UNITED STATES INTERNATIONAL TRADE COMMISSION
WASHINGTON, D.C. 20436

Before The Honorable MaryJoan McNamara
Administrative Law Judge

In the Matter of **CERTAIN ELECTRONIC DEVICES, INCLUDING SMARTPHONES, COMPUTERS, TABLET COMPUTERS, AND COMPONENTS THEREOF**	**Inv. No. 337-TA-1373**

COMMISSION INVESTIGATIVE STAFF'S *MARKMAN* BRIEF

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TABLE OF CONTENTS

I. INTRODUCTION 1

II. LEGAL STANDARD 1

A. General Principles of Construction 1

III. LEVEL OF ORDINARY SKILL IN THE ART 4

IV. U.S. PATENT NO. 10,250,877 5

A. Background 5

B. Patent Overview 6

C. Disputed Term – "circuit configured to" 8

V. U.S. PATENT NO. 9,674,556 10

A. Background 10

B. Patent Overview 11

C. Disputed Claim Constructions 13

1. "sparse denoising filter" 13

a. '556 Patent's Disclosure Supports Staff's Construction 15

b. Extrinsic Evidence Supports Staff's Construction 17

(1) References Dated at or Before the Time of the Invention 17

(2) References Dated After the Time of Invention 19

c. Respondents' Constructions Should Not be Adopted Because There Has Not Been a Disclaimer of a Deringing Filter 20

(1) Statements in the Prosecution of the Parent to the '556 Patent Do Not Constitute a Disclaimer 20

(2) Statements Made During Prosecution of Child of the '556 Patent Do Not Constitute a Disclaimer 23

d. Respondents' Alternative Construction Should Not be Adopted Because it is Overly Narrow 25

e. Conclusion 27

2. "adaptive sparse de-noising filter" 27

a. The '556 Patent's Disclosure of Adaptive 28

VI. U.S. PATENT NO. 8,674,859 30

A. Background 30

B. Patent Overview 32

C. Agreed Claim Constructions 33

D. Disputed Claim Constructions 34

1. "arithmetic decoding method for symbols coded in the form of a stream, comprising the following steps applied at switching points distributed in said stream to decode a current symbol" 34

a. The Portion of the Term Following "Comprising" is Not Part of the Preamble 36

b. "Stream," "Current Symbol," and "Switching Points" Are Limiting, even if Part of the Preamble 37

(1) "Stream" and "Current Symbol" are Limiting at least to the Extent they Provide Antecedent Basis 37

(2) "Switching Points" is Limiting 39

(3) The Staff's Construction of "Switching Points" Should be Adopted 42

c. Conclusion 43

2. "means for decoding from the stream, at switching points distributed in said stream to decode a current symbol, for said current symbol, a probability model identifier" 43

a. The Parties Agree that § 112, ¶ 6 Applies to this Term 45

b. The Function is Disclosed by the Claim 46

c. The '859 Patent's Disclosure of Structures 46

(1) Disclosure of Decoding Device and Entropy Decoding Module 46

(2) Disclosure of Algorithm 48

(3) Adequacy of Disclosed Structure 50

3. "means for selecting using said probability model identifier a probability model in a set comprising a current probability model defined from symbols coded previous to the current symbol and a subset of probability models wherein subset comprises at least one probability model defined by default" 52

a. The Parties Agree that § 112, ¶ 6 Applies to this Term 54

b. The Function is Disclosed by the Claim 54

c. The '859 Patent's Disclosure of Structures 54

(1) Disclosure of Decoding Device and Entropy Decoding Module 54

(2) Disclosure of Algorithm 55

(3) Adequacy of Disclosed Structure 56

4. "means for adding in said subset said current probability model, the selected probability model becoming the current probability model" 57

a. The Parties Agree that § 112, ¶ 6 Applies to this Term 58

b. The Function is Disclosed by the Claim 58

c. The '859 Patent's Disclosure of Structures 59

(1) Disclosure of Decoding Device and Entropy Decoding Module 59

(2) Disclosure of Algorithm 59

(3) Adequacy of Disclosed Structure 61

5. "means for decoding said current symbol with said current probability model" 61

a. The Parties Agree that § 112, ¶ 6 Applies to this Term 63

b. The Function is Disclosed by the Claim 63

c. The '859 Patent's Disclosure of Structures 63

(1) Disclosure of Decoding Device and Entropy Decoding Module 63

(2) Disclosure of Algorithm 64

(3) Adequacy of Disclosed Structure 64

6. "means for updating said current probability model according to the decoding of said current symbol" 65

a. The Parties Agree that § 112, ¶ 6 Applies to this Term 66

b. The Function is Disclosed by the Claim 66

c. The '859 Patent's Disclosure of Structures 67

(1) Disclosure of Decoding Device and Entropy Decoding Module 67

(2) Disclosure of Algorithm 67

(3) Adequacy of Disclosed Structure 68

VII. CONCLUSION 69

TABLE OF AUTHORITIES

Cases

ACTV, Inc. v. Walt Disney Co., 346 F.3d 1082 (Fed. Cir. 2003) 2

Biomedino, LLC v. Waters Techs. Corp., 490 F.3d 946 (Fed. Cir. 2007) 51

Bio-Rad Laboratories, Inc. v. 10X Genomics Inc., 967 F.3d 1353 (Fed. Cir. 2020) 38

Brown v. 3M, 265 F.3d 1349 (Fed. Cir. 2001) 2

C.R. Bard, Inc. v. U.S. Surgical Corp., 388 F.3d 858 (Fed. Cir. 2004) 14

C.W. Zumbiel Co., Inc. v. Kappos, 702 F.3d 1371 (Fed. Cir. 2012) 38

Certain Computer Network Security Equipment and Systems, Related Software, Components Thereof, and Products Containing Same, Inv. No. 337-TA-1314, Order No. 37 (Feb. 22, 2023) ..9

Certain Consumer Elecs. and Display Devices with Graphics Processing and Graphics Processing Units Therein, Inv. No. 337-TA-932, Order No. 20 (Apr. 2, 2015) 34

Certain Dermatological Treatment Devices and Components Thereof, Inv. No. 337-TA-1356, Order No. 35 (Oct. 25, 2023) 34

Certain Devices for Mobile Data Commc'n, Inv. No. 337-TA-809, Order No. 46 (Sept. 28, 2012) 34

Certain Multiple Mode Outdoor Grills and Parts Thereof, Inv. No. 337-TA-895, Comm'n Op. (Feb. 3, 2015) 33

Certain Wearable Activity Tracking Devices, Sys., and Components Thereof, Inv. No. 337-TA-973, Order No. 16 (May 16, 2016) 4

Cisco Systems, Inc. v. Int'l Trade Comm'n, 873 F.3d 1354 (Fed. Cir. 2017) 22

Cisco Systems, Inc. v. ITC, 873 F.3d 1354 (Fed. Cir. 2017) 2

Diebold Nixdorf v. ITC, 899 F.3d 1291 (Fed. Cir. 2018) 1

G.W. Aru, LLC v. W.R. Grace & Co.-Conn, Civ. No. JKB-22-2636, 2023 WL 7170356 (D. Maryland Oct. 31, 2023) 36

Goodyear Dental Vulcanite Co. v. Davis, 102 U.S. 222 (1880) 3

In re Fought, 941 F.3d 1175 (Fed. Cir. 2019) 38

Innova/Pure Water, Inc. v. Safari Water Filtration Systems, Inc., 381 F.3d 1111 (Fed. Cir. 2004) ...2

Intelligent Agency, LLC v. 7-Eleven, Inc., 2022 WL 760203 (E.D. Tex. March 11, 2022).....36

Littelfuse, Inc. v. Mersen USA EP Corp., 29 F.4th 1376 (Fed. Cir. 2022).....16, 26

Markman v. Westview Instruments, Inc., 52 F.3d 967 (Fed. Cir. 1995), *aff'd*, 517 U.S. 370 (1996)..2, 3

Mintz v. Dietz & Watson, Inc., 679 F.3d 1372 (Fed. Cir. 2012) 4

Nevro Corp. v. Boston Sci. Corp., 955 F.3d 35 (Fed. Cir. 2020).....10

Pacing Technologies LLC v. Garmin Int'l, Inc., 778 F.3d 1021 (Fed. Cir. 2015).....38

Phillips v. AWH Corp., 415 F.3d 1303 (Fed. Cir. 2005).....passim

Renishaw PLC v. Marposs Societa' per Azioni, 158 F.3d 1243 (Fed. Cir. 1998).....3

Ruckus Wireless, Inc. v. Innovative Wireless Sols., LLC, 824 F.3d 999 (Fed. Cir. 2016) 2, 4

SanDisk Corp. v. Memorex Products, Inc., 415 F.3d 1278 (Fed. Cir. 2005).....22, 25

Saunders Group, Inc. v. Comfortrac, Inc., 492 F.3d 1326 (Fed. Cir. 2007).....23

SIMO Holdings Inc. v. Hong Kong uCloudlink Network Technology, Ltd., 983 F.3d 1367 (Fed. Cir. 2021).....2, 36

Teva Pharm. USA, Inc. v. Sandoz, Inc., 574 U.S. 318 (2015) 1

TomTom, Inc. v. Adolph, 790 F.3d 1315 (Fed. Cir. 2015) 37, 39, 42

Williamson v. Citrix Online, LLC, 792 F.3d 1339 (Fed. Cir. 2015).....passim

World Class Technology Corp. v. Ormco Corp., 769 F.3d 1120 (Fed. Cir. 2014).....2

Statutes

35 U.S.C. § 112, ¶ 6 45

TABLE OF EXHIBITS

JXM-0001	U.S. Patent No. 10,250,877
JXM-0002	U.S. Patent No. 8,674,859
JXM-0003	U.S. Patent No. 9,674,556
JXM-0006	File History of U.S. Patent No. 9,674,556
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I. INTRODUCTION

Pursuant to Order No. 18 (December 20, 2023), the Commission Investigative Staff ("Staff") respectfully submits this *Markman* Brief. The parties in this investigation dispute the proper constructions of certain claim terms in U.S. Patent No. 8,674,859 ("the '859 Patent"); U.S. Patent No. 9,674,556 ("the '556 Patent"); and U.S. Patent No. 10,250,877 ("the '877 Patent") (collectively, "Asserted Patents").[1] A *Markman* hearing is scheduled for February 13, 2024.

For the reasons discussed below, the Staff respectfully submits that the disputed claim terms should be construed as proposed by the Staff.[2]

II. LEGAL STANDARD

A. General Principles of Construction

The ultimate question of the proper construction of patent claims is a question of law. *Teva Pharm. USA, Inc. v. Sandoz, Inc.*, 574 U.S. 318, 325 (2015). Determinations based on evidence intrinsic to the patent, i.e. the patent claims and specification, and the patent's prosecution history, are determinations of law. *Id*. at 331; *Diebold Nixdorf v. ITC*, 899 F.3d 1291, 1297 (Fed. Cir. 2018). However, claim construction is "a practice with evidentiary underpinnings, a practice that falls somewhere between a pristine legal standard and a simple historical fact." *Teva Pharm.*, 574 U.S. at 326-327 (internal quotations omitted). Thus, in some instances, claim construction also requires the court to resolve subsidiary factual disputes. *Id*. at 327.

"It is a 'bedrock principle' of patent law that 'the claims of a patent define the invention to which the patentee is entitled the right to exclude.'" *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (quoting *Innova/Pure Water, Inc. v. Safari Water Filtration Systems, Inc.*, 381 F.3d

[1] Copies of the Asserted Patents and their file histories were filed as Exhibits 1-3 and Appendices A-C to the Complaint.

[2] The Staff reserves its right to amend its positions in view of any expert declarations that may be submitted by the private parties.

1111, 1115 (Fed. Cir. 2004)). The words of a claim "are generally given their ordinary and customary meaning," which is "the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention." *Id.*; *see Brown v. 3M*, 265 F.3d 1349, 1352 (Fed. Cir. 2001) (holding that terms that are not technical terms of art do not require elaborate interpretation). "The ordinary meaning [of the claim term] may be determined by reviewing various sources, such as the claims themselves, the specification, the prosecution history, dictionaries, and any other relevant evidence." *Cisco Systems, Inc. v. ITC*, 873 F.3d 1354, 1361 (Fed. Cir. 2017) (citing *Ruckus Wireless, Inc. v. Innovative Wireless Sols., LLC*, 824 F.3d 999, 1002-03 (Fed. Cir. 2016)).

"[T]he claims themselves provide substantial guidance as to the meaning of particular claim terms." *Phillips*, 415 F.3d at 1314. Additionally, the context of the surrounding words can be "highly instructive" and may provide guidance as to the meaning of particular claim terms. *Id*. at 1314; *ACTV, Inc. v. Walt Disney Co.*, 346 F.3d 1082, 1088 (Fed. Cir. 2003) ("the context of the surrounding words of the claim also must be considered in determining the ordinary and customary meaning of those terms"). The other claims of the patent may also provide valuable context and serve as "sources of enlightenment as to the meaning of a claim term." *Phillips*, 415 F.3d at 1314.

"Claims must be read in light of the specification, of which they are a part." *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 979 (Fed. Cir. 1995), *aff'd*, 517 U.S. 370 (1996); *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996). The specification is "the single best guide to the meaning of a disputed term." *Phillips*, 415 F.3d at 1315 (quoting *Vitronics*, 90 F.3d at 1582). "The specification particularly, but also the prosecution history, informs the determination of claim meaning in context, including by resolving ambiguities." *SIMO Holdings Inc. v. Hong Kong uCloudlink Network Technology, Ltd.*, 983 F.3d 1367, 1374 (Fed. Cir. 2021) (quoting *World Class Technology Corp. v. Ormco Corp.*, 769 F.3d 1120, 1123 (Fed. Cir. 2014)).

However, in some instances "even if the meaning is plain on the face of the claim language, the patentee can, by acting with sufficient clarity, disclaim such a plain meaning or prescribe a special definition." *Id.* "Ultimately . . . the construction that stays true to the claim language and most naturally aligns with the patent's description of the invention will be, in the end, the correct construction." *Phillips,* 415 F.3d at 1316 (quoting *Renishaw PLC v. Marposs Societa' per Azioni*, 158 F.3d 1243, 1250 (Fed. Cir. 1998)).

Claims must also be read in view of the prosecution history. *Markman*, 52 F.3d 967 at 980. "Like the specification, the prosecution history provides evidence of how the PTO and the inventor understood the patent." *Phillips*, 415 F.3d at 1317. While the prosecution history can be used to understand the claims, it cannot "enlarge, diminish, or vary" the claim limitations. *Markman*, 52 F.3d 967 at 980 (quoting *Goodyear Dental Vulcanite Co. v. Davis*, 102 U.S. 222, 227 (1880)). And "because the prosecution history represents an ongoing negotiation between the PTO and the applicant, rather than the final product of that negotiation, it often lacks the clarity of the specification and thus is less useful for claim construction purposes." *Id.* Nonetheless, "the prosecution history can often inform the meaning of the claim language by demonstrating how the inventor understood the invention and whether the inventor limited the invention in the course of prosecution, making the claim scope narrower than it would otherwise be." *Id.*

In addition to the intrinsic evidence, extrinsic evidence may be considered, if necessary, to explain scientific principles, technical terms, and terms of art that appear in the patent and prosecution history. *Markman*, 52 F.3d at 980. Extrinsic evidence "consists of all evidence external to the patent and prosecution history, including expert and inventor testimony, dictionaries, and learned treatises." *Id*.; *Vitronics*, 90 F.3d at 1584. Expert testimony, in particular, "can be useful to a court for a variety of purposes, such as to provide background on the technology at issue, to explain how an invention works, to ensure that the court's understanding of the technical aspects

of the patent is consistent with that of a person of skill in the art, or to establish that a particular term in the patent . . . has a particular meaning in the pertinent field." *Phillips*, 415 F.3d at 1318. However, "[t]he only meaning that matters in claim construction is the meaning in the context of the patent." *Ruckus Wireless*, 824 F.3d at 1003 (internal quotations omitted), quoting *Trs. of Columbia Univ. v. Symantec Corp.*, 811 F.3d 1359, 1363 (Fed. Cir. 2016).

III. LEVEL OF ORDINARY SKILL IN THE ART

The words of a claim "are generally given their ordinary and customary meaning." *Phillips*, 415 F.3d at 1312. This is the meaning "that the term would have to a person of ordinary skill in the art in question at the time of the invention, i.e., as of the effective filing date of the patent application." *Id*. at 1313.

The first step in the analysis is to determine the level of skill possessed by such a person. "Factors that may be considered in determining [the] level of skill include: 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." *See Certain Wearable Activity Tracking Devices, Sys., and Components Thereof*, Inv. No. 337-TA-973, Order No. 16, at 9 (May 16, 2016) (quoting *Mintz v. Dietz & Watson, Inc.*, 679 F.3d 1372, 1376 (Fed. Cir. 2012)).

The Staff understands that the parties have agreed that for the '877, '556, and '859 Patents a person of ordinary skill in the art would have had at least a bachelor's degree in electrical engineering, computer science, computer engineering, or a related filed, and approximately three years of experience in design, development, and/or testing of relevant multimedia processing, such as video, and/or image processing or coding. Advanced graduate studies with coursework and/or research focusing on topics of video encoding and decoding could substitute for working experience

in the field. Accordingly, the Staff is of the view that this is the level of ordinary skill in the art that should be adopted.

IV. U.S. PATENT NO. 10,250,877

A. Background

The '877 Patent is titled "Method and Device for Coding an Image Block, Corresponding Decoding Method and Decoding Device." JXM-0001 ('877 Patent), cover page. Complainants contend that "each of the asserted and domestic industry claims of the '877 Patent have a priority invention date no later than December 6, 2011, which is the date by which the inventors conceived the invention(s) claimed in each of these claims." Complainants' Notice of Patent Priority Dates at 2 (Nov. 9, 2023). The '877 Patent claims priority to French Patent Application No. 1250334, which was filed on January 13, 2012. JXM-0001 ('877 Patent), cover page; *see also* Complainants' Notice of Patent Priority Dates at 2 (Nov. 9, 2023). The '877 Patent names Philippe Bordes, Pierre Andrivon, and Philippe Salmon as inventors. JXM-0001 ('877 Patent), cover page.

The '877 Patent issued on April 2, 2019 and has a total of 12 claims. Complainants are asserting independent claims 1, 4, 7, and 8. Complaint, ¶ 1.

The parties dispute the construction of one term that appears in claims 7 and 8. Asserted independent claims 7 and 8 of the '877 Patent are shown below with the disputed term in bold italics.

> 7. A decoding device comprising at least one ***circuit configured to***:
> access, from a decoded picture buffer, a reference image reconstructed at a size different from the size of a current image;
> motion compensate a reference block of said reconstructed reference image by applying a single horizontal filter GFH and a single vertical filter GFv successively on the lines and on the columns of pixels of said reference block,
> decode, for a current block of said current image, a residue block from a binary stream, and
> reconstruct the current block from said residue block and from said motion compensated reference block,

wherein said single vertical filter GFv applied on a pixel s is such that GFv(s)=MCIFv(SCFv(s)), where MCIFv is a vertical motion compensation interpolation filter and SCFv is a vertical resampling filter, MCIFv and SCFv being applied jointly and wherein said single horizontal filter GFH applied on a pixel u is such that GFH(u)=MCIFH(SCFH(u)), where MCIFH is a horizontal motion compensation interpolation filter and SCFH is a horizontal resampling filter, MCIFH and SCFH being applied jointly and wherein no resampled version of said reconstructed reference image is stored in the decoded picture buffer.

8. A coding device comprising at least one ***circuit configured to***:

access, from a decoded picture buffer, a reference image reconstructed at a size different from the size of a current image;

motion compensate a reference block of said reconstructed reference image by applying a single horizontal filter GFH and a single vertical filter GFv successively on the lines and on the columns of pixels of said reference block,

calculate, for a current block of said current image, a residue block from said current block and from said motion compensated reference block, and

code the residue block in a binary stream,

wherein said single vertical filter GFv applied on a pixel s is such that GFv(s)=MCIFv(SCFv(s)), where MCIFv is a vertical motion compensation interpolation filter and SCFv is a vertical resampling filter, MCIFv and SCFv being applied jointly and wherein said single horizontal filter GFH applied on a pixel u is such that GFH(u)=MCIFH(SCFH(u)), where MCIFH is a horizontal motion compensation interpolation filter and SCFH is a horizontal resampling filter, MCIFH and SCFH being applied jointly and wherein no resampled version of said reconstructed reference image is stored in the decoded picture buffer.

B. Patent Overview

The ’877 Patent generally relates to image coding and, more specifically, methods and devices for reconstructing an image block from a current image and a method for coding an image block from a block of a reference image reconstructed at a different size than the current image. JXM-0001 (’877 Patent), 1:15-22. Previously, at low bitrates the size of the image to code was reduced by subsampling before coding. *Id*. at 1:37-39. For example, a decoder subsamples the decoded image before displaying it, and the coded stream has a field that specifies the size of the original version/image of the coded image. *Id*. at 1:39-42. In other words, the size of the image is dynamically adapted, which is known as adaptive resolution. *Id*. at 1:42-44.

In adaptive resolution, reconstructed reference images of different sizes are stored in Decoded Picture Buffer ("DPB") memory. JXM-0001 ('877 Patent), 1:45-49. The stored reference images are then used to determine motion compensated reference blocks. *Id*. at 1:49-51. The reference image and the current image can be different sizes. *Id*. at 1:51-55. Thus, when the reference image is smaller than (respectively, larger than) the size of the current image, it must be upsampled (respectively, subsampled) to the size of the current image before being motion compensated. *Id*. at 1:55-59. These upsampled or subsampled versions of the reference image are also stored in the DPB memory. *Id*. at 1:59-64. Overall, several versions—the reconstructed image and the upsampled and/or subsampled versions—of the same reference image must be stored in memory. *Id*. at 2:8-11. Consequently, adaptive resolution requires more memory space, which is becoming increasingly problematic in hardware implementations "for which the surface of the component is notably critical." *Id*. at 2:11-13.

As mentioned above, the '877 Patent discloses methods "for reconstructing a current block of a current image from at least one block of a reconstructed reference image at a different size from the size of the current image." JXM-0001 ('877 Patent), 2:19-22. The reconstruction involves motion compensating the reference block with an interpolation filter, decoding, for a current block, a residue block; and reconstructing the current block from the residue block and from the motion compensated reference block. *Id*. at 2:22-28. The disclosed invention purportedly overcomes the disadvantages of the prior art by performing "the operations of upsampling or subsampling of the data of the reference image and of motion compensation of a reference block" "conjointly by applying an interpolation filter that depends on the 'n' index, i.e. on the size of the reference image and on the size of the current image." JXM-0001 ('877 Patent), 2:32:37.

The '877 Patent also discloses decoding and coding devices that reconstruct a current block of a current image from at least one block of a reconstructed reference image (decoding), and code a

current block of a current image from at least one block of a reconstructed image (coding), respectively. JXM-0001 ('877 Patent), 3:25-49.

C. Disputed Term – "circuit configured to"

The parties dispute the meaning of the term "circuit configured to," which appears in asserted claims 7 and 8 of the '877 Patent. The parties' proposed constructions are as follows:[3]

Term and Claims	Complainant's Construction	Respondents' Construction	Staff's Construction
"circuit configured to" Cls. 1, 7	Plain and ordinary meaning (i.e., requires pre-existing hardware and software programmed to perform the cited functionality)	Plain and ordinary meaning (i.e., requires pre-existing programming of hardware and software to perform the cited functionality)	Plain and ordinary meaning (i.e., requires pre-existing programming of hardware and software to perform the cited functionality)

The parties agree that the term "circuit configured to" is limiting but dispute the proper construction of the plain and ordinary meaning of the term. In the Staff's view, there is no substantive difference between the parties' proposed constructions. However, for the reasons discussed below, the Staff is of the view that its construction should be adopted.

The Staff's and Respondents' (and until recently the Complainants') proposed plain and ordinary meaning of "circuit configured to" is based on the ALJ's construction of the term "configured to" in Inv. No. 337-TA-1314. *See Certain Computer Network Security Equipment and*

[3] After several meet and confers, the parties disagreed whether "circuit configured to" was limiting, but appeared to agree that the plain and ordinary meaning of the term was "requires pre-existing programming of hardware and software to perform the cited functionality." However, upon further review Complainants decided (at the end of last week) that the agreed-to construction was problematic and proposed a modified construction. As the Staff understands it, the issue stemmed from Complainants' new interpretations of the parties' construction as requiring "programming of software," which in Complainants' view is nonsensical, and Complainants' reading of *Nevro Corp. v. Boston Sci. Corp.*, 955 F.3d 35 (Fed. Cir. 2020) and its construction of "circuit configured to," which was deemed to be a better fit with the fact pattern here.

Systems, Related Software, Components Thereof, and Products Containing Same, Inv. No. 337-TA-1314, Order No. 37 at 9-19 (Feb. 22, 2023), *unreviewed in relevant part*, Comm'n Notice at 3-4 (12/5/23). In Inv. No. 337-TA-1314 ("1314 Investigation"), the parties disputed, with respect to a claim directed to a system comprising a processor and memory, whether the construction of "configured to" should include "capable of performing" language. *Id*. at 9-10. This dispute included an argument regarding whether "further modification," such as further modification of software by a user, should be covered by the proper construction of "configured to." *Id*. at 16-19. The ALJ found that the claims did not have "capability" language and the specification did not use the words "capable of" when describing the relevant limitation of the claim at issue. *Id*. at 12-13, 17-19. Accordingly, the term "configured to" was construed to have its plain and ordinary meaning, "i.e., requires pre-existing programming of hardware and software to perform the cited functionality without modification." *Id*. The ALJ further specified that "[a] system would be infringed when the hardware and software performs the functionality as cited in the claim without the need to modify any hardware or software." *Id*. at 19.

Here, the parties agree that the term "circuit configured to" should not be construed to include "capable of performing" language. The ALJ's construction of "configured to" in Inv. No. 1314 is phrased in a manner that expressly excludes "capable of" and thus is consistent with the parties' understanding of the term "circuit configured to." Further, the ALJ's construction was made with respect to claim language directed to similar technology, namely, a combination of hardware and software. *See Certain Computer Network Security Equipment and Systems, Related Software, Components Thereof, and Products Containing Same*, Inv. No. 337-TA-1314, Order No. 37 at 10 (Feb. 22, 2023) (the asserted claim claimed a system comprising at least one processor, and a memory storing instructions (i.e. software) that caused the system to perform certain functions). As a result, the Staff is of the view that using the ALJ's construction from Inv. No. 1314 is

appropriate here[4] and clearly conveys what the parties all agree the plain and ordinary meaning "circuit configured to" covers — pre-existing hardware and software.

Accordingly, the Staff's proposed construction of "circuit configured to" should be adopted—the term should be given its plain and ordinary meaning, (i.e., requires pre-existing programming of hardware and software to perform the cited functionality).[5]

V. U.S. PATENT NO. 9,674,556

A. Background

The '556 Patent is titled "Methods and Apparatus for In-Loop De-Artifact Filtering." JXM-0003 ('556 Patent), cover page. Complainants contend that "each of the asserted and domestic industry claims of the '556 Patent has a priority invention date no later than June 15, 2006, which is the date the inventors conceived the invention(s) claimed in each of these claims." Complainants' Notice of Patent Priority Dates at 3 (Nov. 9, 2023). The '556 Patent claims priority to U.S. Provisional Application No. 60/864,917 filed on November 8, 2006. JXM-0003 ('556 Patent), cover page 2; *see also* Complainants' Notice of Patent Priority Dates at 3. The '556 Patent names

[4] The only difference between the ALJ's proposed construction in Inv. No. 1314 and the Staff's and Respondents' proposed construction here is that the Staff and Respondents have removed the language "without modification" as being unnecessary in view of the requirement of pre-existing programming.

[5] Complainants are expected to argue that the technology at issue here is more similar to that discussed in *Nevro*, which construed the term "configured to" as used in the phrase "a signal generator configured to generate" to mean "programmed to," and that their proposed construction that uses "programmed to" should therefore be adopted. *Nevro Corp. v. Boston Sci. Corp.*, 955 F.3d 35, 40 (Fed. Cir. 2020). The Staff sees no meaningful difference between "programming of" and "programmed to," regardless of whether the technology at issue was more or less similar to that at issue here. Moreover, Complainants' construction potentially introduces ambiguity regarding whether the programming must be pre-existing, or whether it covers a circuit with pre-existing hardware and software that is capable of being programmed to perform the claimed functionality. This issue is expressly addressed by the construction proposed by the Staff and Respondents. This is yet another reason why the Staff's and Respondents' proposed construction should be adopted.

Meng-Ping Kao, Peng Yin, and Oscar Divorra Escoda as inventors. JXM-0003 ('556 Patent), cover page.

The '556 Patent issued on June 6, 2017 and has a total of 20 claims. Complainants are asserting independent claims 1 and 5 and dependent claims 3-4 and 7-8. Complaint, ¶ 1.

The parties dispute the constructions of two terms that appear in independent claims 1 and 5. The asserted independent claims of the '556 Patent are shown below with the disputed term in bold italics.

> 1. A method comprising:
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> decoding an image region, wherein the decoding includes performing in-loop filtering to reduce at least a first and a second type of coding artifact using at least two filters in succession, the at least two filters including a deblocking filter for performing a first pass to reduce blocking artifacts and an ***adaptive sparse de-noising filter*** for performing a second pass to reduce noise, wherein the ***adaptive sparse de-noising filter*** is selectively enabled or disabled at a given level, the given level being at least a macroblock level, a slice level, a picture level or a sequence level.
>
> 5. An apparatus comprising at least a memory and one or more processors, the one or more processors being configured to:
>
> decode an image region, the one or more processors including at least two filters for successively performing in-loop filtering to reduce at least a first and a second type of coding artifact, the at least two filters including a deblocking filter for performing a first pass to reduce blocking artifacts and an ***adaptive sparse de-noising filter*** for performing a second pass to reduce noise, wherein the ***adaptive sparse de-noising filter*** is selectively enable or disabled at a given level, the given level being at least a macroblock level, a slice level, a picture level or a sequence level.

B. Patent Overview

The '556 Patent generally relates to video encoding and decoding (video compression/decompression) and, specifically, "methods and apparatus for in-loop de-artifact filtering." JXM-0003 ('556 Patent), 1:6-8. Video compression can result in artifacts, which can include blocky artifacts, ringing artifacts, edge distortion, and texture corruption. *Id*. at 1:12-17. Filters and filtering methods can be used to improve video quality. *See id*. at 1:17-33. One type of

filter is a deblocking filter that is designed to reduce blocky artifacts/the blockiness of the content. *Id*. at 1:32-57. It typically does not correct other artifacts, such as distorted edges and textures. *Id*. at 1:58-2:3. To overcome these limitations, an approach has been proposed to use a de-noising type nonlinear in-loop[6] filter that "adapts to non-stationary image statistics which exploits a sparse image model." *Id*. at 2:4-15. However, "it has been observed that sparsity based de-noising techniques, even though they present a higher distortion reduction in terms of objective measures (e.g., mean squared error (MSE)) than other techniques, they may present important visual artifacts that need to be addressed." *Id*. at 2:43-47. Thus, "the use of a single de-noising filter is not very efficient or effective in removing coding artifacts." *Id*. at 48-50.

To address these disadvantages, the '556 Patent discloses methods and apparatus for in-loop de-artifact filtering using an encoder or decoder that has "at least two filters for successively performing in-loop filtering to respectively reduce at least a first and a second type of quantization[7] artifact." JXM-0003 ('556 Patent), 4:58-67, 5:7-12. In one embodiment, two in-loop filtering passes are used — in the first pass, an adaptive deblocking filter is used to target the removal of blocking artifacts, and in a second pass, an adaptive sparse de-noising filter is used that can "further reduce quantization noise over video frames composed of locally uniform regions (smooth, high frequency, texture, and so forth)." *Id*. at 10:17-23. The adaptive sparse de-noising filter "can be turned on/off at the macroblock level, slice level, picture level, and/or sequence level."[8] *Id*. at

[6] The '556 Patent states that incorporating filters into the encoder/decoder look is known as in-loop filtering. '556 Patent, 10:50-53.

[7] The '556 Patent states that "[a]ll video compression artifacts result from quantization, which is the only lossy coding part in a hybrid video coding framework." '556 Patent, 1:12-14.

[8] A macroblock is a group of blocks of data. *See* SXM-0002 ("Compression basics") at 26. A slice is "made up of several contiguous macroblocks." *Id*. A picture consists of "a group of slices and contains information needed by the decoder." *Id*. A sequence includes one or more groups of pictures. *Id*.; *see also id.* at Fig. 2.

11:50-53. The use of "a succession of filters (or filtering passes)" removes or reduces "a plurality of possible coding artifact types caused by quantization." *Id*. at 10:42-45. Different kinds of filters are used to handle different kinds of artifacts and quantization errors, which results in a decoded sequence that "is substantially better in both subjective and objective measures." *Id*. at 10:45-50.

The adaptive sparse de-noising filter "is directed to recovering the original signal from an independent and identically distributed (i.i.d.) noisy environment." JXM-0003 ('556 Patent), 14:19-21. However, the noise in video compression "is usually not independent and identically distributed (i.i.d.)." *Id*. at 14:21-24. To address this issue, the '556 Patent discloses using an adaptive sparse de-noising filter after a deblocking filter. JXM-0003 ('556 Patent), 10:62-11:1, 14:24-28. "Since visual blocking artifacts are most successfully removed by the deblocking filter, the remaining quantization noise tends to become more independent and identically distributed (i.i.d.), which conforms to the noise model assumption of an adaptive sparse de-noising filter." *Id*. at 11:1-5; *see also id.* at 14:28-30. This use of a succession of filters "has shown its superior performance in removing video compression artifacts, both in practice and theory." *Id*. at 14:34-36.

C. Disputed Claim Constructions

1. "sparse denoising filter"

The parties dispute the meaning of the term "sparse denoising filter," which appears in asserted claims 1 and 5 of the '556 Patent. The parties' proposed constructions are as follows:

Term and Claims	Complainants' Construction	Respondents' Construction	Staff's Construction
"sparse denoising filter"	Plain and ordinary meaning[9] (i.e., a filter	Sparse de-noising filter for performing a second	A filter that reduces noise

[9] On Monday, January 22, 2024, Complainants revised their construction to be "plain and ordinary meaning." It is the Staff's understanding that this change was made to reflect that the words of the claim are generally given their ordinary meaning and that Complainants' proposed construction is a reflection of that plain and ordinary meaning. In the Staff's view, this late revision to

Cls. 1, 5	that reduces noise based on a sparse representation of the signal)	pass to reduce noise, which is not a deringing filter Alternatively, a filter which exploits a sparse image model using an over complete set of linear transforms and hard thresh-holding, which is not a deringing filter	based on a sparse representation of the signal

The Staff agrees with Complainants that a "sparse denoising filter" is properly construed as "a filter that reduces noise based on a sparse representation of the signal."[10] This construction is consistent with the description of such filters in the '556 Patent and in contemporaneous references. The Staff's proposed construction provides a meaning for the term "sparse denoising filter,"[11] unlike Respondents' primary proposed construction, and does not include text that is duplicative of language in the claim (i.e., for performing a second pass). Additionally, the Staff's construction is not unnecessarily exclusionary and does not overly narrow the meaning of the term to a single

Complainants' proposed construction was not necessary. At the end of the day, Complainants are still arguing that the term should be construed to mean "a filter that reduces noise based on a sparse representation of the signal."

[10] Although the Staff agrees with Complainants' construction, there is a dispute among the parties regarding whether the signal itself can be sparse (i.e. whether "a sparse representation of the signal" encompasses a sparse signal). The Staff is of the view that "a sparse representation of the signal" in its proposed construction *does not* encompass a sparse signal (i.e., the representation of the signal is sparse, not the signal itself). The Staff understands that Complainants disagree and that the dispute is based on infringement arguments related to the functionality of the accused products. In the Staff's view, the evidence and, in particular, the extrinsic evidence supports its understanding.

[11] In the Staff's view, the construction of the term "sparse denoising filter" requires more than simply rephrasing the plain language of the claim, as Respondents' construction does. *See C.R. Bard, Inc. v. U.S. Surgical Corp.*, 388 F.3d 858, 863 (Fed. Cir. 2004) ("[M]erely rephrasing or paraphrasing the plain language of a claim by substituting synonyms does not represent genuine claim construction.").

disclosed embodiment. For these reasons, discussed in detail below, the Staff's construction should be adopted.

a. '556 Patent's Disclosure Supports Staff's Construction

The '556 Patent's discussion of both known sparsity based de-noising tools and the claimed sparse denoising filter supports the Staff's construction. Specifically, in a background discussion of sparsity based denoising tools, the '556 Patent states that for certain regions the signal "would probably have sparse representation at the filtering stage if the same transform is used for compression and denoising. JXM-0003 ('556 Patent), 2:37-47. This supports the Staff's construction requiring a sparse representation of the signal.

Additionally, '556 Patent describes "adaptive sparse de-noising filtering" as being "directed to recovering the original signal from an independent and identically distributed (i.i.d.) noisy environment." JXM-0003 ('556 Patent), 14:19-21. The fact that sparse denoising filtering recovers the original signal from a noisy environment indicates that something other than the original signal is being filtered, namely, a sparse representation of the signal, as discussed above.

The '556 Patent also discloses several embodiments of the adaptive sparse denoising filter and its operation. All of these embodiments involve a transform step whereby the signal is transformed into a sparse representation. For example, Figure 5, shown below, depicts "an exemplary succession of de-artifact filters" in a two-pass filter embodiment where the "adaptive sparse de-nosing filter 544" includes a forward transformer 571, a threshold module 573, and inverse transformer 575, and an adaptive weighting module that are in signal communication with each other. JXM-0003 ('556 Patent), 10:62-64, 11:16-24.

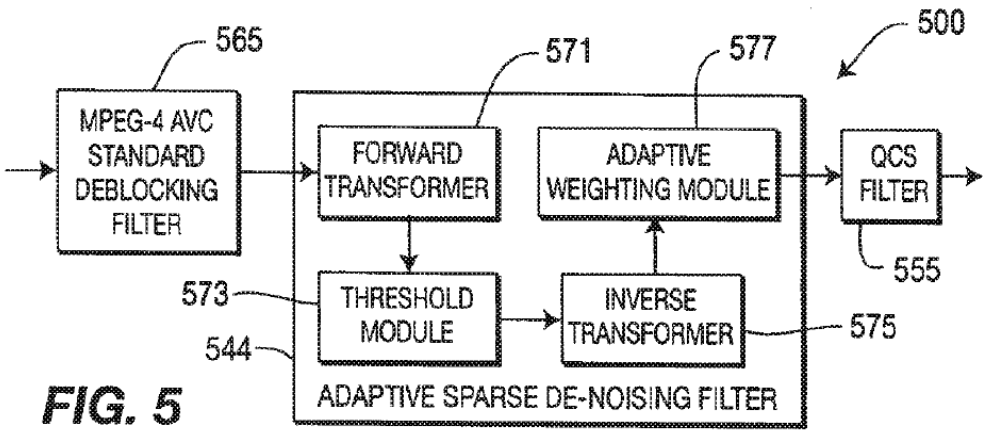

FIG. 5

The first step of the process involves a forward transformer, which the Staff understands based on references discussed in Section V.C.1.b. below transforms the signal (in this case the signal from the MPEG-4 Standard Deblocking Filter) into a sparse representation that is then denoised through a series of steps. Two other disclosed embodiments, one described as the adaptive sparse denoising filter operation and the other described as "adaptive sparse de-noising filter methodology used for refinement" also appear to involve a similar transform process. JXM-0003 ('556 Patent), 13:24-65. This use of a transform to change the signal into a sparse representation is reflected by the Staff's construction of a sparse denoising filter as "a filter that reduces noise based on a sparse representation of the signal.[12]

The foregoing shows that the '556 Patent supports the Staff's proposed construction of "sparse denoising filter."

[12] This also shows that the sparse denoising filter can be implemented in different ways. Therefore, "sparse denoising filter" should not be limited to any specific example or embodiment. *See Littelfuse, Inc. v. Mersen USA EP Corp.*, 29 F.4th 1376, 1381 (Fed. Cir. 2022) ("courts ordinarily should not limit the claimed invention to preferred embodiments or specific examples in the specification" (internal quotations omitted)).

b. Extrinsic Evidence Supports Staff's Construction[13]

(1) References Dated at or Before the Time of the Invention

References that pre-date or are contemporaneous with the '556 Patents claimed June 15, 2006 priority date also support the Staff's construction. As discussed below, the references explain sparsity, discuss sparse representation and its usefulness in denoising, and describe how transforms work to achieve sparse representations, all of which support the Staff's construction.

With respect to sparsity, an article by Cheng (SXM-0004) discloses techniques of modeling sparse systems (one in which many of the coefficients are zero) that adapt only nonzero weights of the system, which reduces "the misadjustment error due to gradient noise." SXM-0004 (Cheng) at .001. Similarly, an abstract by Normile (SXM-0006) discloses a sparse adaptive filtering technique to reduce noise that avoids calculations associated with near zero coefficients (where the system has clusters of non zero coefficients separated by samples that are small or zero). SXM-0006 (Normile) at .001. The foregoing shows that sparse systems are those in which the data or information being analyzed has many coefficients that are zero.[14] Further, Normile shows that sparse adaptive filtering techniques can be applied to these "sparse" systems to efficiently reduce noise. This is consistent with the Staff's construction, where the filter's noise reduction is based on a sparse representation of the signal.

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[13] The prosecution history of the '556 Patent is unremarkable, particularly with respect to "sparse denoising filter." There were a total of two rejections, one that was overcome by filing a terminal disclaimer and one that was overcome by cancelling the objected to claims. *See* JXM-0006 ('556 Patent Prosecution History).

[14] To the extent it is alleged that the Staff's proposed construction is vague as to what is meant by "sparse," the Staff is of the view that "sparse" can be defined in this manner. SXM-0004 (Cheng) at .001; SXM-0006 (Normile) at .001. However, Cheng and Normile show that the term "sparse" is a term that would have been known to and understood by one of ordinary skill in the art, so the Staff is of the view that it does not need to be further construed.

Regarding sparse representation, an article by Huang from 2006 discusses the "application of sparse representation (factorization) of signals over an overcomplete basis (dictionary) for signal classification." SXM-0005.001. Specifically, Huang presents "a theoretical framework for signal classification with sparse representation" that combines "the discrimination power of the discriminative methods with the reconstruction property and the sparsity of the sparse representation that enables one to deal with signal corruptions: noise, missing data and outliers." *Id*. at .001. The objective of this framework is to "achieve a sparse and robust representation of corrupted signals for effective classification." *Id*. at .002. Huang also discloses that "[s]parse representation works well in applications where the original signal y needs to be reconstructed as accurately as possible, such as denoising, image inpainting and coding." *Id*. at .003. Thus, a "sparse representation" is a representation of signal that can be used for noising, which is consistent with the Staff's construction.

Additionally, an article from 2006 by Elad, explains that "[i]n signal processing we are often interested in a replacement of the representation, seeking some simplification for an obvious gain." CXM-0003 (Elad) at IDG1373_0018207. According to Elad, "[t]he basic idea is to 'change language,' and describe the signal differently, in the hope that the new description is better for the application in mind," which is the "rationale" behind the use of transforms. *Id*. In other words, Elad uses transforms into order to obtain a representation that has the fewest nonzero entries, thereby "achieving an ultimate simplicity in representation" — the sparsest result. *Id*. at IDG1373_0018207-8 (describing a "special interest" in the sparsest solution/representation). As discussed above, the '556 Patent uses transforms in connection with its disclosed sparse denoising filtering. Elad shows that those transforms are used to create a sparse representation of the signal, which is used for denoising. Thus, the sparse denoising filter is a filter that reduces noise based on a sparse representation of a signal.

Elad provides a helpful illustration - "think of [the] signal as a molecule, and the forward transform decomposes it to its building atoms, where we try to use the fewest in this construction." *Id*. at IDG1373_0018208. Based on the Staff's understanding, the use of the fewest atoms is a sparse representation of the molecule. This is akin to the sparse representation of the signal in the Staff's proposed construction. The signal (or molecule) itself is not sparse, but an action is performed (a transform) that creates a sparse representation (decomposes the molecule to its building atoms), which can then be used in further functions, such as denoising.

This is also consistent with the '556 Patent's disclosed embodiments discussed in Section V.C.1.a. above describing how the adaptive sparse denoising filter may function, all of which involve a transform, which Elad teaches produces the sparse representation of the signal.

In sum, the references discussed above describe sparsity and sparse representation in a manner that is both consistent with the '556 Patent's disclosures and with the Staff's proposed construction of "sparse denoising filter" — "a filter that reduces noise based on a sparse representation of the signal."

(2) References Dated After the Time of Invention

A reference that post-dates the time of the invention also describes "sparsity" and "sparse representation" in a manner that is consistent with the Staff's proposed construction. Like the references discussed in Section V.C.1.b.(1) above, this reference also discloses the use of a transform to obtain sparse representations of signals that are used to reduce noise. Thus, it too supports the Staff's construction.

For instance, an article by Dabov states that plenty of denoising methods exist, including transform-domain denoising methods that "typically assume that the true signal can be well approximated by a linear combination of few basis elements" — "[t]hat is, the signal is sparsely represented in the transform domain." SXM-0007 at .001. "[B]y preserving the few high-

magnitude transform coefficients that convey mostly the true-signal energy and discarding the rest which are mainly due to noise, the true signal can be effectively estimated." *Id*. Thus, a sparse representation of a signal can be used to reduce noise. This is consistent with the Staff's proposed construction of "sparse denoising filter."

c. Respondents' Constructions Should Not be Adopted Because There Has Not Been a Disclaimer of a Deringing Filter

(1) Statements in the Prosecution of the Parent to the '556 Patent Do Not Constitute a Disclaimer

Respondents are expected to rely on statements made during prosecution of the parent to the '556 Patent, U.S. Patent Application No. 12/312,386 ("the '386 Application"), which issued as U.S. Patent No. 9,277,243 ("the '243 Patent"), to argue that the patentee disclaimed a deringing filter in the '556 Patent. In the Staff's view, the statements made during the prosecution of the parent to the '556 Patent do not constitute a disclaimer and therefore do not warrant the addition of "which is not a deringing filter" to the construction of "sparse denoising filter."

(a) Prosecution History of '243 Patent

Respondents are expected to rely on statements made in a June 2, 2014 response to an office action as alleged evidence of disclaimer of a deringing filter. The relevant portions of the prosecution of the '243 Patent are discussed below.

Before this response, the Examiner rejected the pending claims, except claim 25, as being anticipated by U.S. Patent No. 6,665,346 ("Lee"), because Lee discloses an encoder having at least two filters for successively performing in-loop filtering where the encoder determines whether deblocking filtering is needed and whether ringing filtering is needed. RXM-0022 ('243 Patent Prosecution History) 1/2/14 Office Action at LENOVO_1373-00160088-91. The Examiner also rejected claim 25 as obvious in view of Lee and U.S. Patent Publication No. 2010/0150229). *Id*. at LENOVO_1373-00160091 ("Francois").

In the June 2, 2014 response, the applicant amended independent claims 1, 6, 11, 16, and 21 to add *inter alia* the limitation "the at least two filters including a deblocking filter for performing a first pass to reduce blocking artifacts and a sparse de-noising filter for performing a second pass to reduce noise." RXM-0022 ('243 Patent Prosecution History) 6/2/14 Response at LENOVO_1373-00160112-17. The applicant argued that "[t]he cited portions of Lee do not expressly or inherently disclose at least *a sparse de-noising filter for performing a second pass* to reduce noise." *Id*. at LENOVO_1373-00160119 (emphasis in original). The applicant also argued that "[w]hile the cited portion of Lee may disclose deringing filtering, Lee does not disclose or suggest *a sparse de-noising filter for performing a second pass* to reduce noise." *Id*. (emphasis in original). Additionally, the applicant argued that "Lee's deringing filtering does not disclose or suggest *a sparse de-noising filter for performing a second pass* to reduce noise" and Francois failed to cure this deficiency. *Id*.

On July 15, 2014, the Examiner issued a final rejection, which withdrew the anticipation rejection in view of Lee, but included a new obviousness rejection based on the combination of Lee and the applicant's admitted prior art in the background section of the application. RXM-0022 ('243 Patent Prosecution History) 7/15/14 Final Rejection at LENOVO_1373-00160131-41. The Examiner argued that Lee disclosed "at least two filters including a deblocking filter for performing a first pass to reduce blocking artifacts and a de-noising filter for performing a second pass to reduce noise [a deblocking filter to reduce blocking artifacts (first pass) and a deranging [sic] filter (de-noising filer [sic], second pass) to reduce noise (Fig. 1, Abstract, paragraphs [0009], [0031], [0044])]." *Id*. at LENOVO_1373-00160135-6. The Examiner admitted that "Lee discloses an adaptive deringing filter (de-noising filter) (paragraph [0049]) but does not disclose that the de-noising filter is a sparse filter." *Id*. at LENOVO_1373-00160136. However, the Examiner argued that in view of the background of the application discussing sparsity based de-noising techniques

"[i]t would have been obvious to one having ordinary skill in the art at the time the invention was made to use the teachings of Applicant's Admitted prior art to modify the apparatus of Lee by using a sparsity based de-noising filter in order to achieve a higher distortion reduction in terms of objective measures (e.g., mean squared error (MSE)) than other filters." *Id*.

Through additional examination, including amending the claims to recite an *adaptive* sparse de-noising filter, the claims were allowed. *See, e.g.,* RXM-0022 ('243 Patent Prosecution History), 5/15/14 Response at LENOVO_1373-00160174.

(b) Deringing Filters Were Not Disclaimed During Prosecution of the '243 Patent

A disclaimer must be "clear and unmistakable" to limit the meaning of a claim term. *SanDisk Corp. v. Memorex Products, Inc.*, 415 F.3d 1278, 1286 (Fed. Cir. 2005) ("When the patentee makes clear and unmistakable prosecution arguments limiting the meaning of a claim term in order to overcome a rejection, the courts limits the relevant claim term to exclude the disclaimed matter."). Indeed, "[t]he standard for disavowal us exacting, requiring clear and unequivocal evidence that the claimed invention includes or does not include a particular feature." *Cisco Systems, Inc. v. Int'l Trade Comm'n*, 873 F.3d 1354, 1361 (Fed. Cir. 2017). Where the disclaimer is ambiguous or whether the argument made during prosecution is subject to more than one reasonable interpretation, one of which is consistent with the proffered construction of the term, there is no clear and unmistakable disclaimer. *SanDisk*, 415 F.3d at 1287. In the Staff's view, the statements the applicant made during prosecution of the parent of the '556 Patent do not clearly and unmistakably disclaim a deringing filter.

Here, the applicant distinguished the prior art Lee reference from the claimed invention by arguing *inter alia* that "Lee's deringing filtering does not disclose or suggest *a sparse de-noising*

filter for performing a second pass to reduce noise."[15] RXM-0022 ('243 Patent Prosecution History) 6/2/14 Response at LENOVO_1373-00160119 (emphasis in original). From this statement, one might reasonably conclude that a denoising filter is not the same as a deringing filter. However, as the Examiner acknowledged in the July 15, 2015 Final Rejection, a deringing filter is a type of denoising filter. *See* RXM-0022 ('243 Patent Prosecution History) at LENOVO_1373-00160136 ("Lee discloses an adaptive deringing filter (de-noising filter) (paragraph [0049]) but does not disclose that the de-noising filter is a sparse filter."). Thus, what distinguishes the deringing filter from the sparse denoising filter is that the denoising filter is a sparse filter — not that the denoising filter is not or cannot be a deringing filter. In other words, the genus sparse denoising filter includes the species of a sparse deringing filter (i.e. a deringing filter that is also a sparse filter), to the extent such filters exist. This is not, in the Staff's view a clear and unmistakable disclaimer of a deringing filter and certainly is not a disclaimer of *any* deringing filter. For this reason, Respondents' proposed construction should be rejected.[16]

(2) Statements Made During Prosecution of Child of the '556 Patent Do Not Constitute a Disclaimer

As with the parent, statements made during the prosecution of the child of the '556 Patent, U.S. Patent Application No. 15/585,462 ("the '462 Application"), which issued as U.S. Patent No. 11,089,337 ("the '337 Patent"), do not constitute a disclaimer.

[15] The claim language at issue when these arguments were made was "sparse denoising filter" not "adaptive sparse denoising filter," as the claims were amended to recite shortly before allowance (and as the asserted claims of the '556 Patent recite). *See Saunders Group, Inc. v. Comfortrac, Inc.*, 492 F.3d 1326, 1333 (Fed. Cir. 2007) ("When the purported disclaimers are directed to specific claim terms that have been omitted or materially altered in subsequent applications (rather than to the invention itself), those disclaimers do not apply."). The fact that the claim language about which the alleged disclaimer arguments were made is not the same as that recited in the asserted claims of the '556 Patent may serve as another reason why disclaimer should not apply.

[16] Respondents' disclaimer argument also appears to be based on to their non-infringement arguments.

(a) Prosecution History of '337 Patent

Respondents are expected to rely on the arguments the applicant made in an October 20, 2020 response to an office action. The relevant portions of the prosecution history of the '337 Patent are discussed below.

Before this response, there were several office actions and responses disputing the Examiner's rejection of the pending claims as obvious in view of Lee and M. Welling et al., "Learning Sparse Topographic Representations with Products of Student-t Distributions," *Advances in Neural Information*, 2003, pp. 1-8 ("Welling"). *See, e.g.*, RXM-0021 ('337 Prosecution History), 11/20/17 Office Action at 3-6. The Examiner stated that "Lee discloses a ringing de-noising filter and does not disclose a sparse de-noising filter," but that Welling "discloses a sparse de-noising filter that is efficient and works well even for highly overcomplete sets of filters." *Id*. at 5. The Examiner further stated that it would have obvious to "use the teaching of Welling to modify the method of Lee by replacing the ringing de-noising filter with a sparse de-noising filter." *Id*.

On October 20, 2020, the applicant filed a response to a July 20, 2020 office action, amending the claims to recite an adaptive sparse de-noising filter, and arguing that neither Lee nor Welling disclose the use of such a filter. RXM-0021 ('337 Prosecution History), 10/20/20 Response at 2-5. Specifically, the applicant argued that Welling distinguishes its machine learning based iterated Wiener filter from an adaptive Wiener filter, and Welling describes the results of the iterated Weiner filter as being better. *Id*. at 5. The applicant also maintained that it would not be obvious to combine Welling and Lee because there would not be a motivation to combine or a reasonable expectation of success. *Id*. In particular, the applicant argued that there is no evidence that Welling's iterated Wiener filter designed to remove Gaussian pixel noise is a simple substitution for Lee's filter designed to remove ringing noise. *Id*. ("In contrast, Lee's filter is designed to remove 'ringing noise near image edges' … There is no evidence that a filter designed

to remove Gaussian pixel noise is a 'simple substitution' for a filter designed to remove 'ringing noise near image edges.'"). The applicant also argued that the invention disclosed in Welling was unsatisfactory for use with the invention in Lee because of its complexity and because it is trained for a specific type of image. *Id*. at 5-6.

The claims were subsequently allowed. *See, e.g.*, RXM-0021 ('337 Prosecution History), 11/4/20 NOA, 4/6/21 NOA, 6/24/21 NOA

(b) Deringing Filters Were Not Disclaimed During Prosecution of the '337 Patent

Here, the statements made during prosecution of the child of the '556 Patent do not clearly and unmistakably disclaim a deringing filter. *SanDisk Corp*, 415 F.3d at 1286 (a disclaimer must be "clear and unmistakable."). During examination, the applicant's statements characterized the disclosures of the asserted prior art, Lee and Welling, the differences between Lee and Welling, and whether one of ordinary skill in the art at the time would have been motivated to combine these references. At most, the applicant argued that in contrast to Welling, Lee's filter removed ringing noise near image edges, not Gaussian pixel noise. RXM-0021 ('337 Prosecution History), 10/20/20 Response at 2-5. This discussion distinguished Welling and Lee from each other, it did not distinguish the claimed invention from Welling or Lee. In the Staff's view, this discussion (or any other statement in the prosecution history) does not constitute a clear and unmistakable disclaimer of a deringing filter and is certainly not a disclaimer of an adaptive sparse deringing filter – to the extent such a filter exists.

d. Respondents' Alternative Construction Should Not be Adopted Because it is Overly Narrow

Respondents' alternative construction ("a filter which exploits a sparse image model using an over complete set of linear transforms and hard thresh-holding, which is not a deringing filter") appears to be based on the '556 Patent's disclosure of a "recently proposed" approach that uses a

"de-noising type nonlinear in-loop filter." JXM-0003 ('556 Patent), 2:4-7. The '556 Patent describes this approach as using "a nonlinear de-noising filter [that] adapts to non-stationary image statistics which exploits a sparse image model using an over complete set of linear transforms and hard-thresholding." JXM-0003 ('556 Patent), 2:7-10. This is a discussion of a known approach in the background section of the patent, which provides one way in which a denoising filter can be used. However, this discussion is not tied to the claimed invention or embodiments thereof. Further, as discussed above, the '556 Patent discloses several different embodiments for a sparse denoising filter. Thus, there is no indication that "sparse denoising filter" should be limited to a specific embodiment, let alone a description of a known approach. *See Littelfuse, Inc. v. Mersen USA EP Corp.*, 29 F.4th 1376, 1381 (Fed. Cir. 2022) ("courts ordinarily should not limit the claimed invention to preferred embodiments or specific examples in the specification" (internal quotations omitted)).

Respondents are also expected to rely on the prosecution history of related EP Patent Publication No. 2082583 ("EP '583") as supporting their alternative construction. In the Staff's view, it does not support adopting Respondents' narrow alternative construction.

During prosecution of EP '583, the applicant submitted a second auxilliary request that amended claim 1 to recite that that the adaptive sparse de-noising filter "exploits a sparse image model using an over complete set of linear transforms." RXM-0023, 10/8/21 Applicant Communication at 2-3. This amendment was made to address the Board's objection to the term "sparse filter" as having inconsistent interpretations due to the context. *Id*. at 3. Specifically, the term "sparse denoising filter" could be interpreted as "a denoising filter represented by a matrix of coefficients containing very few non-zero elements" or in the context of "representation of an image region when the representation uses an over complete set of linear transforms." *Id*. The applicant did not concede that these interpretations are inconsistent but amended the claim to be compliant

with the interpretation given by the Board. *Id*. This does not indicate that the applicant represented that the disclosed sparse denoising filter was limited to a filter that "exploits a sparse image model using an over complete set of linear transforms." Thus, there is no reason to adopt Respondents' alternative construction.

e. Conclusion

For all of the reasons discussed above, the Staff's proposed construction of "sparse denoising filter" should be adopted.

2. "adaptive sparse de-noising filter"

The parties dispute the meaning of the term "adaptive sparse de-noising filter" which appears in asserted claims 1 and 5 of the '556 Patent. The parties' proposed constructions are as follows:

Term and Claims	Complainants' Construction	Respondents' Construction	Staff's Construction
"adaptive sparse denoising filter" Cls. 1, 5	Plain and ordinary meaning (i.e., a sparse denoising filter (a filter that reduces noise based on a sparse representation of the signal) that can adjust its own parameters according to the image region)	Sparse de-noising filter for performing a second pass to reduce noise, which is not a deringing filter, that can adjust its own parameters automatically; Alternatively, a filter which exploits a sparse image model using an over complete set of linear transforms and hard thresh-holding, which is not a deringing filter, that can adjust its own parameters automatically.	A sparse denoising filter (a filter that reduces noise based on a sparse representation of the signal) that can adjust its own parameters automatically

Here, the parties dispute the meaning of the term "adaptive." The parties' constructions are otherwise the same as those discussed above with respect to "sparse denoising filter." The Staff and Respondents agree that "adaptive" means "can adjust its own parameters automatically;" whereas, Complainants allege that "adaptive means "can adjust its own parameters according to the image region." In the Staff's view, the difference between these constructions in minimal with Complainants' offered construction being narrower in scope. In the Staff's view, the '556 Patent does not expressly limit "adaptive" to an adjustment of parameters according to the image region. As a result, the Staff's construction is more appropriate and should be adopted.

a. The '556 Patent's Disclosure of Adaptive

The '556 Patent has limited disclosures related to the meaning of "adaptive," particularly in the context of discussing an "adaptive sparse denoising filter." However, the patent discusses advantages of the claimed invention(s) in connection with adaptively indicated parameters, as follows:

> Still another advantage/feature is the apparatus having the encoder that, in turn, has at least two filters wherein at least one of the at least two filters is used to enforce at least one compression constraint as described above, wherein at least one of, enablement information or disablement information for the at least one compression constraint and side information corresponding to the image region to adaptively indicate parameters of the at least one compression constraint, is signaled using at least one of at least one high level syntax element and at least one block level syntax element.

JXM-0003 ('556 Patent), 16:25-34.

> Moreover, another advantage/feature is the apparatus having the encoder that, in turn, has at least two filters wherein at least one of the at least two filters is used to enforce at least one compression constraint as described above, wherein parameters of the at least one compression constraint is adaptively indicated based at least in part on at least one of data characteristics and data statistics corresponding to the image region.

Id. at 16:35-42.

> Additionally, another advantage/feature is the apparatus having the encoder that, in turn, has at least two filters as described above, wherein at least one of the two or more filters is adaptively enabled or disabled depending upon at least one of data characteristics and data statistics corresponding to the image region.

Id. at 16:53-57.

> Further, another advantage/feature is the apparatus having the encoder that, in turn, has at least two filters as described above, wherein the encoder transmits side information corresponding to the image region to adaptively indicate parameters of at least one of the two or more filters, the side information being transmitted at at least one of a macroblock level, a slice level, a picture level, and a sequence level.
>
> Also, another advantage/feature is the apparatus having the encoder that transmits side information as described above, wherein the parameters of the at least one of the two or more filters are adaptively tuned based at least in part on at least one of data characteristics and data statistics corresponding to the image region.

Id. at 16:65-17:10.

As Complainants are expected to argue, all of these passages discuss adaptively indicating parameters, adaptively indicating compression constraints, adaptively enabling or disabling filters, or adaptively tuning filters based on either information or data characteristics and data statistics

corresponding to the image region. However, none of these discussions are specific to an adaptive sparse denoising filter (*e.g.*, they generally refer to at least one of the two or more filters), which is the term being construed. Thus, while these disclosures may be informative, the Staff disagrees that they should limit the scope of the term "adaptive" as it is used in connection with "adaptive sparse denoising filter."

In the Staff's view, the Widrow article, titled "Adaptive Noise Cancelling: Principles and Applications," provides a good description of adaptive filters. SXM-0003 (Widrow). Widrow states "[a]daptive filters, on the other hand, have the ability to adjust their parameters automatically, and their design requires little to no *a priori* knowledge of signal or noise characteristics." *Id*. at .002. Here, the term "adaptive" is being construed as part of the larger term "adaptive sparse denoising filter." Thus, Widrow's definition appears to be appropriate to use in this context. It also has the benefit of avoiding any unnecessary or unsupported limitation on the scope of the term.

For these reasons, the Staff's construction of "adaptive" should be adopted. Further, for the reasons discussed above with respect to "sparse denoising filter," the Staff's complete construction of "adaptive sparse denoising filter" should be adopted.

VI. U.S. PATENT NO. 8,674,859

A. Background

The '859 Patent is titled "Methods for Arithmetic Coding and Decoding and Corresponding Devices." '859 Patent, cover page. Complainants contend that "each of the asserted and domestic industry claims of the '859 Patent have a priority invention date no later than May 20, 2009, which is the date by which the inventors conceived the invention(s) claimed in each of these claims. Complainants' Notice of Patent Priority Dates at 2 (Nov. 9, 2023). The '859 Patent claims priority to a French Patent Application No. 0954483, which was filed July 1, 2009. '859 Patent, cover page;

see also Complainants' Notice of Patent Priority Dates at 2. The '859 Patent names Philippe Bordes, Dominique Thoreau, Jerome Vieron, and Edouard Francois as inventors. *Id*.

The '859 Patent issued on March 18, 2014 and has a total of 15 claims. Complainant is asserting independent claims 10 and 15. Complaint, ¶ 1.

The parties have agreed to the construction of one claim term that appears in the '859 Patent, which is discussed below. The parties dispute the constructions of six terms that appear in independent claims 10 and 15. Claims 10 and 15 are shown below with the disputed terms in bold italics.

> 10. ***Arithmetic decoding method for symbols coded in the form of a stream, comprising the following steps applied at switching points distributed in said stream to decode a current symbol:***
>
> decoding from the stream, for said current symbol, a probability model identifier,
>
> selecting using said probability model identifier a probability model in a set comprising a current probability model defined from symbols coded previous to the current symbol and a subset of probability models wherein subset comprises at least one probability model defined by default,
>
> adding in said subset said current probability model, the selected probability model becoming the current probability model,
>
> decoding said current symbol with said current probability model, and
>
> updating said current probability model according to the decoding of said current symbol.
>
> 15. Arithmetic decoder for decoding symbols coded in the form of a stream, comprising:
>
> ***means for decoding from the stream, at switching points distributed in said stream to decode a current symbol, for said current symbol, a probability model identifier,***
>
> ***means for selecting using said probability model identifier a probability model in a set comprising a current probability model defined from symbols coded previous to the current symbol and a subset of probability models wherein subset comprises at least one probability model defined by default,***
>
> ***means for adding in said subset said current probability model, the selected probability model becoming the current probability model,***
>
> ***means for decoding said current symbol with said current probability model, and***
>
> ***means for updating said current probability model according to the decoding of said current symbol.***

B. Patent Overview

The ’859 Patent generally relates to the coding and decoding of symbols in a stream. JXM-0002 (’859 Patent), 1:14-19. By way of background, one type of coding/decoding is entropy coding. *Id*. at 1:23-33. In general terms, entropy coding associates a shorter binary word with the most frequent symbol values (those that have the highest probability of appearing) to reduce the “coding cost.” *Id*. There are several different entropy coding methods, including variable length coding and arithmetic coding. *Id*. at 1:34-46. In variable length coding “VLC” a VLC table is defined for each symbol. *Id*. at 1:34-36. The VLC table associates each possible value of the symbol with a binary code. *Id*. at 1:36-40. The length of the binary code depends on the probability of the appearance of the value of the symbol. *Id*. In arithmetic coding “AC” in arithmetic coding “the probabilities that a symbol takes a value are initialized for example at the image start or image slice in the case of symbols representative of an image.” *Id*. at 1:47-51. The probabilities are updated regularly during the image coding of the image slice to take into account the characteristics of the source signal being coded.[17] *Id*. at 1:51-54.

According the ’859 Patent, these coding/decoding methods have certain disadvantages, namely, that “the probability that a symbol takes a given value is intrinsically linked to the characteristics of the source signal which is not known a priori.” JXM-0002 (’859 Patent), 1:55-58. For instance, in VLC the estimated probability is set *a priori* according to a prior analysis. *Id*. at 2:4-11. And, in arithmetic coding, the probability is regularly updated during the coding of the current signal, but with an increasing delay as the real probability fluctuates during the coding process. *Id*. at 2:4-11.

[17] An example of how arithmetic coding works to code the message “BILL GATES” can be found at pages 4-7 of SXM-0001 (“Arithmetic Coding + Statistical Modeling = Data Compression,” *Dr. Dobb’s Journal* (Feb. 1991)).

To address these issues, the ’859 Patent discloses arithmetic methods for coding symbols in a stream where a current symbol is coded according to a current probability model and the current probability model is updated according to the coding of the current symbol. JXM-0002 (’859 Patent), 2:15-22. At switching points distributed in the stream, the current probability model is selected in a set of at least two probability models according to a coding cost criterion and an identifier of a selected probability is coded. *Id*. at 2:23-28. This purportedly “enables the real probability to be approached more rapidly than with a standard VLC or AC type method and thus enables the symbol or symbols to be coded more efficiently, i.e. at a lower coding cost.” *Id*. at 2:29-33. The ’859 Patent also discloses corresponding arithmetic methods for decoding a succession of symbols in a stream. ’859 Patent, 3:50-56.

C. Agreed Claim Constructions

The parties have agreed to the following claim constructions:

Term and Claims	Agreed Construction
“wherein subset comprises” Cls. 10, 15	“wherein said subset comprises”

Joint Proposed Claim Construction Chart (Dec. 11, 2023).

The parties agree that a person of skill in the art would understand this term to mean “wherein said subset comprises,” despite the omitted article before “subset,” which appears to be an inadvertent error. The Commission has the ability to interpret claim language to correct certain claim drafting errors. *See Certain Multiple Mode Outdoor Grills and Parts Thereof*, Inv. No. 337-TA-895, Comm’n Op. at 23-26 (Feb. 3, 2015) (interpreting “exhaust” as reciting “exhaust means” because patentee mistakenly struck “means” when amending the claim); *see also Certain Dermatological Treatment Devices and Components Thereof*, Inv. No. 337-TA-1356, Order No. 35

at 30-32 (Oct. 25, 2023) (ALJ construed the term "separatably" to mean "separable" because there was no reasonable debate that a person of ordinary skill would understand the term to mean "separable" and explaining that the parties were not seeking that the Commission correct the claim to swap out "separatably" and replace it with "separable."); *Certain Consumer Elecs. and Display Devices with Graphics Processing and Graphics Processing Units Therein*, Inv. No. 337-TA-932, Order No. 20 at 59-60 (Apr. 2, 2015) (ALJ held that the disputed term "is an obvious typographical error that a person of ordinary skill in the art reading [the claim in which the disputed term appeared] in the context of the other claims of the patent would understand," construed the term to correct that error, and rejected Respondents' indefiniteness contention); *Certain Devices for Mobile Data Commc'n*, Inv. No. 337-TA-809, Order No. 46 at 140 (Sept. 28, 2012) (interpreting a disputed term to correct a grammatical error because it was "not subject to reasonable debate" and was supported by the prosecution history).

D. Disputed Claim Constructions

1. "arithmetic decoding method for symbols coded in the form of a stream, comprising the following steps applied at switching points distributed in said stream to decode a current symbol"

The parties dispute whether the entirety of the term "arithmetic decoding method for symbols coded in the form of a stream, comprising the following steps applied at switching points distributed in said stream to decode a current symbol" is the preamble to claim 10 of the '859 Patent. Additionally, the parties dispute whether this claim term is limiting. The parties' proposed constructions are as follows:

Term and Claims	Complainant's Construction	Respondents' Construction	Staff's Construction
"arithmetic decoding method for symbols coded in the form of a	The terms "stream" and "current symbol" are limiting at least to	The portion of this claim term following "comprising" is not	The portion of this claim term following "comprising" is not

stream, comprising the following steps applied at switching points distributed in said stream to decode a current symbol" Cl. 10	the extent that they provide antecedent basis for those terms as they appear elsewhere in the claim. stream: stream of data. switching point: a point in the stream at the level of which the probability model used to code the current symbol can be modified. current symbol: a symbol that is currently being decoded.	part of the preamble and therefore is limiting. Regardless, the entire term is limiting. The preamble is limiting To the extent construction is necessary, stream: "stream of data" current symbol: "a symbol that is currently being decoded" switching point: "a point in the stream at the level of which the probability model used to code the current symbol can be modified—i.e., a probability model can be selected"	part of the preamble and therefore is limiting. Regardless, the terms "stream" and "current symbol" are limiting at least to the extent that they provide antecedent basis for those terms as they appear elsewhere in the claim. stream: stream of data. current symbol: a symbol that is currently being decoded. The term "switching points" is also limiting, regardless of whether it is considered to be part of the preamble. switching points: a point in the stream at the level of which the probability used to code the current symbol can be modified.

Here, the parties dispute what, if any, portions of the term "arithmetic decoding method for symbols coded in the form of a stream, comprising the following steps applied at switching points distributed in said stream to decode a current symbol" are limiting. The parties agree that at least the terms "stream" and "current symbol" are limiting. The parties also agree to the constructions of the terms "stream" and "current symbol." However, the parties dispute whether any portion of the

term is not part of the preamble, whether the entirety of the term is limiting, and the construction of "switching points."

For the reasons discussed below, the portion of the claim term following "comprising," namely "the following steps applied at switching points distributed in said stream to decode a current symbol" is part of the body of the claim, not the preamble, and is therefore limiting. Regardless, the terms "stream," "current symbol," and "switching points" are limiting and should be construed as agreed-to by the parties and proposed by Staff.

a. The Portion of the Term Following "Comprising" is Not Part of the Preamble

The portion of the disputed claim term following "comprising," "the following steps applied at switching points distributed in said stream to decode a current symbol" is part of the body of the claim and therefore is limiting.

The word "comprising" typically marks the transition from the preamble to the body of the claim. *See SIMO*, 983 F.3d at 1375 ("comprising" "is one of the transition words that typically mark the end of the preamble, with what follows constituting the body of the claim."); *G.W. Aru, LLC v. W.R. Grace & Co.-Conn*, Civ. No. JKB-22-2636, 2023 WL 7170356, at *5 (D. Maryland Oct. 31, 2023) (preamble is often "set off from the body of a claim by the term 'comprising.'"); *see also Philips*, 312 F.Supp.2d at 602, n. 6 (the word "comprising" signals the end of the preamble for one of the asserted claims); *Intelligent Agency, LLC v. 7-Eleven, Inc.*, 2022 WL 760203, at *8 (E.D. Tex. March 11, 2022) (finding that the preamble stopped after the word "comprising" where the remaining claim language recited physical components that "by their placement after 'comprising' means they are recited limitations of the claim."). In the Staff's view, this is exactly what "comprising" does in the term "arithmetic decoding method for symbols coded in the form of a stream, comprising the following steps applied at switching points distributed in said stream to

decode a current symbol." The preamble, "arithmetic decoding method for symbols coded in the form a stream," describes what the claimed method is used for; whereas, the body, "the following steps applied at switching points distributed in said stream to decode a current symbol," provides the location at which the claimed steps are performed/applied. Thus, the portion of the term after "comprising" is not part of the preamble and is therefore limiting. However, regardless of whether "the following steps applied at switching points distributed in said stream to decode a current symbol," at least the terms "stream," "current symbol," and "switching points" are limiting for the reasons discussed below.

b. "Stream," "Current Symbol," and "Switching Points" Are Limiting, even if Part of the Preamble

The terms "stream," "current symbol," and "switching point" are limiting regardless of whether "the following steps applied at switching points distributed in said stream to decode a current symbol" is part of the preamble. The terms "stream" and "current symbol" are limiting at least to the extent they provide antecedent basis for these terms when they appear elsewhere in the claim. Additionally, the term "switching point" is limiting because it indicates where the method should be applied and therefor gives "life, meaning, and vitality" to the claims. *See TomTom, Inc. v. Adolph*, 790 F.3d 1315, 1323 (Fed. Cir. 2015).

(1) "Stream" and "Current Symbol" are Limiting at least to the Extent they Provide Antecedent Basis

The terms "stream" and "current symbol" provide antecedent basis for the terms when they appear elsewhere in the claim, as shown in bold italics below.

> 10. Arithmetic decoding method for symbols coded in the form of ***a stream***, comprising the following steps applied at switching points distributed in ***said stream*** to decode ***a current symbol***:
>
> decoding from ***the stream***, for ***said current symbol***, a probability model identifier,
>
> selecting using said probability model identifier a probability model in a set comprising a current probability model defined from symbols coded previous

to ***the current symbol*** and a subset of probability models wherein subset comprises at least one probability model defined by default,

adding in said subset said current probability model, the selected probability model becoming the current probability model,

decoding ***said current symbol*** with said current probability model, and

updating said current probability model according to the decoding of ***said current symbol***.

JXM-0002 ('859 Patent), cl. 10.

The Federal Circuit has stated that "the preamble constitutes a limitation when the claim(s) depend on it for antecedent basis." *In re Fought*, 941 F.3d 1175, 1178 (Fed. Cir. 2019) (internal quotations omitted) (quoting *C.W. Zumbiel Co., Inc. v. Kappos*, 702 F.3d 1371, 1385 (Fed. Cir. 2012) (term in preamble limiting where it provided antecedent basis for a term in the claim body)); *see also Bio-Rad Laboratories, Inc. v. 10X Genomics Inc.*, 967 F.3d 1353, 1369 (Fed. Cir. 2020) ("Reliance on a preamble phrase for antecedent basis, however, may limit claim scope."); *see also Pacing Technologies LLC v. Garmin Int'l, Inc.*, 778 F.3d 1021, 1024 (Fed. Cir. 2015) ("[w]hen limitations in the body of the claim rely upon and derive antecedent basis from the preamble, then the preamble may act as a necessary component of the claimed invention."). As shown above, the terms "stream" and "current symbol" provide an antecedent basis for these terms as they appear later in the body of the claim. Therefore, both terms are limiting at least to the extent they provide antecedent basis. *See, e.g.*, *In re Fought*, 941 F.3d at 1178 ("We have repeatedly held a preamble limiting when it serves as antecedent basis for a term appearing in the body of a claim.") (collecting cases).

Additionally, the presence of terms that provide antecedent basis in the "preamble" and, in particular, the portion following "comprising," is a "strong indication" that the "preamble" acts "as a necessary component of the claimed invention" and therefore is limiting. *Bio-Rad*, 967 F.3d at 1371 (internal quotations omitted). This is another reason to find the entirety of the phrase "the following steps applied at switching points distributed in said stream to decode a current symbol" to

be limiting (in addition to finding "stream" and "current symbol" limiting), if not found to be part of the body of the claim for the reasons discussed above.

In any case, the foregoing shows that at least "stream" and "current symbol" are limiting to the extent they provide antecedent basis for those terms when they appear later in the claim.

(2) "Switching Points" is Limiting

The term "switching points" is also limiting regardless of whether the phrase "the following steps applied at switching points distributed in said stream to decode a current symbol" is considered to be part of the preamble. Specifically, the "switching points" defines the location, or point at which the recited steps of the claimed method are to be performed. In the Staff's view, this is an essential part of the claimed method and gives life, meaning, and vitality to the claim. *See TomTom*, 790 F.3d at 1323 (a preamble is limiting if it "recites essential structure or steps, or if it is necessary to give life, meaning, and vitality to the claim").

The '859 Patent describes the claimed invention as comprising certain steps that take place in "switching points." For instance, the '859 Patent states that "[t]he invention relates to an arithmetic method for coding symbols in a stream" involving a series of steps, including "in the switching points distributed in the stream" the steps of "selecting the current probability model in a set of at least two probability models according to a coding cost criterion, and coding an identifier of a selected probability model." JXM-0002 ('859 Patent), 2:17-28. The '859 Patent makes the same statements with respect to "a method for arithmetic decoding of symbols coded in the form of a stream." *Id*. at 3:37-49. Additionally, the embodiments disclosed in the '859 Patent generally include "switching points." For example, the illustrations of embodiments of the disclosed

arithmetic coding and decoding methods generally include "switching points."[18] *Id*., Figs. 3, 6, 7, 10, 11. The '859 Patent also illustrates the distribution of "switching points" in Fig. 4. *Id*., Fig. 4.

Further, the '859 Patent describes the switching point as determining which steps of the method are performed. *See, e.g.*, JXM-0002 ('859 Patent) at 4:55-5:9 (coding), 9:65-67 (decoding). For example, in its description of a method for decoding, the '859 patent states that first "it is verified if the location is on a switching point SP" and then "[i]f located at a switching point SP the method continues to a step 202, if not it continues to a step 206." *Id*. at 9:55-67. This is shown in Figure 10, below.

[18] The other figures either illustrate the prior art (Figs. 1-2), illustrate particular steps or portions of the claimed methods (Figs. 5, 8-9), or show devices (Figs. 12-13). JXM-0002 ('859 Patent), 3:64-4:28.

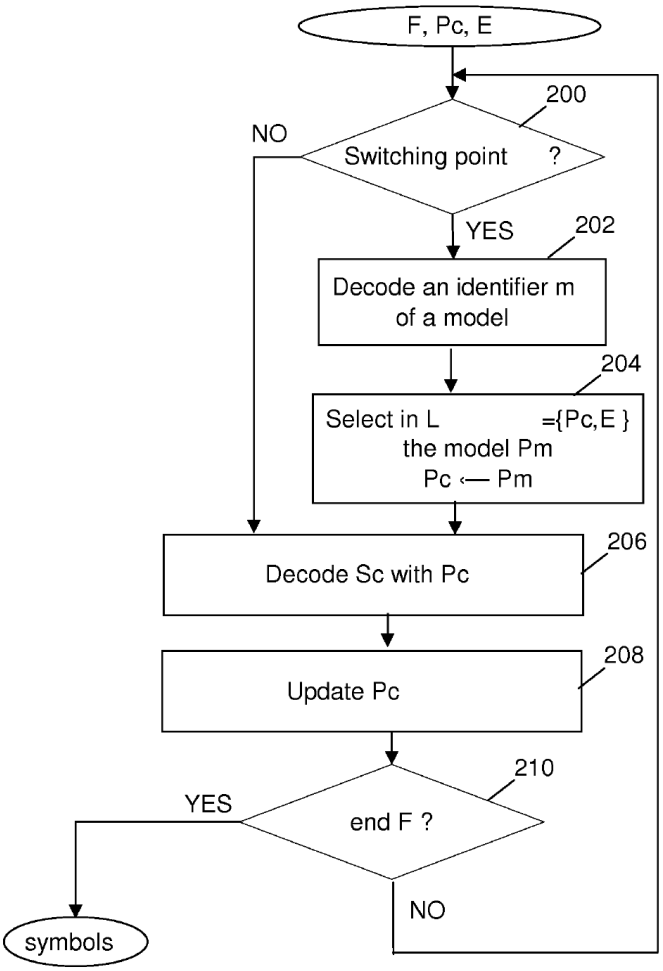

FIGURE 10

Id., Fig. 10. All of the disclosed embodiments appear to share this characteristic. *Id*. at 4:55-5:9, 5:47-54, 7:21-26 (coding), 9:53-67, 10:61-11:11 (decoding). Thus, the "switching points" are key to determining which steps should be applied.

Moreover, claim 10 recites steps that only occur after it is determined if the location is on a switching point. The first step recited in claim 10, "decoding from the stream, for said current symbol, a probability model identifier," corresponds to step 202 in Figure 10, above, which occurs after it is determined that the location is on a switching point. JXM-0002 ('859 Patent), Fig. 10, cl. 10. The same is true for the second step, "selecting using said probability model identifier a

probability model…," which corresponds to step 204 in Figure 10 and occurs after it is determined that the location is on a switching point. This indicates that the recitation of "switching points" in the alleged preamble and that "the following steps [are] applied at switching points" is necessary for the invention to function as disclosed. If "switching points" was not limiting, then the recited steps in claim 10 could be carried out at any point regardless of whether it was located on or at a switching point. This is not what the '859 Patent discloses. Because "switching points" is an essential part of the claimed method and gives life, meaning, and vitality to the claim, it is limiting. *See TomTom*, 790 F.3d at 1323.

(3) The Staff's Construction of "Switching Points" Should be Adopted

The parties dispute the proper construction of the term "switching points." The Staff's (and Complainants') proposed construction is "a point in the stream at the level of which the probability used to code the current symbol can be modified." Respondents propose a similar construction, but with an additional modification at the end – "a point in the stream at the level of which the probability model used to code the current symbol can be modified—i.e., a probability model can be selected." As the Staff understands it, the dispute appears to be based on a concern that under the Staff's proposed construction the word modification is vague and could encompass where a probability model is updated, not selected. However, the '859 Patent expressly defines the term "switching points:" "A switching point SP is defined according to the invention as a point in the stream at the level of which the probability model used to code the current symbol can be modified." SXM-002 ('859 Patent), 4:57-60. Although the Staff appreciates Respondents' concern, the Staff sees no reason to deviate from the definition used by the patentee. As a result, the Staff's construction should be adopted.

c. Conclusion

For the reasons discussed above, the portion of the term "arithmetic decoding method for symbols coded in the form of a stream, comprising the following steps applied at switching points distributed in said stream to decode a current symbol" following comprising is not part of the preamble and therefore is limiting.

Even if the portion of the disputed term is not found to be part of the body of the claim (and therefore not limiting), at least the terms "stream," "current symbol," and "switching points" are limiting for the reasons discussed above. Because the terms "stream" and "current symbol" are limiting, they should be construed in accordance with the parties' agreed-to constructions. "Switching points" should be construed in accordance with the Staff's proposed construction for the reasons discussed above.

2. "means for decoding from the stream, at switching points distributed in said stream to decode a current symbol, for said current symbol, a probability model identifier"

The parties agree that the term "means for decoding from the stream, at switching points distributed in said stream to decode a current symbol, for said current symbol, a probability model identifier" is a mean-plus-function term subject to § 112, ¶ 6. The parties' proposed constructions are as follows:

Term and Claims	Complainants' Construction	Respondents' Construction	Staff's Construction
"means for decoding from the stream, at switching points distributed in said stream to decode a current symbol, for said current symbol, a	Subject to § 112, ¶ 6 Function: selecting ... a probability model Structure: an arithmetic decoder and equivalents	Subject to § 112, ¶ 6 Function: decoding a probability model identifier for the current symbol from the stream, at switching points	Subject to § 112, ¶ 6 Function: at switching points in the stream, decoding a probability

probability model identifier" Cl. 15	thereof. See FIG. 13 and 13:25-52. Alternatively, the structure is an arithmetic decoder operable to perform the claimed function, as described in the specification in connection with step 204 and equivalents thereof, step 204 being described in the specification, for example at the following figures and passages: FIG. 13 and 13:25-52 and FIGS. 10, 11 and 5:36-43, 10:1-17, 11:12-36.	distributed in the stream Structure: indefinite for lack of sufficient corresponding structure.	model identifier for the current symbol Structure: Fig. 13 and col. 13, ll. 25-52 disclose the structure of a decoding device and, more specifically, an entropy decoding module that implements this step/function. However, it is unclear whether this disclosure alone provides a sufficient structure to a person of ordinary skill in the art, such that they would know how to perform this function. Complainant cites to Figs. 10, 11, and 13 and 10:1-14, 11:12-34, and 13:25-52 as disclosing an arithmetic decoder operable to perform the claimed function in connection with step 202 and as describing step 202. These figures and cited paragraphs do not appear to disclose an algorithm that shows how the claimed function is carried out. However, absent expert testimony, it is not clear whether an algorithm must be disclosed in addition to the decoding device. In view of this, the Staff is not in

			a position to say that there is clear and convincing evidence showing indefiniteness. Further discovery, including expert discovery, may reveal that the patent does not disclose a sufficient corresponding structure, or it may narrow the precise portions of the specification that are the required structure.

The Staff is of the view that its proposed construction explains the term in a manner consistent with the understanding of one of ordinary skill in the art and properly identifies the structures disclosed in the '859 Patent that correspond to the claimed function. However, Respondents contend that there is an inadequate disclosure of structure and thus the term is indefinite.

a. The Parties Agree that § 112, ¶ 6 Applies to this Term

Pre-AIA 35 U.S.C. § 112, ¶ 6 allows "patentees to express a claim limitation by reciting a function to be performed rather than by reciting structure for performing that function." *Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1347 (Fed. Cir. 2015)(en banc). However, constraints are placed on how such a limitation is to be construed, "namely, by restricting the scope of coverage to only the structure, materials, or acts described in the specification as corresponding to the claimed function and equivalents thereof." *Id*. The use of the word "means" in a claim limitation creates a rebuttable presumption that § 112, ¶ 6 applies, while the lack of the term creates a rebuttal presumption that § 112, ¶ 6 does not apply. *Id*. at 1349.

Here, the claim term uses the word "means;" therefore, there is a rebuttal presumption that § 112, ¶ 6 applies. The parties are not challenging this presumption. All parties agree that § 112, ¶ 6 applies.

b. The Function is Disclosed by the Claim

The first step in construing a means-plus-function claim term is identifying the function. *Williamson*, 792 F.3d at 1352. The parties all generally agree that the function is the one described in this claim limitation, namely, decoding a probability model identifier for the current symbol at switching points in the stream. The parties differ in how this function is most appropriately described. Complainants rely on the claim language itself but strip it down to its most basic features. On the other hand, the Staff and Respondents offer different versions of the functional language recited in the limitation. There does not appear to be a substantive difference between any of the parties' proposed functions. However, the Staff's proposed description of the function fully describes the entirety of the function and does so in a streamlined manner. For this reason, the Staff is of the view that its proposed function should be adopted.

c. The '859 Patent's Disclosure of Structures

The second step in construing a means-plus-function claim term is determining "what structure, if any, disclosed in the specification corresponds to the claimed function." *Williamson*, 792 F.3d at 1352. As discussed below, the '859 Patent discloses structures that correspond to the claimed function.

(1) Disclosure of Decoding Device and Entropy Decoding Module

The '859 Patent discloses a decoding device and an entropy decoding module that are described as carrying out the function recited in this claim term - "decoding from the stream, at switching points distributed in said stream to decode a current symbol, for said current symbol, a

probability model identifier." The '859 Patent's disclosed "decoding device" is shown in Fig. 13 below.

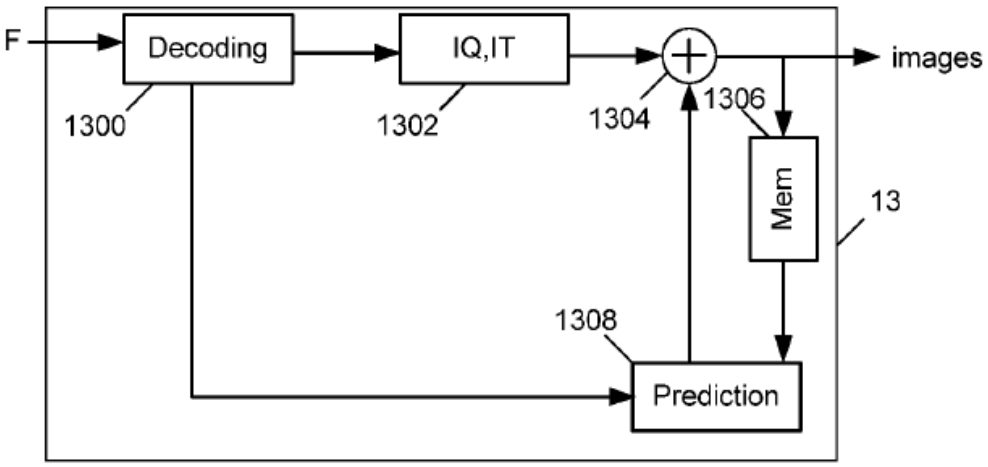

FIGURE 13

JXM-0002 ('859 Patent), Fig. 13, 13:25-26. The '859 Patent states that the "decoding device 13 receives at input a stream F of coded data representative of a sequence of images." *Id*. at 13:26-28. The decoding device is also described as comprising "an entropy decoding module 1300 able to generate decoded data, for example coding modes and decoded data relating to the content of the images." *Id*. at 13:29-32. "For this purpose, the entropy decoding module 1300 implements the steps 200, 202, 204, 206, 208, 210 and possibly 205 of the arithmetic decoding method according to the invention." *Id*. at 13:32-35.

The '859 Patent describes step 202 as decoding an identifier from the stream F where the "identifier enables identification of a probability model in a set L of at least two probability models." JXM-0002 ('859 Patent), 10:1-3, 11:12-14. This appears to correspond to the claim limitation at issue here – "means for decoding from the stream, at switching points distributed in said stream to decode a current symbol, for said current symbol, a probability model identifier."

See Williamson, 792 F.3d at 1352 (a "corresponding structure" is disclosed in the specification "if the intrinsic evidence clearly links or associates that structure to the function recited in the claim."). Thus, the decoding device structure and, more specifically, the entropy decoding module, appear to be "corresponding structures."

(2) Disclosure of Algorithm

The '859 Patent's disclosure of a decoding device and entropy decoding module could be referring to a special use computer and microprocessor (i.e., a computer and/or processor programmed for decoding). In cases involving a means-plus-function claim limitations that must be implemented on a special purpose computer (i.e., "a general purpose computer programmed to perform particular functions pursuant to instructions from program software"), the Federal Circuit "has consistently required that the structure disclosed in the specification be more than simply a general purpose computer or microprocessor." *Williamson*, 792 F.3d at 1352. In such a case, the Federal Circuit has required "that the specification disclose an algorithm for performing the claimed function," which can be "expressed as a mathematical formula, in prose, or as a flow chart, or in any other manner that provides sufficient structure." *Id*.

The '859 Patent's specification does not appear to disclose an algorithm to perform the function of "decoding from the stream, at switching points distributed in said stream to decode a current symbol, for said current symbol, a probability model identifier." As discussed above, the '859 Patent describes step 202 as decoding an identifier from the stream F where the "identifier enables identification of a probability model in a set L of at least two probability models." JXM-0002 ('859 Patent), 10:1-3, 11:12-14. The patent then discusses the various sets, subsets, and probability models involved. For instance, with respect to the embodiment shown in Figure 10, the '859 Patent states:

model in a set L of at least two probability models. The set L comprises the current probability model Pc which is defined from the symbols coded previous to the current symbol Sc and a subset E of probability models defined by default. The subset E comprises at least one such probability model defined by default noted as **P0**. For example, **P0** is a uniform probability model, i.e. all the probabilities of this model are equal. The subset E may contain other models defined by default such as a Gaussian probability model or models obtained by learning on a database representative of the signal to be coded.

JXM-0002 ('859 Patent), 10:3-14. The '859 Patent includes a similar additional disclosure for the embodiment disclosed in Fig. 11:

model in a set L of at least two probability models. The set L comprises the current probability model Pc which is defined from the symbols coded previous to the current symbol Sc and a subset E of probability models defined by default. The subset E comprises at least one such probability model defined by default noted as **P0**. For example, **P0** is a uniform probability model, i.e. all the probabilities of this model are equal. According to a variant, **P0** is a probability model defined in a standard. The subset E may contain other models defined by default such as a Gaussian probability model or models obtained by learning on a database representative of the signal to be coded. Note that if the current symbol Sc is the first symbol coded then the current probability model Pc is defined by default in which case it may be identical to the model **P0** of E. If the current symbol Sc is not the first symbol coded, then the current probability model Pc is defined using the symbols coded previous to the current symbol Sc. Such a probability model Pc has, in fact, been updated during the coding of symbols coded previous to the current symbol Sc so as to dynamically adapt to the characteristics of the source signal.

Id. at 11:14-34. On their face, these disclosures do not appear to describe how to decode a probability model identifier for the current symbol at switching points in the stream.

Figures 10 and 11 do not appear to provide any additional information that could be considered an algorithm for performing the claimed function – "decoding from the stream, at

switching points distributed in said stream to decode a current symbol, for said current symbol, a probability model identifier." Instead, both figures (shown below) provide an overall flow chart for the decoding process. While this could be considered to be an algorithm for "decoding," it does not appear to elaborate on what is necessary for each listed step (i.e., provide an algorithm for each function).

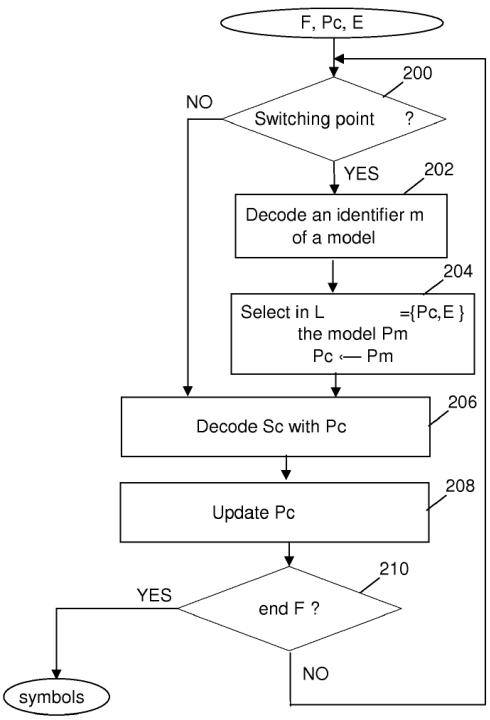

FIGURE 10

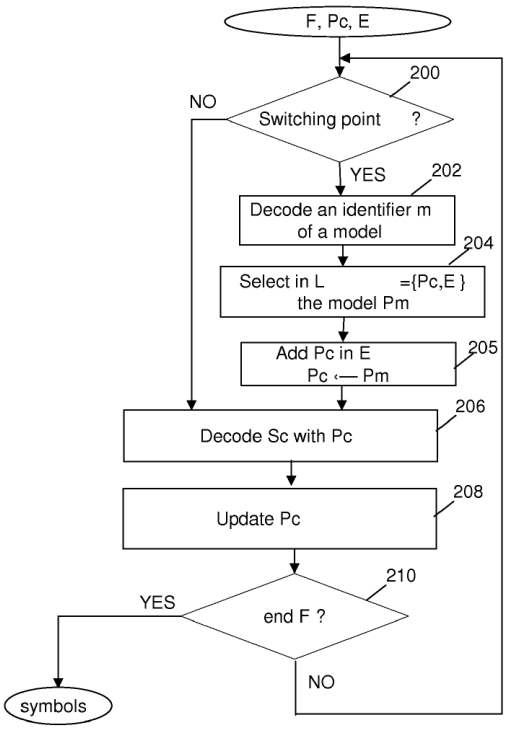

FIGURE 11

The foregoing does not appear to disclose an algorithm corresponding to the claimed function. However, expert discovery may shed additional light regarding whether one of ordinary skill in the art would interpret the '859 Patent's discussion regarding step 202 and/or Figs. 10-11 as a disclosure of an algorithm.

(3) Adequacy of Disclosed Structure

In means-plus-function claim terms, the disclosed corresponding structure must be adequate "to achieve the claimed function." *See Williamson*, 792 F.3d at 1352. If one of ordinary skill in the

art "would be unable to recognize the structure in the specification and associate it with the corresponding function in the claim," the means-plus-function limitation is indefinite. *Id*.

Respondents contend that the '859 Patent does not provide an adequate disclosure of structure to achieve the claimed function. *See Williamson*, 792 F.3d at 1352 ("Even if the specification discloses corresponding structure, the disclosure must be of 'adequate' corresponding structure to achieve the claimed function."). However, disclosure of a decoder has been found to be a sufficient structure to perform the claimed function of a means-plus-function limitation where there was evidence that the decoder had to use an algorithm chosen from a specific class of decoding algorithms. *TQ Beta LLC v. Dish Network Corporation*, 14-CV-848-LPS-CJB, 2016 WL 356024, *7-8 (D. Del. Jan. 28, 2016) (plaintiff argued that a CODEC that is MP3-compatible must use a decoding algorithm chosen from a specific class of decoding algorithms, and defendants did not argue that the term "MP3 coder/decoder" failed to "constitute a sufficient listing of steps" to enable one of ordinary skill in the art to provide an operative software program for the specified function). Here, there is not yet any evidence regarding whether the disclosure of a decoding device and/or entropy decoding module informs one of ordinary skill as to the structure to perform the claimed function. Thus, further development of the record is required. *See Sisvel Int'l S.A. v. Sierra Wireless, Inc.*, 82 F.4th 1355, 1369 (Fed. Cir. 2023) ("while an expert's testimony may 'not create or infer the structure' that is totally absent from the specification, our cases allow '[e]xpert testimony ... to show what' the disclosures that actually appear in the specification 'would convey to one skilled in the art.'" (quoting *Biomedino, LLC v. Waters Techs. Corp.*, 490 F.3d 946, 952 (Fed. Cir. 2007))).

Should the disclosure of a decoding device and/or entropy decoding module be found to be inadequate, then it must be determined whether the '859 Patent discloses an algorithm that a person of ordinary skill would be able to recognize and associate with the corresponding structure in the

claim to achieve the claimed function. *See Williamson*, 792 F.3d at 1352 ("if a person of ordinary skill in the art would be unable to recognize the structure in the specification and associate it with the corresponding function in the claim, a means-plus-function clause is indefinite"). The Federal Circuit has stated that "the sufficiency of the purportedly-adequate structure disclosed in the specification must be evaluated in light of the knowledge possessed by a skilled artisan." *Sisvel*, 82 F.4th at 1365. Accordingly, expert discovery is necessary to determine whether the '859 Patent discloses a sufficient structure for a person of ordinary skill in the art to achieve the claimed function. [19]

In view of the foregoing, without additional expert discovery, the current state of discovery concerning this claim limitation is insufficient for the Staff to determine if it is indefinite.

3. "means for selecting using said probability model identifier a probability model in a set comprising a current probability model defined from symbols coded previous to the current symbol and a subset of probability models wherein subset comprises at least one probability model defined by default"

The parties agree that the term "means for selecting using said probability model identifier a probability model in a set comprising a current probability model defined from symbols coded previous to the current symbol and a subset of probability models wherein subset comprises at least one probability model defined by default" is a mean-plus-function term subject to § 112, ¶ 6. The parties' proposed constructions are as follows:

Term and Claims	Complainants' Construction	Respondents' Construction	Staff's Construction
"means for selecting using said probability model identifier a	Subject to § 112, ¶ 6	Subject to § 112, ¶ 6	Subject to § 112, ¶ 6

[19] The Staff understands that Complainants and Respondents intend to submit expert declarations with their *Markman* Briefs. At present, the parties plan to depose those experts before the scheduled Markman hearing. The Staff reserves its right to modify its position regarding this and any other claim term in view of the experts' testimony.

probability model in a set comprising a current probability model defined from symbols coded previous to the current symbol and a subset of probability models wherein subset comprises at least one probability model defined by default" Cl. 15	Function: selecting ... a probability model Structure: an arithmetic decoder and equivalents thereof. See FIG. 13 and 13:25-52. Alternatively, the structure is an arithmetic decoder operable to perform the claimed function, as described in the specification in connection with step 204 and equivalents thereof, step 204 being described in the specification, for example at the following figures and passages: FIG. 13 and 13:25-52 and FIGS. 10, 11 and 5:36-43, 10:1-17, 11:12-36.	Function: using the probability model identifier to select a probability model in a set comprising a current probability model defined from symbols coded previous to the current symbol and a subset of probability models wherein subset comprises at least one probability model defined by default Structure: indefinite for lack of sufficient corresponding structure.	Function: selecting a probability model using the probability model identifier, where the probability model is selected from a current probability model and a subset of probability models, including a default probability model Structure: Fig. 13 and col. 13, ll. 25-52 disclose the structure of a decoding device and, more specifically, an entropy decoding module that implements this step/function. Complainant cites to Figs. 10, 11, and 13 and 5:36-43, 10:1-17, 11:12-36, and 13:25-52 as disclosing an arithmetic decoder operable to perform the claimed function in connection with step 204 and as describing step 204. It is unclear whether these figures and cited paragraphs disclose an algorithm that shows how the claimed function is carried out. However, absent expert testimony, it is not clear whether an algorithm must be disclosed in addition to the decoding device. Further discovery, including expert

			discovery, may reveal that the foregoing disclosures provide a sufficient structure, or may reveal that the patent does not disclose a sufficient corresponding structure.

The Staff is of the view that its proposed construction explains the term in a manner consistent with the understanding of one of ordinary skill in the art and properly identifies the structures disclosed in the '859 Patent that correspond to the claimed function. However, Respondents contend that there is an inadequate disclosure of structure and thus the term is indefinite.

a. The Parties Agree that § 112, ¶ 6 Applies to this Term

The parties agree that this claim limitation is a means-plus-function limitation. For the same reasons discussed in Section VI.D.2.a. above, there is no question that § 112, ¶ 6 applies.

b. The Function is Disclosed by the Claim

For the same reasons discussed in Section VI.D.2.b. above, there does not appear to be any substantive difference between any of the parties' proposed functions. However, the Staff's proposed description of the function fully describes the entirety of the function and does so in a streamlined manner. For that reason, the Staff is of the view that its proposed function should be adopted.

c. The '859 Patent's Disclosure of Structures

(1) Disclosure of Decoding Device and Entropy Decoding Module

As discussed in Section VI.D.2.c.(1) above, the '859 Patent discloses a decoding device and an entropy decoding module that implements certain steps, including step 204. *See* JXM-0002

('859 Patent), Fig. 13, 13:25-35. The '859 Patent states that "[d]uring a step 204, the probability model of L for which the identifier is m is selected." JXM-0002 ('859 Patent), 10:14-15, 11:35-36. In an embodiment, the '859 Patent further states that "[t]he probability model Pm is recopied in the model Pc, i.e. the probability model Pm selected in step 202 becomes the current probability model Pc." *Id*. at 10:15-17. This appears to correspond to the claim limitation at issue — "means for selecting using said probability model identifier a probability model in a set comprising a current probability model defined from symbols coded previous to the current symbol and a subset of probability models wherein subset comprises at least one probability model defined by default" — at least insofar as it requires selecting a probability model. *See Williamson*, 792 F.3d at 1352 (a "corresponding structure" is disclosed in the specification "if the intrinsic evidence clearly links or associates that structure to the function recited in the claim."). Thus, the decoding device and, more specifically, the entropy decoding module are corresponding structures for this claim limitation.

(2) Disclosure of Algorithm

For the reasons discussed in Section VI.D.2.c.(2), the '859 Patent's decoding device and entropy decoding module could be referring to special use computers and/or microprocessors, in which case an algorithm should be disclosed. *See Williamson*, 792 F.3d at 1352 (requiring the disclosure of an algorithm in cases involving means-plus-function claim limitations that must be implemented on a special purpose computer and microprocessor).

The '859 Patent's specification does not appear to disclose an algorithm to perform the function of "selecting using said probability model identifier a probability model in a set comprising a current probability model defined from symbols coded previous to the current symbol and a subset of probability models wherein subset comprises at least one probability model defined by default." As discussed above, the '859 Patent describes step 204 as involving the selection of the

probability model of L for which the identifier m is selected. JXM-0002 ('859 Patent), 10:14-15, 11:35-36. This does not appear to be an algorithm.

Complainants also rely on the '859 Patent's discussion of step 202 and, specifically, the discussion of the various sets a probability model is selected from (disclosed above while discussing whether an algorithm is disclosed), as disclosing this limitation. The Staff agrees that the disclosures describing the various sets, subsets, and probability models are applicable to this claim limitation. However, for the reasons discussed in Section VI.D.2.c.(2) above, this disclosure does not appear to be an algorithm.

Complainants also cite to the following:

> During a step **104**, an identifier m of the model selected in the set L is coded in the stream. Advantageously this identifier enables a decoding method to find again in the set L the model selected by the coding method. The probability model Pm is recopied in the model Pc, i.e. the probability model Pm selected in step **102** becomes the current probability model Pc. During step **106**, the current symbol Sc is coded with the current probability model Pc.

JXM-0002 ('859 Patent), 5:36-43. Although this passage discusses coding methods, it states that the disclosed identifier enables a decoding method to find the model selected by the coding method, so appears to be relevant to decoding. However, this disclosure is similar to those already discussed above and does not appear to add anything that makes it standout as a disclosure of an algorithm. As discussed in Section VI.D.2.c.(2) above, the same is true regarding Figures 10 and 11.

(3) Adequacy of Disclosed Structure

For the same reasons discussed in Section IV.D.2.c.(3), above, expert discovery is necessary to determine whether the '859 Patent discloses a sufficient structure for a person of ordinary skill in

the art to achieve the claimed function.[20] Without additional expert discovery, the current state of discovery concerning this claim limitation is insufficient for the Staff to determine if it is indefinite.

4. "means for adding in said subset said current probability model, the selected probability model becoming the current probability model"

The parties agree that the term "means for adding in said subset said current probability model, the selected probability model becoming the current probability model" is a mean-plus-function term subject to § 112, ¶ 6. The parties' proposed constructions are as follows:

Term and Claims	Complainants' Construction	Respondents' Construction	Staff's Construction
"means for adding in said subset said current probability model, the selected probability model becoming the current probability model" Cl. 15	Subject to § 112, ¶ 6 Function: adding in said subset said current probability model Structure: an arithmetic decoder and equivalents thereof. See FIG. 13 and 13:25-52. Alternatively, the structure is an arithmetic decoder operable to perform the claimed function, as described in the specification in connection with step 205 and equivalents thereof, step 205 being described in the specification, for example at the	Subject to § 112, ¶ 6 Function: adding the current probability model into the subset of probability models Structure: indefinite for lack of sufficient corresponding structure.	Subject to § 112, ¶ 6 Function: adding the current probability model into the subset of probability models Structure: Fig. 13 and col. 13, ll. 25-52 disclose the structure of a decoding device and, more specifically, an entropy decoding module that possibly implements this step/function. Complainant cites to Figs. 7, 8, 10, 11, and 13 and 11:37-43 (describing 205 and additionally that step 205 can be identical to step 105) and 8:8-37 (describing step 105) as disclosing an arithmetic decoder

[20] The Staff understands that Complainants and Respondents intend to submit expert declarations with their *Markman* Briefs. At present, the parties plan to depose those experts before the scheduled Markman hearing. The Staff reserves its right to modify its position regarding this and any other claim term in view of the experts' testimony.

	following figures and passages: FIG. 13 and 13:25-52 and FIGS. 8, 10, 11 and 11:37-43 (describing 205 and additionally that step 205 can be identical to step 105), FIG. 7 and 8:8-37 (describing step 105).		operable to perform the claimed function in connection with step 205 and as describing step 205. Fig. 8 and col. 11, ll. 37-43 appear to disclose an algorithm for performing this step. However, absent expert discovery, it is unclear whether this disclosure provides a sufficient structure to a person of ordinary skill in the art, such that they would know how to perform this function.

The Staff is of the view that its proposed construction explains the term in a manner consistent with the understanding of one of ordinary skill in the art and properly identifies the structures disclosed in the '859 Patent that correspond to the claimed function. However, Respondents contend that there is an inadequate disclosure of structure and thus the term is indefinite.

a. The Parties Agree that § 112, ¶ 6 Applies to this Term

For the same reasons discussed in Section VI.D.2.a above, § 112, ¶ 6 applies to this claim limitation.

b. The Function is Disclosed by the Claim

For the same reasons discussed in Section VI.D.2.b. above, there does not appear to be any substantive difference between any of the parties' proposed functions. However, the Staff's proposed description of the function fully describes the entirety of the function and does so in a streamlined manner. For that reason, the Staff is of the view that its proposed function should be adopted.

c. The ’859 Patent’s Disclosure of Structures

(1) Disclosure of Decoding Device and Entropy Decoding Module

As discussed in Section VI.D.2.c.(1) above, the ’859 Patent discloses a decoding device and an entropy decoding module that implements certain steps, including step 205. *See* JXM-0002 (’859 Patent), Fig. 13, 13:25-35. The ’859 Patent also states that “[d]uring a step 205, the current probability model Pc is added to the subset E[.] This step is detailed in FIG. 8.” *Id*. at 11:37-38. Additionally, the ’859 Patent discloses that step 205 is “identical to step 105 of the coding method according to the third embodiment.” *Id*. at 11:41-43. This appears to correspond to the claim limitation at issue — “means for adding in said subset said current probability model, the selected probability model becoming the current probability model.” *See Williamson*, 792 F.3d at 1352 (a “corresponding structure” is disclosed in the specification “if the intrinsic evidence clearly links or associates that structure to the function recited in the claim.”). Thus, the decoding device and, more specifically, the entropy decoding module are corresponding structures for this claim limitation.

(2) Disclosure of Algorithm

For the reasons discussed in Section VI.D.2.c.(2), the ’859 Patent’s decoding device and entropy decoding module could be referring to special use computers and/or microprocessors, in which case an algorithm should be disclosed. *See Williamson*, 792 F.3d at 1352 (requiring the disclosure of an algorithm in cases involving means-plus-function claim limitations that must be implemented on a special purpose computer and microprocessor).

The ’859 Patent’s specification appears to disclose an algorithm for performing the function of “adding in said subset said current probability model, the selected probability model becoming the current probability model” in Figure 8, below.

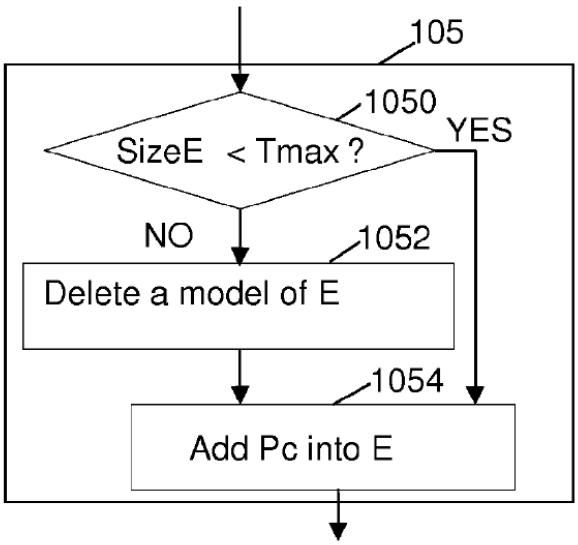

FIGURE 8

JXM-0002 ('859 Patent), Fig. 8. Specifically, the '859 Patent describes Figure 8 as detailing step 205, adding the current probability model Pc to the subset E. *Id*. at 11:37-43. Thus, it appears that the flow chart in Figure 8 constitutes an algorithm for performing the claimed function. *See Williamson*, 792 F.3d at 1352 (an algorithm can be "expressed as a mathematical formula, in prose, or as a flow chart, or in any other manner that provides sufficient structure.").

Further, when discussing step 205 the '859 Patent states that "[t]he probability model Pm is re-copied in the current probability model Pc, i.e. the probability model Pm selected in step 204 becomes the current probability model Pc." JXM-0002 ('859 Patent), 11:38-41. The '859 Patent also describes probability models in connection with coding step 105 according to a third embodiment, which is identical to step 205 (*see* JXM-0002 ('859 Patent), 11:41-43), as follows:

> in step **108** during the coding of the $(k-1)^{st}$ symbol. However according to the third embodiment the following probability models are tested: P0, P_C^{K-1}, $\{P_C^{K-m}\}$, where m depends on the size SizeE of E and where $\{P_C^{K-m}\}$ comprises the probability models added to E during the coding of symbols coded previous to the K^{st} symbol in the switching points. This step is detailed on FIG. **8**.

JXM-0002 ('859 Patent), 8:31-37. This provides additional information regarding the steps shown in Figure 8 above and may be considered to be part of the disclosure of an algorithm.

Overall, Figure 8 alone or in combination with the '859 Patent's disclosures regarding steps 205 and 105 appears to constitute an algorithm for performing the claimed function - "adding in said subset said current probability model, the selected probability model becoming the current probability model."

(3) Adequacy of Disclosed Structure

For the same reasons discussed in Section IV.D.2.c.(3), above, expert discovery is necessary to determine whether the '859 Patent discloses a sufficient structure for a person of ordinary skill in the art to achieve the claimed function.[21] Without additional expert discovery, the current state of discovery concerning this claim limitation is insufficient for the Staff to determine if it is indefinite.

5. "means for decoding said current symbol with said current probability model"

The parties agree that the term "means for decoding said current symbol with said current probability model" is a mean-plus-function term subject to § 112, ¶ 6. The parties' proposed constructions are as follows:

Term and Claims	Complainants' Construction	Respondents' Construction	Staff's Construction
"means for decoding said current symbol with said current probability model" Cl. 15	Subject to § 112, ¶ 6 Function: decoding said current symbol Structure: an arithmetic decoder and equivalents	Subject to § 112, ¶ 6 Function: decoding the current symbol with the current probability model	Subject to § 112, ¶ 6 Function: decoding the current symbol with the current probability model

[21] The Staff understands that Complainants and Respondents intend to submit expert declarations with their *Markman* Briefs. At present, the parties plan to depose those experts before the scheduled Markman hearing. The Staff reserves its right to modify its position regarding this and any other claim term in view of the experts' testimony.

	thereof. See FIG. 13 and 13:25-52. Alternatively, the structure is an arithmetic decoder operable to perform the claimed function, as described in the specification in connection with step 206 and equivalents thereof, step 206 being described in the specification, for example at the following figures and passages: FIG. 13 and 13:25-52 and FIGS. 10, 11 and 10:18-19, 11:55-57.	Structure: indefinite for lack of sufficient corresponding structure.	Structure: Fig. 13 and col. 13, ll. 25-52 disclose the structure of a decoding device and, more specifically, an entropy decoding module that implements this step/function. However, it is unclear whether this disclosure alone provides a sufficient structure to a person of ordinary skill in the art, such that they would know how to perform this function. Complainant cites to Figs. 10, 11, and 13 and 10:18-19, 11:55-57, and 13:25-52 as disclosing an arithmetic decoder operable to perform the claimed function in connection with step 206 and as describing step 206. These figures and cited paragraphs do not appear to disclose an algorithm that shows how the claimed function is carried out, but absent expert testimony, the Staff is not in a position to say that there is clear and convincing evidence showing indefiniteness. Further discovery, including expert discovery, may reveal that the patent does not disclose a

			corresponding structure, or it may narrow the precise portions of the specification that are the required structure.

The Staff is of the view that its proposed construction explains the term in a manner consistent with the understanding of one of ordinary skill in the art and properly identifies the structures disclosed in the '859 Patent that correspond to the claimed function. However, Respondents contend that there is an inadequate disclosure of structure and thus the term is indefinite.

a. The Parties Agree that § 112, ¶ 6 Applies to this Term

The parties agree that this claim limitation is a means-plus-function limitation. For the same reasons discussed in Section VI.D.2.a. above, there is no question that § 112, ¶ 6 applies.

b. The Function is Disclosed by the Claim

For the same reasons discussed in Section VI.D.2.b. above, there does not appear to be any substantive difference between any of the parties' proposed functions. However, the Staff's proposed description of the function fully describes the entirety of the function and does so in a streamlined manner. For that reason, the Staff is of the view that its proposed function should be adopted.

c. The '859 Patent's Disclosure of Structures

(1) Disclosure of Decoding Device and Entropy Decoding Module

As discussed in Section VI.D.2.c.(1) above, the '859 Patent discloses a decoding device and an entropy decoding module that implements certain steps, including step 206. *See* JXM-0002 ('859 Patent), Fig. 13, 13:25-35. The '859 Patent states that "[d]uring a step 206, the current symbol is decoded with the current probability model Pc." JXM-0002 ('859 Patent), 10:18-19. In

another embodiment, the '859 Patent further states that "the current probability model Pc [] is the probability model Pm selected in step 204." *Id*. at 11:55-57. This appears to correspond to the claim limitation at issue — "means for decoding said current symbol with said current probability model." *See Williamson*, 792 F.3d at 1352 (a "corresponding structure" is disclosed in the specification "if the intrinsic evidence clearly links or associates that structure to the function recited in the claim."). Thus, the decoding device and, more specifically, the entropy decoding module are corresponding structures for this claim limitation.

(2) Disclosure of Algorithm

For the reasons discussed in Section VI.D.2.c.(2), the '859 Patent's decoding device and entropy decoding module could be referring to special use computers and/or microprocessors, in which case an algorithm should be disclosed. *See Williamson*, 792 F.3d at 1352 (requiring the disclosure of an algorithm in cases involving means-plus-function claim limitations that must be implemented on a special purpose computer and microprocessor).

The '859 Patent's specification does not appear to disclose an algorithm to perform the function of "decoding the current symbol with the current probability model." The '859 Patent's description of step 206, discussed above, does not appear to be an algorithm. JXM-0002 ('859 Patent), 10:18-19, 11:55-57. Further, for the same reasons discussed in Section VI.D.2.c.(2) above, Figures 10 and 11 do not appear to disclose an algorithm for performing the function recited in this limitation.

(3) Adequacy of Disclosed Structure

For the same reasons discussed in Section IV.D.2.c.(3), above, expert discovery is necessary to determine whether the '859 Patent discloses a sufficient structure for a person of ordinary skill in

the art to achieve the claimed function.[22] Without additional expert discovery, the current state of discovery concerning this claim limitation is insufficient for the Staff to determine if it is indefinite.

6. "means for updating said current probability model according to the decoding of said current symbol"

The parties agree that the term "means for updating said current probability model according to the decoding of said current symbol" is a mean-plus-function term subject to § 112, ¶ 6. The parties' proposed constructions are as follows:

Term and Claims	Complainants' Construction	Respondents' Construction	Staff's Construction
"means for updating said current probability model according to the decoding of said current symbol" Cl. 15	Subject to § 112, ¶ 6 Function: updating said current probability model Structure: an arithmetic decoder and equivalents thereof. See FIG. Figure 13 and 13:25-52. Alternatively, the structure is an arithmetic decoder operable to perform the claimed function, as described in the specification in connection with step 208 and equivalents thereof, step 208 being described in the specification, for example at the	Subject to § 112, ¶ 6 Function: updating the current probability model according to the decoding of the current symbol Structure: an algorithm wherein an occurrence number for the current symbol is increased by 1	Subject to § 112, ¶ 6 Function: updating the current probability model according to the decoding of the current symbol Structure: Fig. 13 and col. 13, ll. 25-52 disclose the structure of a decoding device and, more specifically, an entropy decoding module that implements this step/function. However, it is unclear whether this disclosure alone provides a sufficient structure to a person of ordinary skill in the art, such that they would know how to perform this function.

[22] The Staff understands that Complainants and Respondents intend to submit expert declarations with their *Markman* Briefs. At present, the parties plan to depose those experts before the scheduled Markman hearing. The Staff reserves its right to modify its position regarding this and any other claim term in view of the experts' testimony.

	following figures and passages: FIG. 13 and 13:25-52 and FIGS. 10, 11, 4:33-54, 10:20-22, 11:57-61.		Complainant cites to Figs. 10, 11, and 13 and 4:33-54, 10:20-22, 11:57, and 13:25-52 as disclosing an arithmetic decoder operable to perform the claimed function in connection with step 208 and as describing step 208. Col. 4, ll. 33-54 describes "AC entropy coding." However, absent expert discovery, it is unclear whether this disclosure provides a sufficient structure to a person of ordinary skill in the art, such that they would know how to perform this function.

The Staff is of the view that its proposed construction explains the term in a manner consistent with the understanding of one of ordinary skill in the art and properly identifies the structures disclosed in the '859 Patent that correspond to the claimed function.

a. The Parties Agree that § 112, ¶ 6 Applies to this Term

The parties agree that this claim limitation is a means-plus-function limitation. For the same reasons discussed in Section VI.D.2.a. above, there is no question that § 112, ¶ 6 applies..

b. The Function is Disclosed by the Claim

For the same reasons discussed in Section VI.D.2.b. above, there does not appear to be any substantive difference between any of the parties' proposed functions. However, the Staff's proposed description of the function fully describes the entirety of the function and does so in a

streamlined manner. For that reason, the Staff is of the view that its proposed function should be adopted.

c. The '859 Patent's Disclosure of Structures

(1) Disclosure of Decoding Device and Entropy Decoding Module

As discussed in Section VI.D.2.c.(1) above, the '859 Patent discloses a decoding device and an entropy decoding module that implements certain steps, including step 208. *See* JXM-0002 ('859 Patent), Fig. 13, 13:25-35. The '859 Patent states that "[d]uring a step 208, the current probability model Pc is updated according to the method described previously in reference to the AC coding." *Id*. at 10:20-22, 11:57-59. This appears to correspond to the claim limitation at issue— "means for updating said current probability model according to the decoding of said current symbol." *See Williamson*, 792 F.3d at 1352 (a "corresponding structure" is disclosed in the specification "if the intrinsic evidence clearly links or associates that structure to the function recited in the claim."). Thus, the decoding device and, more specifically, the entropy decoding module are corresponding structures for this claim limitation.

(2) Disclosure of Algorithm

As discussed in Section VI.D.2.c.(2), the '859 Patent's decoding device and entropy decoding module could be referring to special use computers and/or microprocessors, in which case an algorithm should be disclosed. *See Williamson*, 792 F.3d at 1352 (requiring the disclosure of an algorithm in cases involving means-plus-function claim limitations that must be implemented on a special purpose computer and microprocessor). Here, the '859 Patent expressly discloses "the method described previously in reference to the AC coding" as the way the current probability model is updated. JXM-0002 ('859 Patent), 10:20-22, 11:57-59. The '859 Patent describes AC coding as follows:

> AC entropy coding comprises principally the following steps to code a current symbol Sc:
> coding of the current symbol Sc according to a current probability model Pc, and
> updating the current probability model Pc according to the coding of the current symbol Sc.

Id. at 4:33-38. The '859 Patent further states that "[a] probability model associates with each possible value of a symbol a probability." *Id*. at 4:39-40. The patent then provides the following example:

> a symbol a probability. For example, if the symbol Sc takes the values in the set {a, b, c, d} then a probability is associated with each value 'a', 'b', 'c' and 'd'. If the symbol Sc takes the value 'b' then in the step of updating of the current probability model Pc, the associated probability is increased, i.e. the occurrence number F(Sc=b) is increased by 1. The current probability model Pc used to code the current symbol Sc is defined from symbols coded previous to the current symbol Sc. If the current symbol Sc is the first coded then the current probability model Pc is defined by default, for example as a uniform probability model. If the current symbol Sc is the N^{th} symbol coded then the current probability model Pc depends on the coding of $(N-1)^{th}$ symbols coded previous to the current symbol Sc. In fact, the current probability model Pc is updated each time a new symbol is coded.

Id. at 4:40-54. Thus, the '859 Patent provides both a general description of AC entropy coding and a specific example of how AC entropy coding can be carried out. In the Staff's view, this is a clear disclosure of an algorithm.

(3) Adequacy of Disclosed Structure

For the same reasons discussed in Section IV.D.2.c.(3), above, expert discovery is necessary to determine which of the disclosed structures is adequate to enable a person of ordinary skill in the art to achieve the claimed function. [23] There does not appear to be anything specific in the '859

[23] The Staff understands that Complainants and Respondents intend to submit expert declarations with their *Markman* Briefs. At present, the parties plan to depose those experts before the

Patent that would suggest that the AC entropy coding needs to be limited to a specific example. However, that depends on how a person of ordinary skill in the art would interpret the specification. As a result, the Staff is of the view that additional expert discovery is required to evaluate the sufficiency of the potential structures disclosed in the '859 Patent for achieving the claimed function in this limitation. *See Sisvel*, 82 F.4th at 1365 ("the sufficiency of the purportedly-adequate structure disclosed in the specification must be evaluated in light of the knowledge possessed by a skilled artisan.").

VII. CONCLUSION

For all of these reasons, the Staff respectfully submits that the disputed claim terms should be construed as set forth above.

Date: January 26, 2024

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scheduled Markman hearing. The Staff reserves its right to modify its position regarding this and any other claim term in view of the experts' testimony.

CERTIFICATE OF SERVICE

The undersigned certifies that on January 26, 2024, she caused the foregoing **Commission Investigative Staff's *Markman* Brief** to be filed with the Secretary (in electronic format), served electronically upon Administrative Law Judge MaryJoan McNamara (McNamara337@usitc.gov), and served upon the parties in the manner indicated below:

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