contrast, "[a]dapt means you change them"; "that's what you do in the

adaptive process when you calculate P_{new} for the next block”; and “[y]ou’re subjecting it to a computation.” *Id.* (emphasis added).

Even if we were to accept Petitioner’s erroneous reading that “adoption” should have been written as “adaption” in the ’891 patent, Petitioner’s claim construction and arguments improperly rest on the premise that the cited portion of the Specification applies to *every block*. Pet. Reply 6–7. In fact, Petitioner admits that this passage addresses only *the very first or left-most block*. *Id.* at 6 (citing Ex. 1001, 17:58–60 (“for this *very first* part / block (the *leftmost* in each entropy slice in the figure) the adoption equals the initialization described above” (emphases added))). This passage is silent as to initialization for all other blocks. Ex. 1001, 17:58–60.

More importantly, claim 1 requires *separate steps* for initializing and adapting the first probability estimation. For example, the “initializing” element requires “*initializing* the first probability estimation *before* decoding a first block of a first row,” and the “adapting” element requires “*adapting* the first probability estimation along the entropy coding path using a previously-decoded part of the slice subset.” *Id.* at 32:11–22 (emphases added). Petitioner concedes that, under its construction and its erroneous reading of the Specification, “there is *no separate adaptation step that is possible* at the left-most block.” Pet. Reply 6 (emphases added).

Therefore, we are not persuaded by Petitioner’s argument that “[i]ndividual blocks are initialized in the ’891 Patent,” and that “[i]n order to ‘adapt the first probability estimation’ for the second block from the left in a row, it is a fundamental prerequisite that there must actually be an initialized

‘first probability estimation’ for the second block from the left.” Pet. Reply 6–7.

Eighth, Petitioner argues that “the ‘first probability estimation’ for *the left-most block* cannot be adapted . . . because there is no ‘previously-decoded part of the slice subset’ . . . to adapt the ‘first probability estimation’ of the left-most block.” *Id.* at 6 (emphasis added).

However, Petitioner improperly conflates “part” with “block.” Petitioner misinterprets “a previously-decoded *part* of the slice subset,” as recited in claim 1, to mean “a previously-decoded *block* of the slice subset.” Petitioner’s interpretation is not supported by the Specification. Notably, the accompanying description of Figure 4 discloses:

[A] current coding unit of a current entropy slice is entropy coded based on the respective probability estimations of the current entropy slice as adapted using *the previously encoded part* of the current entropy slice, *i.e.* the *part* of the current entropy slice to the left of the current coding unit 50 . . . and the probability estimations as used in entropy coding the spatially neighboring, in entropy slice order 16 preceding entropy slice at a neighboring part, *i.e.* a neighboring coding unit, thereof.

In order to describe the aforementioned dependency more clearly, reference is made to FIG. 4.

Ex. 1001, 9:66–10:10 (emphases added). The Specification defines the term “previously encoded *part* of the current entropy slice” as “the *part* of the current entropy slice to the left of the current coding unit 50.” *Id.* (emphasis added). As Patent Owner explains, “[o]nce initialized and triggered, the so initialized ‘first probability estimation’ has now been coded and thus represents a ‘previously-decoded part of the slice subset’ that can be

adapted.” Sur-reply 20. Patent Owner’s explanation is consistent with the Specification. Ex. 1001, 9:63–10:57.

In particular, Figure 4’s accompanying description discloses that, during starting phase 84, probability estimations 94 (the first probability estimation) is initialized (as shown by arrow 104 in Figure 4) prior to coding first segment 92 (the very first block) of n^{th} entropy slice 90 based on the probability estimations of the second segment 92 of the preceding entropy $n-1^{\text{th}}$ slice. *Id.* at 10:31–57. Probability estimations 94, as initialized, is denoted by initial state 96 (“a previously-decoded part of the slice subset”). *Id.*

The Specification also discloses that, as shown by arrow 106 in Figure 4, “[t]he probability estimations used in entropy coding the entropy slice 90 are continuously *updated* during the continuation phase 86 along the entropy coding path 14 so that the probability estimations increasingly better *adapt* the actual symbol statistics of the respective entropy slice 90.” *Id.* at 10:19–38 (emphases added). The state after coding the first segment (the very first block) is denoted by state 98. *Id.* In short, the Specification discloses how the very first segment (the left-most block) can be adapted.

Therefore, we are not persuaded by Petitioner’s argument that “the ‘first probability estimation’ for the left-most block cannot be adapted . . . because there is no ‘previously-decoded part of the slice subset’ . . . to adapt the ‘first probability estimation’ of the left-most block.” Pet. Reply 6.

Finally, Petitioner argues that “once the second block in a row has been ‘adapted, which results in a new probability estimation and is no longer ‘the first probability estimation,’ the adaption step in the claim could no

longer proceed along the entropy decoding path as required because there would no longer be a ‘first probability estimation’ to adapt on subsequent blocks.” Pet. Reply 7–9.

Petitioner’s argument is not supported by the Specification. The Specification discloses that probability estimations 94 (the first probability estimation) “are associated with the respective entropy slice.” Ex. 1001, 10:24–25. As discussed above, probability estimations 94, as initialized (as shown by arrow 104 in Figure 4) prior to entropy coding the first segment 92, is denoted by initial state 96. *Id.* at 10:31–38, 10:46–51. As shown by arrow 106 in Figure 4, “the probability estimations used to entropy coding the entropy slice 90 are continuously *updated* during the continuation phase 86 along the entropy coding path 14 so that the probability estimations increasingly better *adapt* the actual symbol statistics of the respective entropy slice 90.” *Id.* at 10:19–30.

Therefore, we are not persuaded by Petitioner’s argument that “once the second block in a row has been ‘adapted,’ which results in a new probability estimation and is no longer ‘the first probability estimation,’ the adaption step in the claim could no longer proceed along the entropy decoding path as required because there would no longer be a ‘first probability estimation’ to adapt on subsequent blocks.” Pet. Reply 7–9.

For the foregoing reasons, we agree with Patent Owner that, as claimed, initialization is only carried out *once for each slice subset before coding the very first block* of the slice subset, not repeatedly for each block. In addition, to the extent that the claim term “a first probability estimation” can be interpreted as “one or more” first probability estimations, each of the

first probability estimations is associated with one specific symbol, not with a separate block. And, the first probability estimations would be the same for initializing, as well as coding and adapting along the entropy coding path for all of the blocks in the slice subset.

C. Principles of Law

A patent claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) objective evidence of nonobviousness.³ *See Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

D. Obviousness over Pateux

Petitioner asserts that claims 1–3, 10–13, 20–22, and 28–30 are unpatentable under § 103(a) as obvious over Pateux. Pet. 8–34. To support its contentions, Petitioner cites to Dr. Lippman's Declaration. Ex. 1003.

³ Neither party presents evidence or arguments regarding objective evidence of nonobviousness in the instant proceeding.

Patent Owner argues that Pateux fails to teach or suggest certain claim elements. PO Resp. 57–60, 65–67.

For the reasons provided below, we determine that Petitioner has not demonstrated by a preponderance of the evidence that claims 1–3, 10–13, 20–22, and 28–30 are unpatentable as obvious over Pateux.

1. Pateux

Pateux discloses methods, devices, and computer programs for encoding and decoding images. Ex. 1005, Title. According to Pateux, the invention is based on a novel and inventive approach to image decoding, and more particularly to entropy decoding, allowing both efficient learning of the probabilities of occurrence of the symbols for the encoding and the parallel decoding of the encoded symbols. *Id.* at 8:5–9.

2. Analysis

Claim 1 recites:

wherein the entropy decoder is configured to:

[(b) the “coding” element:] perform, *for each slice subset, entropy decoding along a respective entropy coding path leading in parallel along the rows of the blocks, using a first probability estimation* by:

[(b1) the “initializing” element:] *initializing the first probability estimation before decoding a first block of a first row corresponding to the slice subset based on a second probability estimation of a second block of a second row, the second row spatially-neighboring the first row and corresponding to a preceding slice subset, wherein entropy decoding of the preceding slice subset begins before the entropy decoding of the slice subset, and*

[(b2) the “adapting” element:] *adapting the first probability*

estimation along the entropy coding path using a previously-decoded part of the slice subset.

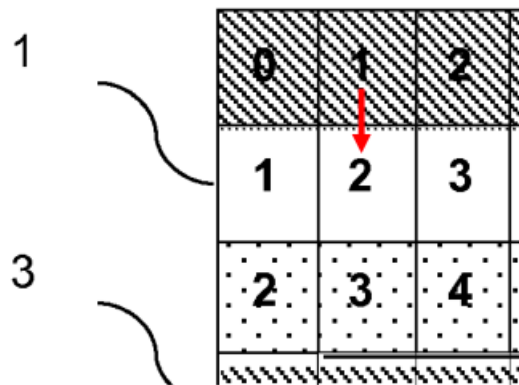
Ex. 1001, 31:66–32:22 (bracketed matter and emphases added). Claims 11, 20, and 28 each require similar elements.⁴ By virtue of their dependency, each of dependent claims 2–3, 10, 12, 13, 21, 22, 29, and 30 also requires these elements.

As discussed in our claim construction section (Section II.B.2), we decline to adopt Petitioner’s proposed claim construction that construes “the “initializing” element to encompass “initialization of a probability estimate *for each block of a slice on a block-by-block basis* with each block’s probability estimate being adapted after it is initialize.” Rather, in light of the Specification, we agree with Patent Owner that, as claimed, initialization is only carried out *once for each slice subset before coding the very first block* of the slice subset. In addition, to the extent that the claim term “a first probability estimation” can be interpreted as “one or more” first probability estimations, each of the first probability estimations is associated with one specific symbol, not with a separate block. And, the first probability estimations would be the same for initializing, as well as coding and adapting along the entropy coding path for all of the blocks in the slice subset.

As to the “initializing” element, Petitioner asserts that “Pateux describes 1) initializing the probability *of a block* using the probability from

⁴ Claims 1 and 11 recite “decoding,” whereas claims 20 and 28 recite “encoding.” We use the term “coding” in this Decision to refer to either decoding or encoding.

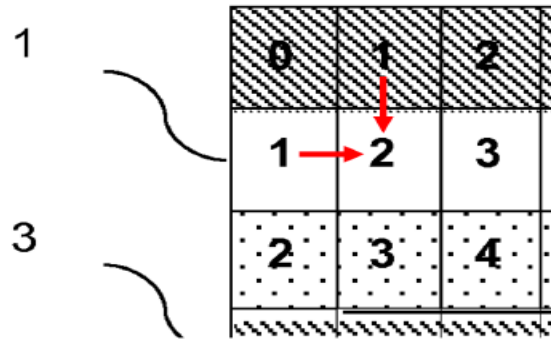
another block 2) from the line immediately adjacent (spatially-neighboring) and above (preceding) the current row or slice subset, including the upper right block.” Pet. 17–20 (emphasis added). As support, Petitioner provides an excerpt of Figure 5a of Pateux, which is reproduced below with annotation added by Petitioner. *Id.*; Ex. 1004, Fig. 5a.



The annotated excerpt of Figure 5a above shows the first three blocks of rows 0, 1, and 2. Pateux discloses that “a super-block, in order to be *decoded*, uses the probabilities stored during the decoding of two adjacent super blocks, those respectively located above and to the left.” Ex. 1005, 26:19–21 (emphasis added). Pateux also discloses that “if we consider line 1, we can see that from the moment when blocks 0 and 1 of line 0 are *decoded*, the blocks of line 1 can also be *decoded*.” *Id.* at 26:24–26 (emphasis added). According to Petitioner, “because blocks 0 and 1 of line 0 are *decoded* before the first block of line 1 begins, Pateux teaches that the *decoding* of row zero begins before the decoding of row 1.” Pet. 21 (emphases added).

As to the “adaptation” element, Petitioner asserts that Pateux teaches this element because it teaches using a previously-decoded part of the

current slice subset to adapt the first probability estimation. Pet. 21–23. As support, Petitioner provides an excerpt of Figure 5a of Pateux, which is reproduced below with annotation added by Petitioner (*id.* at 23).



The annotated excerpt of Figure 5a above shows the first three blocks of rows 0, 1, and 2. Petitioner notes that Pateux discloses “a super-block, in order to be decoded, *using the probabilities* stores during the decoding of two adjacent super blocks, those respectively located above *and to the left*,” and “block 2 of line 1 *needs blocks 1 of decoded lines 0 and 1*, and so on.” Ex. 1005, 26:17–23, 26:24–26.

Patent Owner counters that Pateux’s Figure 5a and the accompanying disclosure (Ex. 1005, 26:17–23) refer to *decoding* each super-block, but they do not disclose “*initializing* the first probability estimation before decoding a first block of . . . the slice subset,” as recited by the “initializing” element. PO Resp. 58–60. Patent Owner argues that Petitioner merely contends that Pateux describes “initializing the probability *of a block*” (Pet. 19 (emphasis added by Patent Owner)), and the claims do not recite initializing the probability estimation of a block. *Id.* at 60.

In addition, Patent Owner argues that even if Petitioner’s construction were adopted so that the claims are construed to encompass initializing on a

block-by-block basis, “[n]one of the documents cited by Petitioner, however, discloses or suggests initializing each block in an entropy slice using *the same ‘first probability estimation’* that is based on the probability estimation of a second block in the preceding entropy slice.” *Id.* at 65–66 (emphasis added). Patent Owner also contends that even if the claims were construed to include initializing the probability estimation of each block using different first probability estimation for each block, Pateux does not disclose or suggest how *the very first block* in the entropy slice is *coded*, as required by the claims. *Id.* at 66–67.

In its Reply, Petitioner argues that “[w]ith respect to Pateux (Ground 1), the Petition both stated and depicted *decoding* the first block.” Pet. Reply 17–18 (citing Pet. 21–22; Ex. 1005, 26:24–26) (emphasis added). Petitioner argues that “[t]he ’891 Patent itself also confirms that ‘for this very first part / block (the leftmost in each entropy slice in the figure) the adoption [sic] equals the initialization described above.’” *Id.* at 18 (quoting Ex. 1001, 17:58–60) (“[sic]” is added by Petitioner). Petitioner avers that “the concept of initializing the leftmost block in a row using a block from the row above is disclosed in Pateux and is mapped to the initializing element in the Petition.” *Id.*

Upon consideration of the parties’ contentions and evidence in this entire trial record, we are not persuaded by Petitioner’s arguments that Pateux teaches or suggests the “initializing” element and the “adaptation” element. “To satisfy its burden of proving obviousness, a petitioner cannot employ mere conclusory statements.” *In re Magnum Oil tools Int’l, Ltd.*, 892 F.3d 1364, 1380 (Fed. Cir. 2016). “The petitioner must instead articulate

specific reasoning, based on evidence of record, to support the legal conclusion of obviousness.” *Id.*

Here, each challenged claim requires separate steps for initializing and adapting the first probability estimation. Petitioner concedes that “[b]oth sub-components of the claimed entropy decoding process (i.e., initializing and adapting) are expressly required to be performed.” Pet. Reply 2.

The portions of Pateux relied upon by Petitioner merely teach *decoding*. Ex. 1005, 26:17–26; Ex. 1004, Fig. 5a. Specifically, the cited passages of Pateux discloses:

Thus, the super-blocks numbered from 0 to 11 on line 0 are all assigned to the same class 0, and form a sub-stream 0, likewise for all the super-blocks of line 4. According to this embodiment, it is considered that a super-block, in order to be *decoded*, uses the probabilities stored during the decoding of two adjacent super blocks, those respectively located above and to the left. Thus, the super blocks of line 0 must be sequentially *decoded*, the block to the left to be *decoded* prior to decoding the routine block.

On the other hand, if we consider line 1, we can see that from the moment when blocks 0 and 1 of line 0 are *decoded*, the blocks of line 1 can also be *decoded*. Indeed, block 2 of line 1 needs blocks 1 of decoded lines 0 and 1, and so on.

Id. (emphases added).

Petitioner improperly conflates decoding with initializing. The cited passages of Pateux do not disclose initialization, much less how the first probability estimation is initialized *before coding* the very first block of the slice subset based on the probability estimation of *the second block of a preceding slice subset*, as required by the claims.

Petitioner does not explain adequately why a person of ordinary skill in the art would have understood that Pateux's *decoding* disclosure teaches or suggests "initializing the first probability estimation before decoding a first block of a first row corresponding to the slice subset based on a second probability estimation of a second block of . . . a preceding slice subset," as required by the claims. Pet. 17–21; Pet. Reply 17–18. Nor does Petitioner articulate a reason why such an artisan would have considered modifying Pateux to arrive at the claimed invention. *KSR*, 550 U.S. 418 ("[I]t can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does.").

Petitioner's reliance on Figure 9's disclosure in the '891 patent to show that Pateux's decoding disclosure teaches the same invention is misplaced. Pet. 17–19. As discussed above in our claim construction analysis (Section II.B.2), Petitioner admits that the calculation of P_{new} as shown in Figure 9 of the '891 patent is directed to *adaptation*, not initialization. Pet. Reply 9–10. In fact, Figure 4's description in the '891 patent discloses that *initialization* occurs only once at the starting phase before coding the very first block of the current slice based on the probability estimations of the second block of the preceding slice, not repeatedly for each block. Ex. 1001, 9:50–10:57, 12:34–45, Fig. 4.

Petitioner also improperly presumes that Pateux's initialization is performed for each block at the time when the block is decoded and that both initializing and decoding uses the same prior-decoded block's probability estimation. To be clear, initializing and decoding do not

necessarily use the same prior-decoded block. For example, in the '891 patent, the initialization of the first probability estimation is based on the probability estimation of *the second block of a preceding slice*, but the adaptation of the first probability estimation is using a *previously-decoded part of the current slice subset*, as disclosed and claimed. Ex. 1001, 9:50–10:57, Fig. 4; 32:11–22.

Even if we were to apply Petitioner's erroneous reading of Pateux, Pateux does not teach or suggest the "initializing" element. Notably, when block 1 of line 1 is being initialized, the block located above, as shown in Pateux's Figure 5a, is the *first block* of the preceding row (block 0 of line 0), not the claimed *second block* of a preceding slice subset, as required by the "initializing" element. Moreover, each block in Pateux would have a *different* "first probability estimation" because the alleged initialization is based on the upper block of *the current block* and is performed for each block on a block-by-block basis. Pet. 19–21; Pet. Reply 17–18. As discussed above in the claim construction analysis (Section II.B.2), the claimed "first probability estimation" is *the same* for initializing as well as coding and adapting along the entropy coding path *for all of the blocks* in the slice subset. As Patent Owner notes, "[n]one of the documents cited by Petitioner, however, discloses or suggests initializing each block in an entropy slice using *the same* 'first probability estimation' that is based on the probability estimation of a second block in the preceding entropy slice." PO Resp. 65–66 (emphasis added).

Therefore, Petitioner's arguments that Pateux's decoding disclosure teaches or suggests the "initializing" element are merely based on

speculation or conjecture. “The legal conclusion of obviousness must be supported by facts” and we may not “resort to speculation, unfounded assumptions or hindsight reconstruction to supply deficiencies.” *In re Warner*, 379 F.2d 1011, 1017 (CCPA 1967). As our reviewing court has explained, “legal determinations of obviousness . . . should be based on evidence rather than on mere speculation or conjecture.” *Alza Corp. v. Mylan Labs., Inc.*, 464 F.3d 1286, 1290 (Fed. Cir. 2006); *see also Star Sci., Inc. v. R.J. Reynolds Tobacco Co.*, 655 F.3d 1364, 1375–76 (Fed. Cir. 2011) (prior art’s “speculative and tentative disclosure of what ‘might’ or ‘may’ [explain the cause of a desired effect] does not sufficiently direct or instruct one of skill in this art”).

Tellingly, Petitioner does not rely on Pateux’s initialization disclosure to meet the “initializing” element. *See, e.g.*, Ex. 1005, 13. We decline to speculate, on our own, as to whether Pateux’s initialization disclosure meets the “initializing” element. *See Magnum Oil*, 829 F.3d at 1380 (“Because such conclusory statements cannot satisfy the petitioner’s burden of demonstrating obviousness, the Board did not have sufficient evidence on which to base its legal conclusion of obviousness.”). It is Petitioner’s burden to “articulate specific reasoning, based on evidence of record, to support the legal conclusion of obviousness.” *Id.*

For the foregoing reasons, we determine that Petitioner fails to establish sufficiently that Pateux teaches or suggests the “initializing” element, as required by the challenged claims.

With respect to the “adapting” element, this element recites “adapting *the first probability estimation along the entropy coding path using a*

previously-decoded part of the slice subset.” Petitioner concedes that the claims require “the first probability estimation” to be adapted for every block in the slice subset, including the left-most block (the very first block). Pet. Reply 6–7, 17–18.

Significantly, Petitioner fails to establish how Pateux *adapts* the first probability estimation for *the very first block* of the slice subset “*using a previously-decoded part of the slice subset,*” as required by the “adapting” element. Pet. 21–23; Pet. Reply 17–18. Petitioner admits that it merely shows “the concept of *initializing* the leftmost block in a row using a block from the row above is disclosed in Pateux and is mapped to the *initializing* element in the Petition.” *Id.* at 18 (emphases added). Petitioner’s reliance on the ’891 patent’s “adoption” disclosure to show that “when looking at *the left-most block*, it can only be initialized and *there is no further adapting*” is misplaced. *Id.* (emphases added). As discussed above in our claim construction analysis (Section II.B.2), Petitioner improperly conflates “adoption” with “adaption,” and erroneously presumes that the ’891 patent has a typographical error. The Specification clearly discloses initialization 104 and a separate adaptation 106 for the left-most block of the n^{th} entropy slice 90. Ex. 1001, 9:66–10:57, Fig. 4. As noted above, Petitioner concedes that “[b]oth sub-components of the claimed entropy decoding process (i.e., initializing and adapting) are expressly required to be performed.” Pet. Reply 2. Therefore, Petitioner fails to establish how Pateux adapts the first probability estimation for *the very first block* of the slice subset “*using a previously-decoded part of the slice subset,*” as required by the claims. Pet. 21–23; Pet. Reply 17–18. Moreover, as noted

above, a *different* “first probability estimation” would be initialized and adopted for each block in Pateux, not the same “first probability estimation” as required by the “adapting” element.

Accordingly, we determine that Petitioner has not shown sufficiently that Pateux teaches or suggests the “adapting” element.

For the foregoing reasons, we determine that Petitioner has not established sufficiently that Pateux teaches or suggests the “initializing” element and the “adapting” element, as required by the challenged claims.

3. Conclusion on Obviousness over Pateux

Based on the entirety of this trial record, we determine that Petitioner has not demonstrated by a preponderance of the evidence that claims 1–3, 10–13, 20–22, and 28–30 are unpatentable under § 103(a) as obvious over Pateux.

E. Obviousness over Huang in view of Marpe

Petitioner asserts that claims 1–3, 6, 7, 10–13, 16, 17, 20–22, 25, 26, and 28–30 are unpatentable under § 103(a) as obvious over the combination of Huang and Marpe. Pet. 34–69. To support its contentions, Petitioner cites to Dr. Lippman’s Declaration. Ex. 1003. Patent Owner counters that the prior art combination fails to teach or suggest certain claim elements. PO Resp. 60–67.

For the reasons provided below, we agree with Patent Owner and determine that Petitioner has not demonstrated by a preponderance of the evidence that claims 1–3, 6, 7, 10–13, 16, 17, 20–22, 25, 26, and 28–30 are unpatentable.

1. Huang

Huang discloses a method and an apparatus for performing parallel encoding and decoding with ordered entropy slices. Ex. 1006, Abstract. Huang also discloses that Context-based Adaptive Binary Arithmetic Coding (“CABAC”) “is a powerful entropy coding tool and has been adopted in compression standards.” *Id.* at 1:23–25.

2. Marpe

Marpe is an IEEE publication, describing CABAC entropy coding. Ex. 1015, Abstract. Petitioner asserts that a person of ordinary skill in the art would have looked to Marpe to understand the fundamental principles of CABAC, including that CABAC states provide probability estimates. Pet. 40.

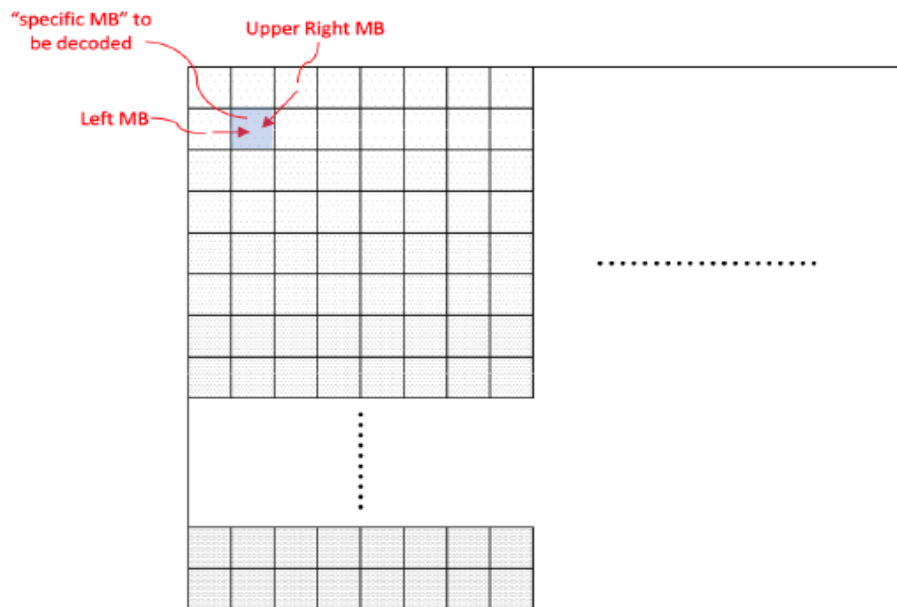
3. Analysis

As discussed above in Section II.D.2, each of independent claims 1, 11, 20, and 28 requires the “initializing” element and the “adapting” element. By virtue of their dependency, each of dependent claims 2–3, 6, 7, 10, 12, 13, 16, 17, 21, 22, 25, 26, 29, and 30 also requires these elements.

As to the “initializing” element, Petitioner asserts that Huang, in view of Marpe, describes “initializing the probability of a block using the probability from another block from the line immediately adjacent and above the current row or slice subset.” Pet. 49–53. As support, Petitioner notes that Huang’s “CABAC state” teaches the claimed probability estimation. *Id.* at 50–51 (citing Ex. 1006, 8:53–57). According to Petitioner, Huang teaches that “each entropy slice can be initialized as

CABAC states of a previous entropy slice after processing D_B MBs of the previous entropy slice.” Ex. 1006, 7:10–12, 8:52–54. Petitioner argues that Marpe establishes that a “CABAC state” is a probability estimate. Pet. 50–52 (citing Ex. 1015, 5, 7). Citing to Dr. Lippman’s testimony (Ex. 1003 ¶ 55) for support, Petitioner contends that, in view of Marpe, a person of ordinary skill in the art would have understood that “initializ[ing] as CABAC states,” as taught in Huang, means initializing a probability estimate. Pet. 51–52.

Petitioner notes Huang further teaches that “when *decoding* a specific MB, the apparatus 100 ensures that the upper MB (if exists) of the specific MB and the left MB (if exists) of the specific MB have already been parsed.” Ex. 1006, 5:66–6:7 (emphasis added). Figure 4 of Huang is reproduced below with annotations added by Petitioner. Pet. 52.



Annotated Figure 4 is provided to support Petitioner’s contention that upper right MB (the third block of the top row) corresponds to the claimed

second block of a second row. *Id.* at 52–53. Petitioner argues that “[a] PHOSITA would understand that initializing the CABAC state is initializing the first probability estimation of the current block (i.e., first block of a first row) using the probability estimation of the previously processed blocks (second probability estimation), including the upper right MB, which is the second block of a second row spatially-neighboring the first row and corresponding to a preceding slice subset.” *Id.* at 53. Petitioner relies on Dr. Lippman’ testimony (Ex. 1003 ¶¶ 46, 48) for “explaining that a ‘CABAC state’ is a probability estimate from prior entropy coded blocks.” *Id.*

With respect to the “adapting” element, Petitioner asserts that Huang, in view of Marpe, teaches “adapting the first probability estimation along the entropy coding path using a previously-decoded part of the slice subset.” Pet. 53–54. According to Petitioner (*id.*), Huang describes using a probability estimation from the left MB (a previously-decoded part of the slice subset). Ex. 1006, 6:1–7. Petitioner explains that an ordinarily skilled artisan would have understood that, once initialized using the CABAC states of the previous entropy slice (a block from the preceding row), the left MB would be used to adapt that initialized probability estimation because Huang expressly teaches that “if it exists” the left block is used. Pet. 54 (citing Ex. 1003 ¶¶ 46, 48). Petitioner further contends that the left block in Huang is used to adapt the first probability estimation that was initially determined from the upper block (first probability estimation based on the second probability estimation). *Id.*

Patent Owner counters that Figure 4 of Huang does not disclose initialization because “the evidence only supports *decoding* the second block (‘specific MB’ to be decoded) of a first row based on the probability estimation from the third block (Upper Right MB”) of a second row.” PO Resp. 61–62 (emphasis added). Patent Owner also argues that, as Petitioner contends, Huang describes “initializing the probability of *a block*,” but the claims require initializing the first probability estimation *for each entropy slice* before decoding the entropy slice can begin. *Id.* at 62–65 (emphases added).

In addition, Patent Owner argues that even if Petitioner’s construction were adopted so that the claims are construed to encompass initializing on a block-by-block basis, “[n]one of the documents cited by Petitioner, however, discloses or suggests initializing each block in an entropy slice using *the same ‘first probability estimation’* that is based on the probability estimation of a second block in the preceding entropy slice.” *Id.* at 65–66 (emphasis added). Patent Owner also contends that even if the claims were construed to include initializing the probability estimation of each block using different first probability estimation for each block, Huang does not disclose or suggest how *the very first block* in the entropy slice is coded, as required by the claims. *Id.* at 66–67.

In its Reply, Petitioner argues that “Huang decodes the first block as follows: ‘when decoding a specific MB, the apparatus 100 ensures that the upper MB (if exists) of the specific MB and *the left MB (if exists)* of the specific MB have already been parsed.’” Pet. Reply 19 (quoting Ex. 1006 5:66–6:2). According to Petitioner, “[t]his disclosure from Huang teaches

that each block in a row is CABAC parsed, and the blocks to the left are used in decoding *if they exist*.” *Id.* Petitioner asserts that “[if] there is not a preceding block to the left as in the case of the left-most block, the block *is decoded using only the above right MB*.” Pet. Reply 19 (emphasis added).

Upon consideration of the parties’ contentions and evidence in this entire trial record, we are not persuaded by Petitioner’s arguments and Dr. Lippman’s testimony because they improperly apply Petitioner’s proposed claim construction that construes the “initializing” element to encompass *more than one* “first block” and “initialization of a probability estimate *for each block* of a slice *on a block-by-block basis* with each block’s probability estimate being adapted after it is initialized.” *See, e.g.*, Pet. 50 (relying on the claim construction arguments on pages 17–19 of the Petition (“See Element 1(c) in Ground 1 above (Section V.A.i) for a description of this element in view of the ’891 Patent”) and asserting that “Huang describes . . . initializing the probability *of a block*”); 53 (asserting that “[a] PHOSITA would understand that initializing the CABAC state is initializing the first probability estimation of the *current block*”) (citing Ex. 1003 ¶¶ 46, 48); Pet. Reply 18–19.

As discussed in our claim construction analysis (Section II.B.2), we decline to adopt Petitioner’s proposed construction. Rather, in light of the claim language itself and the Specification, we agree with Patent Owner that “a first block” means “the very first block of the slice subset” and that initialization is only carried out once for each slice subset before decoding the very first block of the slice subset, not repeatedly for each block.

In addition, Petitioner fails to show sufficiently that Huang, in view of Marpe, teaches or suggests the “initializing” element and “adapting” element. First, Petitioner relies upon Huang’s “initializing” disclosure—namely, “each entropy slice can be initialized as pre-defined CABAC states, or as the CABAC states of a previous entropy slice after processing D_B MBs of the previous entropy slice.” Pet. 50–53 (citing Ex. 1006, 7:10–12, 8:52–54). Although we recognize “CABAC states” are probability estimations in view of Marpe, Petitioner does not explain how Huang’s “initializing” disclosure teaches or suggests initializing the first probability estimation before coding the very first block of the slice subset *based on a second probability estimation of the second block* of the preceding slice subset, as required by the claims.

Tellingly, Petitioner further relies on Huang’s “decoding” disclosure—namely, “when *decoding a specific MB*, the apparatus 100 ensures that the upper MB (if exists) of the specific MB and the left MB (if exists) of the specific MB have already been parsed” (Pet. 51 (quoting Ex. 1006, 5:66–62 (emphasis added))); and “before *processing each MB*, its upper left MB (if exists), its upper MB (if exists), its upper right MB (if exists), and its left MB (if exists) have been fully reconstructed” (*id.* at 52 (quoting Ex. 1006, 5:49–54 (emphasis added))). Based on Huang’s “decoding” disclosure, Petitioner argues that, “upper right MB corresponds to the claimed *second block of a second row*.” *Id.* at 52–53.

However, Petitioner improperly conflates decoding with initialization. Huang’s “decoding” disclosure relied upon by Petitioner merely teaches *when to decode* each block. It does not teach or suggest initialization, much

less when and how initialization occurs or which block's probability estimation is being used for the initialization. Petitioner does not explain sufficiently how Huang's "decoding" disclosure teaches or suggests "initializing the first probability estimation before decoding a first block of . . . the slice subset based on a second probability estimation of *a second block of a second row*," as recited in the "initializing" element. Petitioner's argument that "the upper right MB corresponds to the claimed *second block of a second row*" is based on speculation or conjecture. As discussed above, "[t]he legal conclusion of obviousness must be supported by facts" and we may not "resort to speculation, unfounded assumptions or hindsight reconstruction to supply deficiencies." *Warner*, 379 F.2d at 1017; *see also Alza*, 464 F.3d at 1290; *Star Sci.*, 655 F.3d at 1375–76.

Further, Petitioner attempts to combine Huang's "decoding" disclosure with Huang's "initializing" disclosure. Pet. 53. Petitioner argues that "[a] PHOSITA would understand that initializing the CABAC state is initializing the first probability estimation of the current block (i.e., first block of a first row) using the probability estimation of the previously processed blocks (second probability estimation), including the upper right MB, which is the second block of a second row spatially-neighboring the first row and corresponding to a preceding slice subset." *Id.*

However, in the combination proposed by Petitioner, *each block* will have a *different* "first probability estimation" because the alleged initialization is based on the upper right MB of *the current block* and is performed for each block on a block-by-block basis. Pet. 53; Pet. Reply 18–19. As discussed above in the claim construction analysis (Section

II.B.2), the claimed “first probability estimation” is the same for initializing as well as coding and adapting along the entropy coding path for *all of the blocks* in the slice subset. As Patent Owner notes, “[n]one of the documents cited by Petitioner, however, discloses or suggests initializing each block in an entropy slice using *the same* ‘first probability estimation’ that is based on the probability estimation of a second block in the preceding entropy slice.” PO Resp. 65–66 (emphasis added).

In addition, Petitioner improperly combines Huang’s “initializing” disclosure with Huang’s “decoding” disclosure without providing a reason to combine the teachings. Petitioner also improperly presumes that Huang’s initialization is performed for each block at the time when the block is decoded and that both initializing and decoding uses the same prior-decoded block’s probability estimation. As discussed above, initialization and coding do not necessarily use the probability estimations of the same prior-decoded block. For example, in the ’891 patent, initializing the first probability estimation is based on the *second block of a preceding slice*, but adapting the first probability estimation is using a *previously-decoded part of the current slice subset*. Ex. 1001, 9:50–10:57, Fig. 4; 32:11–22.

Petitioner directs our attention to “explanation of row and block descriptions in element 1(c) of Ground 1.” Pet. 53. However, that explanation relies upon Figure 9 of the ’891 patent regarding the calculation of Pnew. *Id.* at 17–19. As discussed above in the claim construction analysis (Section II.B.2), Figure 9’s Pnew calculation is directed to adaptation, not initialization. Petitioner improperly conflates adaptation with initialization.

For the foregoing reasons, we determine that Petitioner has not demonstrated sufficiently that Huang, in view of Marpe, teaches or suggests the “initializing” element.

With respect to the “adapting” element, this element recites “adapting *the first probability estimation* along the entropy coding path *using a previously-decoded part of the slice subset*.” Petitioner concedes that the claims require “the first probability estimation” to be adapted for every block in the slice subset, including the left-most block (the very first block). Pet. Reply 6–7, 18–19.

Significantly, Petitioner admits that, in its proposed prior art combination, no previously-decoded part of the slice subset is used for decoding the left-most block, stating that “[if] there is not a preceding block to the left as in the case of *the left-most block*, the block *is decoded using only the above right MB*.” *Id.* at 19 (emphases added). Petitioner does not explain adequately how this meets the “adapting” element that requires adaptation “using a previously-decoded part of the slice subset.” *Id.* Moreover, as noted above, a *different* “first probability estimation” would be initialized and adopted for each block, not the same “first probability estimation” as required by the claims.

Accordingly, we determine that Petitioner has not shown sufficiently that Huang, in view of Marpe, teaches or suggests the “adapting” element.

For the foregoing reasons, we determine that Petitioner has not established sufficiently that Huang, in view of Marpe, teaches or suggests the “initializing” element and the “adapting” element, as required by the challenged claims.

4. Conclusion on Obviousness over Huang in view of Marpe

Based on the evidence in the present record, we determine that Petitioner has not established by a preponderance of the evidence that claims 1–3, 6, 7, 10–13, 16, 17, 20–22, 25, 26, and 28–30 are unpatentable under § 103(a) as obvious over Huang in view of Marpe.

III. CONCLUSION

For the foregoing reasons, we conclude that Petitioner has not established by a preponderance of the evidence that claims 1–3, 6, 7, 10–13, 16, 17, 20–22, 25, 26, and 28–30 of the '891 patent are unpatentable.

IV. ORDER

For the foregoing reasons, it is

ORDERED that claims 1–3, 6, 7, 10–13, 16, 17, 20–22, 25, 26, and 28–30 of the '891 have not been shown to be unpatentable; and

FURTHER ORDERED that, because this is a Final Written Decision, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

In summary:

Claims	35 U.S.C. §	Reference(s)/Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1–3, 10–13, 20–22, 28–30	103	Pateux, the knowledge of a person having ordinary skill in the art (“PHOSITA”)		1–3, 10–13, 20–22, 28–30

1-3, 6, 7, 10-13, 16, 17, 20-22, 25, 26, 28-30	103	Huang, Marpe		1-3, 6, 7, 10-13, 16, 17, 20-22, 25, 26, 28-30
Overall Outcome				1-3, 6, 7, 10-13, 16, 17, 20-22, 25, 26, 28-30

For PETITIONER:

Eric Buresh
Jason Mudd
Chris Schmidt
ERISE IP, P.A.
eric.buresh@eriseip.com
jason.mudd@eriseip.com
chris.schmidt@eriseip.com

Ashraf Fawzy
Roshan Mansinghani
UNIFIED PATENTS INC.
afawzy@unifiedpatents.com
roshan@unifiedpatents.com

For PATENT OWNER:

Patrick Doody
Bryan Collins
PILLSBURY WINTHROP SHAW PITTMAN LLP
patrick.doody@pillsburylaw.com
bryan.collins@pillsburylaw.com