PUBLIC VERSION

UNITED STATES INTERNATIONAL TRADE COMMISSION

Washington, D.C.

In the Matter of **CERTAIN WIRELESS CONSUMER ELECTRONICS DEVICES AND COMPONENTS THEREOF**	**Inv. 337-TA-853**

ORDER NO. 31: [CORRECTED[1]] CONSTRUING THE TERMS OF THE ASSERTED CLAIMS OF THE PATENT AT ISSUE

(April 18, 2013)

[1] The parties' agreed construction for the term "external clock is operative at a frequency independent of a clock frequency of said variable speed clock" has been corrected.

TABLE OF CONTENTS

The following abbreviations may be used in this Markman Order:

JXM	Joint Exhibit
CXM	Complainants' Markman exhibit
CDXM	Complainants' demonstrative Markman exhibit
CMBr.	Complainants' initial Markman brief
CRMBr.	Complainants' reply Markman brief
RXM	Respondents' Markman exhibit
RDXM	Respondents' demonstrative Markman exhibit
RMBr.	Respondents' initial Markman brief
RRMBr.	Respondents' reply Markman brief
SMBr.	Commission Investigative Staff's initial Markman brief
SRMBr.	Commission Investigative Staff's reply Markman brief
Tr.	Markman hearing transcript
Stip.	Technology Stipulation
JL	Parties' Final Joint Submission Concerning Construction of Claim Terms From U.S. Patent No. 5,809,336, dated 3/12/13

I. INTRODUCTION.

The Commission instituted this Investigation pursuant to subsection (b) of Section 337 of the Tariff Act of 1930, as amended, to determine:

> whether there is a violation of subsection (a)(1)(B) of section 337 in the importation into the United States, the sale for importation, or the sale within the United States after importation of certain wireless consumer electronic devices and components thereof that infringe one or more of claims 1, 6, 7, 9-11, and 13-16 of the '336 patent and whether an industry in the United States exists as required by subsection (a)(2) of section 337.

77 Fed. Reg. 51572 (August 24, 2012).

The Notice of Investigation names Technology Properties Limited LLC and Phoenix Digital Solutions LLC of Cupertino, California and Patriot Scientific Corporation of Carlsbad, California as complainants and Acer, Inc. of Taipei, Taiwan; Acer America Corporation of San Jose, California; Amazon.com, Inc. of Seattle, Washington; Barnes and Noble, Inc. of New York, New York; Garmin Ltd of Schaffhausen, Switzerland; Garmin International, Inc. of Olathe, Kansas; Garmin USA, Inc. of Olathe, Kansas; HTC Corporation of Taoyuan, Taiwan; HTC America of Bellevue, Washington; Huawei Technologies Co, Ltd. of Shenzhen, China; Huawei North America of Plano, Texas; Kyocera Corporation of Kyoto, Japan; Kyocera Communications, Inc. of San Diego, California; LG Electronics, Inc. of Seoul, Korea; LG Electronics U.S.A., Inc. of Englewood Cliffs, New Jersey; Nintendo Co. Ltd. of Kyoto, Japan; Nintendo of America, Inc. of Redmond, Washington; Novatel Wireless, Inc. of San Diego, California; Samsung Electronics Co., Ltd., of Seoul, Korea; Samsung Electronics America, Inc. of Ridgefield Park, New Jersey; Sierra Wireless, Inc. of British Columbia, Canada; Sierra Wireless America, Inc. of Carlsbad, California; ZTE Corporation of Shenzhen, China; and ZTE (USA) Inc. of Richardson, Texas as respondents. (*Id.*) The Commission Investigative Staff ("Staff") of the Office of Unfair Import Investigations is also a party in this investigation. (*Id.*)

On March 5, 2013, the Administrative Law Judge held a Markman hearing in order to permit the parties to present their positions with respect to the interpretation of certain disputed claim language in the asserted patents. Complainants, Respondents, and Staff attended the Markman hearing.

After reviewing the parties' Markman briefs, presentations, and evidence, the Administrative Law Judge finds as follows.

The claim terms construed in this Order are done so for the purposes of this Section 337 Investigation. Only claim terms in controversy need to be construed, and then only to the extent necessary to resolve the controversy. *Vanderlande Indus. Nederland BV v. Int'l Trade Comm.*, 366 F.3d 1311, 1323 (Fed. Cir. 2004); *Vivid Tech., Inc. v. American Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999). Hereafter, discovery and briefing in this Investigation shall be governed by this construction of the claim terms. All other claim terms shall be deemed undisputed and shall be interpreted by the Administrative Law Judge in accordance with their ordinary meaning as viewed by a person of ordinary skill in the art.

II. RELEVANT LAW.

Any finding of infringement requires a two-step analysis. First, the asserted patent claims must be construed as a matter of law to determine their proper scope. Second, a factual determination must be made whether the properly construed claims read on the accused devices. *See Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 976 (Fed. Cir. 1995) (*en banc*), *aff'd*, 517 U.S. 370 (1996).

Claim construction begins with the language of the claims themselves. Claims should be given their ordinary and customary meaning as understood by a person of ordinary skill in the art, viewing the claim terms in the context of the entire patent. *Phillips v. AWH Corp.*, 415 F.3d 1303,

1312-13 (Fed. Cir. 2005). In some cases, the ordinary meaning of claim language is readily apparent and claim construction will involve little more than "the application of the widely accepted meaning of commonly understood words." *Id.* at 1314. In other cases, claim terms have a specialized meaning and it is necessary to determine what a person of ordinary skill in the art would have understood disputed claim language to mean by analyzing "the words of the claims themselves, the remainder of the specification, the prosecution history, and extrinsic evidence concerning relevant scientific principles, as well as the meaning of technical terms, and the state of the art." *Id.* (quoting *Innova/Pure Water, Inc. v. Safari Water Filtration Sys., Inc.*, 381 F.3d 1111, 1116 (Fed. Cir. 2004)).

The claims themselves provide substantial guidance as to the meaning of disputed claim language. *Id.* at 1314. "[T]he context in which a term is used in the asserted claim can be highly instructive." *Id.* Likewise, other claims of the patent at issue, regardless of whether they have been asserted against respondents, may show the scope and meaning of disputed claim language. *Id.*

With respect to claim preambles, a preamble may limit a claimed invention if it (i) recites essential structure or steps, or (ii) is "necessary to give life, meaning, and vitality" to the claim. *Eaton Corp. v. Rockwell Int'l Corp.*, 323 F.3d 1332, 1339 (Fed. Cir. 2003) (citations omitted). The Federal Circuit has explained that a "claim preamble has the import that the claim as a whole suggests for it. In other words, when the claim drafter chooses to use both the preamble and the body to define the subject matter of the claimed invention, the invention so defined, and not some other, is the one the patent protects." *Id.* (quoting *Bell Communications Research, Inc. v. Vitalink Communications Corp.*, 55 F.3d 615, 620 (Fed. Cir. 1995)). When used in a patent preamble, the term "comprising" is well understood to mean "including but not limited to," and thus, the claim is

open-ended. *CIAS, Inc. v. Alliance Gaming Corp.*, 504 F.3d 1356, 1360 (Fed. Cir. 2007). The patent term "comprising" permits the inclusion of other unrecited steps, elements, or materials in addition to those elements or components specified in the claims. *Id.*

In cases where the meaning of a disputed claim term in the context of the patent's claims remains uncertain, the specification is the "single best guide to the meaning of a disputed term." *Phillips,* 415 F.3d at 1321. Moreover, "[t]he construction that stays true to the claim language and most naturally aligns with the patent's description of the invention will be, in the end, the correct construction." *Id.* at 1316. As a general rule, however, the particular examples or embodiments discussed in the specification are not to be read into the claims as limitations. *Id.* at 1323.

The prosecution history may also explain the meaning of claim language, although "it often lacks the clarity of the specification and thus is less useful for claim construction purposes." *Id.* at 1317. The prosecution history consists of the complete record of the patent examination proceedings before the U.S. Patent and Trademark Office, including cited prior art. *Id.* It may reveal "how the inventor understood the invention and whether the inventor limited the invention in the course of prosecution, making the claim scope narrower than it would otherwise be." *Id.*

If the intrinsic evidence is insufficient to establish the clear meaning of a claim, a court may resort[2] to an examination of the extrinsic evidence. *Zodiac Pool Care, Inc. v. Hoffinger Industries, Inc.*, 206 F.3d 1408, 1414 (Fed. Cir. 2000). Extrinsic evidence may shed light on the relevant art, and consists of all evidence external to the patent and the prosecution history, "including expert and inventor testimony, dictionaries, and learned treatises." *Phillips,* 415 F.3d at 1317. In evaluating expert testimony, a court should disregard any expert testimony that is conclusory or

[2] "In those cases where the public record unambiguously describes the scope of the patented invention, reliance on any extrinsic evidence is improper." *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1583 (Fed. Cir. 1996).

"clearly at odds with the claim construction mandated by the claims themselves, the written description, and the prosecution history, in other words, with the written record of the patent." *Id.* at 1318. Furthermore, expert testimony is only of assistance if, with respect to the disputed claim language, it identifies what the accepted meaning in the field would be to one skilled in the art. *Symantec Corp. v. Computer Associates International, Inc.*, 522 F.3d 1279, 1290-91 (Fed. Cir. 2008). Testimony that recites how each expert would construe the term should be accorded little or no weight. *Id.* Extrinsic evidence is inherently "less reliable" than intrinsic evidence, and "is unlikely to result in a reliable interpretation of patent claim scope unless considered in the context of the intrinsic evidence." *Phillips*, 415 F.3d at 1318-19.

III. U.S. PATENT NO. 6,150,689

A. Overview

This Investigation concerns U.S. Patent No. 5,809,336, titled "High Performance Microprocessor Having Variable Speed System Clock" ("the '336 patent"), which resulted from U.S. Patent Application No. 484,918 filed on June 7, 1995. (JXM-0001.) The '336 patent is a division of Serial No. 389,334, filed on August 3, 1989 and issued as U.S. Patent No. 5,440,749. (*Id.*) The '336 patent issued on September 15, 1998 and names Charles H. Moore and Russell H. Fish, III as the inventors. (*Id.*) The patent was assigned to Patriot Scientific Corporation. (*Id.*; Complaint at ¶36; *id.*, Ex. 8.)

The '336 patent discloses a microprocessor system having (1) an on-chip variable speed clock and (2) a second independent clock connected to an input/output (I/O) interface. (Stip. at 2.) Microprocessors must operate over (1) temperature ranges, (2) voltage variations and (3) variations in semiconductor processing, each of which affects operating speed ("PVT parameters" for "process," "voltage" and "temperature"). (*Id.* (citing JXM-0001 at 16:44-53).) The '336 patent

discloses a microprocessor having a clock circuit and a CPU fabricated on the same substrate. (*Id.* (citing JXM-0001 at 16:56-58).) The '336 patent presents the following embodiment in Figure 17:

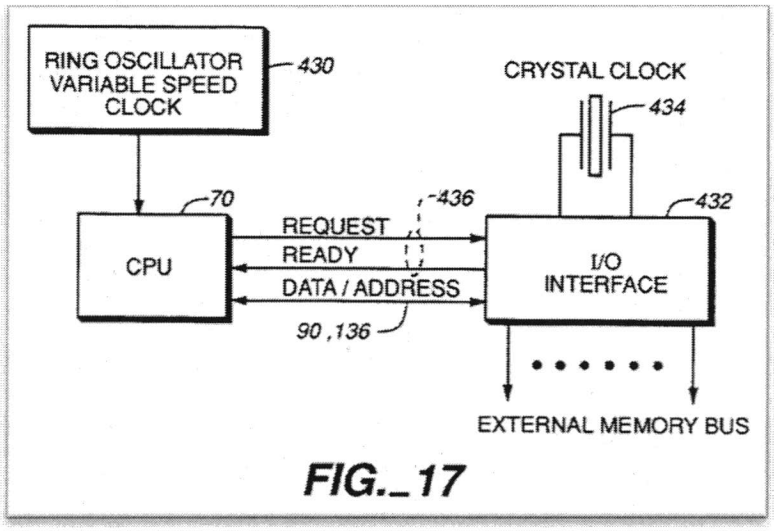

FIG._17

In the embodiment shown in Figure 17, CPU 70 operates asynchronously with I/O interface 432. (*Id.* (citing JXM-0001 at 17:14-19).) I/O interface 432 is controlled independently by crystal clock 434. (*Id.* (citing JXM-0001 at 17:17-19, 17:25-27).) The on-chip ring oscillator variable speed clock 430 clocks the CPU 70. (*Id.* (citing JXM-0001 at 16:59-60, 17:19-22, 17:32-34).)

Asserted claims 1, 6, 7, 9-11, and 13-16 of the '336 patent are shown below.

> 1. A microprocessor system, comprising a single integrated circuit including a central processing unit and an entire ring oscillator variable speed system clock in said single integrated circuit and connected to said central processing unit for clocking said central processing unit, said central processing unit and said ring oscillator variable speed system clock each including a plurality of electronic devices correspondingly constructed of the same process technology with corresponding manufacturing variations, a processing frequency capability of said central processing unit and a speed of said ring oscillator variable speed system clock varying together due to said manufacturing variations and due to at least operating voltage and temperature of said single integrated circuit; an on-chip input/output interface connected to exchange coupling control signals, addresses and data with said central processing unit, and a second clock independent of said ring oscillator variable speed system clock connected to said input/output interface, wherein a clock signal of said

second clock originates from a source other than said ring oscillator variable speed system clock.

6. A microprocessor system comprising:

a central processing unit disposed upon an integrated circuit substrate, said central processing unit operating at a processing frequency and being constructed of a first plurality of electronic devices;

an entire oscillator disposed upon said integrated circuit substrate and connected to said central processing unit, said oscillator clocking said central processing unit at a clock rate and being constructed of a second plurality of electronic devices, thus varying the processing frequency of said first plurality of electronic devices and the clock rate of said second plurality of electronic devices in the same way as a function of parameter variation in one or more fabrication or operational parameters associated with said integrated circuit substrate, thereby enabling said processing frequency to track said clock rate in response to said parameter variation; an on-chip input/output interface, connected between said central processing unit and an off-chip external memory bus, for facilitating exchanging coupling control signals, addresses and data with said central processing unit; and

an off-chip external clock, independent of said oscillator, connected to said input/output interface wherein said off-chip external clock is operative at a frequency independent of a clock frequency of said oscillator and wherein a clock signal from said off-chip external clock originates from a source other than said oscillator.

7. The microprocessor system of claim 6 wherein said one or more operational parameters include operating temperature of said substrate or operating voltage of said substrate.

9. The microprocessor system of claim 6 wherein said oscillator comprises a ring oscillator.

10. In a microprocessor system including a central processing unit, a method for clocking said central processing unit comprising the steps of:

providing said central processing unit upon an integrated circuit substrate, said central processing unit being constructed of a first plurality of transistors and being operative at a processing frequency;

providing an entire variable speed clock disposed upon said integrated circuit substrate, said variable speed clock being constructed of a second plurality of transistors;

clocking said central processing unit at a clock rate using said variable speed clock with said central processing unit being clocked by said variable speed clock at a variable frequency dependent upon variation in one or more fabrication or operational parameters associated with said integrated circuit substrate, said processing frequency and said clock rate varying in the same way relative to said variation in said one or more fabrication or operational parameters associated with said integrated circuit substrate;

connecting an on-chip input/output interface between said central processing unit and an off-chip external memory bus, and exchanging coupling control signals, addresses and data between said input/output interface and said central processing unit; and

clocking said input/output interface using an off-chip external clock wherein said off-chip external clock is operative at a frequency independent of a clock frequency of said variable speed clock and wherein a clock signal from said off-chip external clock originates from a source other than said variable speed clock.

11. A microprocessor system, comprising a single integrated circuit including a central processing unit and an entire ring oscillator variable speed system clock in said single integrated circuit and connected to said central processing unit for clocking said central processing unit, said central processing unit and said ring oscillator variable speed system clock each including a plurality of electronic devices correspondingly constructed of the same process technology with corresponding manufacturing variations, a processing frequency capability of said central processing unit and a speed of said ring oscillator variable speed system clock varying together due to said manufacturing variations and due to at least operating voltage and temperature of said single integrated circuit; an on-chip input/output interface connected to exchange coupling control signals, addresses and data with said central processing unit; and a second clock independent of said ring oscillator variable speed system clock connected to said input/output interface, wherein said central processing unit operates asynchronously to said input/output interface.

13. A microprocessor system comprising: a central processing unit disposed upon an integrated circuit substrate, said central processing unit operating at a processing frequency and being constructed of a first plurality of electronic devices;

an entire oscillator disposed upon said integrated circuit substrate and connected to said central processing unit, said oscillator clocking said central processing unit at a clock rate and being constructed of a second plurality of electronic devices, thus varying the processing frequency of said first plurality of electronic devices and the clock rate of said second plurality of electronic devices in the same way as a function of parameter variation in one or more fabrication or operational parameters associated with said integrated circuit substrate, thereby enabling said processing frequency to track said clock rate in response to said parameter variation;

an on-chip input/output interface, connected between said central processing unit and an off-chip external memory bus, for facilitating exchanging coupling control signals, addresses and data with said central processing unit; and

an off-chip external clock, independent of said oscillator, connected to said input/output interface wherein said off-chip external clock is operative at a frequency independent of a clock frequency of said oscillator and further wherein said central processing unit operates asynchronously to said input/output interface.

14. The microprocessor system of claim 13 wherein said one or more operational parameters include operating temperature of said substrate or operating voltage of said substrate.

15. The microprocessor system of claim 13 wherein said oscillator comprises a ring oscillator.

16. In a microprocessor system including a central processing unit, a method for clocking said central processing unit comprising the steps of:

providing said central processing unit upon an integrated circuit substrate, said central processing unit being constructed of a first plurality of transistors and being operative at a processing frequency;

providing an entire variable speed clock disposed upon said integrated circuit substrate, said variable speed clock being constructed of a second plurality of transistors;

clocking said central processing unit at a clock rate using said variable speed clock with said central processing unit being clocked by said variable speed clock at a variable frequency dependent upon variation in one or more fabrication or operational parameters associated with said integrated circuit substrate, said processing frequency and said clock rate varying

> in the same way relative to said variation in said one or more fabrication or operational parameters associated with said integrated circuit substrate;
>
> connecting an on-chip input/output interface between said central processing unit and an off-chip external memory bus, and exchanging coupling control signals, addresses and data between said input/output interface and said central processing unit; and
>
> clocking said input/output interface using an off-chip external clock wherein said off-chip external clock is operative at a frequency independent of a clock frequency of said variable speed clock, wherein said central processing unit operates asychronously to said input/output interface.

(JXM-0001 at 33:17-19, 33:23-24, Ex Parte reexamination Certificate at 1:59-3:26, 3:29-4:46.)

B. Level of Ordinary Skill in the Art

Claims should be given their ordinary and customary meaning as understood by a person of ordinary skill in the art. *Phillips*, 415 F.3d at 1312-13. Complainants' expert opines that a person of ordinary skill in the art with respect to the '336 patent would have a minimum of a bachelor's degree in electrical engineering and two to three years of experience in semiconductor design. (*See* Initial Report of Dr. Vojin G. Oklobdzija (Infringement and Domestic Industry) at 7.) Respondents' expert opines that the relevant level of ordinary skill in the art is a master's degree in electrical engineering, computer engineering, or a related field, and at least 5 years of experience in integrated circuit design, or a commensurate amount of relevant experience. (*See* Opening Expert Report of Eby G. Friedman, Ph. D Regarding U.S. Patent No. 5,809,336 at 23.) Upon consideration of these opinions and the technology at issue, the Administrative Law Judge finds that a person of ordinary skill in the art would have at least a bachelor's degree in electrical engineering, computer engineering, or a related field and at least 5 years of experience in integrated circuit design or a related field or a graduate degree in electrical engineering, computer

engineering, or a related field and at least 3 years of experience in integrated circuit design or a related field.

C. Agreed Constructions

1. Claims 1, 6, 10, 11, 13, 16—*"central processing unit"*

The parties agree that the term "central processing unit" in claims 1, 6, 10, 11, 13, and 16 of the '336 patent should be construed to mean "electronic circuit on an integrated circuit that controls the interpretation and execution of programmed instructions." (JL at 1.)

2. Claims 1, 11—*"second clock independent of said ring oscillator variable speed system clock"*

The parties agree that the term "second clock independent of said ring oscillator variable speed system clock" in claims 1 and 11 of the '336 patent should be construed to mean "a second clock wherein a change in the frequency of either the second clock or ring oscillator system clock does not affect the frequency of the other." (JL at 2.)

3. Claims 1, 6, 10, 11, 13, 16—*"on-chip input/output interface"*

The parties agree that the term "on-chip input/output interface" in claims 1, 6, 10, 11, 13, and 16 of the '336 patent should be construed to mean "a circuit having logic for input/output communications, where that circuit is located on the same semiconductor substrate as the CPU." (JL at 2.)

4. Claims 6, 13—*"external clock is operative at a frequency independent of a clock frequency of said oscillator"*

The parties agree that the term "external clock is operative at a frequency independent of a clock frequency of said oscillator" in claims 6 and 13 of the '336 patent should be construed to mean "an external clock wherein a change in the frequency of either the external clock or oscillator does not affect the frequency of the other." (JL at 2.)

5. Claims 10, 16—*"external clock is operative at a frequency independent of a clock frequency of said variable speed clock"*

The parties agree that the term "external clock is operative at a frequency independent of a clock frequency of said variable speed clock" in claims 10 and 16 of the '336 patent should be construed to mean "an external clock wherein a change in the frequency of either the external clock or the variable speed clock does not affect the frequency of the other." (JL at 2.)

D. Construction of Disputed Claim Terms

1. Claims 1, 9, 11, 15—*"ring oscillator"*

The parties' proposed constructions for this term are as follows:

Respondents	Complainants	Staff
an oscillator having a multiple, odd number of inversions arranged in a loop, wherein the oscillator is: (1) non-controllable; and (2) variable based on the temperature, voltage, and process parameters in the environment	interconnected electronic components comprising multiple odd numbers of inversions arranged in a loop, where three or more inversions are required to maintain an oscillating output	an oscillator having a multiple, odd number of inversions arranged in a loop, wherein the oscillator is variable based on the temperature, voltage, and process parameters in the environment

(CMBr. at 7; RMBr. at 56; SMBr. at 22-23.) There is no unique definition set forth in either the claims or in the specification of the patent. Rather, the specification says this: "The microprocessor **50** uses the technique shown in FIGS. **17-19** to generate the system clock and its required phases. Clock circuit **430** is the *familiar* 'ring oscillator' used to test process performance." (JXM-0001 at 16:54-55 (emphasis added).) Figure 18 of the patent illustrates the "[c]lock circuit **430,**" as shown here:

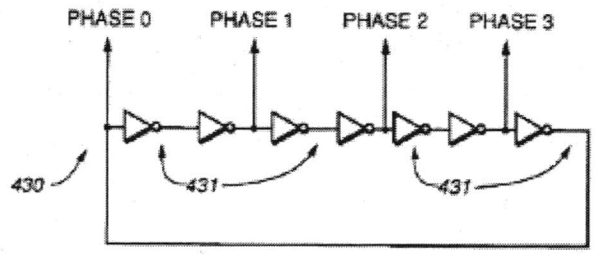

FIG._18

Complainants' arguments in support of their proposed construction

Complainants say a person of ordinary skill in the art would understand the term "ring oscillator" to mean "interconnected electronic components comprising multiple odd numbers of inverters arranged in a loop." (CMBr. at 7.) In so saying, Complainants refer to the claim construction that was previously made by a judge in a parallel federal district court case involving some of the parties in this investigation: "an oscillator having multiple odd number of inversions arranged in a loop, wherein the oscillator is variable based on the temperature, voltage and process parameters in the environment." (*Id.* at 6-7 (citing CXM-0003[3] at 2).)

Complainants say the oscillation of the claimed device depends on there being at least three inverters for output. (*Id.* at 8 (citing Oklobdzija Decl. at ¶¶ 9-10).) Complainants note that the claimed device oscillates because its signals, as they move around the loop or ring of inverters, alternates between 1and 0. (*Id.*) A sample signal taken at any point in the loop of inverters will be opposite one taken there in a succeeding cycle. This would not be the case if there were an even number of inverters in the loop—in that instance, the signal would be the same for every cycle. (*Id.* (citing Oklobdzija Decl. at ¶ 7).) Furthermore, a ring oscillator will not work with just a single

[3] Renumbered as JXM-0009 (Claim Construction Order of Paul S. Grewal, dated Dec. 4, 2012, in Case No. 5:08-cv-00877 PSG: Acer, Inc. et al. v. Technology Properties, Ltd., et al.)

inverter. (*Id.* (citing Oklobdzija Dec. at ¶¶ 7, 15).) Complainants say that the ring oscillator of the '336 patent, by inclusion of its circuitry within the wider network of integrated circuitry for the microprocessor, can be used for generating a clock signal for the central processing unit. (*Id.* at 9 (citing JXM-0001 at claims 1 and 11).)

There is nothing within the context of the asserted claims that suggests that the claimed ring oscillator has to be non-controllable or necessitates adding the words "variable based on the temperature, voltage, and process parameters in the environment," argue the Complainants. (*Id.*) Nor does anything expressed in the claims preclude an additional element for managing the oscillator clock, according to Complainants. (*Id.*) As for the other limitation proposed by Respondents—that the oscillation of the ring oscillator clock is variable based on temperature, voltage, and processing characteristics—Complainants argue that this verbiage adds nothing to the meaning of the term ring oscillator and diverges from the gist of the claim itself, thereby creating ambiguity. (*Id.*)

Complainants further argue that the specification supports their contention that, to a person of ordinary skill in the art, the term ring oscillator, as it pertains to the asserted claims of the '336 patent, should be understood according to its common and ordinary meaning. (*Id.*) The specification states that the "[c]lock circuit **430** is the familiar 'ring oscillator'" used to test process performance. (*Id.* (citing JXM-0001 at 16:54-58).) Also, the specification says the ring oscillator clock is "fabricated on the same silicon chip as the rest of the microprocessor," as illustrated in Figure 17 of the patent, while Figure 19 discloses a sampling of a clock signal over time at various points, or phases, which are depicted in Figure 18. (*Id.* at 9-10.)

Respondents' arguments in support of their proposed construction

Respondents say that in order to overcome a rejection of the asserted claims, the patent owner (Charles Moore)[4] argued that the voltage-controlled oscillator ("VCO") of a prior patent, U.S. Patent No. 4,689,581 ("Talbot"), did not teach the "ring oscillator" claimed in the '336 patent. (RMBr. at 57.) Respondents quote the following comment of the examiner in support of their position:

> Continuing, the patent owner further argued that the reference of Talbot does not teach of a "ring oscillator." The patent owner discussed features of a ring oscillator, such as being non-controllable, and being variable based on the environment. The patent owner argued that these features distinguish over what Talbot teaches.

(*Id.* (citing JXM-0005[5] (Interview Summary, Feb. 12, 2008, Control No. 90/008,227)).) In light of this written comment by the examiner, which Respondents describe as disavowing arguments, Respondents maintain that the term "ring oscillator" must include the limitations "non-controllable" and "variable based on temperature, voltage, and process parameters in the environment." (*Id.*) According to Respondents, Federal Circuit law is clear that "[a]rguments made during the prosecution of a patent application are given the same weight as claim amendments." (*Id.* at 57-58 (citing *Elkay Mfg. v. Ebco Mfg. Co.*, 192 F.3d 973, 979 (Fed. Cir. 1999)).) They say it is black letter law that a court "cannot construe the claims to cover subject matter broader than that which the patentee itself regarded as comprising its invention and represented to the PTO." (*Id.* at 58 (citing *Microsoft Corp. v. Multi-Tech Sys., Inc.*, 357 F.3d 1340, 1349 (Fed. Cir. 2004)).) Respondents note that "[t]he purpose of consulting the prosecution

---

[4] JXM-0014 at TPL-853_02954311. Although Respondents say it was TPL (Technology Properties Limited) that did this, the exhibits identify Charles Moore as the owner and party involved. Charles Moore and Russell Fish are identified in the patent as the inventors, and Patriot Scientific Corporation is identified as assignee. (JXM-00014 at TPL853_00000003.)

[5] Renumbered JXM-0014.

history in construing a claim is to 'exclude any interpretation that was disclaimed during prosecution.'" (*Id.* (citing *Chimie v. PPG Indus. Inc.*, 402 F.3d 1371, 1384 (Fed. Cir. 2005)).) They say that "where the patentee has unequivocally disavowed a certain meaning to obtain his patent, the doctrine of prosecution disclaimer attaches and narrows the ordinary meaning of the claim congruent with the scope of the surrender." (*Id.* (quote *Chimie*, 402 F.3d at 1384).) Additionally, they cite and quote *Rheox, Inc. v. Entact, Inc.*, 276 F.3d 1312, 1325 (Fed. Cir. 2002): "Explicit arguments made during prosecution to overcome prior art can lead to narrow claim interpretation because 'the public has a right to rely on such definitive statements made during prosecution.'" (*Id.*)

Respondents argue that an examiner's interview summary is a proper basis for finding a disavowal of claim scope because it expressly reflects what the patent owner argued. (*Id.*) According to Respondents, the examiner had no motive to misstate the position that was being advocated by the patent applicants in pursuit of the patent. (*Id.* at 58-59.) Moreover, say the Respondents, the applicants did not dispute the accuracy of any aspect of the examiner's summary of what had been discussed. (*Id.* at 59.) Thus, the disavowal recorded by the examiner remains effective even though it occurred during the reexamination of the '148 patent, because that patent shares the same specification as, and is directly related to, the '336 patent, both patents claiming a ring oscillator. (*Id.*)

Respondents further argue that the applicants' disavowals in connection with the professed ring oscillator being non-controllable and variable based on the temperature, voltage, and process parameters in the environment was essentially a shorthand summary of numerous arguments made by the applicants during the original prosecution of the patent, in order to overcome multiple prior art references, and underscores the fact that the ring oscillator is indeed non-controllable inasmuch

as its variation in frequency is a result of environmental factors. (*Id.*) During the prosecution of the '336 patent, the applicants repeatedly drew a distinction between deliberate control of an oscillator's frequency by means of an input signal, such as a crystal or some other component of the system, and its frequency variations stemming from the environmental factors of temperature, voltage, and process, according to Respondents. (*Id.* at 60.) Respondents say the patent owner consistently characterized the claimed variable speed clock, ring oscillator variable system clock, and oscillator as environmentally dependent and expressly distinguished prior art clocks that were controlled, whether through clock control signals, frequency control information, or command inputs, and therefore it comes as no surprise that during reexamination the owner again emphasized the features of a ring oscillator as being non-controllable and variable based on the environment. (*Id.* at 61-62.)

Staff's arguments in support of its proposed construction

Staff says that the '336 patent shares essentially the same specification and drawings as U.S. Patent No. 6,598,148 ("the '148 patent), and during reexamination of the '148 patent the applicants argued that a prior art patent, U.S. Patent No. 4,689,581 ("Talbot") does not teach a ring oscillator, even though Talbot teaches a voltage-controlled oscillator that has a multiple odd number of inversions arranged in a loop. (SMBr. at 23-24.) According to Staff, Talbot discloses three inversions arranged in a loop, yet the '336 patent applicants made clear that Talbot does not teach a ring oscillator and therefore he disclaimed the subject matter disclosed in Talbot. (*Id.* at 24.) The only question, argues Staff, is the scope of the disclaimer. (*Id.*)

Staff criticizes Respondent's use of the term "non-controllable" because the patentee did not argue that "controllability" was the reason that Talbot's oscillators were not the claimed ring oscillators. (*Id.*) Furthermore, argues Staff, Talbot can be distinguished fully based on the fact

that the frequency of the variable speed ring oscillator clock of the '336 patent is determined, not by an external crystal or off-chip components but by "the parameters of temperature, voltage, and process" as described in the specification and articulated throughout the intrinsic record. (*Id.* at 24-25.)

For these reasons, Staff submits that the term ring oscillator should be interpreted to mean "an oscillator having a multiple, odd number of inversions arranged in a loop, wherein the oscillator is variable based on the temperature, voltage and process parameters in the environment." (*Id.* at 25.)

Administrative Law Judge's construction

The Administrative Law Judge finds that the term "ring oscillator" as it appears in the asserted claims was not invested with any unique or special meaning by the inventor of the '336 patent. The specification, as has been pointed out by others, says that the "[c]lock circuit **430** is the *familiar* 'ring oscillator' used to test process performance." (JXM-0001 at 16:56-57 (emphasis added).) Thus a person of ordinary skill in the art of the '336 patent would, by the lights of all parties to this investigation, know and understand what a ring oscillator is. There is no legal basis for Respondent's inclusion of the word "non-controllable," as pointed out by both Complainants and Staff. The Federal Circuit has pointed out that "[a]lthough…the prosecution history is always relevant to claim construction, it is also true that the prosecution history may not be used to infer the intentional narrowing of a claim absent the applicants' clear disavowal of claim coverage, such as an amendment to overcome a rejection." *Amgen Inc. v. Hoechst Marion Roussel, Inc.*314 F.3d 1313, 1327 (Fed. Cir. 2003). The court further said: "No such clear disavowal occurred here." (*Id.*) More specifically, the court in *Gemstar-TV Guide Intern., Inc. v. International Trade Comm'n,*_383 F.3d 1352, 1375 (Fed. Cir.2004) said: "Gemstar's statements in the prosecution

history do not indicate a disavowal or disclaimer of claim scope (citation omitted), but merely provide an example to illustrate differences between the invention and the prior art. In essence, Gemstar stated only that the [prior-art] reference was incapable of performing a certain type of search, not that the scope of the claimed invention was limited to that particular type of search. Contrary to the ITC's holding, the prosecution history did not limit the '121 patent to that particular sequence of logical searching." The same thinking holds true with respect to the prosecution history of the '336 patent and the alleged disavowals referenced by the Respondents.

On the other hand, Complainant's substitution of "interconnected electronic components" is unnecessary and uninformative for purposes of understanding what a person of ordinary skill in the art would apprehend a ring oscillator to be. Integrated circuits in general consist of interconnected electronic components. So the phrase "integrated electronic components" does not aid in describing what a person of ordinary skill in the relevant art would understand a ring oscillator to be. The purpose of claim construction is to clarify or settle, to the extent necessary to resolve the competing contentions of the parties, asserted claim terms, and not simply to reformulate the inventor's words in alternative ways. Further, the latter portion of Complainant's construction is encompassed in the earlier portion: "multiple" by definition means more than one, and "odd numbers" by definition excludes the quantity two, which is the only number other than one that is less than three. Therefore, the last clause in Complainants' proposed construction is tautological.

As for Staff's construction, its distinctive verbiage is the clause "wherein the oscillator is variable based on the temperature, voltage and process parameters in the environment." However, this, in its own way, is superfluous too, because later in the claim it is stated: "and a speed of said ring oscillator variable speed system clock varying together due to said manufacturing variations

and due to at least operating voltage and temperature of said single integrated circuit". Therefore, this notion is expressed in subsequent language of the claim and does not need to be prefaced in order to understand the term "ring oscillator."

For the foregoing reasons, the Administrative Law Judge concludes that the term "ring oscillator" means "an oscillator having a multiple, odd number of inversions arranged in a loop."

2. Claims 1, 11—*"an entire ring oscillator variable speed system clock in said single integrated circuit"*

The parties' proposed constructions for this term are as follows:

Respondents	Complainants	Staff
a ring oscillator variable speed system clock that is located entirely on the same semiconductor substrate as the CPU and does not rely on a control signal or an external crystal/ clock generator to generate a clock signal	a ring oscillator, variable speed system clock, wherein the ring oscillator is located entirely on the same semiconductor substrate as the central processing unit	a ring oscillator variable speed system clock that includes all components that determine clock frequency located on the same semiconductor substrate as the CPU

(CMBr. at 13; RMBr. at 12; SMBr. at 7.)

Complainants' arguments for their proposed construction

Complainants say the claims simply discuss a ring oscillator with circuitry that is entirely integrated in the same semiconductor as the central processing unit, or CPU. (CMBr. at 13.) They say there is nothing in the claim language that suggests that the ring oscillator cannot use a "control signal" or reference an "external crystal." (*Id.*) Complainants contend that their proposed construction is consistent with the specification of the '336 patent, which says: "Clock circuit is the familiar 'ring oscillator"...fabricated on the same silicon chip as the rest of the microprocessor." (*Id.* at 13-14 (citing JXM-0001 at 16:56-58).) Further, they argue that their construction is supported by the prosecution history, noting that the patent applicants added the word "entire" during the initial prosecution of the '336 patent in an attempt to distinguish it from a

prior patent, U.S. Patent No. 4,503,500 ("Magar"). They said Magar does not have an oscillator integrated on the same silicon die as the CPU and therefore the patent applicants observed that the "entire oscillator" of the '336 invention needs to be physically integrated on the same silicon die as the CPU. (*Id.* at 14.)

Complainants say Respondents' construction, which precludes use of any external auxiliary crystal/clock in conjunction with the "entire ring oscillator variable speed system clock," mischaracterizes Magar and the gist of the applicants' statements in that regard because Magar's oscillator was not on the same integrated circuit as the CPU. According to the '336 invention, the claimed oscillator is an entire ring oscillator that is integrated on the same silicon die as the CPU, but there is no clear disavowal in the file history of the '336 patent that prohibits the use of an off-chip crystal for a reference signal, especially when the "entire ring oscillator" is fully integrated on the chip. (*Id.*) Similarly, according to Complainants, Respondents' attempt to add a limitation that excludes a control signal has no basis in the file history's discussion of "entire" or anywhere else in the internal record of the '336 patent. (*Id.*) Therefore, argue Complainants, there is no clear disavowal of the use of a "control signal." (*Id.*)

Respondents' arguments for their proposed construction

Respondents say the essence of the parties' dispute regarding this claim term, and those other claim terms with similar language, focuses on what the applicants needed to disclaim in order to succeed in getting their patent application issued. (RMBr. at 13.) Respondents contend that their constructions embody the clear disavowals of claim scope by the applicants during the prosecution of the '336 patent and are consistent with the teachings and criticisms of the prior art expressed in the specification. (*Id.*) These "unambiguous disclaimers and teachings" establish that the claimed "entire oscillator" and "entire clock" do not rely on any off-chip crystals, off-chip

clock generators, or control signals. (*Id.*) Respondents say that, in contrast, Complainants' constructions ignore these clear disclaimers and teachings and fail to define what it means for a clock oscillator to be located "entirely" on the same substrate as the CPU. (*Id.*) Because the applicants clearly and unambiguously disclaimed an on-chip clock or oscillator that relies on external off-chip crystals and off-chip clock generators, Respondents argue that their construction, which embodies these disclaimers, should be adopted. (*Id.*)

Respondents say a key feature of the asserted claims is the requirement that the entire variable speed clock or oscillator be located on the same integrated circuit substrate as the CPU that is to be clocked, without having to rely on any external, fixed-frequency source, such as a crystal. (*Id.* at 14.) Consequently, the speed of the variable speed clock and the processing frequency capability of the CPU at any point in time are determined by the process, voltage, and temperature of the integrated circuit. (*Id.* (citing JXM-0001 at 16:59-60, 65-67, 17:5-10, 19-22).) The purported result of this arrangement, say Respondents, is that the performance of the CPU is optimized so that it "will always execute at the maximum frequency possible, but never too fast." (*Id.* (citing JXM-0001 at 16:67-17:2).)

Respondents say the language of the asserted claims and the teachings of the specification describe a purported improvement over the prior art method of clocking a CPU with a fixed clock whose frequency is controlled by an external fixed-speed crystal or clock generator. The specification of the '336 patent makes note that a fixed-speed clock is always set at a frequency well below the maximum potential frequency at which the CPU could operate under the optimal process, voltage, and temperature conditions because, by definition, a fixed-speed clock cannot vary in speed in response to such conditions. (*Id.* (citing JXM-0001 at 16:44-53).) This less-than-optimal design is necessary in order to adapt to instances when the CPU is operating

under the worst of conditions with respect to process, voltage, and temperature. (*Id.*) Setting the frequency of the system at a lower-than-optimal level is inefficient, according to the teaching of the '336 patent, which the claimed invention seeks to overcome by fabricating the CPU and its clock entirely on the same substrate, so that PVT conditions will affect both the CPU and the clock alike, free of control from any external fixed-speed clocking mechanisms. (*Id.* (citing JXM-0001 at 16:44-17:10, 19-22).) Thus, the frequencies of the CPU and clock will automatically vary in response to changes in consequential PVT factors. (*Id.* at 14-15.) In light of the criticisms that were made in the '336 patent in this regard, a proper construction should account for such disclaimers because the Federal Circuit has recognized that a correct claim construction excludes from the scope of the claims those features that the specification criticizes and allegedly overcomes. (*Id.* at 15 (citing *Chicago Board Options Exch. Inc. v. Int'l Secs. Exch., LLC,* 677 F.3d 1361, 1372 (Fed. Cir. 2012)).)

Respondents point to the fact that during the prosecution of the '336 patent the applicants repeatedly distinguished their purported invention from the prior art on the basis that that their on-chip clock and oscillator do not rely on external crystals or frequency generators, as the prior art does, and therefore a proper construction should acknowledge and express this disclaimer. (*Id.*) Specifically, during the prosecution of the '336 patent the examiner issued a non-final rejection in light of Figure 2a of Magar. In his rejection, the examiner said the "CLOCK GEN" (clock generator) circuitry disclosed in that figure is fabricated on the same microprocessor substrate as the CPU, as is required in the claims of the '336 patent. (*Id.* (citing JXM-0002 at TPL-85300002433-36).) In response, the applicants attempted to distinguish Magar on the basis that an external off-chip crystal drives the clock that is disclosed in Magar. (*Id.* at 16 (citing JXM-0002 at TPL85300002426).) The applicants also emphasized that there is a difference

between their claimed variable speed clock and the combination of a clock generator and external clock disclosed in Magar, say Respondents. (*Id.* at 16-17 (citing JXM-0002 at TPL85300002427-28).) Thus, says Respondents, in their first amendment during the course of prosecution the applicants expressly and unambiguously disclaimed clocks and oscillators that rely on an external crystal for frequency control. (*Id.* at 17.)

According to Respondents, because the patent examiner was still not convinced by this attempt to distinguish Magar, the applicants further amended their claims to explicitly require that the entire oscillator/clock be included on the same integrated circuit substrate as the CPU. (*Id.* (citing JXM-0002 at TPL85300002399-400).) Also, the applicants further attempted to distinguish Magar from their claimed invention by arguing that Magar's clock generator could not operate properly without the use of an external component, such as a crystal, and in so doing, directed the examiner to Magar's disclosure that "chip 10 includes a clock generator 17 which has two external pins, X1 and X2, to which a crystal, or external generator, is connected. (*Id.* (citing JXM-0002 at TPL85300002402).) Because Magar does not disclose what components are included in its clock generator or how it uses the signal from the crystal, the only basis for the applicants' disclaimers is Magar's reliance on the external crystal or clock generator, regardless of how the signal supplied by the external crystal or clock generator is used, say Respondents. (*Id.* at 17-18.) Further confirming the scope of their clear disclaimer, the applicants rejected any dependence on an external crystal by telling the examiner that "[w]hile most of Magar's clock (generator) circuitry is on the IC, the entire oscillator, which because it requires an external crystal, is not." (*Id.* at 18.) Once again, according to Respondents, the applicants expressly disclaimed clocks and oscillators that rely on external crystal, but this time they went even further by

disclaiming reliance on an external crystal generally, and not just for purposes of controlling frequency. (*Id.*)

The applicants reinforced this disclaimer by explaining and characterizing "the essential difference" between Magar's fixed-frequency clock and the variable-speed clock shown in Figure 18 of the '336 patent this way:

> The signals PHASE 0, PHASE 1, PHASE 2, and PHASE 3 in Applicants Fig 18 are synonymous with Q1, Q2, Q3 and Q4 depicted in Magar Fig. 2a. The essential difference is that the frequency or rate of the PHASE 0, PHASE 1, PHASE 2 and PHASE 3 signals is determined by the processing and/or operating parameters of the integrated circuit containing the Fig. 18 circuit, while the frequency or rate of the Q1, Q2, Q3 and Q4 signals depicted in Magar Fig. 2A are determined by the fixed frequency of the external crystal connected to the circuit portion outputting the Q1, Q2, Q3, and Q4 signals shown in Magar Fig. 2a.

(*Id.* (citing JXM-0002 at TPL85300002402).) Respondents say the applicants for the'336 patent concluded their arguments to the examiner by distinguishing their invention from an external crystal used for frequency control or oscillation by saying "[t]he Magar teaching…is specifically distinguished from the instant case in that it is both fixed frequency (being crystal based) and requires an external crystal frequency generator." (*Id.* at 18-19.)

The actions of the applicants in support of the '336 patent are clear in their declarations that the invention requires an "entire" on-chip clock or oscillator, which cannot rely on an external crystal or frequency generator, say Respondents. (*Id.* at 19.) Magar's clock generator was differentiated from the '336 patent by the applicants because it is not an "entire" clock but, instead, relies on an external crystal or a frequency generator. According to Respondents, the claimed "entire" clock and "entire" oscillator cannot be construed to encompass a reliance on an external crystal or frequency generator. (*Id.* at 19-20 (citing *Southwall Tech., Inc., v. Cardinal JG Co.,* 54 F.3d 1570, 1576 (Fed. Cir. 1995); *Rheox, Inc.*, 276 F.3d at 1325; *Gillespie v. Dywidag, Systs. Int'l.*

USA, 501 F.3d 1285, 1291; *Computer Docking Station Corp. v. Dell, Inc.,* 519 F.3d 1366, 1379 (Fed. Cir. 2008); *Am. Piledriving Equip. v. Geoquip, Inc.*, 634 F.3d 1324, 1336 (Fed. Cir. 2011); *Seachange Int'l, Inc. v. C-COR, Inc.*, 413 F.3d 1361, 1372-75 (Fed. Cir. 2005)).) Moreover, argue Respondents, regardless of whether either or both of these arguments was successful, or even necessary, in convincing the examiner to allow the sought-after claims, the public is entitled to rely on them. (*Id.* at 20 (citing *Elkay Mfg.,* 192 F.3d at 979).)

Respondents say that, in addition to disclaiming reliance on an external crystal or clock generator, the applicants repeatedly, clearly, and unambiguously disclaimed reliance on control signals for controlling the clock. (*Id.* at 20-21.) The first of these disclaimers concerned the examiner's rejection of the claims in light of U.S. Patent No. 4,670,837 to Sheets ("Sheets"). (*Id.* at 21.) The named inventors distinguished their invention from microprocessors that rely on frequency control information from an external clock source. (*Id.* (citing JXM-0002 at TPL85300002473).) Because the applicants referred to the "present invention" in making this disclaimer, it applies to all of the claims of the '336 patent, according to Respondents. (*Id.* (citing *Ballard Med. Prods. v. Allegiance Healthcare Corp.,* 268 F.3d 1352, 1360-62 (Fed. Cir. 2001)).)

In response to a subsequent rejection, the applicants went further and disclaimed the use of controlled oscillators altogether, regardless of whether the control is on the chip or not:

> Even if the examiner is correct that the variable clock in Sheets is in the same circuit as the microprocessor of system 100, that still does not give the claimed subject matter. In Sheets, a command input is required to change the clock speed.

(*Id.* (citing JXM-0002 at TPL85300002449).) According to the applicants' actions in this regard, simply having a CPU clock on the chip is not enough to meet the claimed invention because controlling the on-chip ring oscillator's speed by use of a command signal "does not give the claimed subject matter." (*Id.* (citing JXM-0002 at TPL85300002449).) In that same amendment,

the applicants left no doubt that, unlike "all cited references," the on-chip clock or on-chip oscillator of the invention is completely free of inputs and extra components:

> Crucial to the present invention is that ...when fabrication and environmental parameters vary, the oscillation or clock frequency and the frequency capability of the driven device will automatically vary together. This differs from all cited references in that...the oscillator or variable speed clock varies in frequency but does not require manual or programmed inputs or external or extra components to do so.

(*Id.* at 21-22 (citing JXM-0002 at TPL85300002450).) This statement confirms the applicants' disclaimer of any reliance on control signals, argue Respondents. (*Id.* at 22.) Therefore, their constructions correctly include, and Complainants' constructions incorrectly ignore, a requirement that the clock or oscillator "not rely on...a control signal to generate a clock signal." (*Id.*)

Respondents call attention to the fact that the '336 patent was the subject of prior litigation in the United States District Court for the Eastern District of Texas, in which case the presiding judge construed the term "entire ring oscillator variable speed system clock in said single integrated circuit" as recited in claim 1 this way: "a ring oscillator variable speed system clock that is located entirely on the same semiconductor substrate as the CPU and does not directly rely on a command input control signal or an external crystal/clock generator to generate a clock signal." (*Id.* at 23 (citing RXM-2 at 11-12 (Markman Order in *Tech Props. Ltd. v. Matsushita Elec. Indus. Co., Ltd.,* 54 F.Supp. 2d 916, 926 (E.D. Tex. June 15, 2007))).) Respondents quote the district court judge's statement that he "agrees with the defendants that the applicant disclaimed the use of an input control signal and an external crystal/clock generator to generate a clock signal." (*Id.*) Respondents argue that their proposed construction largely mirrors the district court judge's construction. (*Id.*)

According to Respondents, Complainant Technical Properties Limited ("TPL") has itself embraced the Texas district court judge's construction, thereby recognizing that a clear disclaimer narrows the claim scope and that the applicants disclaimed the use of an external crystal/clock or external control signals for controlling the oscillator or clock. (*Id.* at 24.) In a pending federal district court case between TPL and HTC, Acer, and Gateway in the Northern District of California (Case Nos. 5:08-cv-00877, 5:08-cv-0082, 5:08-cv-05398) TPL asked the court to adopt the Texas court judge's prior construction for the three disputed claim limitations that include the word "entire." (*Id.* (citing RXM-0003 (Joint Claim Construction Statement at Ex. B. Rows 19, 23, and 28)).) According to Respondents, it is unfairly prejudicial to them and the public for TPL to argue for construction of terms a certain way in one case and another, contrary, way in a co-pending case. (*Id.*)

Respondents say the Texas district judge's construction differs from theirs in two ways. First, it adds the word "directly" as a qualifier to the term "rely on," and second, it adds "command input" as a qualifier of "control signal." According to Respondents, the Texas court's claim construction order does not explain why its construction includes these qualifiers or what they mean; nor would a person of ordinary skill in the art understand what "directly rely on" means in the context of the claims. (*Id.* at 24-25 (citing RXM-0004 (Declaration of Dr. Vivek Subramanian in Support Respondents' Initial Markman Brief) at ¶¶ 9-10).) They argue that nothing in the prosecution history or in the patent itself limits either of the applicants' disclaimers in the manner described in the Texas court's construction, noting that the applicants explained that "Magar…is specifically distinguished from the instant case in that it is both fixed frequency (being crystal based) and requires an external crystal or external frequency generator." (*Id.* (citing JXM-0002 at TPL85300002403).) There is no suggestion of a "direct" reliance on an external crystal by reason

of this statement, argue Respondents. (*Id.*) Similarly, they say, nothing in the following statement by the applicants limits the scope of the disclaimer to "direct" reliance on an external crystal: "one of ordinary skill in the art should readily recognize that the speed of the CPU and clock do not vary together due to manufacturing variation, operating voltage, and temperature of the IC in the Magar processor....This is simply because the Magar microprocessor clock is frequency controlled by a crystal which is also external to the microprocessor." (*Id.* (citing JXM-0002 at TPL85300002427).) Nor, argue Respondents, does this statement limit the frequency control to direct control, and in this regard, Magar is silent as to the specific components that constitute the "clock generator" and how these components interact with the crystal inputs, much less specify that the components are controlled "directly" by control signals. (*Id.*) Similarly, when the applicants told the examiner that the "present invention...differs from all cited references in that...the oscillator or variable speed clock varies in frequency but does not require manual or programmed inputs or external or extra components to do so," they disclaimed all manual or programmed control signals, not just "command input" control signals. (*Id.* at 25-26 (citing JXM-0002 at TPL85300002429).) Therefore, argue Respondents, while the Texas court correctly recognized the external crystal/clock generator and control signal disclaimers, the "directly" and "command input" qualifiers in that constructions should not be adopted for purposes of this investigation. (*Id.* at 26.)

Staff's arguments for its proposed construction

Staff notes that during prosecution of the application that resulted in the '336 patent, the applicants amended the claims so as to distinguish Magar, which discloses an on-chip clock generator that relies on an off-chip component, an external crystal, to determine clock frequency and which the applicants alleged was distinct from their invention. (SMBr. at 8 (citing JXM-0002

at TPL85300002401-02).) Similarly, in the course of distinguishing the patent to Sheets, the applicants asserted:

> The present invention does not...rely upon provision of frequency control information to an external clock, but instead contemplates providing a ring oscillator clock and the microprocessor within the same integrated circuit. The placement of these elements within the same integrated circuit obviates the need for provision of the type of frequency control information described by Sheets, since the microprocessor and clock will naturally tend to vary commensurately in speed as a function of various parameters (e.g. temperature) affecting circuit performance.

(*Id.* (citing JXM-0002 at TPL85300002473).)

According to Staff, Complainants' proposed construction is improper to the extent it fails to reflect these disclaimers. Staff says that, while Respondents' proposed construction appears to accurately capture the applicants' clear disclaimer, Respondents still have not offered a construction of the term "entire." Staff says that incorporating a proper construction of the term "entire" excludes what was disclaimed by the applicants because the prior art that they distinguished does not disclose an entire oscillator in the same integrated circuit as a microprocessor. (*Id.* at 9.) Staff says that both Magar and Sheets disclose oscillators relying on off-chip components to determine frequency, and therefore, Staff's construction better captures the meaning of the disputed phrases as they would be understood by a person of ordinary skill in the art. (*Id.*)

Complaints' response to Respondents and Staff

Complainants maintain that the word "entire" refers to the on-chip circuitry that is used to generate the clock signal, having recognized that traditional microprocessor systems were designed such that their central processing units would operate under worse case conditions, given wide temperature and voltage swings and semiconductor processing variations. (CRMBr. at 9

(citing JXM-0001 at 16:48-53).) Specifically, they argue, traditional CPUs relied on off-chip, fixed-speed crystals or clock generators to generate the clock signal; however, the CPU's speed capability was tied to processing variances and voltage and temperature swings. (*Id.* at 9-10.) For example, the external clock could not assume that the CPU could operate at a particular speed, because the CPUs capabilities were variable. (*Id.* at 10.) Therefore, the CPU had to be clocked at far less than its maximum operating capability to account for times when it would operate under worse case conditions. But in order to enhance CPU performance, the inventors of the '336 patent designed their microprocessor system so that the circuitry that generates the CPU clock "system clock" (ring oscillator, oscillator, variable speed clock) is fabricated on the same silicon chip as the rest of the microprocessor. (*Id.* (citing JXM-0001 at 16:57-58).) The preferred embodiment identifies the ring oscillator of the invention as the "system clock," argue Complainants. (*Id.* (citing JXM-0001 at 16:54-56).) And the terms "oscillator" and "variable speed clock" each refers to the on-chip oscillators that generate the CPU clock. (*Id.*) Because the on-chip oscillator is fabricated of transistors on the same substrate as the rest of the microprocessor, the transistors of the oscillator and the CPU will be similarly affected by manufacturing process variances, and voltage and temperature swings. (*Id.* (citing JXM-0001 at 16:63-17:10).)

Complainants say that each claim of the '336 patent includes a limitation requiring that the oscillator be deposed on the same integrated circuit as the CPU. (*Id.* at 10-11.) In each case, the claims make clear that it is the transistors or electronic components of the circuitry that generate the clock signal for the CPU that must be on the same substrate as the CPU, argue Complainants. (*Id.* at 11.) They say that during the prosecution of the '336 patent, the then-pending claims were rejected as obvious over Magar in view of U.S. Patent 4,627,082 ("Pelgrom"), and in response, the applicants, in order "to sharpen the distinction over the prior art," rewrote the independent claims

to add the word "entire," thus "to specify that the entire ring oscillator variable speed clock, variable speed clock, or oscillator be provided in the integrated circuit." (*Id.* (citing CXM-0016 (2/8/98 Amendment) at 3).) In distinguishing the invention from the prior art, the applicants wrote this:

> Because the prior art does not provide an entire ring oscillator variable speed system clock, variable speed clock or oscillator in the integrated circuit, in that the prior art circuits require an external crystal, the prior art fails to teach or suggest the invention as now claimed.

(*Id.* (citing CXM-0016 at 3).) Therefore, reason Complainants, the phrase "entire ring oscillator variable speed system clock" in claims 1 and 11 is properly construed to mean the ring oscillator, which is inherently variable in speed, on the integrated circuit which generates the system clock. (*Id.*) This construction, they argue, is supported by the '336 patent specification, which teaches that the "[c]lock circuit is the familiar 'ring oscillator'...fabricated on the same silicon chip as the rest of the microprocessor." (*Id.* (citing JXM-0001 at 16:56-58).)

Complainants argue that, contrary to Respondents' argument, there is nothing in the patent specification that comes close to a disclaimer of all uses of off-chip crystals or clock generators; moreover, the patent does not, as Respondents contend, criticize any and all uses of the external crystals and control signals. (*Id.*) Instead, according to Complainants, the patent teaches that, by clocking the CPU using an oscillator that is disposed on the same chip as the CPU, thus enabling both components to vary with PVT parameters, the speed of the CPU need not be fixed to the worse case conditions affecting the CPU. (*Id.* at 12.)

As for the prosecution history with respect to Magar, Complainants argue that Respondents repeatedly mischaracterize the prosecution history in order to argue that all use of an external crystal and frequency generators was disclaimed by the applicants for the '336 patent. (*Id.* at

12-13.) In particular, the Respondents assert that Magar teaches an oscillator as disclosed by an external crystal and an on-chip oscillator disclosed by the "clock gen" block. However, argue Complainants, in the file history, the applicants pointed out that Magar disclosed only one oscillator circuit, which was embodied by the external crystal. (*Id.* at 12-13.) Complainants say Respondents misuse this assertion, taken out of context, to mischaracterize the comments made by the applicants and in so doing assert that the applicants distinguished their invention from the prior art on the basis that their on-chip oscillator does not rely on an external crystal or frequency generator, without pointing out the applicants really distinguished their invention from the prior art system because Magar, unlike the invention, only had an external crystal oscillator for generating the clock signal for the system clock. (*Id.* at 13.)

Complainants say that Magar discloses an on-chip clock generator circuit "CLOCK GEN" into which is provided two signals from an off-chip crystal oscillator. (*Id.*) In a non-final rejection based on Magar, the examiner asserted that the "CLOCK GEN" circuitry was fabricated on the same microprocessor substrate as the CPU. (*Id.* (citing CXM-0015 (4/3/97 Office Action) at 2).) In response, the applicants specifically pointed out that their invention had an on-chip oscillator, unlike Magar, and was further distinguishable from Magar because an external fixed frequency crystal drives the clock disclosed in Magar: "The definitive statement that the clock gen circuit in Fig. 2a in the Magar patent is equivalent to the 'conventional crystal clock' 434 in Fig. 17 of the present application is at col. 15, lines 26-41 of Magar." (*Id.* (citing CXM-0013 (7/7/97 Amendment) at 2).)

To further clarify, argue Complainants, the applicants then quoted from their description of an embodiment of their invention which describes their variable speed clock and pointed out that "the variable speed clock is a primary point of departure from the prior art." (*Id.* (citing

CXM-0013 at 3).) The applicants, say Complainants, explained that not only is the crystal oscillator in Magar not made on the same integrated substrate as the CPU—and therefore the Magar clock is not capable of varying with the CPU based on variations in manufacturing process, operating voltage, and temperature—but even if the crystal were formed on the same substrate, which is not possible, it would not vary in the same way as the frequency capability of the microprocessor because the oscillation frequency of the crystal oscillator is designed not to vary in response to such things as temperature, voltage, or manufacturing conditions. (*Id.*) The applicants, note Complainants, made the following statement:

> The present invention is unique in that it applies, and can only apply, in the circumstance where the oscillator or variable speed clock is fabricated on the same substrate as the driven device. The example given is a non-crystal controlled circuit, a ring oscillator. A ring oscillator will oscillate at a frequency determined by its fabrication and design and the operating environment.

(*Id.* (citing CXM-0013 at 5).) Complainants argue that the applicants went on to explain that their invention differs from the cited prior art not only because the oscillator and the CPU are on the same substrate but also because "the oscillator or variable speed clock varies in frequency but does not require manual or programmed inputs or external or extra components to do so." (*Id.* (citing CXM-0013 at 5).)

According to Complainants, the applicants' remarks in response to the second office action citing Magar do not include a clear and unambiguous disclaimer. (*Id.* at 15.) Complainants argue that the patent applicants maintained that Magar disclosed only an external crystal-based oscillator, noting in their Remarks that Magar did not disclose an "entire ring oscillator variable speed system clock, variable speed clock or oscillator in the integrated circuit" and instead (and not in addition to) "the prior art circuits require an external crystal," as noted in this extract from the prosecution history:

> Because the prior art does not provide an entire ring oscillator variable speed system clock, variable speed clock or oscillator in the integrated circuit, in that the prior art circuits require an external crystal, the prior art fails to teach or suggest the invention now claimed.

(*Id.* (citing CXM-0016 (2/8/98 Amendment) at 3).) Notably, according to Complainants, the applicants went on to emphasize that the external crystal in Magar is required for a particular purpose, oscillation of the clock:

> Magar's clock generator relies on an external crystal connected to terminals X1 and X2 to oscillate, as is conventional in microprocessor designs. It is not an entire oscillator in itself.

(*Id.* (citing CXM-0016 at 3).) The applicants also explained that in Magar the "entire oscillator" is not on the integrated circuit because "it requires an external crystal." (*Id.* (citing CXM-0016 at 4).) Then, say Complainants, the applicants pointed out that "as a self-contained on-chip circuit, Magar's clock gen is distinguished from an oscillator in at least that it lacks the crystal or external generator it requires." (*Id.*) Despite its name, Magar's "Clock Gen" is only circuitry to modify the clock speed provided by the external crystal oscillator and therefore Magar does not have an "entire" oscillator on the same circuit as the CPU because its oscillator was formed off the chip, argue Complainants. (*Id.* at 15-16.) In summarizing their points, the applicants wrote this:

> The Magar teaching is well known in the art as a conventional crystal controlled oscillator. It is specifically distinguished from the instant case in that it is both fixed-frequency (being crystal based) and requires an external crystal or external frequency generator.

(*Id.* at 16 (citing CXM-0016 at 5).) Complainants argue that the applicants were clearly pointing out that their invention does not require an external crystal oscillator or external frequency generator to generate the clock signal, and nowhere do they indicate that such components are prohibited from any embodiment that practices the invention. (*Id.*) It is clear from the file history,

they argue, that the applicants distinguished Magar on the basis that it did not have an "entire" on-chip oscillator as claimed. Because Magar did not have any on-chip oscillator, there was no issue as to whether such an on-chip oscillator could be regulated in any fashion by external circuitry. (*Id.*) Therefore, Respondents' assertion that the applicants "clearly and unambiguously" disclaimed any reliance on an external crystal/clock generator is incorrect and should be rejected, argue Complainants.

As for Respondents' argument that the applicants clearly and unambiguously disclaimed all reliance on control signals to control the clock based on their distinction from Sheets, Complainants say this too should be rejected as an inaccurate characterization of the prosecution history regarding Sheets. (*Id.* at 16-17.) Complainants say the applicants distinguished Sheets because it did not include an on-chip oscillator because it provides frequency control information to an external clock and requires a command signal to control the external clock. (*Id.* at 17 (citing CXM-0012 (4/15/96 Amendment) at 8).) Complainants quote the following passage therefrom:

> The present invention does not simply rely upon provision of frequency control information to an external clock, but instead contemplates providing a ring oscillator clock and the microprocessor within the same integrated circuit. The placement of these elements within the same integrated circuit obviates the need for provision of the type of frequency control information described in Sheets....Sheet's system for providing clock control signals to an external clock is thus seen to be unrelated to the integral microprocessor/clock system of the present invention.

(*Id.*)

According to Complainants, the applicants made the same "requirement" distinction in response to a subsequent rejection over Sheets, wherein they said this:

> Even if the examiner is correct that the variable clock in Sheets is in the same integrated circuit as the microprocessor of system 100, that still does not give the claimed subject matter. In Sheets a command input is required to change the clock

> speed [but in] the present invention...[n]o command input is necessary to change the clock frequency.

(*Id.*)

Administrative Law Judge's findings and construction

The Administrative Law Judge finds the proposed construction of Complainants to be inadequate. They propose this definition: "a ring oscillator, variable speed system clock, wherein the ring oscillator is located entirely on the same semiconductor substrate as the central processing unit". The insertion of the two commas is not explained, as there are no commas in the patentees' syntax: "an entire ring oscillator variable speed system clock in said single integrated circuit". It appears that the Complainants are treating the phrase "variable speed system clock" which lies between the two commas as merely an appositive of the term "ring oscillator," as though the latter term is explanatory of the earlier one. This is also suggested in Complainants' arguments that the preferred embodiment identifies the ring oscillator of the invention as the "system clock," and the terms "oscillator" and "variable speed clock" each refers to the on-chip oscillators that generate the CPU clock. However, the applicants made it clear that their invention is both an oscillator and a clock:

> Applicant's prior comments apparently did not make clear the distinction between an oscillator and a clock as it applies to the Magar reference. As a self-contained on-chip circuit, Magar's clock gen is distinguished from an oscillator in at least that it lacks the crystal or external generator that it requires. Thus Magar's circuit is not an entirely on-chip oscillator as contemplated in the present case, it is only a clock.

(JXM-0016 at 4.) The applicants then said this:

> As mentioned in Applicant's previous remarks, the term clock is sometimes used interchangeably with oscillator, even inappropriately, leading to confusion. And, adding to the confusion, in the instant case, 430 is both an oscillator and a clock in the conventional senses. It is an oscillator in that it oscillates without external components (unlike the Magar reference). An example of such an

> oscillator circuit which does not utilize external components is given in Fig. 18 of the present application. It is also a clock in Magar reference sense in that it produces the various timing signals needed of the CPU....

(*Id.*) Since, in the applicants' own words, "430," which is the "ring oscillator variable speed clock" is both an oscillator and a clock in the conventional senses, there is no reason for treating the term "variable speed system clock" as an appositive of the term "ring oscillator." Rather, the evidence points to the notion that a "ring oscillator variable speed system clock" is a grammatical unit: "both an oscillator and a clock in the conventional senses." Therefore, insofar as Complainants' insertion of the two commas is unexplained and could lead to an ambiguous and perhaps misleading construction, it is deemed improper.

The remainder of Complainants' proposed construction is found lacking because it fails to account for the actions of the applicants during the course of prosecution of the patent. They pointedly said this:

> Because the prior art does not provide an entire ring oscillator variable speed system clock, variable speed clock or oscillator in the integrated circuit, in that the prior art circuits require an external crystal, the prior art fails to teach or suggest the invention as now claimed.

(*Id.* at 3.) It is manifest therefore that the term "entire" as it was argued by the applicants to the examiner, for the very purpose of overcoming his rejection based on Magar and Pelgrom, requires that the ring oscillator variable speed system clock, as taught by the invention of the '336 patent, be on the same semiconductor substrate as the central processing unit. Magar's clock generator "is not an entire oscillator in itself" because it "relies on an external crystal connected to terminals X1 and X2 to oscillate." (*Id.*) "It is specifically distinguished from the instant case in that it is *both* fixed-frequency (being crystal based) and requires an external crystal or external frequency generator." (*Id.* at 5 (emphasis added).)

Complainants' proposed construction does not convey the essential point made by the applicants in seeking to gain acceptance of the examiner for their purported invention by asserting that the ring oscillator variable speed clock "does not utilize external components" (JXM-0016 at 4.) On the other hand, Respondents' proposed construction does. It expresses the fact that the ring oscillator variable speed system clock is a self-contained oscillator and clock which does not utilize external components (as is disclosed in Fig. 18 of the '336 patent). Furthermore, it captures the distinction argued by the applicants in distinguishing Sheets, when they said this:

> The present invention does not similarly rely upon provision of frequency control information to an external clock, but instead contemplates providing a ring oscillator clock and the microprocessor within the same integrated circuit. The placement of these elements within the same integrated circuit obviates the need for provision of the type of frequency control information described by Sheets, since the microprocessor and clock will naturally tend to vary commensurately in speed as a function of various parameters (e.g., temperature) affecting circuit performance. Sheets' system for providing clock control signals to an external clock is thus seen to be unrelated to the integral microprocessor/clock system of the present invention.

(JXM-0017 at 8.)

Although the Complainants argue that the applicants' statements during prosecution of the patent do not amount to a clear disavowal, the Administrative Law Judge finds otherwise. In *Safran v. Johnson & Johnson,* ___ F.3d___ 2013 WL 1338910 (Fed. Cir. 2012) at *7, the court said:

> To be sure, a prosecution disclaimer requires "clear and unambiguous disavowal of claim scope," *Storage Tech. Corp. v. Cisco Sys., Inc.,* 329 F.3d 823, 833 (Fed.Cir.2003), but applicants rarely submit affirmative disclaimers along the lines of "I hereby disclaim the following ..." during prosecution and need not do so to meet the applicable standard. In this case, Saffran's unqualified assertion that "the device used is a sheet" extends beyond illuminating "how the inventor understood the invention," *Phillips v. AWH Corp.,* 415 F.3d 1303, 1317 (Fed.Cir.2005) (en banc), to provide an affirmative definition for the disputed term. Given such definitive statements during prosecution, the interested public was entitled to

> conclude that the "device" recited in the claims of the '760 patent is a continuous sheet.

The same holds true here, where the applicants' unqualified statements in distinguishing Magar, Pelgrom, and Sheets support the conclusion that the entire ring oscillator is both entirely on the same semiconductor substrate as the central processing unit but also does not rely on a control signal or an external crystal/clock generator to generate a clock signal.

Although Staff's construction also addresses the point, it does so too broadly with the words "all components that determine clock frequency." How literally the word "determine" is to be applied in the context of the claim is a subject that invites further debate.

Therefore, the Administrative Law Judge concludes that the term "an entire ring oscillator variable speed system clock in said single integrated circuit" as it appears in claims 1 and 11 means "a ring oscillator variable speed system clock that is located entirely on the same semiconductor substrate as the central processing unit and does not rely on a control signal or an external crystal/clock generator to generate a clock signal".

> **3. Claims 6, 13**—*"an entire oscillator disposed upon said integrated circuit substrate"*

The parties' proposed constructions for this term are as follows:

Respondents	Complainants	Staff
an oscillator that is located entirely on the same semiconductor substrate as the central processing unit and does not rely on a control signal or an external crystal/ clock generator to generate a clock signal	an oscillator that is located entirely on the same semiconductor substrate as the central processing unit	an oscillator that includes all components that determine oscillator frequency located on the same semiconductor substrate as the CPU

(CMBr. at 15; RMBr. at 12; SMBr. at 7.) Complainants say the parties generally agree on the construction of this phrase with the exception that the Respondents seek to add the same improper limitations as those discussed in connection with the previous claim term, and for the same reasons

provided by Complainants in that regard, Respondents' proposed construction should be rejected and Complainants' should be accepted. (CMBr. at 15.)

Respondents' argument with respect to this claim term is the same as its argument with respect to the previous claim term, as mentioned above, and therefore need not and will not be repeated here. (RMBr. at 12-25.) The same holds true for Staff. (SMBr. at 6-9.)

Administrative Law Judge's findings and construction

The Administrative Law Judge finds that the same evidence and reasoning applies to this term as to the prior term and therefore concludes that the term "an entire oscillator disposed upon said single integrated circuit substrate" means "an oscillator that is located entirely on the same substrate as the central processing unit and does not rely on a control signal or an external crystal/clock generator to generate a clock signal".

4. Claims 10, 16—*"an entire variable speed clock disposed upon said integrated circuit substrate"*

The parties' proposed constructions for this term are as follows:

Respondents	Complainants	Staff
a variable speed clock that is located entirely on the same semiconductor substrate as the CPU and does not rely on a control signal or an external crystal/ clock generator to generate a clock signal	a variable speed clock that is located entirely on the same semiconductor substrate as the central processing unit	a variable speed clock that includes all components that determine clock frequency located on the same semiconductor substrate as the CPU

(CMBr. at 15; RMBr. at 13; SMBr. at 7.) Complainants say the parties generally agree on the construction of this phrase with the exception that the Respondents seek to add the same improper limitations as those discussed in connection with the previous claim terms, and for the same reasons provided by Complainants in that regard, Respondents' proposed construction should be rejected and Complainants' should be accepted. (CMBr. at 16.) Respondents' argument with

respect to this claim term is the same as its argument with respect to the previous claim terms, as mentioned above, and therefore need not and will not be repeated here. (RMBr. at 12-25.) The same holds true for Staff. (SMBr. at 6-9.)

Administrative Law Judge's findings and construction

The Administrative Law Judge finds that the same evidence and reasoning applies to this term as to the two previous claim terms and therefore concludes that the term "an entire variable speed clock disposed upon said single integrated circuit substrate" means "a variable speed clock that is located entirely on the same semiconductor substrate as the central processing unit and does not rely on a control signal or an external crystal/clock generator to generate a clock signal".

5. Claims 1, 6, 10, 11, 13, 16—*"clocking said central processing unit"*

The parties' proposed constructions for this term are as follows:

Respondents	Complainants	Staff
timing the operation of the CPU such that it will always execute at the maximum speed possible, but never too fast	providing a timing signal to said central processing unit	

(CMBr. at 16; RMBr. at 62; SMBr. at 26.)

Complainants' arguments in support of their proposed construction

Complainants say the plain and ordinary meaning of "clocking said central processing unit" is to provide a timing signal to the central processing unit, a statement that is supported by the general discussion of the purpose of the ring oscillator variable speed clock in the '336 patent. (CMBr. at 16 (citing JXM-0001 at 16:43-17:37).) Complainants say their proposed construction is supported by the district court judges' constructions in the Texas and California cases previously mentioned. (*Id.*) Complainants say the Respondents seek to import a limitation from the preferred

embodiment of the invention, which they say is improper, even when there is but one embodiment disclosed. (*Id.* at 16-17 (citing JXM-0001 at 16:59-17:2; *Innova/Pure Water,* 381 F.3d at 1117).) Complainants argue that because the patentee never made any clear intention to limit the claim scope of the '336 patent in the manner suggested by Respondents, their proposed additional limitation should be rejected. (*Id.* at 18.)

Respondents' arguments for their proposed construction

Respondents says their proposed construction of this limitation is drawn directly from clear statements in the specification and prosecution history describing the purported invention as including a central processing unit that "will always execute at the maximum speed possible, but never too fast." (RMBr. at 62.) In this regard, argue Respondents, the specification asserts that the alleged invention surpasses the prior art because "[by] deriving system timing from the ring oscillator 430, CPU 70 will always execute at the maximum frequency possible, but never too fast." (*Id.* at 62-63 (citing JXM-0001 at 16:59-17:2).) Respondents argue that these statements must be reflected in the construction of the claims because when the embodiment "is described in the specification as the invention itself, the claims are not necessarily entitled to a scope broader than that embodiment." (*Id.* at 63 (citing *Edwards Lifesciences LLC v. Cook, Inc.,* 582 F.3d 1322, 1330 (Fed. Cir. 2009)).) The say, more specifically, "[w]here the specification makes clear that the invention does not include a particular feature, that feature is deemed to be outside the reach of the claims of the patent, even though the language of the claims, read without reference to the specification, might be considered broad enough to encompass the feature in question." (*Id.*) They also contend that when the specification, as here, "describes a feature of the invention…and criticizes other products… that lack that same feature, this operates as a clear disavowal of these other products…." (*Id.*)

According to Respondents, all of these principles apply here because the specification of the '336 patent emphatically declares that the CPU of the alleged invention "always" executes at the maximum speed and criticizes products that lack this feature. (*Id.*) The applicants also relied on this feature to distinguish the Sheets reference during the prosecution of the '336 patent when they argued that "CPU 70 executes at the fastest speed possible using the adaptive ring counter clock 430." (*Id.* (citing JXM-0002 (4/15/96 Amendment) at 8-9).)

Staff's arguments for its proposed construction

Staff says its proposed construction is consistent with the plain language of the claims, the intrinsic record of the '336 patent, and the prior Markman orders of the district court judges previously mentioned. (SMBr. at 26.) Staff says the specification of the '336 patent describes an embodiment of a microprocessor system using clocking techniques that overcome prior art limitations requiring that clock speeds be restricted based on worst-case conditions. (*Id.* (citing JXM-0001 at 15:44-53).) Although the disclosed clocking technique purportedly allows a microprocessor to be clocked at optimal speed, the specification does not express a clear intent to so limit the claims. (*Id.* at 27.) It is possible for a designer to vary clock speed by changing the number of inverters used in the ring inverter, as indicated in Figure 18 of the '336 patent, and this disclosure is consistent with the constructions proposed by Staff and Complainants, says Staff. (*Id.*) Moreover, the plain language of the claim does not require or even suggest that the CPU must be clocked at the maximum speed possible. Instead, the speed of the disclosed clock depends on the propagation delay of the ring oscillator: too few inverters and the clock will oscillate too fast; too many inverters and the clock will oscillate sub-optimally. (*Id.*)

Staff argues that Respondents' construction attempts to import limitations from a disclosed embodiment into the claims, which is improper. (*Id.* (citing *Intel Corp. v. U.S. Int'l Trade*

Comm'n, 946 F.2d 821, 836 (Fed. Cir. 1991) ("Where a specification does not require a limitation, that limitations should not be read from the specification into the claims.")).) Staff maintains that even though the specification recites that "CPU 70 will always execute at the maximum frequency possible, but never too fast," the intrinsic evidence does not show an express intent to import this limitation into the claims. (*Id.* at 28 (citing *Thorner v. Sony Computer Entertainment America, LLC,* 669 F.3d 1362, 1368 (Fed. Cir. 2012)).)

Administrative Law Judge's findings and construction

The Administrative Law Judge concludes that Respondents' proposed construction impermissibly reads into the claims a limitation expressed in the specification: "such that it will always execute at the maximum speed possible, but never too fast." In the first place, the statement in itself, divorced from the surrounding discussion, is susceptible to misinterpretation. What does it mean to say never too fast? Strictly speaking, if something is designed to operate at the maximum speed possible, it cannot by so doing be operating too fast. What is meant by "too fast"? Too fast for what? In the end, there is only one word in this term that is in question, "clocking," although the parties are in agreement as to the basic meaning of the word. Respondents say it is "timing the operation of the CPU" and Complaints and Staff say it is "providing a timing signal to the central processing unit." In this respect the parties are in accord. However, Respondents seek to impose a further limitation, one which adds ambiguity, and this is not helpful. Furthermore, it violates the principle that the words of a claim are generally to be given their plain and ordinary meaning.

For these reasons, the Administrative Law Judge concludes that the term "clocking said central processing unit" means "providing a timing signal to said central processing unit."

6. Claims 6, 13—*"thereby enabling said processing frequency to track said clock rate in response to said parameter variation"*

The parties' proposed constructions for this term are as follows:

Respondents' Proposed Construction	Staff's Proposed Construction	TPL's Proposed Construction
said parameter variation directly causing said processing frequency to track said clock rate		[thereby enabling] the processing frequency of the central processing unit to follow said clock rate in response to said parameter variation

(CMBr. at 18; RMBr. at 43; SMBr. at 16.)

Complainants' arguments in support of their proposed construction

Complainants begin by criticizing Respondents' and Staffs' proposed construction on the ground that they seek to rewrite the claim language that is clear on its face: fabricating the oscillator and CPU on the same chip enables or allows the "processing frequency of the central processing unit" to follow or track "said clock rate in response to said parameter variation." (CMBr. at 18.) According to Complainants, Respondents seek to read "enabling" entirely out of the claim. (*Id.*) Complainants say the word "enable" connotes "allow," or "make possible," or "create the capability." (*Id.* at 18-19.) They say the Respondents want to replace "enable" with "directly causing," an expression for which there is no basis. (*Id.* at 19.)

According to Complainants, the '336 specification supports their construction that the invention "enables" or "makes possible" the capability for the frequency of the CPU to follow the clock rate in response to changes in parameters like temperature, voltage and semiconductor processing variations. (*Id.* (citing JXM-0001 at 16:47-67).) Complainants argue that, contrary to Respondents' suggestion, nothing in the specification demands a limitation that parameter variations must "directly cause" the processing frequency of the CPU to track the clock rate. (*Id.*) The specification explains that all of the transistors on the same silicon die, both the transistors of

the ring oscillator and those of the CPU, will be affected "similarly" because they are fabricated on the same piece of silicon. (*Id.*) The invention enables a clocking system that takes advantage of the laws of physics, which dictate that all of the transistors on the same chip will be affected "similarly" as certain parameters vary. (*Id.*)

Complainants argue that the prosecution history demonstrates that their proposed construction is correct, because there is nothing in the history that contradicts the clear meaning of the claim as recited in Complainants' construction. The language "thereby enabling said processing frequency to track said clock rate in response to said parameter variation" was added in an amendment of April 15, 1996. (*Id.* at 19-20 (citing CXM-0012 (claim 73)).) In explaining the amendment, the applicants' attorney made the following observation: "This advantageously allows a processing frequency of the central processing unit to track a clock rate of the oscillator as a function of substrate parameter variation." (*Id.* at 20 (citing CXM-0012 at 9-10).) Complainants argue that this explanation is entirely consistent with the Complainants' proposed construction and does not support Respondents' additional limitation. (*Id.*)

Respondents' arguments in support of their proposed construction

Respondents argue that the specification teaches that the PVT parameters (process, voltage, and temperature) determine the ring oscillator frequency, which in turn drives the CPU frequency. In this regard, the specification states "the ring oscillator frequency is determined by the parameters of temperature, voltage, and process…[and] its performance tracks the parameters which similarly affect all other transistors on the same silicon die." (RMBr. at 44 (citing JXM-0001 at 16:59-67).) The CPU, in turn, derives its system timing from the ring oscillator. (*Id.* (citing JXM-001 at 16:67-17:2 ("By deriving system timing from the ring oscillator 430, CPU 70 will always execute at the maximum frequency possible, but never too fast.")).) In other words,

argue Respondents, any change to the PVT parameters will directly cause a change in the CPU processing frequency. (*Id.*)

According to Respondents, the prosecution history is in accord with their proposed construction, revealing that the patent applicants distinguished Magar precisely on this point, as shown by this excerpt:

> The Examiner states that "Since Pelgrom's [Magar's] [sic] microprocessor is made of electronic components, it would have been obvious, from the teaching of Pelgrom, to a person of ordinary skill in the art to have the components of Magar' [sic] microprocessor and clock (oscillator) make [sic] of the same process for ensuring processing frequency of the cpu [sic] to track the clock rate in response to parameter variations." Applicant agrees that the processing frequency capability of the CPU would track the clock rate capability of the clock generator, as this is controlled by the laws of physics on which the Pelgrom reference is based. However, there would be no "tracking" of the clock rate produced by the Magar clock generator, because the entire circuit is not provided on the integrated circuit.

(*Id.* at 44-45 (citing JXM-0002 (February 10, 1999 Amendment) at 3).) The applicants acknowledged that the processing frequency capability of the Magar CPU would track the clock rate capability of the Magar clock generator in response to PVT parameter variations, as controlled by the laws of physics, argue Respondents. (*Id.* at 45.) However, the applicants argued that because the Magar clock generator is not entirely on the same circuit as the CPU, the Magar CPU would not track the actual clock rate—the applicants argued that while the parameter variation would cause changes to the clock rate capability, the result would not be changes to the clock rate. (*Id.*)

In contrast, argue Respondents, the '336 patent claims that both the ring oscillator and the CPU are on the same integrated circuit, and therefore any parameter variation directly causes the CPU processing frequency to track the clock rate. (*Id.*) One of the named inventors confirmed that a key to the alleged invention was combining the entire clock and CPU to allow the PVT

parameter variations to cause the CPU to track the clock rate. (*Id.* (citing RXM-0001C (Fish Dep.) at 140).)

Respondents argue that Federal Circuit precedent supports their construction in respect of equating the phrase "in response to" with "directly causing." (*Id.* at 46.) They say the Federal Circuit affirmed a lower court's construction of "in response to" as requiring direct causation. (*Id.* (citing *Am. CalCar, Inc. v. Am. Honda Motor Co.,* 651 F.3d 1318, 1339-41 (Fed. Cir. (2011)).) In that case, the plaintiff argued that the lower court had misconstrued the term "identifying one of the plurality of providers in response to the vehicle condition," while defendant argued that the "district court properly construed the claims to require a cause-and-effect relationship… require[ing] that the processor identify a provider directly in response to a vehicle condition." (*Id.*) Respondents quote this passage from the Federal Circuit's decision:

> We agree with the district court's claim construction…[that] '[i]n response to' connotes that the second event occur in reaction to the first event. The language of the claim itself suggests that when a vehicle condition is detected, the processing element identifies a provider automatically as opposed to requiring further user interaction. Further, the specification fails to disclose any embodiment that requires any type of user interaction prior to identification of a service provider.

(*Id.* (quoting *Am. CalCar*, 651 F.3d at 1339-40).) According to Respondents, the prosecution history and specification confirm that the same direct cause and effect relationship exists between a parameter variation and the CPU system timing, in accordance with Respondents' and Staff's proposed construction. (*Id.*)

Respondents argue that there is no reason to alter the term "track" to "follow" as Complainants do in their proposed construction. (*Id.*) Nowhere do the claims, specification, or prosecution history refer to the CPU processing frequency "following" a clock rate, say Respondents. (*Id.*) In contrast, the claims as well as the specification and prosecution history use

the term "track" numerous times. (*Id.* at 46-47.) Therefore, there is no need to construe the word "track" as "follow." (*Id.* (citing *Interactive Gift Express, Inc. v. CompuServe Inc.,* 256 F.3d 1323, 1331 (Fed. Cir. 2001) ("If the claim language is clear on its face, then our consideration of the rest of the intrinsic evidence is restricted to determining if a deviation from the clear language of the claims is specified.")).)

Staff's arguments in support of its proposed construction

According to Staff, the '336 patent disparages conventional CPU clocking techniques for failing to achieve maximum theoretical performance. (SMBr. at 16 (citing JXM-0001 at 16:44-53).) As a result, conventional microprocessor systems "must be clocked a factor of two slower than their maximum theoretical performance, so they will operate properly in wors[t] case conditions." (*Id.* (quoting JXM-0001 at 16:50-53).) Staff argues that, in order to overcome this purported deficiency in prior art designs, the '336 patent proposes using a variable speed ring oscillator clock that is located entirely on the same integrated circuit as the microprocessor. (*Id.* (citing JXM-0001 at 16:54-58).) The frequency of the variable speed ring oscillator clock is determined, not by an external crystal or off-chip components but by "the parameters of temperature, voltage, and process." (*Id.* (citing JXM-0001 at 16:59-60).) Therefore, parameter variations affect the microprocessor performance and the clock speed in the same manner, and the disclosed clock inherently compensates for such parameter variations, such that "CPU 70 will always execute at the maximum frequency possible, but never too fast." (*Id.* (citing JXM-0001 at 17:1-2).)

Staff says the purpose of the variable speed clock is to overcome deficiencies in the prior art that require designers to limit performance such that the system will correctly function under worst case conditions, and therefore a person of ordinary skill in the art at the time of invention

would understand the invention as requiring direct causality between parameter variation and clock speed. (*Id.* at 17.)

Staff argues that the plain language of the claim requires direct causality between parameter variation and processing speed. (*Id.*) The claim recites varying "the processing frequency…as a function of parameter variation." (*Id.*) As concluded by the judge in the Texas case "a person of ordinary skill in the art reading the patent would understand that the phrase 'as a function of' is describing a variable that depends on and varies with another." (*Id.* (citing SXM-0002, App., Tab 2, *Markman* Order II, at 0046).) Staff argues that such a dependence gives rise to a direct causal relationship, and therefore the constructions proposed by Respondents and the Staff are consistent with both the claim and the specification. (*Id.*)

Therefore, the Staff submits that the phrase "thereby enabling said processing frequency to track said clock rate in response to said parameter variation" should be interpreted to mean "said parameter variation directly causing said processing frequency to track said clock rate." (*Id.*)

Complainants' response to Respondents' and Staff's arguments

Complainants argue that the constructions proposed by Respondents and Staff suffer from at least two major problems. (CRMBr. at 32.) First, these parties ignore the first two words of the phrase, "thereby enabling." (*Id.*) Second, they ignore the preceding limitation of each claim; in other words, the other parties do not consider the apparatus in each claim that "thereby enables" the rest of the disputed phrase. (*Id.*) In so doing, they ignore the '336 patent's teachings about the relationship between the on-chip oscillator and the processing capability of the CPU. (*Id.* (citing JXM-0001 at 16:63-67, 17:2-10).)

Complainants argue that, as explained in both the claims and the specification, the on-chip oscillator is used to "clock" (i.e., provide a timing signal to) the CPU. (*Id.*) Moreover, because the

oscillator and the CPU are fabricated on the same silicon die, the frequency capability of the oscillator and the processing frequency capability of the CPU naturally will vary similarly because of the PVT parameter variations. (*Id.* at 32-33.) Therefore, the PVT variations do not "directly cause" the processing frequency of the CPU to track the clock rate, as suggested by Respondents. Rather, argue Complainants, the claimed structure allows PVT variations to influence both the on-chip oscillator and the processing capability of the CPU in a similar manner, "thereby enabling" the clock to provide an appropriate timing signal to the CPU. (*Id.*) The processing frequency of the CPU must "track" the clock rate of the on-chip oscillator, because the on-chip oscillator generates the clock signals for timing the operation of the CPU.

Complainants argue that their proposed construction is also confirmed by the prosecution history, in which the applicants repeatedly explained that disposing the CPU and the oscillator within the same integrated circuit "allows" the CPU to track variations in the speed of the oscillator. (*Id.*) Complainants say a proper claim construction begins with the words of the claims themselves, which are to be given their ordinary and customary meaning. (*Id.* (citations omitted).) Respondents and Staff, according to Complainants, ignore the words "thereby enabling" in their constructions of the disputed phrase, and this deficiency on their part undermines their proposed constructions. (*Id.*)

Complainants argue that Respondents attempt to frame the dispute in terms of whether the words "in response to" require a particular direct causation, but the real question is whether the words "thereby enabling" require anything more than their plain and ordinary meaning: "allowing," "making possible," or "providing the means" for the processing frequency of the CPU to track the clock rate in response to parameter variations. (*Id.* at 33-34.) The words of the disputed phrase are clear as they stand, and no one disputes the "said processing frequency" is the

frequency at which the CPU operates, argue Complainants. The limitation expressly provides that the processing frequency is "enable[d]" to track the clock rate, and by definition the verb "enable" means "making possible," not "directly causing" something to happen, as Respondents argue. (*Id.*)

Furthermore, nothing in the plain language of this phrase states or implies that the "parameter variation" "directly causes" the CPU processing frequency to track the clock rate, argue Complainants. (*Id.*) Rather, the word "thereby" clearly refers back to the claims' earlier descriptions of the structure of the invention—an oscillator clock or oscillator that is fabricated in the same integrated circuit as the CPU. (*Id.*) This, according to Complainants, is the structure that "thereby enables" the CPU frequency to track the clock rate in response to the PVT variations. (*Id.*)

Specifically, argue Complainants, the limitations of claims 6 and 13 preceding the "thereby enabling" language explain that the CPU and the entire oscillator are disposed upon the same integrated circuit and that the oscillator clocks the CPU. (*Id.* (citing JXM-0001 at *Ex Parte* Reexamination Certificate C1, claim 6, col. 2, ll. 14-23, claim 13, col. 3, ll. 34-38).) The claims also explain that this structure provides common operating characteristics for the transistors of the oscillator and the CPU, "thus varying the processing frequency of [the CPU] and the clock rate of [the oscillator] in the same way as a function of parameter variation." The structure that "thereby enables" is the previously recited structure, which is the CPU and oscillator disposed upon the same integrated circuit. (*Id.* at 34-35.) So it is this structure that "enables" the "processing frequency of [the CPU] to track said clock rate [of the oscillator] in response to said parameter variation." (*Id.* at 35.) In contrast, the claim language does not require that the

parameter variation must "directly cause" frequency to track the clock rate, as suggested by Respondents and Staff, say Complainants. (*Id.*)

Complainants argue that Staff's separate assertion that a direct causal relationship between the CPU's processing frequency and PVT parameter variations is separately required by the "thus varying" limitation because it includes the phrase "as a function parameter variation" is incorrect because nothing in that language requires "direct causality" between parameter variation and CPU processing frequency. (*Id.*) Nor is Staff's construction supported over Complainants' by the claim construction of the judge in the Texas district court case, who observed that the phrase "as a function of" "describes a variable that depends on and varies with another." (*Id.* at n. 5 (citing JXM-008 (Ware Order) at 18).) The CPU will be enabled to track the clock rate of the oscillator because they are manufactured on the same integrated circuit with the same devices, say Complainants. (*Id.* at 35.) Complainants say they do no dispute that the processing frequency of the CPU will ultimately vary with parameter variations, but not "directly." (*Id.*) Rather, parameter variations influence the oscillator frequency, which causes a change in the processing frequency of the CPU. (*Id.*) In other words, argue Complainants, as the disputed phrase specifically states, the CPU's processing frequency is "enabled," or "allowed," to track the clock rate in response to parameter variation. But the parameter variation does not directly cause tracking, say Complainants. (*Id.*)

In sum, say Complainants, their construction is consistent with the ordinary meaning of the claim language in its entirety; whereas, Respondents' and Staff's constructions read out the language "thereby enabling" and improperly import the narrowing words "directly causing" in a way that is inconsistent with the rest of the claim language. (*Id.* at 36.)

Complainants claim that the specification of the '336 patent also supports their construction, because it states this, for example:

> The ring oscillator frequency is determined by the parameters of temperature, voltage, and process.... The ring oscillator **430** is useful as a system clock...because its performance tracks the parameters which similarly affect all other transistors on the same silicon die.

(*Id.* (citing JXM-0001 at 16:59-67).) According to Complainants, Respondents recognize that there is only an indirect relationship between the parameter variations and the CPU processing frequency because they argue this in their brief: "The specification teaches that the PVT parameters (*i.e.,* temperature, voltage, and process) determine the ring oscillator frequency, which in turn drives the CPU frequency." (*Id.* (citing RMBr. at 44).)

According to Complainants, the following passage in the specification also agrees with their description of the invention:

> [I]f the processing of a particular die is not good resulting in slow transistors, the latches and gates on the microprocessor **50** will operate slower than normal. Since the microprocessor **50** ring oscillator clock **430** is made from the same transistors on the same die as the latches and gates, it too will operate slower (oscillating at a lower frequency), providing compensation which allows the rest of the chips logic to operate properly.

(*Id.* (citing JXM-0001 at 17:2-10).) Clearly, argue Complainants, the invention takes advantage of the fact that the oscillator and the CPU are fabricated on the same silicon die, but it is also clear that the CPU derives its timing from the oscillator. (*Id.*) Therefore, even though PVT parameters influence the transistors of both the CPU and the oscillator, the CPU derives its timing directly from the clock rate, not from parameter variations. (*Id.*)

Complainants say Respondents and Staff do not dispute that the term "to track" means "to follow;" nor do they offer any alternative construction. Instead, Respondents maintain that the term "track" is clear on its face, without offering their understanding of that clear meaning. (*Id.*)

Therefore, say Complainants, if Respondents agree that the term "track" has the meaning of "to follow" no claim construction is required. (*Id.*)

Administrative Law Judge's findings and construction

The Administrative Law Judge finds that the intrinsic evidence does not support Respondents' and Staff's insertions of the limitation "directly causing" in their proposed constructions. Enablement and causation do not mean the same thing; the latter term means effectuating; the former does not. The addition of "directly" adds an even further departure from concept of enablement. Whether the processing frequency actually tracks the clock rate in a given instance depends on how responsive the former is to the latter: there may be a threshold involved. Therefore, tracking may be enabled but not necessarily caused, or effectuated, by changes in the relevant parameters. For this reason, Respondents' and Staff's proposed constructions deviate from the language of the claims. Furthermore, the word "directly" interjects a limitation that is not justified by the intrinsic record. Although the invention recognizes that processing, voltage, and temperature are factors that affect the behavior of the electronic elements that make up the central processing unit and the ring oscillator, the invention does not specify precisely the manner by which that occurs. Therefore injection of the term "directly causes" mischaracterizes the invention.

The Administrative Law Judge finds that the Complainants' proposed construction more accurately reflects the intrinsic evidence and, with slight modification, should be adopted as follows: "thereby allowing the processing frequency of the central processing unit to follow said clock rate in response to said parameter variation."

7. Claims 1, 11—*"varying together;"* Claims 10, 16—*"varying in the same way;"* and Claims 6, 13—*"varying... in the same way"*

The parties' proposed constructions are as follows:

Term	Proposed Constructions		
	Complainants	Respondents	Staff
"varying together" (claims 1, 11) "varying in the same way" (claims 10, 16) "varying...in the same way" (claims 6, 13)	**No construction necessary. But if construed:** changing in a corresponding manner	increasing and decreasing proportionally	increasing and decreasing proportionally

(CMBr. at 20; RMBr. at 36; SMBr. at 14.)

Complainants' arguments in support of their proposals

Complaints report that the parties agree that the term "varying," as it appears in the claims shown above, should be construed the same way in each instance. Complainants argue that Respondents propose an unnecessary and improper additional limitation with the word "proportionally." (CMBr. at 20.) According to Complainants, each of the claims is simply reciting how the invention of the '336 patent applies the law of physics, with the transistors of the CPU and those of the clock varying in a similar manner because they are formed on the same semiconductor substrate. (*Id.* at 21.)

Complainants argue that the specification of the '336 patent explains that the clock frequency and the processing capability of the CPU will vary "similarly" because the transistors of both are fabricated in the same silicon die. (*Id.*) The specification, say Complainants, succinctly explains how the CPU and the clock transistors vary together: