United States District Court
Northern District of California

UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

ADVANCED MICRO DEVICES, INC., et al.,

Plaintiffs,

v.

LG ELECTRONICS, INC., et al.,

Defendants.

Case No. 14-cv-01012-SI

ORDER RE: CLAIM CONSTRUCTION

Re: Dkt. Nos. 147, 148

On March 16, 2017, the Court held a *Markman* hearing regarding disputed claim terms across eight patents. Having considered the arguments of counsel and the papers submitted, the Court construes the disputed claim terms as discussed below.

BACKGROUND

Plaintiffs Advanced Micro Devices, Inc. and subsidiary ATI Technologies ULC (collectively, "AMD" or "plaintiffs") filed this patent infringement suit on March 5, 2014. In the complaint, plaintiffs accused defendants LG Electronics, Inc., LG Electronics U.S.A., Inc., and LG Electronics Mobilecomm U.S.A., Inc. (collectively, "LG" or "defendants") of infringing nine AMD patents.[1] Compl. (Dkt. No. 1). LG brought several counterclaims, asserting, among other

[1] U.S. Patent Nos. 6,889,332 ("Helms '332"), 6,895,520 ("Altmejd '520"), 6,897,871 ("Morein '871"), 7,327,369 ("Morein '369"), 7,742,053 ("Lefebvre '053"), 5,898,849 ("Tran '849"), 6,266,715 ("Loyer '715"), 6,784,879 ("Orr '879"), and 7,095,945 ("Kovacevic '945"). Following *inter partes* review, the PTO invalidated all asserted claims of Lefebvre '053, Morein '369, and Altmejd '520, and one or more asserted claims of Morein '871 and Kovacevic '945. *See* Final Written Decisions, Dkt. Nos. 107-7, 107-8, 107-9, 107-10, 107-11; *see also* Stipulated Dismissal Orders, Dkt. Nos. 124, 138.

things, that AMD infringes four LG patents.[2] Dkt. No. 59.

The parties have identified over twenty terms across eight patents for construction.

LEGAL STANDARD

Claim construction is a matter of law. *Markman v. Westview Instr., Inc.*, 517 U.S. 370, 372 (1996). Terms contained in claims are "generally given their ordinary and customary meaning." *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005). "[T]he 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." *Id.* at 1312. In determining the proper construction of a claim, a court begins with the intrinsic evidence of record, consisting of the claim language, the patent specification, and, if in evidence, the prosecution history. *Id.* at 1313; *see also Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996). "The appropriate starting point . . . is always with the language of the asserted claim itself." *Comark Commc'ns, Inc. v. Harris Corp.*, 156 F.3d 1182, 1186 (Fed. Cir. 1998); *see also Abtox, Inc. v. Exitron Corp.*, 122 F.3d 1019, 1023 (Fed. Cir. 1997).

Accordingly, although claims speak to those skilled in the art, claim terms are construed in light of their ordinary and accustomed meaning, unless examination of the specification, prosecution history, and other claims indicates that the inventor intended otherwise. *See Electro Medical Sys., S.A. v. Cooper Life Scis., Inc.*, 34 F.3d 1048, 1053 (Fed. Cir. 1994). The written description can provide guidance as to the meaning of the claims, thereby dictating the manner in which the claims are to be construed, even if the guidance is not provided in explicit definitional format. *SciMed Life Sys., Inc. v. Advanced Cardiovascular Sys., Inc.*, 242 F.3d 1337, 1344 (Fed. Cir. 2001). In other words, the specification may define claim terms "by implication" such that the meaning may be "found in or ascertained by a reading of the patent documents." *Vitronics*, 90

[2] U.S. Patent Nos. 6,639,998 (the "'998 Patent"), 7,636,863 (the "'863 Patent"), 7,664,971 (the "'971 Patent"), and RE43,184 (the "'184 Patent"). Two of LG's asserted patents underwent *inter partes* review, which resulted in the invalidation of all asserted claims of the '971 Patent and some of the asserted claims of the '863 Patent. *See* LG Opening Br. (Dkt. No. 147) at 6; *see also* Stipulated Dismissal Order, Dkt. No. 138.

F.3d at 1582, 1584 n.6.

In addition, the claims must be read in view of the specification. *Markman*, 52 F.3d at 978. Although claims are interpreted in light of the specification, this "does not mean that everything expressed in the specification must be read into all the claims." *Raytheon Co. v. Roper Corp.*, 724 F.2d 951, 957 (Fed. Cir. 1983). For instance, limitations from a preferred embodiment described in the specification generally should not be read into the claim language. *See Comark*, 156 F.3d at 1187. However, it is a fundamental rule that "claims must be construed so as to be consistent with the specification." *Phillips*, 415 F.3d at 1316. Therefore, if the specification reveals an intentional disclaimer or disavowal of claim scope, the claims must be read consistently with that limitation. *Id.*

Finally, the Court may consider the prosecution history of the patent, if in evidence. *Markman*, 52 F.3d at 980. The prosecution history limits the interpretation of claim terms so as to exclude any interpretation that was disclaimed during prosecution. *See Southwall Techs., Inc. v. Cardinal IG Co.*, 54 F.3d 1570, 1576 (Fed. Cir. 1995). In most situations, analysis of the intrinsic evidence alone will resolve claim construction disputes. *See Vitronics*, 90 F.3d at 1583.

Courts should not rely on extrinsic evidence in claim construction to contradict the meaning of claims discernable from examination of the claims, the written description, and the prosecution history. *See Pitney Bowes, Inc. v. Hewlett-Packard Co.*, 182 F.3d 1298, 1308 (Fed. Cir. 1999) (citing *Vitronics*, 90 F.3d at 1583). However, it is entirely appropriate "for a court to consult trustworthy extrinsic evidence to ensure that the claim construction it is tending to from the patent file is not inconsistent with clearly expressed, plainly apposite, and widely held understandings in the pertinent technical field." *Id.* Extrinsic evidence "consists of all evidence external to the patent and prosecution history, including expert and inventor testimony, dictionaries, and learned treatises." *Phillips*, 415 F.3d at 1317. All extrinsic evidence should be evaluated in light of the intrinsic evidence. *Id.* at 1319.

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DISCUSSION

I. AMD Asserted Patents

A. Helms '332

Helms '332 is entitled "Variable Maximum Die Temperature Based on Performance State." Helms '332 relates to power management of computer systems. Helms '332 1:7-8. The patent's alleged invention is "a system in which the maximum performance state . . . changes according to thermal criteria." *Id.* at 2:13-17. The patent explains that performance can be limited by power and thermal factors. *Id.* at 1:24-25. The patent further explains that prior art computer systems prevented processor damage by implementing active or passive cooling once temperature sensor(s) somewhere in the system detected temperature(s) past a critical threshold. *Id.* at 1:25-31. The patent lists prior art examples of passive cooling: turning off processor clocks for a predetermined period, reducing processor clocks' actual frequencies, and reducing voltage. *Id.* at 1:31-40. The alleged invention allows for multiple critical temperature thresholds and for the operating range associated with each of those thresholds to possess a different set of available performance states. *Id.* at 2:13-53.

Relevant for purposes of the Court's *Markman* analysis, Helms '332 claims the following:

> **Claim 9.** A computer system comprising:
> an integrated circuit operable at multiple performance states, the **performance states being defined by at least one of operating voltage and frequency**;
> and wherein the computing system provides that the integrated circuit, at a first detected temperature, has a first maximum **performance state** and a first plurality of lesser **performance states**; and wherein at a second detected temperature, higher than the first detected temperature, the integrated circuit has a lower maximum performance state and a second plurality of lesser **performance states**, the lower maximum **performance state** providing lower performance than the first maximum **performance state** in terms of maximum power consumption; and wherein the lower maximum **performance state** is one of the first plurality of lesser **performance states**.
>
> **Claim 10.** The computing system as recited in claim **9** further comprising:
> a temperature detection mechanism coupled to detect a temperature associated with the integrated circuit; and
> wherein the computing system is operable to change to a different maximum **performance state** according to the

detected temperature.

Claim 13. The computing system as recited in claim **10** wherein the number of **performance states** available varies according to the detected temperature.

Claim 15. A computer program product encoded in at least one computer readable medium, the computer program product comprising:

a plurality of groups of **performance operating states**, each of the groups of **performance operating states** having a different maximum operating state, the groups of operating states corresponding to respective different temperature ranges related to operation of a processor; and

an instruction sequence executable to change to a different group of **performance operating states** and thereby a different maximum operating state according to a detected temperature associated with the computer system; and wherein a maximum operating state of one group of **performance operating states** is available as an operating state in another group.

Claim 17. A computer system comprising:

means for determining a temperature associated with a processor, the processor having a plurality of groups of **performance states** associated with each of a plurality of temperature ranges, each of the groups having a different maximum **performance state** and common lower **performance states**, and wherein a maximum operating state of one group of **performance operating states** is available as an operating state in another group; and

means for changing from first group of **performance states** available in which to operate to a second group of **performance states** according to predetermined temperature, thereby changing the available maximum **performance state** available for process operation.

Helms '332 at 10:19-43, 10:50-52, 10:55-67, 11:1-2, 11:8-23 (the construction of the bold-underlined terms is disputed by the parties).

The parties dispute the construction of three, related terms ("the performance state terms").

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Claim Language	LG's Proposed Construction	AMD's Proposed Construction
"performance state(s)"	Indefinite	"discrete, selectable level(s) of performance"
"performance operating state(s)"	Indefinite	"discrete, selectable levels of performance available during operation"
"performance states being defined by at least one of operating voltage and frequency"	Indefinite	Plain and ordinary meaning; no construction necessary

AMD contends that a person of ordinary skill in the art ("a POSITA") at the time of the invention would have recognized that the term "performance" refers to "the speed and responsiveness that [a] computer system delivers to [a] user." AMD Opening Br. at 2 (citing Levitt Decl. ¶ 28). AMD contends that a POSITA would also have recognized that "performance state" means "discrete, selectable level(s) of performance" and is being used in a manner consistent with its common meaning in the art. *Id.* at 7 (citing Helms '332 at 2:33-35, 3:9-12, 3:34-41; Levitt Decl. ¶ 39). In support of its contention, AMD cites to "Advanced Configuration and Power Interface" ("ACPI" or "the ACPI specification"), a product specification coauthored by five computer and processor companies in July 2000. *Id.* at 6-7 (citing AMD Ex. B, ACPI (Dkt. No. 148-3)). ACPI defines "[d]evice and [p]rocessor performance states" as "power consumption and capability states within the active/executing states . . . ." AMD Ex. B, ACPI at 23.

AMD also contends that a POSITA at the time of the invention would have recognized that a "performance operating state" differs from a "performance state" only in requiring that the performance state be available during system operation. AMD Opening Br. at 7 (citing Levitt Decl. ¶ 41). AMD argues that "performance states" refer to processor or circuit capability, whereas "performance operating states" refer to the system embodiment and describe the subset of the "performance states" that are available to the system during operation. AMD Reply at 3

(citing Helms '332 at 5:6-8, 6:66-7:7, 8:65-67; Levitt Decl. ¶ 41).

LG contends that the performance state terms lack reasonable clarity and thus are indefinite under *Nautilus, Inc. v. Biosig Instruments, Inc.*, 134 S. Ct. 2120, 2124 (2014). LG Responsive Br. at 2-4. First, LG contends that "performance state" is not being used in a manner consistent with AMD's alleged ordinary meaning because AMD ties the definition to "speed and responsiveness" rather than "power consumption and capability" as in the ACPI specification. *Id.* at 2-3 (citing Helms '332 at 1:24-25). Second, LG contends that none of the three definitions AMD provides read on Helms '332's disclosed embodiments. *Id.* at 3 (citing Helms '332 at 3:36-37, 3:42-48). Finally, LG argues that claim 9 contradicts Helms '332's specification by allowing "performance state" to be defined by *either* operating voltage *or* frequency, rather than by defining it as a combination of *both* operating voltage *and* frequency. *Id.* at 4 (citing Helms '332 at 3:11-13, 3:34-35, 3:56-62, 4:1-4; LG Ex. 6 (Dkt. No. 153-6), Brinkley Depo. at 120:15-17; LG Ex. 7 (Dkt. No. 153-8), Helms Depo. at 42:20-43:5, 43:6-12, 43:20-44:5).

LG further contends that AMD's distinction between "performance state" and "performance operating state" is nonsensical and that both terms lack reasonable clarity. *Id.* at 5. LG argues that this distinction is nonsensical because a non-operating processor can neither be responsive nor possess speed of processing. *Id.* Additionally, LG argues that Helms '332's specification ties the term "performance state," and not "performance operating state," to operating conditions. *Id.* at 5-6 (citing Helms '332 cl. 9, 2:14-17, 3:34-35, 7:46-49, 8:6-8). LG offers no expert testimony in support of its position.

LG focuses much of its argument on showing alleged inconsistencies of AMD's constructions with a POSITA's. *See, e.g.*, LG Responsive Br. at 3:5-16. However, LG provides no expert testimony to support these contentions or its broader indefiniteness contentions, despite needing to prove its position by clear and convincing evidence. *See Teva*, 789 F.3d at 1345. The Court finds that the performance state terms are not "facially subjective terms." *Cf. Interval Licensing LLC v. AOL, Inc.*, 766 F.3d 1364, 1371-1373 (Fed. Cir. 2014) (holding "unobtrusive manner" indefinite because the specification did not outline the scope of the claims to a skilled artisan with reasonable certainty). LG has not demonstrated by clear and convincing evidence that

a POSITA in light of the specification would not have recognized the scope of the claimed invention with reasonable certainty. *See Nautilus, Inc. v. Biosig Instruments, Inc.*, 134 S. Ct. 2120, 2129 (2014); *Teva*, 789 F.3d at 1345 (Fed. Cir. 2015).

While Helms '332 does not explicitly define "performance," it provides "specific and unequivocal examples" of "performance states," and those examples are "sufficient to provide a skilled artisan with clear notice of what is claimed." *See DDR Holdings, LLC v. Hotels.com, LP*, 773 F.3d 1245, 1260 (Fed. Cir. 2014); *see, e.g.*, Helms '332 at 3:11-13 (stating that processor performance states are generally determined by unique voltage/frequency combinations); *id.* at 3:34-38 (stating that processor performance states could alternately be determined by an amount of chip area that is enabled). The burden is on LG to show indefiniteness by clear and convincing evidence, and it has not done so. *See Teva*, 789 F.3d at 1345. The terms are not indefinite.

AMD argues that the ACPI specification shows that "performance state" has a definition known to those in the applicable art. *See* AMD Opening Br. at 6; AMD Ex. B, ACPI at 23. AMD supplements the ACPI specification with expert testimony that a POSITA at the time of the invention would have recognized that "performance state," in light of Helms '332's specification, means "discrete, selectable level(s) of performance." *See* Helms '332 at 2:33-35, 3:9-12, 3:34-41; Levitt Decl. ¶ 39. AMD and its expert provide a definition of "performance" allegedly consistent with the Helms '332 specification. *See* AMD Opening Br. at 2 (citing Levitt Decl. ¶ 28); Helms '332 at 1:11-15. AMD also provides expert testimony explaining the distinction a POSITA at the time of the invention would have recognized between "performance state" and "performance operating state." *Id.* at 7 (citing Levitt Decl. ¶ 41). The Court concludes that the definitions AMD provides are logical and consistent with the intrinsic record. *Cf. Teva Pharm. USA, Inc. v. Sandoz, Inc.*, 789 F.3d 1335, 1338, 1342 (Fed. Cir. 2015) ("A party cannot transform into a factual matter the internal coherence and context assessment of the patent simply by having an expert offer an opinion on it."). Accordingly, the Court adopts AMD's constructions for the performance state terms.

For the reasons stated above, the Court construes "performance state(s)" to mean "discrete, selectable level(s) of performance"; "performance operating state(s)" to mean "discrete, selectable

levels of performance available during operation"; and "performance states being defined by at least one of operating voltage and frequency" by its plain and ordinary meaning.

B. Loyer '715

Loyer '715 is entitled "Universal Serial Bus Controller with a Direct Memory Access Mode." Loyer '715 explains that direct memory access ("DMA") is a function in computers and peripheral devices that allows data transfers between memory locations, or between memory locations and an input/output port, without involving a microprocessor. Loyer '715 at 1:60-2:16. The patent further explains that a universal serial bus ("USB") is a "communication architecture" that "allow[s] for the connection of multiple peripherals through a single port . . . ." *Id.* at 2:43-63. "Each USB device," the patent explains, comprises a plurality of "independently operating endpoints" that transmit and receive data between the USB device and the USB host. *Id.* The alleged invention combines DMA and USB functionality. *Id.* at 3:30-64. The patent states that the alleged invention eliminates buffer size restrictions on maximum packet size, which allows for a USB device that can handle data as fast as the USB host can request data. *Id.* In short, Loyer '715 purportedly enables faster data transfers to and from USB devices.

Relevant for purposes of the Court's *Markman* analysis, Loyer '715 claims the following:

> **Claim 1.** A universal serial bus (USB) device for USB transfer with direct memory access (DMA), comprising:
> a **DMA controller**, comprising:
> a plurality of **DMA channels** for performing data transfer between the USB device and a USB host; and
> a USB controller having a DMA mode, comprising:
> a plurality of USB endpoints, each **selectively programmed for** one of a plurality of **DMA channels** during the DMA mode of the USB controller.
>
> **Claim 10.** The USB device of claim **1**, the **DMA controller** further comprising:
> at least one DMA control register configured to select each of the plurality of USB endpoints as a source for data to be provided to the USB host.

Claim 13. A universal serial bus (USB) host for USB transfer with direct memory access (DMA), comprising:
a **DMA controller**, comprising:
a plurality of **DMA channels** for performing data transfer between the USB host and a USB device; and
a USB controller having a DMA mode, comprising:
a plurality of USB endpoints each **selectively programmed for** one of the plurality of **DMA channels** during the DMA mode of the USB controller.

Claim 22. The USB host of claim **13**, the **DMA controller** further comprising:
at least one DMA control register configured to select each of the plurality of USB endpoints as a source for data to be provided to the USB device.

Claim 24. The USB host of claim **13**, where the USB host is a computer system.

Claim 25. A universal serial bus (USB) controller having a direct memory access (DMA) mode, comprising:
a plurality of USB endpoints, each **selectively programmed for** one of a plurality of **DMA channels** during the DMA mode of the USB controller.

Loyer '715 at 11:59-67, 12:38-42, 12:48-56, 13:29-33, 13:36-42 (construction of the bold-underlined terms is disputed by the parties).

The parties dispute the construction of three terms.

1. "selectively programmed for" (asserted claims 1, 10, 13, 22, 24, 25)

Claim Language	LG's Proposed Construction	AMD's Proposed Construction
"selectively programmed for"	"selectively assigned using a sequence of executable instructions to a different"	"capable of being set to transfer data via"

The parties disagree with a few aspects of each other's proposed constructions of "selectively programmed for." AMD prefers its simple term "set" to LG's "assigned using a sequence of executable instructions," and objects to LG's limitation "to a different." LG seeks to

retain the term "selectively" in its construction and finds AMD's inclusion of "capable of" overly broad.

a. the meaning of "programmed for" ("assigned using a sequence of executable instructions" vs. "set")

AMD contends that "using a sequence of executable instructions" improperly limits "programmed" to programming techniques using software. *See* AMD Opening Br. at 11-12; AMD Reply Br. at 4-5. AMD contends that programming techniques exist that use only hardware, use only software, use a combination of hardware and software, or function by "adjusting register values." AMD Opening Br. at 11 (citing Levitt Decl. ¶¶ 47-54).

First, to demonstrate a method of programming using hardware, AMD directs the Court to incorporated U.S. Patent No. 6,298,396 (the "'396 patent"). AMD claims that the '396 patent demonstrates a programming technique using hardware because the '396 patent teaches a method for programming a "register," and a register is hardware. AMD Reply Br. at 4-5 (citing '396 Patent at 11:36-40) ("[T]he transmit channel . . . programs that value into an internal terminal count register."). LG counters that "selectively programmed" in Loyer '715 specifically refers to programming a USB endpoint, and that no non-software programming methods exist to program a USB endpoint. *See* LG Responsive Br. at 8 (citing Hospodor Decl. ¶¶ 25-32). LG argues that limiting the meaning of "programmed" to software is therefore appropriate here.

Second, AMD argues that construing program to mean "using a sequence of executable instructions" instead of "set" would exclude embodiments described in the specification and file history. AMD Opening Br. at 11. LG counters that a POSITA would have understood that "a USB endpoint is programmed by software, i.e., by 'a sequence of executable instructions.'" LG Responsive Br. at 8 (citing Hospodor Decl. ¶¶ 17-24; LG Ex. 9, IBM DICTIONARY OF COMPUTING, at 535). In support, LG points to language in the background of Loyer '715 and to the use of software in at least some of the embodiments. *Id.*

Finally, AMD's expert, Dr. Levitt, offers what he claims is an example of programming a USB endpoint using hardware. *See* Levitt Decl. ¶ 53 ("[A] USB endpoint register value can be set via a hardware state machine executing an algorithm that looks for a free DMA channel, and if one

is found, sets the USB endpoint register with the value for said free DMA channel, thereby selectively programming the USB endpoint for a DMA channel."). LG's expert, Dr. Hospodor, argues that Dr. Levitt's example of a programming technique using hardware should not be given any weight because (i) the example hardware "execut[es] an algorithm"; (ii) a POSITA would not consider setting a register value to be "programming"; and (iii) Dr. Levitt's example lacks sufficient detail to enable a POSITA to use the described programming method. *Id.* at 8-9 (citing Hospodor Decl. ¶¶ 25-32).

The parties agree that "using a sequence of executable instructions" limits "programmed" to programming techniques using software. As set forth above, the parties and their experts disagree on whether programming techniques exist that utilize only hardware. Based on the record, the Court is not convinced that "programming" in the context of Loyer '715 involves anything other than "using a sequence of executable instructions."

The Court finds AMD's references to the intrinsic record unpersuasive. *See* Loyer '715 at 7:42-48, 9:11-36. Loyer '715 itself does not describe any programming techniques that use only hardware, and the patent does not contain any language suggesting to the Court that such programming techniques exist. AMD contends that the incorporated '396 patent demonstrates that programming can occur via hardware, because a register is hardware and the '396 patent states that "the transmit channel . . . programs that value into an internal terminal count register." AMD Reply at 4-5 (citing '396 patent at 11:36-40). But the plain language of the '396 patent citation indicates that the register is what is *being programmed*; the register is not what is performing the programming. Consequently, the '396 patent does not definitively demonstrate that it is possible to program using hardware. AMD has not pointed to intrinsic evidence that favors its proposed meaning of "programmed."

AMD's expert, Dr. Levitt, contends that it is possible to program using hardware, but provides only one example. Levitt Decl. ¶ 53. However, the "hardware state machine" in his example "execut[es] an algorithm" in "programming" the USB endpoint. *Id.* This phrase strongly suggests to the Court that software performs the actual "programming." Indeed, LG's expert is unsure as to how a POSITA could even implement the hardware state machine in Dr. Levitt's

example. Hospodor Decl. ¶¶ 27, 31. The Court finds Dr. Levitt's example unpersuasive.

LG supports its proposed construction with a technical dictionary that includes "a sequence. . ." or "a set of executable instructions" in every applicable definition of "program." LG Ex. 9, IBM DICTIONARY OF COMPUTING, at 535. This strongly suggests to the Court that a POSITA at the time of the invention would have understood "programming" to include the "us[e] of a sequence of executable instructions."

For the reasons stated above, the Court holds that the programming of Loyer '715's "selectively programmed for" entails "using a sequence of executable instructions."

b. the meaning of "selectively" (whether each of the "plurality of USB endpoints" must be programmed for a "different" DMA channel)

LG contends that the language from claims 1, 13, and 25, "a plurality of USB endpoints, each selectively programmed for one of [the/a] plurality of DMA channels" means that each USB endpoint is selectively programmed for *a different* DMA channel, *i.e.*, that the claim language precludes more than one of the USB endpoints being programmed for the same DMA channel. LG Responsive Br. at 9. LG contends that AMD is barred from arguing otherwise by virtue of judicial estoppel. *Id.* LG argues that because AMD convinced the PTAB to adopt this interpretation in its decision denying IPR institution on Loyer '715, AMD is estopped from now asserting a different position. *Id.* at 9-10 (citing AMD Ex. E (Dkt. No. 148-6), July 10, 2015 PTAB Decision Denying Institution, at 18).

AMD contends that the claim language "a plurality of USB endpoints, each selectively programmed for one of [the/a] plurality of DMA channels" by its plain language means "the ability to program a plurality of USB endpoints for a *plurality* of DMA channels." AMD Opening Br. at 13 (emphasis original) (citing Loyer '715, Figs. 2, 3, 4; *id.* at 4:14-21; 7:13-17, 7:42-48; 7:50-67; 8:63-9:36; Levitt Decl. ¶¶ 60-63). AMD argues that judicial estoppel does not apply because it has not changed its position in any material respect. AMD Reply Br. at 5. AMD argues that "[t]he [PTAB] . . . merely explained that LGE's asserted prior art only allowed programming all USB endpoints to the same, *single* DMA channel." AMD Opening Br. at 13 (emphasis

original) (citing AMD Ex. E, July 10, 2015 PTAB Decision Denying Institution, at 17-18).

Judicial estoppel prevents a party from asserting one position to prevail in a legal proceeding and then asserting an inconsistent position to prevail in another legal proceeding or in another phase of the original legal proceeding. *New Hampshire v. Maine*, 532 U.S. 742, 749-50 (2001). The Supreme Court has set forth a three factor test for courts to determine whether judicial estoppel should apply. *Id.* First, in order for estoppel to apply, the party's second position must be "clearly inconsistent" with its first. *Id.* Second, a court considers whether the party succeeded in persuading a judicial body to accept that party's earlier position – success weighs in favor of applying estoppel. *Id.* Finally, a court determines whether allowing the party to assert the inconsistent position would result in an unfair advantage to that party or an unfair detriment to the opposing party. *Id.*

AMD is not estopped from asserting its position on this point. The PTAB's decision denying institution on Loyer '715 states:

> Claims 1 and 25 [of Loyer '715] recite 'a plurality of USB endpoints, each selectively programmed for one of [the/a] plurality of DMA channels during the DMA mode of the USB controller.' [LG] acknowledges that, although this limitation may be construed to provide for each USB endpoint to be programmed for a different DMA channel, the claim language does not require that construction. Instead, [LG] suggests that limitation may be construed to provide for each USB endpoint to be programmed for the same DMA channel. We disagree. . . . We are persuaded by [AMD's] contention that each USB endpoint is programmed for a different DMA channel.

AMD Ex. E, July 10, 2015 PTAB Decision Denying Institution, at 17-18 (emphasis original) (citations omitted). While the PTAB's discussion above suggests that AMD has shifted position, a closer read demonstrates otherwise. After stating that it was persuaded by AMD's contention, the PTAB cited to the introductory section of AMD's preliminary response. *See id.* at 18. The cited portion of AMD's preliminary response states as follows:

> In FIG. 2, the DMA controller includes a plurality of DMA channels, and the USB controller includes a plurality of USB endpoints. [Loyer '715] at 6:56-7:25. Each USB endpoint can be selectively programmed for one of the DMA channels. Id. at 7:44-48.

AMD Ex. N (Dkt. No. 163-2), IPR2015-00329, Patent Owner Preliminary Response at 1. While

the PTAB interpreted this as AMD's "contention that each USB endpoint is programmed for a *different* DMA channel[,]" that is not quite what AMD's response papers stated. In any event, the PTAB did not construe this claim language in denying IPR institution, *see* AMD Ex. E, at 6-8, and LG has not offered anything more concrete to demonstrate that AMD asserted a position squarely inconsistent with its claim construction position in this Court.

LG suggests that "a plurality of USB endpoints, each selectively programmed for one of [the/a] plurality of DMA channels" can only mean either (i) each USB endpoint be selectively programmed for the same DMA channel; or (ii) each USB endpoint be selectively programmed for a different DMA channel. LG Responsive Br. at 9. LG contends that the language is therefore ambiguous. The Court will not read in LG's proposed limitation, as it lacks sufficient support from the record. The Court instead prefers AMD's approach of retaining the plain language "one of [the/a] plurality of DMA channels" without attempting to modify that language through construction of "selectively programmed for."

For the reasons stated above, the Court will not include "a different" in its construction of "selectively programmed for."

c. "selectively"

LG contends that AMD's omission of "selectively" in its construction renders the claim language "selectively" superfluous. LG Responsive Br. at 11-13. AMD contends that its proposed construction does not exclude a selection element. AMD Reply at 5. Assuming, *arguendo*, that AMD's contention is accurate, AMD should have no objection to the Court including "selectively" in a construction of "selectively programmed for," as doing so simply introduces a redundant element. The Court holds that the construction of "selectively programmed for" must include the word "selectively."

d. "capable"

LG contends that AMD's use of "capable of" in its construction ("capable of being set to transfer . . .") is improper. LG Responsive Br. at 10. LG argues that adding "capable of"

essentially replaces the word "programmed" with "programmable" or "capable of being programmed," and that these terms possess different meanings. *Id.* at 11. AMD argues that its inclusion of "capable of" is appropriate because each asserted independent apparatus claim uses the language "selectively programmed . . . during the DMA mode." AMD Reply Br. at 5-6. AMD argues that the use of "during the DMA mode" places a temporal limitation on "selectively programmed," to convey the meaning that the apparatus is "*capable* of being programmed when in DMA mode." *Id.* at 6 (emphasis original). The Court disagrees.

The use of "capable of" in the construction of "selectively programmed for" is improper because it essentially replaces the word "programmed" with "programmable." *See Ball Aerosol & Specialty Container, Inc. v. Ltd. Brands, Inc.*, 555 F.3d 984, 994-95 (Fed. Cir. 2009); *see also Cross Med. Prods., Inc. v. Medtronic Sofamor Danek, Inc.*, 424 F.3d 1293, 1311 (Fed. Cir. 2005) ("Here, the claim does not require that the interface be merely 'capable' of contacting bone; the claim has a structural limitation that the anchor seat be in contact with bone."). As the patent applicant, AMD was in the best position to prevent any ambiguity in the claim language. AMD could have used "programmable" or "capable of being programmed" instead of or in addition to "programmed," but it did not.

For the reasons stated in the subsections above, the Court construes "selectively programmed for" to mean "selectively assigned using a sequence of executable instructions to."

2. "DMA channel" (asserted claims 1, 10, 13, 22, 24, 25)

Claim Language	LG's Proposed Construction	AMD's Proposed Construction
"DMA channel"	"hardware loaded with address and count information for moving data directly to or from memory without processor intervention"	"transfer mechanism for moving data to or from memory locations, without processor intervention"

The parties next dispute the construction of the language "DMA channel." The parties agree that a "DMA channel" "mov[es] data," "to or from memory," and does so "without processor intervention." The parties dispute whether a "DMA channel" is simply a "transfer mechanism" or whether it is "hardware loaded with address and count information." The parties

also dispute whether the DMA channel moves data "directly" to or from memory.

AMD contends that intrinsic evidence supports the use of "transfer mechanism," as the specification uses the words "transfer mechanism" in describing a "DMA channel." *See* Loyer '715 at 10:21-23 ("In a general purpose DMA mode, a general purpose DMA channel 202 or 204 serves as the transfer mechanism for USB data."). AMD argues that LG's limitation of "hardware loaded with address and count information" is improper because that limitation is never discussed in the specification or the claims. AMD Opening Br. at 14. AMD further argues that the words "hardware," "address," and "count" are not used in Loyer '715 with reference to a "DMA channel." *Id.* Finally, AMD contends that "directly" imposes the same limitation as "without processor intervention," and therefore should be excluded from the construction of "DMA channel." *Id.* at 15. AMD has provided expert testimony supporting its contentions. *See* Levitt Decl. ¶¶ 67-79.

LG contends that the intrinsic record demonstrates a "DMA channel" is "hardware loaded with address and count information." LG Responsive Br. at 13. LG argues that the specification makes clear that DMA transfer involves a "source address," "destination address," and "size of the data block," and that a "DMA channel" requires a "count." *Id.* (citing Loyer '715 at 2:6-11, 2:17-19, 8:54-56). LG argues that the incorporated '396 Patent explains that a DMA channel requires address and count information. *Id.* at 14 (citing '396 Patent at 5:52-60, FIG. 3). LG also argues that AMD's use of "transfer mechanism" is illogical because while a "DMA channel" may function as a transfer mechanism, it is not necessarily defined as such. *Id.* Finally, LG contends that "directly" should be included in the construction because it is in the name of DMA ("direct memory access") and because dictionaries use the word "directly" in defining "DMA." *Id.* at 15 (citing LG Ex. 9, IBM DICTIONARY OF COMPUTING, at 201; LG Ex. 14, IEEE STANDARD DICTIONARY OF ELECTRICAL AND ELECTRONICS TERMS, at 297; LG Ex. 15, DICTIONARY OF COMPUTERS, DATA PROCESSING, AND TELECOMMUNICATIONS, at 149).

"[I]t is improper to read limitations from a preferred embodiment described in the specification – even if it is the only embodiment – into claims absent a clear indication in the intrinsic record that the patentee intended the claim[term] to be so limited." *Liebel-Flarsheim Co.*

v. Medrad, Inc., 358 F.3d 898, 913 (Fed. Cir. 2004). The parties do not dispute that the construction of "DMA channel" should include "moving data to or from memory, without processor intervention." The Court finds that the intrinsic record supports AMD's inclusion of "a transfer mechanism" in the construction. *See* Loyer '715 at 10:21-23 ("In a general purpose DMA mode, a general purpose DMA channel 202 or 204 serves as the transfer mechanism for USB data."). All of the additional limitations LG proposes are derived either from preferred embodiments or from descriptions of prior art systems. The intrinsic record does not contain "a clear indication" that "[AMD] intended the claim [term] to be so limited," and therefore LG's proposed limitations are improper. *See Liebel-Flarsheim*, 358 F.3d at 913.

Moreover, the technical dictionaries that LG cites to contain definitions of DMA that closely track AMD's proposed construction, such as: "[t]he transfer of data between memory and input/output units without processor intervention," or "[a] method for transferring data between an external device and memory without interrupting program flow or requiring CPU intervention." *See* LG Ex. 9 at 201; LG Ex. 14 at 297.

For the reasons stated above, the Court construes "DMA channel" to mean a "transfer mechanism for moving data to or from memory locations, without processor intervention."

3. "DMA controller" (asserted claims 1, 10, 13, 22, 24)

Claim Language	LG's Proposed Construction	AMD's Proposed Construction
"DMA controller"	"DMA controller that is external to the USB controller"	Plain and ordinary meaning; no construction necessary

The parties dispute whether claim language dictates that the DMA controller must be "external to the USB controller."

LG argues that by listing the DMA controller and USB controller separately as components of a USB device/host, claims 1 and 13 imply that the DMA controller is external to the USB controller. LG Responsive Br. at 16 (citing Loyer '715 cls. 1, 13 ("[a] universal serial bus (USB) [device/host] . . . comprising: a DMA controller . . . and a USB controller . . . .")

(emphasis omitted). LG further contends that the prosecution history supports its construction because AMD, in amending Loyer '715 during prosecution, told the PTO that "[c]laims 1 and 13 were amended to clarify that the DMA controller is internal to the USB device rather than the USB controller." *Id.* at 18 (citing LG Ex. 11, Loyer '715 File Hist., Oct. 16, 2000 Resp. and Amdt., at 1-4) (emphasis omitted).

AMD, however, argues that "only a clear disavowal of claim scope can support such a 'negative' limitation that merely excludes certain subject matter from the claim." AMD Reply Br. at 7. AMD contends that the claims in question are "silent as to the spatial relationship between the DMA controller and USB controller." *Id.* AMD further argues that the prosecution history does not demonstrate a "clear disavowal" of claim scope, and that the relevant amendment clarified that the "DMA controller" could be either internal or external to the "USB controller."

LG's evidence of a prosecution disclaimer is insufficient. For a prosecution disclaimer to attach, "the alleged disavowing statements [must] be both so clear as to show reasonable clarity and deliberateness, and so unmistakable as to be unambiguous evidence of disclaimer." *Omega Eng'g, Inc. v. Raytek Corp.*, 334 F.3d 1314, 1325 (Fed. Cir. 2003). AMD's statement to the PTO could reasonably be interpreted in the manner AMD suggests – as simply clarifying that "the 'DMA controller' can be *either* internal *or* external to the 'USB controller.'" *See* AMD Reply Br. at 7. Therefore, AMD's statement to the PTO is not "so unmistakable as to be unambiguous evidence of a disclaimer." *See id.*

For the reasons stated above, the Court construes "DMA controller" according to its plain and ordinary meaning.

C. Morein '871

Morein '871 is entitled "Graphics Processing Architecture Employing a Unified Shader." The patent describes and claims "[a] graphics processing architecture employing a single shader . . . ." Morein '871, Abstract. "Conventional graphics processors require[d] the use of both a vertex shader and a pixel shader in order to generate an object." *Id.* at 1:60-62. Because both types of shaders had historically been required, "known graphics processors [were] relatively large in size,

with most of the real estate being taken up by the vertex and pixel shaders." *Id.* at 1:62-65. In addition to taking up a lot of space, "there is also a corresponding performance penalty associated" with employing both types of shaders. *Id.* at 1:66-2:1. Morein '871 sought to resolve these conventional issues by creating "a graphics processor that employs a unified shader that is capable of performing both the vertex operations and the pixel operations in a space saving and computationally efficient manner." *Id.* at 2:36-40.

Relevant for purposes of the Court's *Markman* analysis, the '871 Patent claims the following:

> **Claim 15.** A unified shader, comprising:
> a general purpose register block for maintaining data;
> a **processor unit**; and
> a sequencer, coupled to the general purpose register block and the **processor unit**, the sequencer maintaining instructions operative to cause the **processor unit** to execute vertex calculation and pixel calculation operations on selected data maintained in the general purpose register block.
>
> **Claim 20.** The shader of claim **15**, wherein the **processor unit** executes vertex calculations while the pixel calculations are still in progress.

Morein '871 at 8:1-9, 8:20-22 (the construction of the bold-underlined terms is disputed by the parties).

The parties dispute the construction of one term.

Claim Language	LG's Proposed Construction	AMD's Proposed Construction
"processor unit"	"stand-alone CPU"	"logic component capable of interpreting and executing instructions"

AMD objects to LG's construction on two bases: (i) LG seeks to limit the "processor unit" to a specific type of processor, a CPU; and (ii) LG imports the restriction that the processor be "stand-alone."

1. "CPU"

First, LG asserts that the "processor unit" is a CPU (Central Processing Unit). In describing a preferred embodiment of Morein '871, the specification identifies four components of the "unified shader": (i) "a general purpose register block 92"; (ii) "a plurality of source registers [93/95/97]"; (iii) "a processor (e.g. CPU) 96"; and (iv) "a sequencer 99." Morein '871 at 4:10-14. The parties agree that item 3, "a processor (e.g. CPU) 96," refers to the "processor unit" of claim 15. LG asserts that a CPU is not merely an example of the claimed processor unit, but that the terms "processor unit" and "CPU" are interchangeable. LG Responsive Br. at 25.

LG finds support in the prosecution history of a continuation of Morein '871, U.S. Patent Application No. 13/109,738 (the "'738 Application"). At times, the prosecution history of a related patent may be relevant to the Court's claim construction. *See Teva*, 789 F.3d at 1342-43. However, that is not true here. LG's primary support is an applicant-initiated interview summary, from which LG quotes the examiner's notes regarding the substance of the interview. *See* LG Ex. 21 (Dkt. No. 154-24) at LG_AMD_0383458. The examiner's notes, set forth below, demonstrate nothing definitive.

> The representative argues, in general, that the shader is hardware and the claim recites this shader hardware as a single processor that is capable of doing both pixel shading and vertical shading. Examiner has cited to Shen to describe a system that has a GPU [graphics processing unit] that can perform both pixel and vertex shading. However, representative believes Shen is different from the Applicant's application because applicant's unified shader has a CPU [central processing unit] within which perform the dual shading and Shen only discloses a GPU, not within a unified shader, that does pixel and vertex shading. Examiner, however, believes that a GPU can correspond to the shader while still being a processing unit or that the video decoder can be viewed upon as a unified shader. . . . No agreement is reached at the time of the interview but the Examiner will discuss this interpretation with his Supervisor.

Id. LG characterizes these as "clear and unmistakable statements [] made by the same patentee on the same term" emphasizing that the described processor unit is a CPU. LG Responsive Br. at 26. The Court does not view these statements as such. Without additional context, the interview summary is ambiguous. The Court could read the summary to indicate that the patentee sought to distinguish its unified shader *within* a GPU from Shen's dual-shader GPU, not necessarily that the

claimed "processor unit" could only be a CPU. This evidence deserves minimal weight.

In addition, LG argues that AMD's proposed construction of "processor unit" as a "logic component" has no support in the intrinsic record. AMD identifies two sections of the specification that support its construction. In describing the invention, the patentee states "[t]he shader includes . . . a processor capable of executing both floating point arithmetic and logical operations on the selected inputs according to the instructions maintained in the sequencer." Morein '871 at 2:50-56. And in describing a preferred embodiment, the patentee states "[t]he processor 96 may be comprised of a dedicated piece of hardware or can be configured as part of a general purpose computing device (i.e. personal computer). In an exemplary embodiment, the processor 96 is adapted to perform 32-bit floating point arithmetic operations as well as a complete series of logical operations on corresponding operands." *Id.* at 4:21-26. In AMD's view, this language indicates that the "processor unit" is "a logic component, capable of interpreting and executing instructions." AMD Reply Br. at 8.

On the other hand, Figure 5 identifies the "processor 96" as simply a "CPU." *See* Morein '871, Fig. 5; *but see id.* at 4:10-14 (emphasis added) ("As illustrated [in Figure 5], the unified shader 62 includes . . . a processor (*e.g. CPU*) 96 . . . ."). AMD contends that a CPU is only one example of a "processing unit." The Court agrees with AMD.

Limitations from a preferred embodiment described in the specification generally should not be read into the claim language. *See Comark*, 156 F.3d at 1187; *Liebel-Flarsheim*, 358 F.3d at 913. Throughout the specification, Morein '871 describes the processor unit as performing arithmetic and logic operations on data. *See, e.g.*, Morein '871 at 2:50-56 ("The shader includes . . . a processor capable of executing both floating point arithmetic and logical operations on the selected inputs . . . ."); *id.* at 4:23-26 ("In an exemplary embodiment, the processor 96 is adapted to perform 32-bit floating point arithmetic operations as well as a complete series of logical operations on corresponding operands."); *id.* at 4:36-41 ("The instruction store 98 contains the necessary instructions that are executed by the processor 96 in order to perform the respective arithmetic and logic operations on the data . . . ."); *id.* at 4:54-63. Although Figure 5 identifies the processor unit as a CPU, and although the specification discloses a CPU as an example of a

processor unit, the Court will not read in this limitation.

But AMD's proposed construction is perhaps too broad. AMD has offered insufficient support to connect the claims and specification of Morein '871 to its proposed construction. Its expert declaration on this point is highly conclusory. *See* Wolfe Decl. ¶¶ 52-53. While the parties agree that the processor unit interprets and executes instructions, *see* Hrg. Tr. (Dkt. No. 174) at 121-22, the Court is not convinced that a processor unit capable of executing floating point arithmetic and logical operations can be broadly defined as a "logic component."

2. "stand-alone"

LG asserts that the processor unit must be "stand-alone." LG states that the phrase "stand-alone" was offered only to contrast with AMD's broader construction, but LG's proposal lacks support from the intrinsic record. The Court will not construe the processor unit as a "stand-alone" unit.

In sum, there is a heavy presumption that claim terms carry their ordinary and customary meaning. *See Tex. Digital*, 308 F.3d at 1202; Teleflex, 299 F.3d at 1325 ("We indulge a 'heavy presumption' that a claim term carries its ordinary and customary meaning."). Because neither party's construction overcomes this presumption and the term "processor unit" is not itself inherently unclear, the Court finds that this term requires no construction. For the reasons stated above, the Court construes the term according to its plain meaning: "processor unit."

D. Tran '849

Tran '849 is entitled "Microprocessor Employing Local Caches for Functional Units to Store Memory Operands Used by the Functional Units." The patent describes and claims a microprocessor with multiple "functional units," each with a corresponding "local cache" located in close proximity to its respective functional unit. Tran '849, Abstract. This structure enables faster processing because the processor often accesses local cache memory instead of slower main memory to perform certain functions. *Id.* at 2:3-10. Before Tran '849, functional units within a microprocessor would share a single cache memory. *See* Mangione-Smith Decl. (Dkt. No. 148-

17) ¶ 30. As manufacturers began to incorporate more functional units in microprocessors, increased demand on the shared cache memory could lead to a bottleneck effect. Tran '849 at 2:24-32. More functional units also led to additional interconnect delay. *Id.* at 2:32-36. Tran '849 sought to solve these problems with a microprocessor that includes "local caches" for each functional unit, decreasing reliance on a shared cache memory, reducing interconnect delay, and increasing cache bandwidth. *See* Mangione-Smith Decl. ¶¶ 30-32.

Figure 1, below, depicts one embodiment of a microprocessor practicing Tran '849, with functional units 18A-C, 19, and 20, and local caches 15A-E.

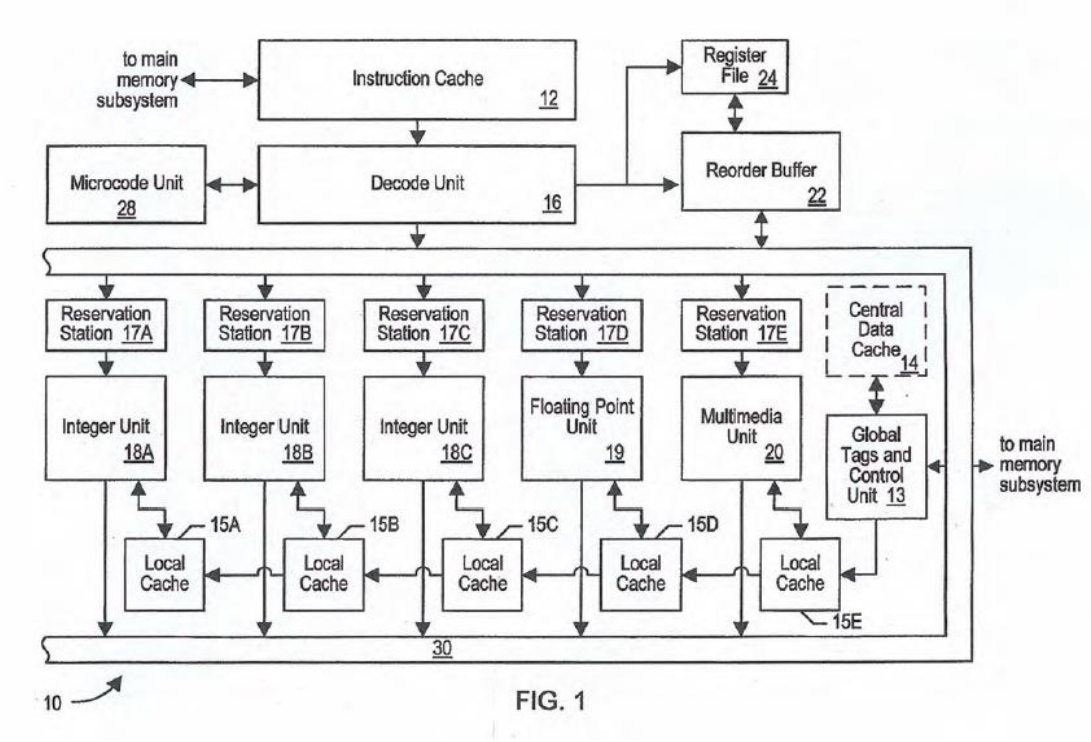


FIG. 1

Relevant for purposes of the Court's *Markman* analysis, Tran '849 claims the following:

> **Claim 1.** A microprocessor comprising:
> a first functional unit configured to execute instructions, wherein said first functional unit, responsive to a first plurality of address operands specified by a first instruction, is configured to generate a first memory address corresponding to a first **memory operand** of said first instruction;
>
> a second functional unit configured to execute instructions, wherein said second functional unit, responsive to a second plurality of address operands

specified by a second instruction, is configured to generate a second memory address corresponding to a second **memory operand** of said second instruction;

a first **local cache** coupled to said first functional unit, wherein said first functional unit is configured to access said first **local cache** using said first memory address in order to retrieve said first **memory operand** corresponding to said first instruction; and

a second **local cache** coupled to said second functional unit, wherein said second functional unit is configured to access said second **local cache** using said second memory address in order to retrieve said second **memory operand** corresponding to said second instruction.

Tran '849 at 15:61-16:17, 17:13-15 (construction of the bold-underlined terms is disputed by the parties). The parties dispute the construction of two terms.

1. "local cache" (asserted claim 1)

Claim Language	LG's Proposed Construction	AMD's Proposed Construction
"local cache"	"dedicated cache for the corresponding functional unit"	"cache associated with a specific functional unit"

The parties do not dispute how a "local cache" operates within the claimed microprocessor. Each local cache serves a corresponding functional unit. The parties dispute whether a local cache must be "dedicated" to its corresponding functional unit, such that only one corresponding functional unit can access that particular cache. AMD prefers a broader construction, "cache *associated with* a specific functional unit."

The structure of claim 1, which specifies a "first functional unit" and corresponding "first local cache coupled to said first functional unit" and a "second functional unit" and corresponding "second local cache coupled to said second functional unit," is not drafted to explicitly contemplate multiple functional units sharing local cache. Nor do the preferred embodiments disclose such a structure. Indeed, the invention is summarized as "employ[ing] a local cache for each functional unit, located physically close to that functional unit." Tran '849 at 2:57-58; *see*

also id. at 3:11-12 ("Essentially, each local cache is a dedicated cache port for the corresponding functional unit.").

AMD argues that local cache are not "dedicated" because local cache may forward "cache line[s]" for use in another functional unit. But Tran '849 does not describe one functional unit retrieving a memory operand *directly* from another functional unit's local cache; it describes, for example, passing a cache line from Local Cache A to Local Cache B for use by Local Cache B's functional unit. *See* Tran '849 at 3:2-8 ("If the memory operand hits in a remote cache (either a different local cache or the central cache) . . . . the cache line containing the memory operand is transferred to the local cache experiencing the miss. In this manner, subsequent access to the cache line containing the memory operand will hit in the local cache."). Figure 1, above, reflects this.

Accordingly, the Court construes "local cache" to mean: "dedicated cache for the corresponding functional unit."

2. "memory operand" (asserted claim 1)

Claim Language	LG's Proposed Construction	AMD's Proposed Construction
"memory operand"	"functional operand stored in a memory location as opposed to in a register"	"data stored in memory"

LG seeks to impose two limitations on AMD's broader construction: (i) that a "memory operand" is "stored in a memory location *as opposed to in a register*"; and (ii) that a "memory operand" is a "functional operand." AMD objects to LG's constructions because, among other reasons, LG's construction does nothing to clarify the meaning of the disputed term "operand."

a. "stored in a memory location as opposed to in a register"

LG advances three arguments that the claim language, specification, and prosecution history all require the claimed "memory operand" to be stored "in a memory location as opposed to in a register." LG Responsive Br. at 21-23. First, LG argues that because this Court once

construed "register" in an unrelated case as "a small, named region of high speed memory . . . referenced in programs *by a name, rather than by an address*," memory operands cannot be stored in registers, and therefore must be stored in memory locations. *See Northpeak Wireless, LLC v. 3Com Corp.*, No. 09-0602-SI, 2015 WL 5117020, at *6 (N.D. Cal. Aug. 28, 2015) (emphasis added). In essence, because a "memory address" – as opposed to a name – is used to "retrieve [a] . . . memory operand," the operand is not stored in a register. *See* Tran '849 at 15:62-67, 16:7-11.

Second, LG points to a few isolated locations in the specification that it claims make its reading clear. LG argues that the patent "expressly defines a 'register operand' and a 'memory operand' distinctly based on where they are stored." LG Responsive Br. at 21-22 (citing Tran '849 at 2:40-41 ("An operand may be stored in a register (register operand) or a memory location (memory operand)."). LG argues that "the specification consistently distinguishes memory operands from operands stored in registers." LG Responsive Br. at 22 (citing Tran '849 at 2:46-50 ("The x86 microprocessor architecture is particularly susceptible to cache latency increase, since relatively few registers are available. Accordingly, many operands in x86 instruction code sequences are memory operands."). In LG's view, since memory operands and register operands are different, a memory operand cannot be stored in a register.

Third, LG relies on the prosecution history in support of its "memory location" limitation. LG contends AMD unambiguously disavowed that the claimed memory operands could be stored in a register. In its response to an office action, AMD distinguished a prior art patent working with register operands as opposed to memory operands. AMD added a limitation in claim 1 specific to memory operands, stating that the prior art did not "teach or suggest the recited features," which "are not typically performed in the fetching of register operands." LG Ex. 17, Tran '849 File Hist., Dec. 18, 1998 Response, at 9.

AMD agrees that a "memory operand" "is stored in a memory location and not in a register," but argues that this does not support LG's construction. AMD Reply Br. at 11. AMD argues that its construction, "data stored in memory," already specifies that data is stored in memory as opposed to a register. The Court agrees with AMD that LG's limitation adds unnecessary verbiage. The Court will not limit its construction in this manner.

b. "functional operand"

LG argues that the term "memory operand" refers only to a "functional operand." LG Responsive Br. at 23-24. LG argues that AMD's construction of operand as just "data" is too broad, and omits the requirement that an operand is data *that is operated upon*.

AMD argues that the specification supports its construction of a memory operand as "data." The Court disagrees. A memory operand is undoubtedly a *type* of data; this much is clear from the specification. *See* Mangione-Smith Decl. ¶¶ 62-64. Although a memory operand may be classified as "data," this does not mean that a memory operand can be any data.

AMD further argues that "functional operand" is too narrow because it would omit address operands stored in memory. *See* AMD Reply Br. at 12 ("Because the specification defines the term 'functional operand' as not including address operands, LGE's construction would exclude the common scenario where a functional unit executes an instruction on a plurality of address operands that point to other address operands stored in memory."). The Court disagrees. Indeed, the specification states that address operands and memory operands are wholly distinct.[3] So a construction that omits "address operands" from the meaning of "memory operand" is appropriate.

AMD also takes issue with the fact that LG's construction retains the term "operand," describing a "memory operand" as a "functional operand . . . ." and failing to provide any clarity as to the meaning of "operand." The Court agrees that the word "operand" should be defined for the jury's benefit. *See* LG Responsive Br. at 24 n.11. The specification explains that "an instruction operates upon operands specified by the instruction," Tran '849 at 2:39-40, and that functional operands are "operated upon by the functional unit to produce a result of the

[3] *See, e.g.*, Tran '849 at 9:45-56:

> Some of the operands are used to form the address of a memory operand when the instruction specifies a memory operand. These operands are referred to as address operands. . . . Additionally, other operands are operated upon by the functional unit to produce a result of the instruction. These operands are referred to as functional operands. The memory operand is a functional operand, along with register operands (other than address operands) . . . ."

instruction," *id.* at 9:51-53. AMD also provides two dictionary definitions of the term "operand": (i) "the data unit or equipment that is operated upon," and (ii) [either] [a]n entity on which an operation is performed[, or] [t]hat which is operated upon. . . ." AMD Ex. I, WEBSTER'S NEW WORLD DICTIONARY OF COMPUTER TERMS (4th ed. 1992), at 292; AMD Ex. J, IBM DICTIONARY OF COMPUTING (Daniel A. Gonneau, et al. eds., 10th ed. 1994), at 478. The Court will construe "operand" as data "that is operated upon."

For the reasons stated above, the Court construes "memory operand" to mean: "data stored in a memory location that is operated upon by a functional unit."

E. Orr '879

Orr '879 is entitled "Method and Apparatus for Providing Control of Background Video." The patent teaches "[a] method and apparatus for controlling background video on a computer display . . . ." Orr '879, Abstract. The patent discloses a means for controlling live background video without disrupting programs in focus in the foreground.

Relevant for purposes of the Court's *Markman* analysis, Orr '879 claims the following:

> **Claim 17.** A digital storage device that stores programming instructions that, when read by a processing unit, causes [sic] the processing unit to provide control of background video, the digital storage device comprises [sic]:
>
> first **storage means for storing programming instructions** that, when read by the processing unit, causes the processing unit to provide a video control icon that is visible on the display, wherein the video control icon relates to live **video that is being presented as a background on a display**;
>
> second **storage means for storing programming instructions** that, when read by the processing unit, causes the programming unit to detect selection of the video control icon; and
>
> third **storage means for storing programming instructions** that, when read by the processing unit, causes the processing unit to provide a control panel while the live video remains in the background and an **application** that was in focus remains in focus when the video control icon has been selected.

> **Claim 21.** A digital storage device that stores programming instructions tat [sic], when read by a processing unit, causes [sic] the processing unit to provide control of background video, the digital storage device comprises [sic]:
>
> first **storage means for storing programming instructions** that, when read by the processing unit, causes the processing unit to detect selection of a video control icon, wherein the video control icon relates to live **video that is being presented as a background on a display**;
>
> second **storage means for storing programming instructions** that, when read by the processing unit, causes the processing unit to provide a control panel while the live video remains in the background and an **application** that was in focus remains in focus when the video control icon has been selected; and
>
> second [sic] **storage means for storing programming instructions** that, when read by the processing unit, causes the processing unit to adjust at least one attribute of the live video based on an input received via the control panel.

Orr '879 at 5:25-45, 6:14-34 (construction of the bold-underlined terms is disputed by the parties). The parties dispute the construction of three terms.

1. "application" (asserted claims 17, 21)

Claim Language	LG's Proposed Construction	AMD's Proposed Construction
"application"	"a computer program designed to help a user perform useful work other than for video overlay"	"software that enables a computer to accomplish a task or tasks"

Although they adopt different words, the parties agree that their proposed constructions of the term "application" are not too different. The parties' constructions do differ in one significant respect. AMD disputes LG's inclusion of the limitation "other than for video overlay." AMD argues that this additional limitation has no basis in the claims or the specification, and that "application" is not ordinarily understood to include any such limitation.

LG finds support for limiting an "application" to those used "other than for video overlay" in the prosecution history. LG directs the Court to the applicant's response from September 1999,

in which the applicant distinguished prior art teaching a technique for video overlay. *See* LG Responsive Br. at 32 & LG Ex. 23, Orr '879 File Hist., Sept. 10, 1999 Resp., at 1-2. The applicant explained to the examiner that the prior art teaches a technique for having "a video window in a foreground position with respect to graphics data," whereas, in contrast, Orr '879 teaches a technique for having "live video in the background, with an application in a foreground position." *Id.* In other words, the cited prior art "teaches the opposite of an aspect of what [Orr '879] is claiming." *Id.* LG argues that by distinguishing foreground "video overlay" from "an application in a foreground position," Orr '879's claimed "application" is limited to applications "other than for video overlay." LG Responsive Br. at 32.

The Court finds insufficient support for LG's proposed limitation in the record. The prosecution history is not persuasive – the portion LG cites to merely shows the applicant attempting to distinguish "video overlay" from a means for controlling background video with another application in the foreground. It says nothing as to the *type* of application operating in the foreground. The Court does not read the prosecution history to contain an express disclaimer of applications for video overlay.

For the reasons stated above, the Court construes "application" to mean: "software that enables a computer to accomplish a task or tasks."

2. "video that is being presented as a background on a display" (asserted claims 17, 21)

Claim Language	LG's Proposed Construction	AMD's Proposed Construction
"video that is being presented as a background on a display"	"video being displayed as the desktop pattern on a computer"	Plain and ordinary meaning; no construction necessary

LG argues that "as a background on a display" refers to displaying video not just in the background generally, but as the computer's "desktop pattern." AMD argues that, while certain embodiments might envision background video displayed as the computer's desktop pattern, the invention is not so limited.

LG contends that the specification provides an express definition for background video. LG Responsive Br. at 34. The specification provides,

> [t]he displaying of live video on a computer monitor may be done in several ways. A first displaying approach is to have the live video being displayed in the entire display area of the computer monitor. As such, the computer is acting very much like a television where the only service that is being provided is the displaying of the live video. Alternatively, the live video may be presented in a window of the computer screen while other applications are running. As another alternative, *the live video may be in the background* of the computer screen.

Orr '879 at 1:23-33 (emphasis added). The next sentence states, "[i]n the background mode, the live video is acting as the desktop pattern." *Id.* at 1:34-35. LG argues that this defines background video in Orr '879 to mean video displayed as the computer's desktop pattern.

First, the Court disagrees that the quoted language offers a definition of the term "video that is being presented as a background." This is far from a case in which the patentee has acted as his or her own lexicographer. *See Thorner v. Sony Computer Entm't Am. LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012) (citation and internal quotation marks omitted) ("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."). Orr '879 contains no such "clearly express[ed] [] intent" to redefine "background" video. *See id.* (citations and internal quotation marks omitted).

Second, despite the specification language LG points to, the same portion of the specification also describes that when applications "go into a background mode," they are "taken out of focus." Orr '879 at 1:42-45. So while the specification indicates that "background mode" can mean "acting as the desktop pattern," it also indicates that "background mode" means "out of focus," *i.e.*, in the background, as opposed to "actively being displayed and/or being worked upon." *Compare id.* at 1:34-35, *with id.* at 1:42-45. The claims and specification do not use language consistent with limiting the invention to either video displayed as the user's desktop pattern or just video displayed "in the background." *See, e.g., id.* at 1:34-35; *id.* at 1:42-45; *id.* at 3:7-10 (emphasis added) ("The video control icon related to live video that is being presented as background on the display. Such background *may be* the desktop portion of the computer's display . . . ."). The claims sometimes describe video "presented as *a* background," sometimes

displayed as "*the* background," sometimes "*in the* background." *See, e.g., id.* at 3:59-61, 4:12-14, 4:17-19, 4:46-52. Absent clear limiting language, the Court will not read the term as being limited only to video displayed as a computer's desktop pattern.

To further support its position, LG cites to the inventor's deposition testimony. LG submits a section of Mr. Orr's deposition during which he describes video players that enable a user to replace his or her desktop with live video. *See* LG Ex. 24, Orr Depo. Excerpt, at 30-31. AMD argues that Mr. Orr was only testifying about a particular embodiment of the invention, and not limiting the invention to "a desktop pattern." AMD Reply Br. at 14. The excerpt LG offers is very short and provides insufficient context. Without more, the Court cannot properly assess the scope of Mr. Orr's testimony.

Finally, the parties dispute whether the invention covers background video in any display device or just a computer display. LG points the Court to a claim construction order in a prior action that construed claims of Orr '879 as limited to a computer display. *See Advanced Micro Devices, Inc. v. Samsung Elecs. Co., Ltd.*, No. 08-0986-SI, 2009 WL 3007916, at *23-27 (N.D. Cal. Sept. 17, 2009). There, this Court construed the term "control panel." The parties disputed "whether the control panel is limited to screens of personal computers." *Id.* at *25. In construing this claim, the Court found that "[t]he specification of [Orr '879] unequivocally limits [the] invention to computers." *Id.*; *see also id.* at *26 ("[the] intrinsic evidence leaves no doubt that the inventor was working in the field of video displayed by a computer; there is no suggestion in the specification that the invention can be implemented without a computer."). Here, the Court will not depart from its prior finding that Orr '879 is limited to computers.

For the reasons stated above, the Court construes "video that is being presented as a background on a display" to mean: "video that is being presented as a background on a computer display."

3. "storage means for storing programming instructions" (asserted claims 17, 21, *et al.*)

Claim Language	LG's Proposed Construction	AMD's Proposed Construction
"storage means for storing programming instructions"	Indefinite	Function: storing programming instructions Structure: computer memory locations

The parties are in agreement that "storage means for storing programming instructions" is a means-plus-function limitation. Means-plus-function terms are governed by 35 U.S.C. § 112(f), which states:

> An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.

Under this "provision, an applicant can describe an element of his invention by the result accomplished or the function served, rather than describing the item or element to be used (e.g., 'a means of connecting Part A to Part B,' rather than 'a two-penny nail')." *Warner–Jenkinson Co. v. Hilton Davis Chem. Co*., 520 U.S. 17, 27 (1997). When using the means-plus-function format, "[t]he applicant must describe in the patent specification some structure which performs the specified function." *Valmont Industries, Inc. v. Reinke Manufacturing Co., Inc*., 983 F.2d 1039, 1042 (Fed. Cir. 1993). "The first step in construing such a limitation is a determination of the function of the means-plus-function limitation. The next step is to determine the corresponding structure described in the specification and equivalents thereof. Structure disclosed in the specification is 'corresponding' structure only if the specification . . . clearly links or associates that structure to the function recited in the claim." *Medtronic, Inc. v. Advanced Cardiovascular Sys., Inc*., 248 F.3d 1303, 1311 (Fed. Cir. 2001) (internal quotations and citations omitted). It is therefore not enough that structures be able to perform the corresponding function if they are not "clearly linked" in the specification. *Id*. "The 'cost' of using a § 112(f) function statement, especially if done unintentionally, is that the scope of the claim is restricted to the particular structures or acts disclosed in the specification, as well as their equivalents." *Cardiac*

Pacemakers, Inc. v. St. Jude Med., Inc., No. IP96–1718–C–H/G, 2000 WL 1765358, at *11 (S.D. Ind. Nov. 29, 2000) (citing *Personalized Media Commc'ns, LLC v. International Trade Comm'n*, 161 F.3d 696, 703 (Fed. Cir. 1998)).

As an initial matter, the Court declines to find the "storage means" terms indefinite at this time. While such a finding is sometimes appropriate during the claim construction stage, *see Eon Corp IP Holdings LLC v. Aruba Networks Inc.*, 62 F. Supp. 3d 942, 948-49 (N.D. Cal. 2014), courts often prefer to reserve an indefiniteness determination for resolution at summary judgment. *See Indus. Tech. Research Inst. v. LG Elecs. Inc.*, No. 13-02016-GPC, 2014 WL 6907449, at *1-2 (S.D. Cal. Dec. 8, 2014); *Morvil Tech., LLC v. Medtronic Ablation Frontiers, LLC*, No. 10-2088-BEN, 2012 WL 3277272, at *12 (S.D. Cal. Aug. 10, 2012) ("An argument that a claim is indefinite is more appropriately addressed at summary judgment."); *ASM Am., Inc. v. Genus, Inc.*, No. 01-2190-EDL, 2002 WL 1892200, at *15 (N.D. Cal. Aug. 15, 2002) ("There is some ambiguity . . . as to whether a finding of indefiniteness should occur during claim construction, or whether it should occur at a later step."). For instance, where "[t]he [c]ourt has not been sufficiently briefed on indefiniteness," it may decline to rule on an indefiniteness claim raised during claim construction. *Kowalski v. Ocean Duke Corp.*, No. 04-0055-BMK, 2007 WL 4104259, at *3 (D. Haw. Nov. 19, 2007). Here, given the parties' page limitations and their respective arguments, the Court is not properly positioned to address the issue of indefiniteness.

Turning to the construction of the means-plus-function limitation identified by the parties – "storage means for storing programming instructions" – the Court must first determine the claimed function. *Medtronic, Inc.*, 248 F.3d at 1311. AMD argues that the function is simply "storing programming instructions." LG argues that the function goes beyond simply storing instructions, and that the function of each "storage means" term is further limited to the specific programming instructions described thereafter. LG Responsive Br. at 27-28. For example, claim 17 requires "second storage means for storing programming instructions *that, when read by the processing unit, causes the programming* [sic] *unit to detect selection of the video control icon*." Orr '879 at 5:36-39 (emphasis added). The other "storage means" terms are similar. *See, e.g., id.* at 5:40-45 ("[T]hird storage means for storing programming instructions that, when read by the processing

unit, causes the processing unit to provide a control panel while the live video remains in the background and an application that was in focus remains in focus . . . .”). LG argues that the function in these means-plus-functions terms must include the specific function of the programming instructions.

In support, LG relies primarily on *Lockheed Martin Corp. v. Space Sys./Loral, Inc.*, 324 F.3d 1308 (Fed. Cir. 2003) and *Baran v. Med. Device Techs., Inc.*, 616 F.3d 1309 (Fed. Cir. 2010). In *Lockheed*, the Federal Circuit rejected this Court’s construction of the function in the claim term “means for rotating said wheel *in accordance with a predetermined rate schedule which varies sinusoidally over the orbit at the orbital frequency of the satellite*” as simply “rotating said wheel.” 324 F.3d at 1319 (emphasis added). The Federal Circuit took issue with the Court’s broad reading of the claimed function, holding that the function encompassed the rest of the detailed phrase italicized above. *See id.* (“The function is properly identified as the language after the ‘means for’ clause and before the ‘whereby’ clause . . . .”). And in *Baran*, the Federal Circuit held that the claim language “release means for retaining the guide in the charged position” recites both a release function and a retention function. 616 F.3d at 1316-17. The court found that the term “release” was “not an idle description but a vital function to be performed by the means-plus-function element. . . . The claim language ties both functions to the same means-plus-function element, so it is appropriate that the element be construed accordingly.” *Id.* at 1317.

Here, LG argues that cutting off the function of “storage means for storing programming instructions” at “storing programming instructions” would run afoul of the holdings in *Lockheed* and *Baran*. The Court disagrees. Unlike in *Lockheed*, the Court has not been tasked with construing the entire claim term including its other functional limitations. The parties identified “storage means for storing programming instructions” as the term requiring construction. As AMD notes, the parties agreed the “storage means” terms would be construed as a single term and would not seek construction of subsidiary terms. *See* Joint Claim Construction Statement (Dkt. No. 139) at 5 n.1 (“The parties agree that they are not currently seeking a construction of subsidiary terms appearing in these limitations (such as ‘video control icon,’ ‘live video,’ or ‘in focus’), unless the subsidiary term is separately identified as a priority term (‘application’) or has

an agreed-upon construction ('control panel')."). LG's attempt to link the functional limitations of the various "programming instructions" into a construction of "storage means" is inappropriate. The parties agreed to select one "term," which LG argues requires construction of several other unidentified terms, a finding of indefiniteness, and an invalidation of Orr '879. The function of "storage means for storing programming instructions" is "storing programming instructions."

As an alternative to its indefiniteness argument, LG argues that the corresponding structure of the "storage means" terms is "cache memory, hard drive, floppy disk, or CD ROM." LG Responsive Br. at 32. AMD argues that the corresponding structure is "computer memory locations." The specification states that "memory" stores the programming instructions, and that "[t]he memory may be cache memory, hard drive, floppy disk, CD ROM, or any other means for storing digital information." AMD submits a declaration from its expert, Dr. Andrew Wolfe, who testifies that "[t]he term 'memory' would be understood to those of skill in the art in 1997 (the filing date) as simply computer memory locations." Wolfe Decl. (Dkt. No. 148-16) ¶ 71. LG offers nothing to rebut this statement except its argument that Dr. Wolfe's testimony improperly adds structure beyond what is disclosed in the specification. However, LG ignores the portion of the specification cited above that includes "any other means for storing digital information." The Court agrees with AMD and Dr. Wolfe that the corresponding structure for "storing programming instructions" is "computer memory locations."

For the reasons stated above, the Court adopts the function of "storing programming instructions" with the corresponding structure of "computer memory locations."

II. LG Asserted Patents

A. The '998 Patent

The '998 Patent is entitled "Method of Detecting a Specific Object in an Image Signal." *See* LG Ex. 1 (Dkt. No. 147-2), '998 Patent. The patent teaches "[a] method of detecting a specific object in an image signal both efficiently and accurately . . . ." The '998 Patent, Abstract. The patent teaches a method whereby "an object is first detected from an image or frame using a general feature of the object and in the following image or frame, the object is detected using an

object-dependent feature." *Id.* "Also, when detecting a plurality of objects or portions of the object, a full color range of the specific object is determined, and color range sections of the full color range is [sic] used to detect the object." *Id.*

Relevant for purposes of the Court's *Markman* analysis, the '998 Patent claims the following:

> **Claim 1.** A method of detecting a specific object in an image signal comprising:
> detecting the specific object from an image using a general feature of the object;
>
> measuring a reliability of the detected object by a **template matching**;
>
> obtaining an object-dependent feature from the specific object detected in the detecting the specific object from an input image step; and
>
> detecting the specific object in the next input image using either the object-dependent feature or both the object-dependent feature and the general feature, wherein said **template matching** is performed by at least one of a whole matching method based on **template matchings** in predetermined positions, a motion estimation matching method based on a motion of an object, and a speed estimation matching method based on a relative speed difference of object motion appearing in the input images during a defined time interval (Δt).
>
> **Claim 2.** A method of claim **1**, wherein the **template matching** is the whole matching method, which may be a shift matching, a scale matching or a combination of both the shift matching and the scale matching.
>
> **Claim 8.** The method of claim **1**, wherein detecting the specific object from an input image comprises:
> detecting an initial object region from an input image using a **general detection algorithm** if an object region has not been detected in a previous input image; and
> detecting an object region from an input image by a **template matching** based upon an effective range if an object region was detected in a previous input image.

'998 Patent 14:8-27, 14:28-31, 14:51-58 (the construction of the bold-underlined terms is disputed by the parties). The parties dispute the construction of two terms.

1. "template matching" (asserted claims 1, 2, 8)

Claim Language	LG's Proposed Construction	AMD's Proposed Construction
"template matching"	"comparing all or part of an image with one or more patterns or shapes"	"comparison of an image with a predetermined two-dimensional array of values representing an object"

The parties agree that "template matching" involves comparison of an image. AMD's proposed construction, however, narrows LG's in two respects: (i) by specifying that the template is "predetermined," and (ii) by specifying that the template is a "two-dimensional array of values representing an object."

First, AMD argues that the template must be "predetermined." AMD Responsive Br. (Dkt. No. 155) at 1-3. AMD argues that, logically, if a "template" is to be used for purposes of comparison, it must already exist in the system – it must be predetermined. *Id.* at 2. LG, on the other hand, argues that the '998 Patent discloses various ways of template matching that do not use a predetermined template. LG Opening Br. at 7. Because the patent contemplates, for example, shift matching when locating an object that has moved, or scale matching when locating an object that has changed in size, LG argues that the templates may vary and therefore cannot be predetermined. LG argues that "[e]ven in embodiments where the template is 'predetermined,' the patent expressly acknowledges that this template could vary beyond its predetermined parameters." LG Opening Br. at 7 (citing '998 Patent at 6:12-17).

The Court agrees with AMD that the '998 Patent discloses a "template matching" that involves use of a predetermined template. While the '998 Patent teaches methods for the detection of an object using "shift matching" or "scale matching" where the detected object has moved or changed size, both methods still necessarily rely on a predefined template. *See, e.g.*, '998 Patent, at 6:15-17 ("In the template matching method, a size of a predefined template may be varied within a predetermined range."). Indeed, LG itself cites a technical dictionary defining "template matching" as a "technique in which patterns or shapes are detected by comparison with *prespecified* patterns or shapes called templates." LG Opening Br. at 6 & Ex. 4, THE NEW IEEE

STANDARD DICTIONARY OF ELECTRICAL AND ELECTRONICS TERMS (5th ed. 1993), at 1350 (emphasis added). Although the '998 Patent does allow for template matching where the template varies beyond its predetermined parameters, the patent nevertheless discloses a process whereby the system compares an image to a predefined template to determine a match.

Second, AMD argues that the template must be a "two-dimensional array of values representing an object," AMD Responsive Br. at 1-2, whereas LG argues that a "template" is "one or more patterns or shapes," LG Opening Br. at 7. AMD argues that any image is a two-dimensional array of colors that make up a recognizable picture. *Id.* at 1. Thus, AMD argues, in order to compare an image to a template, the template must also be two-dimensional. *Id.* at 1-2. LG contends that because the '998 Patent itself makes no mention of a "two-dimensional array of values," and because none of the dictionary definitions cited by either party include this language, there is no reason to "exclude other possible templates, such as a one-dimensional or three-dimensional pattern." LG Opening Br. at 7.

Neither party cites to any helpful intrinsic evidence on this point. In fact, AMD cites no evidence in support of its position. Without any evidence supporting AMD's proposed narrow construction of a template as a "two-dimensional array of values," the Court is not persuaded. LG cites to a technical dictionary that defines "template" as "[i]n image processing, a *pattern* that can be used to identify or match a scanned image." LG Opening Br. at 7 & Ex. 5, MICROSOFT PRESS COMPUTER DICTIONARY (3d ed. 1997), at 463; *see also* LG Ex. 4, THE NEW IEEE STANDARD DICTIONARY OF ELECTRICAL AND ELECTRONICS TERMS, at 1350 (emphasis added) (defining "template matching" as a "technique in which *patterns or shapes* are detected by comparison with prespecified *patterns or shapes* called templates.").

For the reasons stated above, the Court construes "template matching" to mean: "comparison of all or part of an image with one or more predetermined patterns or shapes."

2. "general detection algorithm" (asserted claim 8)

Claim Language	LG's Proposed Construction	AMD's Proposed Construction
"general detection algorithm"	"a sequence of steps for detecting an object region"	"a sequence of steps applied to the whole input image frame to detect an object region"

The parties agree that an "algorithm" is "a sequence of steps," and that, in the '998 Patent, the "general detection algorithm" is used for detecting an object region. AMD seeks to include a further limitation, however, that the detection algorithm is "applied to the whole input image frame." The parties rely entirely on intrinsic evidence in arguing their respective constructions.

Dependent claim 8 first describes a method of claim 1 that involves "detecting an initial object region *from an input image* using a general detection algorithm." '998 Patent at 14:53-54 (emphasis added). "[I]f an object region was detected in a previous input image," claim 8 then discloses using template matching to "detect[] an object region from an input image . . . based upon an effective range." *Id.* at 14:56-58. AMD argues that the claim language should be interpreted to mean that the detection algorithm is applied to the whole input image frame to detect an initial object region from the entire image, and then template matching is performed on a more specific part of the image. AMD Responsive Br. at 4. In describing the second preferred embodiment, the '998 Patent states that "the final detection object can be efficiently and accurately detected by initially detecting the object from the whole image region using a general detection algorithm . . . ." '998 Patent at 10:16-21. "In another aspect of the present invention, a method of detecting a specific object in an image signal comprises detecting the specific object from an input image frame using a detection algorithm . . . ." *Id.* at 2:45-48. AMD argues that "without looking at the whole input frame, the general detection algorithm would risk missing an otherwise detectable object." AMD Responsive Br. at 5:19-20.

LG argues that AMD's construction would exclude embodiments described in the specification. LG cites to the embodiment disclosed in Figure 4, which states that "the initial face region may be detected by a template matching method . . . . [b]y scanning from a small image region to a large image region with the predefined template of a corresponding size, the face

regions of characters can be detected using one frame, i.e. the current image frame." '998 Patent at 6:12-19. The Court fails to see how this supports LG's proposed construction. Indeed, the '998 Patent goes on to contrast the above-described detection method from one that uses an image difference between two frames. *See id.* at 6:19-25. There is no indication that when "scanning from a small image region to a large image region," if the system detects an initial object region, it should stop scanning the image. This language does not support a construction that claim 8's general detection algorithm uses less than the whole input image frame.

LG argues in its reply that, "[l]ogically, detecting an object region from an input image does not necessarily require analyzing the whole input image any more than hiring an employee from an applicant pool necessarily requires analyzing the whole pool. If you find a good match, why keep searching?" LG Reply at 2-3. Of course, logically, what LG describes is correct. However, the Court's task is not simply to use logic to determine what would be a better or more efficient image recognition method. The Court's task is to construe the terms according to what is claimed by this particular invention. Nothing in the '998 Patent's claims or specification indicate that the invention claims a method for detecting the "initial object region" by stopping short of scanning the entire input image. LG provides insufficient support that the '998 Patent contemplates otherwise.

For the reasons stated above, the Court construes "general detection algorithm" in claim 8 to mean: "a sequence of steps applied to the whole input image frame to detect an object region."

B. The '184 Patent

The '184 Patent is entitled "Method of Application Menu Selection and Activation Using Image Cognition." The patent teaches "[a] method for selecting and activating a particular menu displayed in a [] region of a monitor screen by use of [] image cognition . . . ." The '184 Patent, Abstract. The patent discloses how, "[u]sing an image-capturing device such as a camera attached to a system, a user's image is recognized [in] real time and displayed on an initial screen . . . ." *Id.* "The user [then] makes a direct hand motion while viewing his own image displayed on the initial screen, and when a desired menu icon is designated among a variety of menu icons arrayed on the

initial screen, the system guides the user's hand image to the corresponding menu icon for its selection." *Id.* The described system recognizes "a particular body motion to activate the selected menu . . . ." *Id.*

Relevant for purposes of the Court's *Markman* analysis, the '998 Patent claims the following:

> **Claim 1.** An **application menu** selecting and activating method using image cognition, comprising [the steps of]:
>
> recognizing a pattern position *of a particular portion of a captured image* on a screen using a pattern cognition function executed per predetermined time period;
>
> selecting a **menu** when the recognized pattern position is within a [certain] *predetermined* pattern region on the screen, the *predetermined* pattern region containing the **menu**; and
>
> activating the selected **menu**, *wherein the activating the selected **menu** is performed after the recognized pattern position is positioned within the predetermined pattern region for a predetermined period of time.*
>
> **Claim 3.** The **application menu** selecting and activating method of claim **2**, wherein the user's image is displayed on a predetermined position in the client's region.
>
> **Claim 10.** The **application menu** selecting and activating method of claim **1**, wherein the selecting of the **menu** is performed when a background color of the pattern is converted in accordance with conversion of a user's pattern position.
>
> **Claim 22.** An **application menu** selecting and activating apparatus using image cognition, comprising:
>
> a camera for capturing a user's image in real time;
>
> display means for displaying the user's image received from the camera on a client region and for designating a particular region of the externally applied image;
>
> **means for selecting a required menu when a pattern is positioned on a corresponding region**; and
>
> a means for activating the selected **menu**.

'184 Patent 5:35-47, 5:52-54, 6:11-14, 8:1-9 (italics original to reflect additions made by reissue)

(construction of the bold-underlined terms is disputed by the parties). The parties dispute the construction of two terms.

1. "application menu" / "menu" (asserted claims 1, 3, 10, 22)

Claim Language	LG's Proposed Construction	AMD's Proposed Construction
"application menu" / "menu"	"a region on the screen indicating an option that can be selected and activated"	"a region on the screen indicating a plurality of options that can be selected and activated"

The parties' proposed constructions differ in only one respect. LG suggests that a "menu" indicates "an option" and AMD argues that a "menu" indicates "a plurality of options."

The Abstract describes the invention as "[a] method for selecting and activating a particular menu" using image cognition. '184 Patent, Abstract. The user uses his or her hands, rather than a remote control or other external device, to select menu icons. "[W]hen a desired menu icon is designated among a variety of menu icons arrayed on the initial screen, the system guides the user's hand image to the corresponding menu icon for its selection." *See id.*; *see also* '184 Patent, at 2:1-4. AMD argues that its construction is appropriate given the conspicuous inclusion of the words "icon" or "item" in the specification when referring to a specific item contained in a list, and the absence of any such language in the claims. AMD Responsive Br. at 7-8. AMD argues that the absence of "icon" or "item" when referring to "menu" or "application menu" in the claims indicates that the patent only claims a method for selecting a plurality of options, not a menu item or icon. *Id.* LG argues that the same language in the specification indicates the invention is meant to include a method for selecting individual menu options and not just a menu list. LG Opening Br. at 12. AMD's construction defies logic.

The specification describes embodiments that allow for the selection of particular menu items. *See* '184 Patent at 4:45-48 (emphasis added) ("[T]he system recognizes the first pattern portion [] and converts color of the menu icon [], whereby the user recognizes that *a desired menu item is selected.*"); *id.* at 4:64-65 ("[A] plurality of menus with song titles are displayed on each side of the image block [].") Indeed, Figure 1 depicts a user selecting "a menu icon" for

activation on a video screen. *See* '184 Patent, Figure 1; *id.* at 3:23-25. The Court does not see how the claimed invention is limited only to selecting lists of options, and not a particular option. Thus, while the plain and ordinary English meaning of the word "menu" might refer to an array of options, the specification makes clear that the term "menu" in the claims of the '184 Patent can also refer to a specific menu option for selection.

For the reasons stated above, the Court construes "application menu"/"menu" to mean: "a region on the screen indicating an option that can be selected and activated."

2. "means for selecting a required menu when a pattern is positioned on a corresponding region" (asserted claim 22)

Claim Language	LG's Proposed Construction	AMD's Proposed Construction
"means for selecting a required menu when a pattern is positioned on a corresponding region"	Function: selecting a required menu when a pattern is positioned on a corresponding region Structure: A digital image processing system, such as a personal computer or HDTV set, programmed to perform the following: recognizing a pattern in an image by pattern cognition and selecting a menu when the pattern is positioned over a region corresponding to the menu	Function: selecting a required menu when a pattern is positioned on a corresponding region Structure: a digital image processing system, such as a personal computer or HDTV set, executing an algorithm. The disclosed steps of the algorithm are: 1. continuously monitoring the color of designated pattern regions on the screen; and 2. detecting when the color of one or more pixels in a pattern region change to a previously set color

The parties next dispute the construction of language found in claim 22, which they agree should be interpreted as a means-plus-function term. The parties agree that the function is "selecting a required menu when a pattern is positioned on a corresponding region," but disagree regarding the corresponding structure.

As set forth earlier in this order, means-plus-function terms are governed by 35 U.S.C.

§ 112(f). Under section 112, "an applicant can describe an element of his invention by the result accomplished or the function served, rather than describing the item or element to be used (e.g., 'a means of connecting Part A to Part B,' rather than 'a two-penny nail')." *Warner–Jenkinson Co. v. Hilton Davis Chem. Co.*, 520 U.S. 17, 27 (1997). When using the means-plus-function format, "[t]he applicant must describe in the patent specification some structure which performs the specified function." *Valmont Industries, Inc. v. Reinke Manufacturing Co., Inc.*, 983 F.2d 1039, 1042 (Fed. Cir. 1993). "The first step in construing such a limitation is a determination of the function of the means-plus-function limitation. The next step is to determine the corresponding structure described in the specification and equivalents thereof. Structure disclosed in the specification is 'corresponding' structure only if the specification . . . clearly links or associates that structure to the function recited in the claim." *Medtronic, Inc. v. Advanced Cardiovascular Sys., Inc.*, 248 F.3d 1303, 1311 (Fed. Cir. 2001) (internal quotations and citations omitted).

The parties agree that the corresponding structure is "a digital image processing system, such as a personal computer or HDTV set" programmed to perform a series of steps. *See* AMD Responsive Br. at 9 & n.5. The parties disagree, however, as to the steps performed. LG contends that its proposed structure "encompasses all of the algorithms with which the digital image processing system can be programmed." LG Opening Br. at 15. LG argues that AMD's proposed structure relates only to the color matching embodiments disclosed in the specification, but fails to account for other embodiments that do not use color matching, such as selection of a menu by recognizing a ring-type pattern worn on a user's finger. *Id.* at 14-15; '184 Patent, Figs. 1, 4A, '184 Patent at 4:6-11. AMD argues that its proposed structure is consistent with all of the embodiments disclosed in the specification. AMD Responsive Br. at 9. AMD argues that the ring-type pattern disclosed must also operate through color recognition, because the specification does not describe a different corresponding structure. *Id.* at 11. Because the ring pattern recognition is not disclosed with sufficient specificity, the Court agrees with AMD.

The specification discloses, in some detail, a structure whereby the colors of various pattern regions are continuously checked to recognize either a user's hand or an "indication rod" located within those pattern regions. This is how a user "selects" a particular menu option, which

he or she may "activate" in various ways described in the patent. The specification describes how a user can wear a "ring type pattern" on his or her finger to "allow the system to accurately select a desired menu item" and circumvent errors such as "erroneous recognition in which a hand motion of the user is mistaken for an arm motion." *See* '184 Patent at 3:66-4:11. It is unclear whether this describes an alternative to the color recognition method.

When the system erroneously recognizes a "hand motion" for an "arm motion," this could be because a user's arm and hand are the same color, and the system fails to distinguish arm from hand or *vice versa*. Wearing the ring pattern avoids such an error, perhaps by having the system recognize the ring pattern instead of skin color. However, it is not clear from the specification whether the system recognizes the ring's color, as the first and second embodiments describe in some detail, or some other feature of the ring, such as its shape. When describing pattern recognition with any detail, the specification refers only to color recognition. While the "ring-type pattern" may offer an alternative to color recognition, this is not clear from the specification. LG's construction is too broad because the specification does not sufficiently describe the ring pattern structure. *See Medtronic, Inc.*, 248 F.3d at 1311 ("Structure disclosed in the specification is 'corresponding' structure only if the specification . . . clearly links or associates that structure to the function recited in the claim.").

For the reasons stated above, the Court adopts the parties' agreed function of "selecting a required menu when a pattern is positioned on a corresponding region" with the corresponding structure of "A digital image processing system, such as a personal computer or HDTV set, executing an algorithm. The disclosed steps of the algorithm are: (1) continuously monitoring the color of designated pattern regions on the screen; and (2) detecting when the color of all or a part of a pattern region changes to a previously set color."

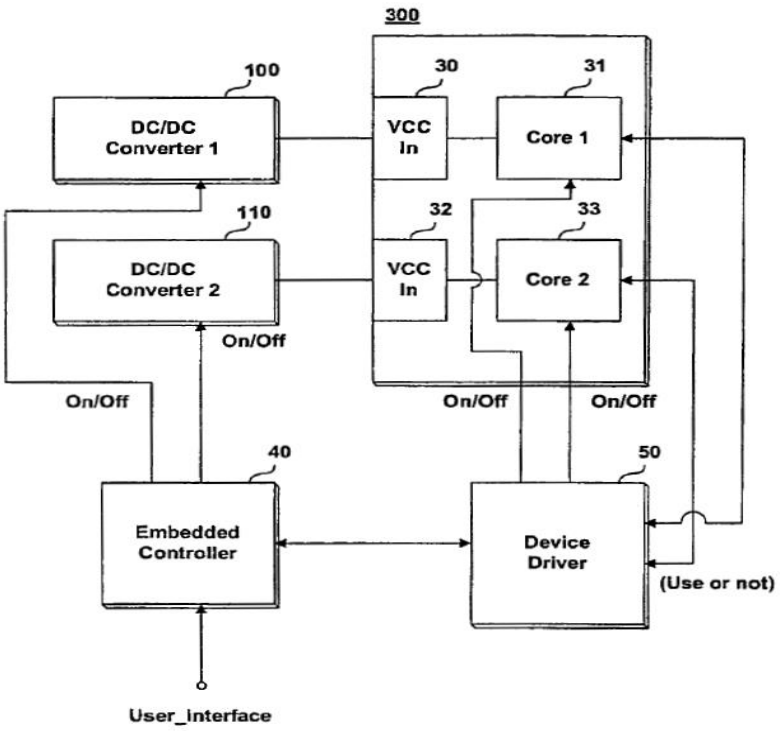
C. The '863 Patent

The '863 Patent is entitled "Apparatus for Controlling Power of Processor Having a Plurality of Cores and Control Method of the Same." The patent teaches "[e]mbodiments of an apparatus and methods for controlling power of a processor having a plurality of cores [to]

independently control individual or selected cores and power supply circuits corresponding to the cores based on, for example, an operation state of the processor or a power mode." The '863 Patent, Abstract. The patent teaches methods for measuring processor use and increasing or decreasing processor computing power and voltage consumption accordingly. The invention aims to optimize processing capability and battery longevity through efficient power use.

The following diagram depicts a preferred embodiment of the invention in a processor with two processor cores.

Fig.3



Relevant for purposes of the Court's *Markman* analysis, the '998 Patent claims the following:

> **Claim 30.** A computer comprising:
> a plurality of DC/DC converters;
> a processor having a plurality of cores, **each of the plurality of cores to receive power from a corresponding one of the plurality of DC/DC converters**, wherein a first one of the DC/DC converters to supply power to a single selected core; and
> a **single device driver** to determine a **use amount of the single selected core**,
> wherein the computer to turn on an additional core and the

corresponding DC/DC converter that supplies power to the additional core when the determined **use amount of the single selected core** is greater than a first prescribed value, and

the **single device driver** to determine an **entire use amount of the processor** when at least two cores are separately and independently turned on by the **single device driver**, wherein the computer to turn off at least one core and the corresponding DC/DC converter that supplies power to said at least one core when the determined processor use amount is less than a second prescribed value, and

the computer to turn on an additional core and the corresponding DC/DC converter or to turn off an error-occurred core and the corresponding DC/DC converter, when a certain error occurs when at least one core is turned on, wherein **the single device driver to separately and individually turn ON or turn OFF each of the plurality of cores of the processor**, and the computer further comprises **an embedded controller to separately and individually turn ON or turn OFF each of the plurality of DC/DC converters**.

'863 Patent 11:29-12:29 (the construction of the bold-underlined terms is disputed by the parties). The parties originally disputed the construction of six terms, which they have narrowed to five.

1. "single device driver" (asserted claim 30)

Claim Language	LG's Proposed Construction	AMD's Proposed Construction
"single device driver"	"a program for interacting with hardware"	"only one software program that is part of an operating system for interfacing with hardware"

The parties agree that a device driver is a program that interacts with hardware. LG's proposed construction ends there. AMD seeks to impose additional limitations on the construction of "single device driver": (i) that "single device driver" means "only one" device driver; (ii) that the device driver is a program "that is part of an operating system"; and (iii) that the device driver is a "software" program.

a. "only one"

LG does not dispute that "single" means one. LG Opening Br. at 19 n.5. Indeed, LG's construction of "single device driver" as "*a* program" is the same as a construction of "one

program." LG Reply Br. at 9. LG disputes AMD's construction of single as "*only* one" because it could lead to an interpretation that the computer described in claim 30 contains only one device driver, rather than understanding "single device driver" to mean that the functions described in claim 30 are performed by one device driver. *See id.* at 9-10. The Court agrees with LG and will not construe "single" to mean "only one," but rather "a" or "one."

b. "part of an operating system"

The parties dispute whether the claimed single device driver is "part of an operating system." LG argues that limiting the construction of "single device driver" to a program "that is part of an operating system" ignores both the claim language and the specification. LG quotes a section from the specification that reads

> According to one embodiment of the present invention, an ON/OFF control signal can be performed in a device driver of the OS (Operating System), a BIOS (Basic Input Output System) of the system or an EC (embedded controller). However, the present invention is not intended to be so limited.

'863 Patent at 4:21-24. LG argues that the disclosed embodiment explicitly states that the driver can be part of a BIOS or an EC as well as an operating system. AMD argues that LG misreads the specification in a manner that is "technically nonsensical and inconsistent with the remaining disclosure of the claims and the specification." AMD Responsive Br. at 14-15. AMD argues that the passage cited by LG should actually be read as follows

> According to one embodiment of the present invention, an ON/OFF control signal can be performed in **[1]** a device driver of the OS (operating system), **[2]** a BIOS (Basic Input Output System) of the system or **[3]** an EC (embedded controller).

AMD Responsive Br. at 14 (numbering added by AMD for demonstration). AMD further argues that throughout the specification, the device driver and embedded controller are "wholly distinct components," and that nowhere in the specification is an embedded controller described as using its own device driver. *Id.* at 15. For example, "[t]he device driver 50 can provide the use state of the plurality of cores based on an interface with the embedded controller 40." *Id.* (citing '863 Patent at 4:61-65). AMD contends that this language describes an embedded controller interfacing with an OS-based device driver. The Court finds AMD's reading of the specification section

above, with its demonstrative numbering, persuasive.

Next, LG contends that the language of surrounding claims belies AMD's narrower interpretation. Claim 11, which depends on claim 8, refers to "the device driver of an operating system," while claim 8 refers to the "device driver" without any such limitation. Claims 28 and 22 operate in a similar manner. LG argues that the doctrine of claim differentiation should apply to preclude reading in AMD's "operating system" limitation. AMD disputes LG's characterization of the surrounding claim language, arguing that the dependent claims include additional limitations such that the application of claim differentiation is inappropriate. For example, dependent claim 11 serves to specify the system response in claim 8 when "the checked power management mode is the none mode." As such, AMD argues that claim 11 can be read as applying the same meaning of "device driver" as in claim 8 without being rendered superfluous.

"Under the doctrine of claim differentiation, dependent claims are presumed to be of narrower scope than the independent claims from which they depend." *AK Steel Corp. v. Sollac*, 344 F.3d 1234, 1242 (Fed. Cir. 2003). This "presumption is especially strong when the limitation in dispute is the only meaningful difference between an independent and dependent claim, and one party is urging that the limitation in the dependent claim should be read into the independent claim." *SunRace Roots Enter. Co. v. SRAM Corp.*, 336 F.3d 1298, 1303 (Fed. Cir. 2003).

Indeed, if the "only meaningful difference" between claim 8 and dependent claim 11 was claim 11's inclusion of the phrase "of an operating system," the differentiation presumption would be appropriate. That is not the case here. The Court agrees, for the most part, with AMD's reading of the specification and the claims.

In addition, AMD argues that the Court should adopt a construction of "device driver" consistent with that adopted by the PTAB in its IPR final written decision, namely, "software that is part of an operating system for interfacing with hardware." The PTAB found this definition to be "consistent with the '863 patent's specification, which states that a control signal can be performed in a device driver of the operating system and that a device driver interfaces with the hardware." LG Ex. 8, Final Written Decision (Dkt. No. 147-9), at 9. LG argues that the PTAB's construction should be given no weight because LG did not meaningfully contest this construction

during IPR, instead choosing to focus its efforts elsewhere.

It does appear that the parties dedicated minimal effort to claim construction during IPR. The PTAB's claim construction analysis occupies less than one page of its thirty-page decision. It is also true, however, that the PTAB "interprets claims using the broadest reasonable construction in light of the specification of the patent in which they appear." Final Written Decision, at 8 (citing 37 C.F.R. § 42.100(b)). Although LG did not dispute AMD's proposed construction, the PTAB heard testimony as to the ordinary meaning of "device driver" to a POSITA, and found AMD's proposed definition consistent with the '863 Patent's specification. Final Written Decision, at 9 (citing '863 Patent at 3:55-56, 3:65-67, 4:61-63) (the "specification . . . states that a control signal can be performed in a device driver of the operating system and that a device driver interfaces with the hardware."). While not controlling, the Court finds the PTAB's construction informative, especially given that the PTAB was satisfied with AMD's reading under "the broadest reasonable construction in light of the specification."

Finally, the parties cite to an array of self-serving technical dictionary definitions in support of their respective constructions. Because the proffered definitions could support either party's position, the Court finds them unhelpful.

Based on the record, the Court finds that the device driver is part of an operating system.

c. "software program"

LG disputes AMD's proposal to limit "device driver" to a "software program." LG argues that the word "software" does not appear anywhere in the '863 Patent, and that the patent lends no support to a limitation to a particular type of program, software, that would exclude others, such as firmware. *Id.* at 19. AMD argues that the device driver is part of an operating system and is therefore software. LG counters that because, in its view, the device driver is not part of an operating system, it is not software. LG Reply Br. at 9. As set forth above, the Court agrees with AMD that the claimed device driver is "part of an operating system." Thus, the Court will also adopt the construction of the driver as "software."

Accordingly, for the reasons stated above, the Court construes "single device driver" to

mean: "a software program that enables the operating system to interface with hardware."

2. "each of a plurality of cores to receive power from a corresponding one of the plurality of DC/DC converters" (asserted claim 30)

Claim Language	LG's Proposed Construction	AMD's Proposed Construction[4]
"each of a plurality of cores to receive power from a corresponding one of the plurality of DC/DC converters"	"each of the plurality of cores to receive power from a corresponding one of a plurality of circuits or devices that can convert one DC voltage to another DC voltage"	"each of the plurality of cores to receive power from a corresponding one of a plurality of circuits that can convert one DC voltage to another non-zero DC voltage"

The parties' proposed constructions originally read very differently, but with AMD's last-minute changes, the parties' constructions are quite similar. The primary points of disagreement are AMD's insertion of "non-zero" and AMD's use of the word "circuits" where LG prefers "circuits or devices." LG Opening Br. at 19.

a. "non-zero"

AMD appears to concede that the Court's construction need not use its proposed term "non-zero," as long as the construction captures the "key concept" that "DC/DC converters modulate DC voltage, as opposed to merely turning DC voltage on and off." AMD Responsive Br. at 19. AMD argues that when voltage is to be cut off from a core, the corresponding DC/DC converter does not "convert" input voltage down to zero, but rather, the converter is turned off. AMD Responsive Br. at 19-20. So, for purposes of conversion, only non-zero voltages are relevant in AMD's view.

LG contends that AMD's limitation is not supported by the intrinsic record. LG references Claim 16 in support, which refers to a "use amount of the processor" that is "greater than zero." LG Opening Br. at 21. According to LG, this demonstrates that "the patentee knew how to

[4] Days prior to the *Markman* hearing, AMD revised its construction without notifying the Court. AMD's previously proposed construction was: "for each processor core, there is hardware that converts a non-zero input DC voltage to another, non-zero output DC voltage that supplies the processor core."

include a 'non-zero' requirement where appropriate," and that the absence of any non-zero language in Claim 30 shows that the claim was not intended to be so limited.

To illustrate that the DC/DC converters serve this modulation function, AMD points to the specification's description of a functionality called "SpeedStep," in which it is necessary for DC/DC converters to control voltage levels in order to achieve various operation modes. *See* AMD Responsive Br. at 21 (citing '863 Patent at 3:19-39). AMD contends the SpeedStep functionality confirms that DC/DC converters modulate voltage only between non-zero levels. Nothing from this example necessarily limits a DC/DC converter's modulation to non-zero voltages.

AMD has not offered any evidence that the ordinary artisan would view the claim language in this manner. Based on the record, AMD's "non-zero" limitation is unwarranted.

b. "circuits" versus "circuits or devices"

Most of the parties' written argument and evidence on this point is moot by virtue of AMD's revised construction. Previously, the parties disputed whether the '863 Patent's DC/DC converter is "hardware," but now the dispute is whether the converter is a "circuit" or a "circuit or device." The intrinsic record does not add clarity. Dictionary definitions provided by AMD define DC/DC converters as "machine[s], device[s], or system[s]" and "circuit[s]." *See* AMD Ex. F, IEEE STANDARD DICTIONARY OF ELECTRICAL AND ELECTRONICS TERMS (6th ed. 1997), at 257 ("A machine, device, or system . . . ."); AMD Ex. G (Dkt. No. 155-8), MCGRAW-HILL DICTIONARY OF SCIENTIFIC AND TECHNICAL TERMS (Sybil P. Parker ed. 5th ed. 1994), at 522 ("An electronic circuit . . . ."). Because both parties' proposed constructions include "circuits," and because "device" is an extremely broad term, the Court adopts "circuits."

For the reasons stated above, the Court construes "each of a plurality of cores to receive power from a corresponding one of a plurality of DC/DC converters" to mean: "each of the plurality of cores to receive power from a corresponding one of a plurality of circuits that can convert one DC voltage to another DC voltage."

3. "entire use amount of the processor" (asserted claim 30)

Claim Language	LG's Proposed Construction	AMD's Proposed Construction
"entire use amount of the processor"	"total amount of use by the processor cores"	"total amount of use by all the processor cores"

The parties' sole disagreement here is whether "entire use amount of the processor" refers to "use by ***all*** [of] the processor cores" or just "use by the processor cores." LG argues that "entire use amount of the processor" refers only to the "total amount of use by the processor cores *that are turned on*." LG Opening Br. at 22. LG points to the language of claim 30, which states ". . . to determine an entire use amount of the processor when at least two cores are separately and independently turned on," and argues that a plain reading dictates that the entire use amount of the processor refers to the cores that are turned on. AMD disagrees, stating that "when at least two cores are . . . turned on," simply indicates when the system determines the "entire use amount of the processor." On this point, the Court agrees with AMD.

LG further argues that the specification supports its reading. LG states that the specification describes the process of determining the "entire use amount of the processor" as follows: "When *multiple cores* (*e.g.*, both the first and second cores 31 and 33) *are turned on*, the device driver 50 checks the use amount of *the cores* (*e.g.*, first and second cores), *respectively*, [] thereby checking the entire use amount of the processor." LG Opening Br. at 22 (emphasis added by LG) (citing '863 Patent at 6:16-20). LG reads this to mean that the "entire use amount of the processor" can be checked by "respectively checking the use amounts of only the cores that are turned on." *Id.* (emphasis and quotation marks omitted). AMD disagrees, pointing out that the specification only uses "entire use amount of the processor," or similar phrases, in embodiments in which all cores are turned on. AMD Responsive Br. at 23. AMD argues that "[t]he specification does not disclose any embodiment in which an 'entire use amount' measures the use of only a subset of cores." *Id.* In the Court's view, the specification is not clear.

The embodiments disclosed in the specification only contain two cores, *see* '863 Patent, Figs. 3, 6, but the patent was written broadly and in such a way as to ideally encompass other

multi-core processors.[5] The patent does not disclose what is being measured when referring to "entire use amount." The patent discloses a method of measuring the use amount of all processor cores, and turning individual cores on or off based on use amount. Absent a clear indication one way or the other, the Court declines to adopt either party's construction.

Accordingly, the Court construes "entire use amount of the processor" according to its plain language.

4. "the single device driver to separately and individually turn ON or turn OFF each of the plurality of cores of the processor" (asserted claim 30)

Claim Language	LG's Proposed Construction	AMD's Proposed Construction
"the single device driver to separately and individually turn ON or turn OFF each of the plurality of cores of the processor"	"the single device driver to separately turn on or off each of the plurality of cores of the processor"	"the single device driver turns on and off each core of the processor separately from turning on and off any other core"

Much of the parties' dispute over this claim term hinges on whether the claimed invention contemplates the device driver turning on/off cores only individually versus turning on/off multiple cores at once. LG's proposed construction contemplates the latter; AMD's limits the invention to turning cores either on or off one at a time. The parties also dispute whether the language should be interpreted in the disjunctive "on *or* off" versus the conjunctive "on *and* off."

The Court begins with the context in which the claim language appears.

> the computer to turn on an additional core and the corresponding DC/DC converter or to turn off an error-occurred core and the corresponding DC/DC converter, when a certain error occurs when at least one core is turned on, wherein **the single device driver to**

[5] Indeed, Figure 6 depicts a power control method practicing this alleged invention. The flow chart demonstrates a dual-core processor beginning in a state only utilizing one core. When the use amount of that one core reaches 100%, the second core and its corresponding power supply are switched on. The system monitors "entire use amount" while both cores are on, and if "entire use amount" falls below 50%, the second core and its power supply are switched off, returning to a state utilizing only one core. In this example, the entire use amount of the processor and the entire use amount of cores that are turned on is the same because it is a dual-core processor utilizing both cores. Nothing in this example clarifies whether the "entire use amount of the processor" refers either to the use amount of only the operative cores within the processor or to the use amount of all processor cores.

separately and individually turn ON or turn OFF each of the plurality of cores of the processor, and the computer further comprises an embedded controller to separately and individually turn ON or turn OFF each of the plurality of DC/DC converters.

'863 Patent at 12:19-29. AMD argues that LG's proposal reads out "and individually" from the claim language.[6] AMD contends that "separately and individually" means that the single device driver turns separate cores on and off individually, *i.e.*, one at a time.

LG points to the specification to suggest a different reading. In describing a preferred embodiment, the '863 Patent states, "[f]or example, when the entire amount of the use of the processor is below 50%, only the first core 31 preferably is turned on, and only the first DC/DC converter 100 is turned on based on an interface with the embedded controller 40. The ON/OFF operations can be optimally performed *or performed in combination* based on the use state of each core and various power management modes . . . ." '863 Patent at 4:27-34 (emphasis added). LG argues that the italicized language "or performed in combination" indicates that *cores* can be turned on or off "in combination." AMD, however, argues that "in combination" refers to turning on/off a core and its corresponding DC/DC converter, not turning on/off multiple cores in combination. It is not clear from the specification which reading is correct.

AMD next argues that its inclusion of "and" rather than "or" is intended to reflect the functionality of the invention. AMD suggests that the single device driver is not just capable of *either* turning a core on *or* turning a core off, but rather is capable of turning cores both on *and* off. According to AMD, neither the claims nor the specification describe a device driver that only turns cores on or only turns cores off. But the Court is not construing what a "device driver" might be capable of doing, the Court is construing the claim language "the single device driver to separately and individually turn ON or turn OFF each of the plurality of cores of the processor." As AMD states, "[t]he 'or' reflects the practical reality that the single device driver will turn cores

[6] LG states that, "to the extent the Court would prefer to adhere more closely to the language of the claim, LG would not object to the addition of 'and individually' to its proposed construction." LG Reply Br. at 15. Adding "and individually" would change LG's proposed construction to "the single device driver to separately *and individually* turn on or off each of the plurality of cores of the processor." This would lead to LG's construction differing from the claim term itself by only one word (by eliminating the second "turn" in "turn ON or *turn* OFF") – essentially resulting in the adoption of the term's plain language.

on *or* off, as needed, based on conditions at any given moment . . . ." AMD Responsive Br. at 26. For this reason, the Court will not construe "or" in this claim term to mean "and."

Finally, the parties agree that "each of the plurality of cores" derives antecedent basis from "a processor having a plurality of cores." AMD Responsive Br. at 26; LG Reply at 15. To address this, AMD does not object to a construction that substitutes "core of the plurality of cores" for "core." AMD Responsive Br. at 26.

Only minimal construction of this term is necessary, essentially preserving the plain language of the claim. For the reasons stated above, the Court construes "the single device driver to separately and individually turn ON or turn OFF each of the plurality of cores of the processor" to mean: "the single device driver separately and individually turns on or off each of the plurality of cores of the processor."

5. "an embedded controller to separately and individually turn ON or turn OFF each of the plurality of DC/DC converters" (asserted claim 30)

Claim Language	LG's Proposed Construction	AMD's Proposed Construction
"an embedded controller to separately and individually turn ON or turn OFF each of the plurality of DC/DC converters"	"controller on a device or on a main system board to separately turn ON or OFF each of the plurality of circuits or devices that can convert one DC voltage to another DC voltage"	"a controller on a device or on a main system board to separately and individually turn ON or turn OFF each of the plurality of DC/DC converters"

The parties have agreed that this term no longer requires construction. *See* AMD Responsive Br. at 27; LG Reply Br. at 15. The Court will not construe this claim term.

/ / / / /

6. "use amount of the single selected core" (asserted claim 30)

Claim Language	LG's Proposed Construction	AMD's Proposed Construction
"use amount of the single selected core"	"quantity of use[7] of the single selected core"	"the percentage of the single selected core's processing capability being used"

The parties' constructions of this claim term differ in two significant respects: (i) AMD seeks to limit the measurement of "use amount" to a "percentage"; and (ii) AMD seeks to construe the term "use" of the core as usage of the "core's processing capability."

a. "percentage"

First, LG argues that the '863 Patent does not limit measurement of "use amount" to percentages. LG Opening Br. at 27-28. According to LG, although the '863 Patent specification generally refers to "use amounts" in terms of percentages, these descriptions are merely examples; an ordinary artisan would understand that a use amount could also be expressed, for example, "in terms of raw numbers." *Id.* LG directs the Court to U.S. Patent No. 6,711,447 (the "'447 prior art"), cited on the face of the '863 Patent, which, LG argues, demonstrates an alternative way of measuring "use amount" of a core. AMD argues that LG's reading of the term is too vague and that AMD's construction provides necessary clarity. AMD Responsive Br. at 27-28. AMD argues that its inclusion of "percentage" is consistent with the teachings of the specification, which explain use amount only in terms of percentages, and not anything else. *Id.* The Court agrees with AMD.

The '863 Patent, while broadly drafted, does not so much as hint at alternative means of measuring "use amount." In each described embodiment, the "use amount," whether of a single processor core or the entire processor, is described as a percentage. *See* '863 Patent at 4:15-17, 6:8-9, 6:20-22; *see also* Fig. 6. The specification is worded in such a manner that expressing "use amount" in terms of a percentage does not appear just to be one example of an array of

[7] Consistent with the construction of "entire use amount of the processor," LG does not object to the Court's adoption of "amount of use" over "quantity of use." LG Opening Br. at 27.

measurement metrics. *See* '863 Patent at 6:7-9 ("[T]he use amount of the preset core can be checked . . . . For example, when the use amount of the first core reaches 100% . . . ."); *id.* at 4:15-17 ("The amount of use of the first core can be checked. For example, when the amount of the use of the first core reaches 100%, both the first and second cores 31 and 33 are turned on . . . ."). The "examples" demonstrate what happens when use amount reaches a certain percentage, not that measuring use as a percentage is just an exemplar metric. Nothing in the context of the specification indicates that the patentee contemplated an alternative to measuring the *percentage* of use. *See Phillips*, 415 F.3d at 1323 (citing *Snow v. Lake Shore & M.S. Ry. Co.*, 121 U.S. 617, 630 (1887)).

Additionally, as AMD points out, the reference to the '447 prior art is not illuminating. The passage LG refers to in the '447 prior art is

> For another embodiment of the invention, in operation 110, the workload may be determined by comparing the number of threads with the number of CPU cores in the system. If the number of threads is greater than the number of CPU cores, then all CPU cores remain active in operation 140. On the other hand, if the number of CPU cores is greater than the number of threads, then a first CPU core is deactivated in operation 130.

LG Ex. 10, U.S. Patent No. 6,711,447, at 2:38-46. This invention discloses that "the workload may be determined by comparing the number of threads with the number of CPU cores in the system." *Id.* LG contends that this is another metric for measuring "use amount." AMD disagrees, arguing that the '447 prior art merely "offers a way of deciding which cores to turn on and which to turn off by performing a simple comparison of the number of threads and the number of cores." AMD Responsive Br. at 29.

The '447 prior art discloses a method for controlling CPU core usage based on the "level of multi-threadedness," to maximize processor performance when running multi-threaded workloads, yet conserve battery power by turning off unused processor cores. The '447 prior art describes embodiments in which levels of "multi-threadedness" are measured, for example, as a percentage, or, in the example above, by counting "the number of threads." *See* '447 prior art at 2:19-26, 2:39-46. Unlike the '863 Patent, the '447 prior art discloses a number of methods for calculating multi-threadedness. The '863 Patent describes a number of embodiments, all of which

calculate "use amount" as a percentage. LG has not sufficiently connected the teachings of the '447 prior art to the '863 Patent's measurement of "use amount." LG offers no evidence as to an ordinary artisan's view of these two teachings, and points to nothing in the prosecution history that might shed light on the issue. The Court declines to read any methods of measuring "multi-threadedness" from the '447 prior art into the claims of the '863 Patent.

b. "processing capability"

LG argues that AMD's proposed limitation of "use" to the usage of a core's "processing capability" has no support in the claims or specification of the patent. LG Opening Br. at 27. AMD argues that, logically, the use amount (a percentage) must be a percentage "of something." AMD Responsive Br. at 28. AMD's inclusion of "processing capability being used" is to clarify exactly what is being measured to determine the "use amount." *See id.* While AMD's argument is logical, AMD offers no evidentiary support for this additional limitation. Because AMD offers no substantive support for this proposed limitation, the Court will not construe the claim in such a manner.

For the reasons stated above, the Court construes "use amount of the single selected core" to mean: "the percentage of use of the single selected core."

CONCLUSION

For the foregoing reasons and for good cause shown, the Court hereby adopts the constructions set forth in this order.

IT IS SO ORDERED.

Dated: April 18, 2017

SUSAN ILLSTON
United States District Judge