IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION

OPLUS TECHNOLOGIES, LTD.,	)	
	)	
Plaintiff,	)	
	)	**No. 11 C 09027**
v.	)	
	)	
FUNAI ELECTRIC CO., LTD.,	)	**Judge John J. Tharp, Jr.**
	)	
Defendant.	)	

MEMORANDUM OPINION AND ORDER

Oplus Technologies, Ltd. ("Oplus") filed this action against Funai Electric Company, Ltd. ("Funai") and Sears Holdings Corporation ("Sears") alleging infringement of United States Patent No. 7,271,840, entitled "Method for Determining Entropy of a Pixel of a Real Time Streaming Digital Video Image Signal, and Applications Thereof," issued September 18, 2007 ("the '840 patent"). Sears was voluntarily dismissed from this litigation without prejudice on June 8, 2012. *See* Order, Dkt. 38. Now before the Court are four disputed terms and phrases from claim 56, the only asserted claim of the '840 patent, submitted by the parties for this Court's construction.

I. BACKGROUND

Oplus owns the '840 patent which "relates to a method for determining [the] entropy of a pixel of a real time streaming digital video image signal." '840 patent, Oplus's Resp., Dkt. 56, Ex.1 at col. 5 ll. 11-13. The '840 patent explains that:

> Due to the fact that TV station and video broadcasting systems are increasingly broadcasting various mixes of video image signals acquired by a variety of video camera sources such as interlaced video, non-interlaced video or progressive video, non-interlaced Hollywood movie film, and non-interlaced computer graphics, camera sources, operating according to different formats, coupled with the continued widespread usage of interlaced format TV display devices and

> systems, along with increasing appearance and usage of progressive TV display devices and systems, there is a significant on-going need for developing new approaches and techniques which are applicable for real time identifying the original mode or type of camera source of digital video image signals, in order to properly convert the broadcast digital video image signals into an interlaced or progressive format corresponding to the digital video image signal display format. Moreover, there is a corresponding on-going need for developing new approaches and techniques which are applicable for real time correcting errors produced during editing of the digital video image signals.

Id. at col. 4 ll. 33-52. The '840 patent states that it "successfully meets [this] on-going need" by providing a method for "identifying the origin of…and correcting errors produced during editing of streaming digital video image signals" which is "based upon determining the degree or extent of randomness or disorder…[or] entropy, and determining the fluctuation thereof…[or] entropy fluctuation, of each pixel relative to the inter-local neighborhoods and intra-local neighborhoods of pluralities of select pixels originating from the streaming digital video image signal." *Id.* at col. 5 ll. 37-38, 14-26.

The only asserted claim of the '840 patent in this litigation is claim 56, which provides for:

> A method determining entropy of a *pixel* of a real time streaming digital video image signal, for automatically correcting *an error produced during real time editing of the real time streaming digital video image input signal*, comprising the steps of:
>
> > (a) receiving and characterizing the streaming digital video image input signal during a pre-determined time interval;
> > (b) assigning and characterizing a local neighborhood of neighboring pixels to each input image pixel of the streaming digital video image input signal, in a temporal interlaced sequence of three consecutive fields in a global input grid of pixels included in the streaming digital video input image signal, said three consecutive fields being a previous field, a next field, and a current field; and
> > (c) determining the entropy of each virtual pixel, of each previous pixel, and of each next pixel, in said temporal interlaced sequence of said three consecutive fields, relative to said assigned and characterized local neighborhoods of said neighboring pixels, said determining comprising the steps of:

> (i) calculating values of pixel inter-local neighborhood parameters for each said previous pixel in said previous field, and for each said next pixel in said next field, whereby each said value of each said pixel inter-local neighborhood parameter represents a regional sum of inter-local neighborhood weighted distances measured between said neighboring pixels located in subsets of said assigned and characterized local neighborhood of each said virtual pixel in said current field, and said assigned and characterized local neighborhood of each said previous pixel in said previous field, and of each said next pixel, in said next field, respectively;
> (ii) calculating a *value of a virtual-pixel intra-local neighborhood parameter*, for each said virtual pixel in said current field;
> (iii) adjusting a value of a *pixel entropy counter* for each said previous pixel in said previous field, for each said next pixel in said next field, and for each said virtual pixel in said current field; and
> (iv) calculating a value of the entropy of each said previous pixel in said previous field, of each said next pixel in said next field, and of each said virtual pixel in said current field from said values of said *pixel entropy counters* of said pixels, whereby said values of the entropy of each said previous pixel in said previous field, of each said next pixel in said next field, and of each said virtual pixel in said current field, in the streaming digital video input image signal are used for automatically deciding, by performing sequences of mathematical logical operations, not to use values selected from the group consisting of value of a said previous pixel in said previous field, and value of a next pixel in said next field, for assigning a real value to said virtual pixel in said current field in said global input grid of pixels featured in the streaming digital video input image signal, thereby correcting *an error produced during real time editing of the streaming digital video image input signal.*

Id. at col. 25 ll. 22 - col. 26 ll.16 (disputed terms and phrases emphasized).

Oplus contends that Funai infringed claim 56 of the ‘840 patent by making, using, importing, selling or offering to sell, and/or by contributing to others’ use of, among other products, video products using video signal error correction methods that fall within the scope of claim 56, pursuant to the United States patent laws, 35 U.S.C. § 271, *et seq*. *See* Compl., Dkt. 1 at 2. An example of an allegedly infringing product is Funai’s Sylvania DVL1000F DVD Player (“Sylvania DVD Player”). *Id.* Alternatively, Oplus argues that Funai is indirectly

infringing the '840 patent because it knows that the steps of the claimed method are being performed by users of Funai's products like the Sylvania DVD Player. *Id.* Funai answered Oplus's complaint and denied the allegations against it on April 16, 2012. Funai's Answer, Dkt. 25.

Pursuant to the Northern District of Illinois's Local Patent Rules and this Court's revised scheduling Order, Funai filed its opening claim construction brief on February 4, 2013. Funai's Br., Dkt. 54. Oplus responded on March 4, 2013, Oplus's Resp., Dkt. 56, and Funai filed a corrected reply brief on March 19, 2013. Funai's Reply, Dkt. 58. On March 25, 2013, the parties filed their Joint Claim Construction Chart and Status Report pursuant to Local Patent Rule 4.2(f), which outlined the disputed terms and the parties' respective proposed constructions of those terms. *See* Joint Claim Construction Chart, Dkt. 60.

In their joint submission, the parties identified the following four disputed terms from claim 56 for the Court's construction: (1) "pixel"; (2) "error produced during real time editing of the streaming digital video image input signal"; (3) "value of a virtual-pixel intra-local neighborhood parameter"; and (4) "pixel entropy counter." *See id.* at 2. A *Markman* hearing was held on May 31, 2013, in which both parties received an opportunity to present evidence and argument in support of their proposed constructions of the disputed terms. *See* Order, Dkt. 64.

On this Court's own motion, a further *Markman* hearing was held on June 27, 2013, in which the parties were given the opportunity to comment and advance arguments concerning alternative proposed constructions for three of the four disputed terms. *See* Order, Dkt. 65. At the conclusion of that hearing, the Court directed the parties to submit revised proposed constructions of the term "pixel." *See* Order, Dkt. 66. A joint submission to that effect was filed on July 11, 2013. *See* Joint Revised Proposed Constructions, Dkt. 67. Accordingly, the Court

incorporates the parties' revised proposed constructions of the term "pixel" in the analysis set forth below.

II. ANALYSIS

"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) (en banc) (citing *Innova/Pure Water, Inc. v. Safari Water Filtration Sys., Inc.*, 381 F.3d 1111, 1115 (Fed. Cir. 2004); *see also Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)). And the meaning and interpretation of those patent claims are questions of law for the Court to decide. *Markman v. Westview*, 517 U.S. 370, 391 (1996).

The Court's analysis of the disputed claim terms begins with the terms' "ordinary and customary meaning." *Phillips*, 415 F.3d at 1312-13. As the Federal Circuit has explained, the ordinary and customary meaning of a claim term 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 (citations omitted). In making that determination, the Federal Circuit has emphasized the importance of "intrinsic evidence" in claim construction. *Id.* at 1317. This is so because "a person of ordinary skill in the art is deemed to read the claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the specification." *Id.* Indeed, the specification "is always highly relevant to the claim construction analysis," and "is the single best guide to the meaning of a disputed term." *Id.* at 1315 (citing *Vitronics*, 90 F.3d at 1582). Other forms of intrinsic evidence include the patent claims and prosecution history. *Id.* at 1317.

While "less significant than the intrinsic record," district courts may also rely on "extrinsic evidence, which consists of all evidence external to the patent and prosecution history, including expert and inventor testimony, dictionaries, and learned treatises." *Id.* (citations omitted). In particular, dictionaries, technical dictionaries, and treatises may be considered "if the court deems it helpful in determining 'the true meaning of language used in the patent claims.'" *Id.* at 1318 (citing *Markman,* 52 F.3d at 980). That said, the Federal Circuit has cautioned that while "extrinsic evidence may be useful to the court…it is unlikely to result in a reliable interpretation of patent claim scope unless considered in the context of the intrinsic evidence." *Id.* at 1319.

This Court may also look to the constructions given to the disputed terms in earlier litigation. *See, e.g., Arlington Indus., Inc. v. Bridgeport Fittings, Inc.,* 632 F.3d 1246, 1253 (Fed. Cir. 2011) ("In the interest of uniformity and correctness, this court consults the claim analysis of different district courts on the identical terms in the context of the same patent." (quoting *Finisar Corp. v. DirectTV Group, Inc.,* 523 F.3d 1323, 1329 (Fed. Cir. 2008)). Of course, "a district court decision does not have *stare decisis* effect; it is not precedent." *Midlock v. Apple Vacations W., Inc.,* 406 F.3d 453, 457 (7th Cir. 2005); *see also Jackson v. VTech Telecomm. Ltd.,* No. 01 C 08001, 2003 WL 25815373, at *3 (N.D. Ill. Oct. 23, 2003) ("We conclude that none of the prior claim constructions have binding or preclusive effect in this Court, especially in light of the fact that none of defendants here were party to the earlier actions." (citing *Allen Archery, Inc v. Browning Mfg. Co.,* 819 F.2d 1087, 1091 (Fed. Cir. 1987); *Texas Instruments, Inc. v. Linear Techs. Corp.,* 182 F. Supp. 2d 580, 589-90 (E.D. Tex. 2002); *Nilssen v. Motorola,* 80 F. Supp. 2d 921 (N.D. Ill. 2000))). But decisions by district courts construing the same terms as those in the instant case, particularly in the context of the

same patent, may prove helpful and persuasive. *See, e.g., Jackson*, 2003 WL 25815373, at *3 ("[The Court] will, however, consult, adopt and refer to these prior opinions when [the Court] find[s] it persuasive, reasonable, economical or otherwise appropriate to do so."); *see also Pinpoint Inc. v. Hotwire, Inc*, No. 11 C 05597, 2013 WL 1174688, at *8 (N.D. Ill. Mar. 20, 2013) ("[An earlier] decision might be relevant to the construction of the related claim terms [in this case], and [the Court] ultimately find[s] it helpful and persuasive, but it is not binding."). Accordingly, the Court neither ignores nor blindly adopts the determinations of earlier cases, but notes and considers those constructions where appropriate.

The Court also notes that "[t]here are only two exceptions to the general rule [that claim terms are given their ordinary and customary meaning]: 1) when a patentee sets out a definition and acts as his own lexicographer, or 2) when the patentee disavows the full scope of a claim term either in the specification or during prosecution." *Thorner v. Sony Computer Entm't Am. LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012) (citing *Vitronics Corp.*, 90 F.3d at 1580). "To act as its own lexicographer, a patentee must clearly set forth a definition of the disputed claim term other than its plain and ordinary meaning." *Id.* (internal quotation marks omitted) (citing *CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1366 (Fed. Cir. 2002)). The patentee must "clearly express an intent" to redefine the term. *Id.* (citing *Helmsderfer v. Bobrick Washroom Equip., Inc.*, 527 F.3d 1379, 1381 (Fed. Cir. 2008); *see also Kara Tech. Inc. v. Stamps.com*, 582 F.3d 1341, 1347-48 (Fed. Cir. 2009)). The "standard for disavowal of claim scope is similarly exacting." *Id.* at 1366. "The patentee may demonstrate intent to deviate from the ordinary and accustomed meaning of a claim term by including in the specification expressions of manifest exclusion or restriction, representing a clear disavowal of claim scope." *Id.* (citing *Teleflex, Inc. v. Ficosa N. Am. Corp.*, 299 F.3d 1313, 1325 (Fed. Cir. 2002); *see also Home Diagnostics, Inc.*

v. LifeScan, Inc., 381 F.3d 1352, 1358 (Fed. Cir. 2004)). With these principles in mind, the Court now turns to the construction of the disputed claim terms and phrases.

A. "Pixel"

Oplus's Proposed Construction	Funai's Proposed Construction	Court's Construction
"the smallest complete element of an image which represents all of the characteristics (*e.g.*, in the electronic form of the image: the hue, intensity, and brightness, RGB components, Y, Ry, By components, etc.) representing a point on the original image"	"the smallest discrete element of an image, having an addressable location in the image and being individually capable of representing any of the values in the image"	"the smallest addressable element of an image that is capable of representing any of the values and characteristics in the image, whether displayed or in the streaming digital video input signal"

The first and perhaps most vexing of the disputed claim terms to be construed is "pixel." Funai argues that while "pixel" is commonly understood to be an abbreviation of "picture element," the term requires a more precise construction within the context of the '840 patent. According to Funai, the '840 patent "claims and specification suggest that a pixel must have a specific location, size and value." Funai's Br., Dkt. 54 at 8. In particular, Funai emphasizes that a pixel must be addressable. As Funai argues, the specification "describes each input 'pixel' as being assigned a local neighborhood of neighboring pixels." *Id.* at 7. "To assign a local neighborhood of neighboring pixels to each input pixel, each pixel must thus have a discrete location such as a location on an x-y grid." *Id.* at 8. Further, "[i]n order to measure weighted distances between neighboring pixels," as the patented method does, "the pixels must be specifically located or addressable." *Id.* Therefore, Funai initially maintained that a dictionary definition from *McGraw-Hill's Dictionary of Computing & Communications* most precisely construes the term as "the smallest addressable element of an image." *Id.* at 7-8. But as Oplus

correctly points out, an image may contain sub-pixels[1] which are both smaller than pixels and have a location or address. *Markman* Hr'g Tr. May 31, 2013 at 29-30. As such, Funai's initial proposal, which defined pixel as the *smallest* addressable element of the image, is inaccurate.

Oplus, on the other hand, originally proposed that "pixel" be construed as "the smallest complete element of an image." Oplus's Resp., Dkt. 56 at 6. According to Oplus, this is the agreed construction of the term pixel in two concurrent cases.[2] *See* Joint Claim Construction and Prehearing Statement, *Oplus Techs., Ltd. v. JVC Am. Corp.*, 12-cv-05231-WJM-MF (D.N.J. Apr. 30, 2013), Dkt. 75 at 2 (agreeing to construction of "pixel" as "the smallest complete element of an image"); Joint Claim Construction and Prehearing Statement, *Oplus Techs., Ltd.*

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[1] In a color display, each pixel is generally comprised of three sub-pixels. As the court in *Semiconductor Energy Lab. Co., Ltd. v. Samsung Elec. Co.* explained, "each pixel has three sub-pixels, each corresponding to a different color filter, typically red, green and blue…[and] the amount of light that passes through each sub-pixel determines the color of the pixel." 711 F. Supp. 2d 913, 919 (W.D. Wis. 2010); *see also Oxford English Dictionary* (Fiona McPherson, *et al.* eds., 2013), *available at* http://www.oed.com/view/Entry/ 192418?redirectedFrom=subpixel#eid237095671 ("[A sub-pixel is] an area of an image smaller than a pixel…[especially] each of the three or more single-[color] elements of a pixel in an LED or liquid crystal display. A pixel in a display is typically composed of three subpixels of the [colors] red, green, and blue.").

[2] The Court also notes that courts in this district have construed the term "pixel" in a manner similar to Oplus's original proposal, albeit within the context of different patents. *See IP Innovation LLC v. Mitsubishi Elec. Corp.*, No. 08 C 00393, 2009 WL 3617505, at *4 (N.D. Ill. Oct. 29, 2009) (Der-Yeghiayan, J.) (construing "pixel" according to the plaintiff's proposed construction as "the smallest complete element of an image" and rejecting the defendant's proposed construction of "the smallest independently addressable location capable of being displayed on a display device"); *IP Innovation LLC v. Lexmark Int'l, Inc.*, 424 F. Supp. 2d 1078, 1087-88 (N.D. Ill. 2006) (Kocoras, J.) (construing "pixel" to mean "the smallest complete element of an image" and rejecting the defendants' proposed construction as "the smallest addressable element of the displace device"); *IP Innovation LLC v. Sony Elec., Inc.*, No. 04 C 06388, 2005 WL 2035578, at *3-4 (N.D. Ill. Aug. 18, 2005) (Kennelly, J.) (construing "pixel" as "the smallest complete element of an image" and rejecting the defendant's proposed construction as "the smallest addressable element in an electronic display"); *but see Crystal Image Tech., Inc. v. Mitsubishi Elec. Corp.*, No. 08-307, 2010 WL 1979298, at *6 (W.D. Pa. Apr. 9, 2010) (construing "image element" synonymously with "pixel" as "the smallest element of an image that can be assigned independent characteristics").

v. Vizio, Inc., 12-cv-05707-MRP-E (C.D. Cal. Oct. 29, 2012), Dkt. 90 at 2 (same). Oplus's proposal, however, runs into the same problem as Funai's. In particular, the modifier "complete" provides no clearer understanding of what a pixel is in the context of the '840 patent. In fact, this construction tends to raise more questions about the meaning of what a pixel is than it answers. Specifically, what does it mean for an image element to be "complete"? Is a single-color sub-pixel complete? If so, Oplus's construction is no more accurate than Funai's.

Taking these considerations into account, the Court asked the parties to submit revised proposed constructions of the term "pixel" following the June 27, 2013 *Markman* hearing. Their submissions, in addition to the intrinsic and extrinsic evidence available to the Court, clarify what a "pixel" is within the context of the '840 patent. First, there is nothing in the specification or claim language to support the proposition that an exception to the general rule that a claim term receive its ordinary and customary meaning should apply here. *See, e.g.*, *Medtronic Inc. v. Boston Scientific Corp.*, 695 F.3d 1266, 1275 (Fed. Cir. 2012) (citing *Thorner*, 669 F.3d at 1365)). The specification expressly states that claim terms and phrases "unless otherwise defined…have the same meaning as commonly understood by one of ordinary skill in the art to which" the patented method belongs. '840 patent, Oplus's Resp., Dkt. 56, Ex. 1 at col. 9 ll. 12-17. Further, there is no indication that the patentee set out a specific definition or some other idiosyncratic use of the term "pixel," or that he expressly disavowed the full scope of the claim term. Accordingly, there is no justification to deviate from the broadest scope of the term based on the ordinary and customary meaning that the claim term would have to a person of ordinary skill in the art.

Proceeding on that basis, what can be gleaned from the specification, dictionary definitions, and the parties' briefs, oral arguments, and revised constructions is that a "pixel" is

capable of representing any of the full range of possible values and characteristics of the image, including color, hue, saturation, brightness, and so forth—unlike a sub-pixel, which can only display a subset of the characteristics of an image (*e.g.*, red color hues versus green). Further, as Funai argues and the specification describes, a pixel must have an addressable location in order to be processed by the patented method. Indeed, even Oplus's revised construction states that a "pixel" "represent[s] a point on the original image." To represent a point, the pixel must be addressable. Moreover, as Oplus contends and Funai agrees, a pixel does not necessarily need to be displayed on an electronic device, but may also exist and have an addressable location within the streaming digital input signal. *Markman* Hr'g Tr. June 27, 2013 at 43:20-24, 45:3-22 (Oplus's argument); *id.* at 47:1-5 (Funai's agreement).

Accordingly, the Court construes "pixel" as "the smallest addressable element of an image capable of representing the full range of the values and characteristics in the image, whether displayed or in the streaming digital video input signal."

B. "Error Produced During Real Time Editing of the Streaming Digital Video Image Input Signal"

Oplus's Proposed Construction	Funai's Proposed Construction	Court's Construction
plain and ordinary meaning or "error within the streaming digital video image input signal introduced during editing, bad edits, and/or conversion"	"error resulting from conversion of real time streaming digital video image input signal"	"error within the streaming digital video image input signal resulting from conversion and/or other editing of the streaming digital video input signal"

At issue with this disputed phrase is the nature of the errors that claim 56 of the '840 patent aims to correct. Oplus argues that the phrase does not need construction because its meaning is readily apparent. Oplus's Resp., Dkt. 56 at 9. In the alternative, Oplus argues that the "errors" that the patented method aims to correct result from "editing, bad edits, and/or

conversion." *See Markman* Hr'g Tr. June 27, 2013 at 57:4-12. Oplus avers that there is no reason to remove the term "editing" from the disputed phrase, as Funai's proposed construction does, and that their proposed construction most accurately encompasses the world of errors that the '840 patent corrects. *Id.*

Funai, on the other hand, contends that "real time editing" of the input signal refers solely to "conversion" of that signal. According to Funai, the specification of the '840 patent "consistently describes the conversion of the streaming digital video input signal between various formats, such as conversion of an interlaced video signal to a progressive video signal, as being the real-time editing which produces the errors the invention aims to correct." Funai's Br., Dkt. 54 at 14. Oplus argues that this cannot be correct because the specification also describes errors that the patent aims to correct as including those that result from "bad edits." *See Markman* Hr'g Tr. May 31, 2013 at 46:7-19. According to the specification, "bad edits" occur "whenever two non-continuous or partially continuous film scenes are attached or glued together…whereby at a certain point in time the glued video sequence does not match the original sequence," thereby "generat[ing] fractions in lines and pixels in the glued video sequence of the streaming digital video images signal." '840 patent, Oplus's Resp., Dkt. 56, Ex. 1 at col. 16 ll. 18-24. Therefore, Oplus argues that based on the specification language, the errors corrected by the patented method must include not only those arising from conversion of the input signal but also those resulting from other forms of editing of the video image.

Oplus's interpretation, however, fails to stand up to closer review. As Funai points out, the patent purports to correct errors "produced during real time editing of the real time streaming digital video image input signal." *Id.* at col. 25 ll. 24-25. It corrects such errors by providing a method to fill in missing pixels during "de-interlacing," that is, during conversion

from an interlaced to a progressive frame display format. Funai's Br., Dkt. 54 at 15. "Bad edits," described by the specification as edits to the video image source, plainly are not "real time editing of the streaming digital video image input signal"; that phrase necessarily excludes errors that result during, for instance, manual editing of video or other image sources before they become part of the streaming digital video input signal. In other words, the claim language limits the possible world of errors to be corrected to those that occur as a result of editing of the streaming signal itself, as opposed to the editing of the image source. While "bad edits" in source video may create errors in the "streaming digital video input image signal" when the video source that includes those bad edits is introduced to the streaming digital signal, it is only the errors actually within the input signal that that the '840 patent corrects. *See Markman* Hr'g Tr. June 27, 2013 at 59-60. Simply put, errors in the streaming digital video signal are not "introduced during . . . bad edits," as Oplus's proposed construction would have it.

Based on the foregoing, Funai argues that the type of error that the '840 patent aims to correct is limited to "an error resulting from *conversion* of real time streaming digital video image input signal." *Id.* (emphasis added). On this point, however, the Court disagrees with Funai. Nothing in the specification or claim language limits the type of error corrected by the patented method to those resulting exclusively from "conversion" as Funai avers. To the contrary, the patent specification and claim language consistently refer to the errors the patent aims to correct as those resulting from *editing*, as opposed to *conversion*, of the input signal. *See*, *e.g.*, *Kara,* 582 F.3d at 1348 ("The patentee is entitled to the full scope of his claims, and [the court] will not limit him to his preferred embodiment or import a limitation from the specification into the claims."). Indeed, the specification explains that the patented method is useful for both "identifying the original mode or type of camera source of digital video image

signals, in order to properly convert" that signal *and* "correcting errors produced during editing of the digital video image signals." *See* '840 patent, Oplus's Resp., Dkt. 56, Ex. 1 at col. 4 ll. 33-52. The patentee could have specified that the patented method was useful for correcting errors during "conversion" of digital video signals, but expressly did not.

And a review of the specification and claim show that the patentee neither set out a specific definition for "editing" nor demonstrated an intent to disavow claim scope as it relates to the term "editing." Nothing in the specification or claim indicates that the patented method only corrects errors resulting from "conversion" to the exclusion of other errors resulting from some other manipulation or action affecting the streaming digital video image input signal—so long as those errors result from processing of the signal itself. For that reason, the Court concludes that Funai's effort to limit the construction to errors introduced by "conversion" of the streaming digital video signal is not justified. *See Diagnostics, Inc.*, 381 F.3d at 1358 ("Absent a clear disavowal in the specification or the prosecution history, the patentee is entitled to the full scope of its claim language.").

A comparison of independent claim 56 and dependent claim 57 further supports this proposition. Claim 56 teaches that the patented method determines the entropy of a pixel "for automatically correcting an error produced during real time *editing* of the real time streaming digital video image input signal." '840 Patent, Oplus's Resp., Dkt. 56, Ex. 1 at col. 25 ll. 22-5. Importantly, claim 56 makes no mention of conversion of the input signal. Dependent claim 57, however, specifies that the method of claim 56 can be used to determine the entropy of a pixel of an input signal that has been subjected to "pull down mode conversion."

Specifically, while step (a) of claim 56, the asserted claim, is "receiving and characterizing the streaming digital video image input signal during a pre-determined time interval," step (a) of dependent claim 57 states that:

> the streaming digital video image input signal is received following subjecting the streaming digital video image input signal to a pull down mode conversion method selected from the group consisting of a 3:2 pull down mode conversion method, a 2:2 pull down mode conversion method, and a scan rate conversion, other than the 3:2 pull down mode conversion and the 2:2 pull down mode conversion, *from a non-interlaced film format or a progressive video format to an interlaced video format.*

Id. at col. 26 ll. 16-26 (emphasis added). The claim 57 limitation, which operates on a signal that has been subjected to a "pull down mode conversion," implies that the limitations of independent claim 56, and therefore the errors it aims to correct, do not necessarily operate on a signal that has been subjected to "pull down mode conversion." If claim 56, which teaches that it is aimed at correcting errors caused by "editing" of the input signal, exclusively addressed errors caused by "conversion," as Funai contends, or if "editing" was synonymous with "conversion" in claim 56, there would be no need for dependent claim 57—claim 56 would already encompass the processing of that type of signal. *See, e.g., Philips*, 415 F.3d at 1314-15 ("Differences among claims can also be a useful guide in understanding the meaning of particular claim terms. For example, the presence of a dependent claim that adds a particular limitation gives rise to a presumption that the limitation in question is not present in the independent claim." (citations omitted)).

This is not to say that "editing" does not include "conversion." Indeed, the parties agree, although to differing extents, that the term "editing" encompasses conversion of the input signal. Accordingly, the Court construes the disputed term as "an error within the streaming

digital video input signal resulting from conversion and/or other editing of the streaming digital video input signal."

C. "Value of a Virtual-Pixel Intra-Local Neighborhood Parameter"

Oplus's Proposed Construction	Funai's Proposed Construction	Court's Construction
"sum of two or more weighted distances measured between pixels within a single local neighborhood of a current field"	"sum of weighted distances measured between pixels within a local neighborhood of a current field"	"sum of two or more weighted distances measured between pixels within a single local neighborhood of a current field"

As the parties indicated in their briefs and at the *Markman* hearing, their dispute over the meaning of this phrase goes to form rather than substance. Oplus's proposed construction relies on the agreed constructions the parties have given to the term "intra-local neighborhood" and the phrase "regional sum of inter-local neighborhood weighted distances." Oplus's Resp., Dkt. 11. The parties agree that "intra-local neighborhood" means "within a *single* local neighborhood." *Id.* (emphasis added). The parties further agree that "regional sum of inter-local neighborhood weighted distances" means "sum of *two or more* weighted distances measured between pixels within local neighborhoods of different fields." *Id.* (emphasis added).

Funai admits that "Oplus's construction is almost identical to" its own. Funai's Reply, Dkt. 58 at 9. However, Funai contends that the words "two or more" and "single," both of which Oplus includes in its proposed construction, are redundant. According to Funai, its proposed construction implicitly includes those terms; therefore, including them adds no value. *Id.*

At bottom, there is no substantive dispute concerning the meaning of the phrase. Oplus's proposal, however, is more consistent with the parties' agreed constructions. Funai has not advanced a persuasive reason to depart from those agreed constructions. At best, deviating from

the agreed verbiage would do little to clarify the meaning of the phrase; at worst, it would sow confusion among the jury. The Court therefore adopts Oplus's proposed construction.

D. "Pixel Entropy Counter"

Oplus's Proposed Construction	Funai's Proposed Construction	Court's Construction
"a counter that is adjusted as the result of mathematical logical operations involving values of the inter-local and intra-local neighborhood parameters"	"a variable that is incremented as a result of mathematical logical operations involving values of the pixel inter-local and intra-local neighborhood parameters"	"a counter that is adjusted as a result of mathematical logical operations involving values of the inter-local and intra-local neighborhood parameters, and/or by being initialized at or set to zero"

The parties' briefs and the Court's subsequent *Markman* hearings have narrowed the dispute over the construction of this term to the manner in which the value of a pixel entropy counter can be changed. This dispute boils down to a choice of verbs. Oplus prefers "adjusted."[3] Oplus correctly argues that both the specification and claim 56 use the term "adjusted" to describe the manner in which a pixel entropy counter is manipulated by the patented method. That said, while sub-step (iii) of Step (c) of claim 56 provides for "adjusting a value of a pixel entropy counter," the claim language does not indicate how that adjustment takes place. '840 patent, Oplus's Resp., Dkt. 56, Ex. 1 at col. 25 ll. 60-63. Claim 56 also indicates that the pixel

[3] In Funai's opening brief, it argued that a pixel entropy counter should be construed to mean "a variable that is incremented as a result of mathematical logical operations involving values of the pixel inter-local and intra-local neighborhood parameters." Funai's Br., Dkt. 54 at 18. In a concurrent case construing "pixel entropy counter" in the '840 patent, a district court concluded that the term "counter" required no construction because "[c]ounters in signal processing algorithms denote adequate structure on account of their usage in common parlance." *Oplus Techs., Ltd. v. Vizio, Inc.*, No. 12-cv-5707-MRP (C.D. Cal. Jan. 14, 2013), slip op. at 21. This Court agrees. *See, e.g., Arlington Indus., Inc.*, 632 F.3d at 1253 (consulting the claims analysis of district courts on identical terms in the same patent). Moreover, at the *Markman* hearing held June 27, 2013, Funai agreed that this construction of "counter" was consistent with the *Vizio* court's construction. *Markman* Hr'g Tr. June 27, 2013 at 63-64. Accordingly, the Court finds that "counter" within the term "pixel entropy counter" requires no construction.

entropy counter values are "used for automatically deciding, by performing sequences of mathematical logical operations, not to use values selected from the group consisting of value [sic] of a said previous pixel in said previous field." *Id.* at col. 26 ll. 6-10. But again, nothing in the claim language indicates or describes how those values are assigned to a pixel entropy counter.

Funai points out, however, that the specification teaches that the values of a pixel entropy counter addressed in sub-step (iii) of Step (c) of claim 56 are adjusted in a specific manner. *See id.* at col. 14 ll. 12-13. The specification explains that:

> the value of each entropy counter is adjusted according to the results obtained by performing the following mathematical logical operations on values of the pixel local neighborhood parameters, that is, first and second previous-pixel inter-local neighborhood parameters, P1 and P2, respectively, first and second next-pixel inter-local neighborhood parameters, N1 and N2, respectively, and virtual-pixel inter-local neighborhood parameter, VIRT, previously defined and calculated according to preceding sub-steps (i) and (ii) of Step (c).

Id. at col. 14 ll. 17-26. The paragraphs following this explanation then describe how a pixel entropy counter's value is adjusted—or more specifically, how that value is increased by one—as a result of six different mathematical logical operations. *Id.* at col. 14 ll. 27-54. For instance, the value of the "P1-entropy counter" is increased by one if "the maximum value, Pmax, between P1 and P2, is greater than the maximum value, Nmax, between N1 and N2, and is greater than the value of VIRT." *Id.* at col. 14 ll. 27-29. In each of the six mathematical logical operations described in the specification, only two results can occur: either the value of the pixel entropy counter is increased by one or its value is unchanged. *See id.* at col. 14 ll. 27-54.

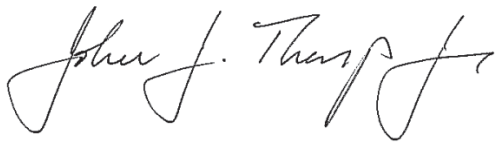
Funai argues that the term "incremented" better conveys the limitation in the manner by which the value of a pixel entropy counter may change because that term implies that a pixel entropy counter's value may only be *increased* as the result of mathematical logical operations.

Funai does not, however, cite any support for its choice of that verb in preference to "adjusted." To be sure, the *Oxford English Dictionary* defines "increment" as "[t]he action or process of increasing or becoming greater, or…increase, augmentation, growth." *Oxford English Dictionary* (Fiona McPherson, *et al.* eds., 2013), *available at http://www.oed.com/view/Entry/94057?redirectedFrom=increment#eid.* But even that definition does not imply, as Funai suggests, that the change in value is limited to an increase of one.

Further, the contention that the counter can only be adjusted by increasing its value is not correct. The specification indicates that the value of a pixel entropy counter can be adjusted in one additional way. Specifically, in sub-step (iv) of Step (c), "there is calculating a value of the entropy of each previous pixel…of each next pixel…and of each virtual pixel…and determining relative relationships among the entropy values, by using the values of the pixel entropy counters of preceding sub-step (iii) of Step (c)." '840 patent, Oplus's Resp., Dkt. 56, Ex. 1 at col. 14 ll. 55-61. The specification teaches that, as in sub-step (iii), a "sequence of mathematical logical operations [are] performed on values of the pixel entropy counters." *Id.* at col. 14 ll. 62-64. The first step of this process is "initialization" in which each pixel entropy counter's value is set to zero. *Id.* at col. 15 ll. 4-7. Therefore, the value of a pixel entropy counter may also be changed by being initialized at or set to zero, in addition to being increased by one as a result of mathematical logical operations. These are the only two ways described by the specification in which the value of a pixel entropy counter may be "adjusted." *See Hologic, Inc. v. SenoRx, Inc.*, 639 F.3d 1329, 1335 (Fed. Cir. 2011) (reversing a district court claim construction where "the specification [made] clear what the inventors contemplated as their invention…[and] [a]ll the descriptions" described the invention in the same manner); *see also*

Phillips, 415 F.3d at 1315 ("[The specification] is the single best guide to the meaning of a disputed term." (citation omitted)).

Therefore, describing a "pixel entropy counter" solely as a counter that is "incremented" is too limiting. As described by the specification, a pixel entropy counter's value may be increased, reset to zero, or even, depending on the outcome of the mathematical logical operation, remain unchanged. An accurate construction of the term must encompass every method by which the value of a pixel entropy counter may be changed described by the specification. To that end, the Court concludes that the term "adjusted" appropriately connotes the concept that the value of the counter changes according to each of the methods set forth in the specification—whether it be an increase by one or an initialization at zero. Accordingly, the Court construes "pixel entropy counter" as "a counter that is adjusted as a result of mathematical logical operations involving values of the inter-local and intra-local neighborhood parameters and/or by being initialized at or set to zero."[4]



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John J. Tharp, Jr.
United States District Judge

[4] At the June 27, 2013 *Markman* hearing, Oplus argued that the phrase "that can be reset" should be omitted from the Court's construction of a "pixel entropy counter." While Oplus did not dispute that a pixel entropy counter *can* be reset, it premised its argument on the concern that the construction would *require* a pixel entropy counter to be reset. *See Markman* Hr'g Tr. June 27, 2012 at 62. As explained above, however, the plain language of the specification teaches that the value of a pixel entropy counter can be "initialized" or set to zero. Further, the Court's construction clearly indicates that a pixel entropy counter may be incremented, initialized, and set. Those are the methods in which pixel entropy counter is capable of being "adjusted" (that is to say, the ways in which it "can" be adjusted). Accordingly, the Court concludes that Oplus's concerns in this regard are unfounded.