

2014-1076, -1317

**IN THE
UNITED STATES COURT OF APPEALS
FOR THE FEDERAL CIRCUIT**

HTC CORPORATION and HTC AMERICA, INC.,

Plaintiffs-Cross-Appellants,

v.

TECHNOLOGY PROPERTIES LIMITED,
PATRIOT SCIENTIFIC CORPORATION and ALLIACENSE LIMITED,

Defendants-Appellants,

Appeals from the United States District Court for the Northern District of
California in Case No. 5:08-cv-00882-PSG, Judge Paul S. Grewal

**RESPONSE AND REPLY BRIEF FOR DEFENDANTS-APPELLANTS
TECHNOLOGY PROPERTIES LIMITED, PATRIOT SCIENTIFIC
CORPORATION AND ALLIACENSE LIMITED**

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Statement of Related Cases

No appeal in this case was previously before this or any other appellate court.

Defendants-Appellants Technology Properties Limited LLC, and Patriot Scientific Corporation (collectively, “TPL”) assert infringement of U.S. Patent Nos. 5,809,336 (“the ’336 patent”) and 5,530,890 (“the ’890 patent”), which are the subject of the present appeal and cross-appeal. The ’336 and ’890 patents are also asserted in eight other cases now pending in the Northern District of California (as listed on pp. 1-2 of HTC’s Principal and Response Brief (“HTC Br.”)).

Statement of the Issues Concerning HTC’s Cross-Appeal

(1) Did the district court correctly construe “entire oscillator” as an on-chip oscillator that cannot use an external clock “to *generate* the signal used to clock the CPU,” while refusing HTC’s repeated invitations to go beyond the prosecution history to exclude an on-chip oscillator that generates the clock signal used to clock the CPU, but uses an external clock to help set the *frequency* of the already generated clock signal?

(2) Did the district court correctly deny HTC’s renewed motion for judgment as a matter of law, given that substantial evidence supported the jury’s verdict that HTC’s accused products used an entire oscillator on the chip – and not an off-chip crystal oscillator – to generate the CPU clock?

Statement of the Case Concerning HTC's Cross-Appeal

HTC's cross-appeal is its latest attempt to avoid the correct construction of the term "entire oscillator" necessitated by the intrinsic evidence and adopted by the district court. Claims 6 and 13 recite "an entire oscillator" as a system/CPU clock that is "disposed upon [the same] integrated circuit substrate" as the CPU. The court correctly held that "entire oscillator" should be "properly understood to exclude any external clock used to **generate** the signal used to clock the CPU." A0078.002 (emphasis added). This claim construction holding was incorporated into the jury instructions at trial, and the jury ultimately found that HTC's products infringed the '336 patent – because the on-chip oscillators in the HTC products do **not** use an external clock to **generate** the clock signal used to clock the CPU; rather, they use an external clock to help **set the frequency** of the clock signal that was already generated by the on-chip oscillator. A0125-28.

In an effort to escape the unfavorable jury verdict, HTC asserts – as it unsuccessfully argued multiple times in the district court – that the construction of "entire oscillator" should be "clarified" to exclude not only an off-chip oscillator that **generates** the clock signal for the CPU, but also any on-chip oscillator that uses an off-chip clock or control signal to help **set the frequency** of the clock signal that was **already generated** by the on-chip oscillator. A7224-26. HTC's proposed construction of "entire oscillator" is wrong.

HTC purports to base its argument on disclaimers made by the '336 patent applicants during prosecution. But, as detailed below, the applicants disclaimed only off-chip oscillators that **generate** the clock signal used to clock the CPU. In fact, the references on which the disclaimers are based do not disclose **any** on-chip oscillator, the frequency of which could be set by an off-chip clock. The relevant prior art references do not even disclose the on-chip oscillator HTC now argues should be excluded. Thus, such an oscillator could not have been disclaimed.

After the jury rendered its verdict against HTC, HTC renewed its motion for Judgment as a Matter of Law. HTC's motion was denied (A0130-44) and this cross-appeal followed.

Statement of Facts Concerning HTC's Cross-Appeal

A. The '336 Invention Achieves High CPU Speed with an On-Chip Ring Oscillator to Generate a High Speed Clock Signal.

The '336 patent issued on September 15, 1998 to Charles Moore and Russell Fish based on a parent application filed on August 4, 1989. The '336 patent was the subject of six *ex parte* reexaminations, during which it overcame 607 prior art references. The '336 patent teaches, *inter alia*, the use of an on-chip variable speed oscillator to provide a clock signal for the CPU in a microprocessor. A0243 '336 Fig. 17. Compared to clocking the CPU with an off-chip crystal (as in the prior art), clocking the CPU with an oscillator that is fabricated on the same silicon chip as the CPU enables the CPU to run much faster. A0254-55 '336 16:67-17:1.

As explained in the '336 patent, the invention achieves this feat – *i.e.*, a much faster CPU clock – through a clever application of the laws of physics. Various environmental parameters affect the speed of the transistors on a silicon chip – including the speed of the CPU and all other circuits on the chip. These parameters include temperature, voltage, and semiconductor processing/fabrication (the “PVT” parameters). *See, e.g.*, A0254 '336 16:44-53; A0243 Fig. 17. In prior art designs – typically, with an off-chip crystal to provide a clock signal for the CPU – a change in PVT parameters affected the CPU and its clock differently. *Id.* Essentially, the speed of the off-chip crystal did **not** vary with PVT; rather, it always clocked the CPU at a relatively slow, constant speed, even under favorable PVT conditions. *Id.* Therefore, traditional CPU designs “must be clocked a factor of two slower than their maximum theoretical performance, so they will operate properly,” even under the worst PVT conditions. *Id.*

By contrast, the clock in the claimed invention is composed of transistors on the same silicon die as the CPU. In the embodiment shown, the clock is a “ring oscillator” – so named because it is composed of an odd number of inverters arranged in a loop or “ring.” *Id.* at A0254-55, 16:54-17:10; A0242 Fig. 18. Because PVT parameters similarly affect all transistors on the chip (including those of the CPU and the ring oscillator), the ring oscillator can provide a clock signal that is much faster: potentially as fast as the CPU’s capability under

favorable PVT conditions. *Id.* In other words, there is no need to constrain the CPU's speed (to anticipate the worst PVT conditions) with a slow, off-chip crystal oscillator. In short, the invention achieves high CPU speed by generating the CPU's clock signal with an on-chip ring oscillator. *See also* A2580-81.

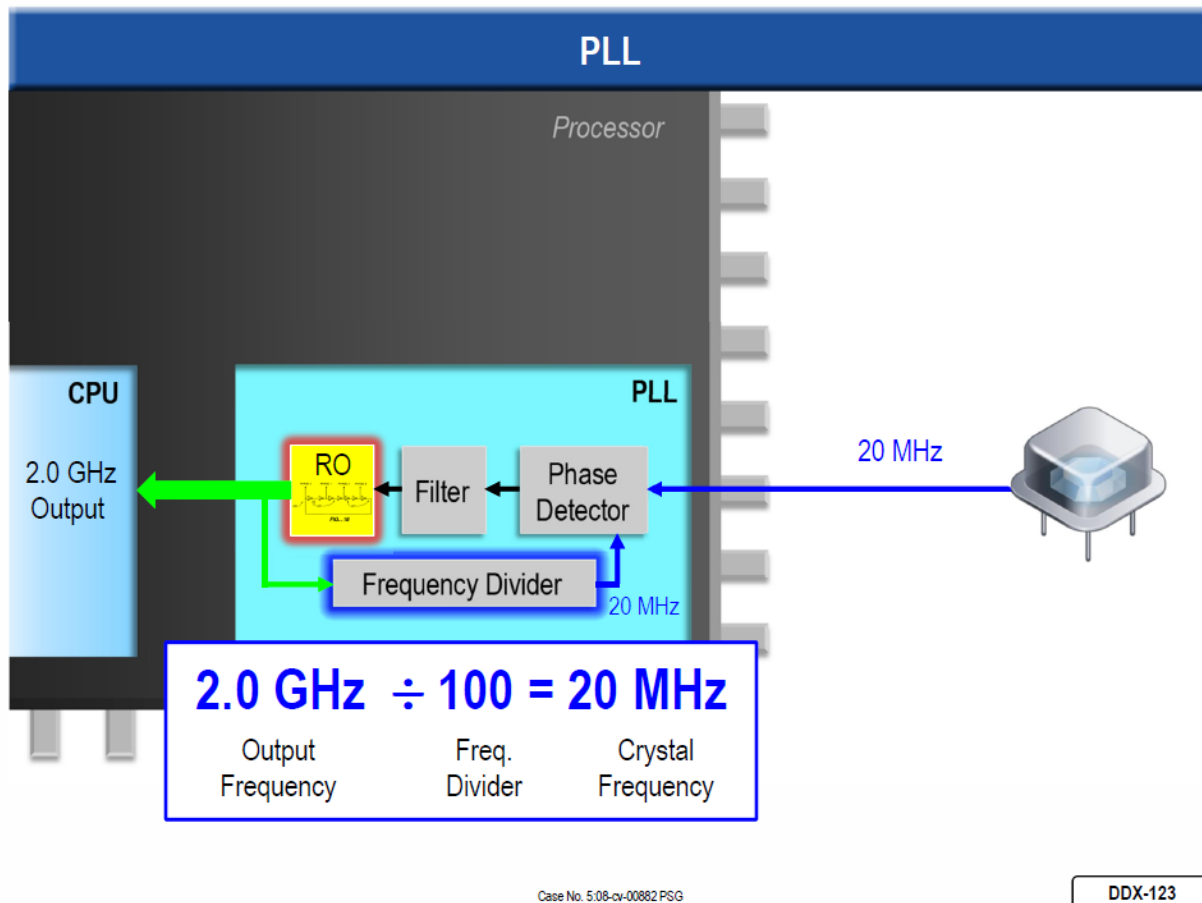
B. The Jury Correctly Found that All of HTC's Products Include "Entire Oscillators" – Ring Oscillators Within PLLs – That Are Entirely on the Same Semiconductor Substrate as the CPU.

The invention of the '336 patent is so important that it has been adopted by essentially everyone in the industry – including HTC. A7878-79 ('336 patent is "a wide reaching patent and describes the technology, microprocessor technology which is, again, widely used."); A7887 ('336 patent is "the most valuable of all of the patents" in the MMP portfolio.). A key reason for this is that microprocessors for modern wireless products must run at very high frequencies, and it is impossible for off-chip crystal oscillators to produce sufficiently high frequencies to clock CPUs in modern wireless products. A7152, ¶ 77; A7833; A8320-21.

At trial, TPL offered evidence that each infringing HTC product includes an "entire oscillator" – a ring oscillator that generates a clock signal for the CPU. A7924-7925. The ring oscillator in each product is entirely on the same semiconductor substrate as the CPU for which it generates a clock signal. *Id.* In the infringing products, the ring oscillator ***generates*** the clock signal for the CPU,

while additional circuitry in a “phase locked loop” or “PLL” helps to set or adjust the *frequency* of the ring oscillator. A7868.

Although all of the circuitry for the PLL in each infringing product is *also* on the same semiconductor substrate as the CPU, the PLL uses a signal from an off-chip crystal oscillator as a comparator or reference to ensure that the clock signal generated by the ring oscillator is adjusted to the desired frequency. A7868; A7877. Essentially, the off-chip crystal is used like a speed limit sign or a metronome, with which the PLL compares the speed or frequency of the clock signal generated by the ring oscillator. A7876-77. However, the normal frequency of the clock signal from the ring oscillator is around *100 times faster* than the frequency of the off-chip crystal’s reference signal. A7855-56. Thus, in order for the PLL to perform a comparison, it must divide the extremely fast clock signal generated by the ring oscillator to a much slower signal that is in the range of the reference signal from the off-chip crystal:



A7859-60; *see also* A8666 (“Q. So you’ve got a 2.0 gigahertz clock signal generated by the ring oscillator that’s clocking the CPU, and you divide by 100, and that’s what this circuitry actually does; correct? A. Yes.”).

Considering all of this evidence, the jury returned a verdict that all of HTC’s accused products infringed claims 6, 7, 9, 13, 14 and 15 of the ’336 patent. A0126. In denying HTC’s renewed motion for judgment as a matter of law, the district court correctly credited substantial evidence that the ring oscillator in each HTC product “generates a clock signal on its own, without relying on external crystals.” A0139. The district court also cited evidence that the external crystal in each HTC

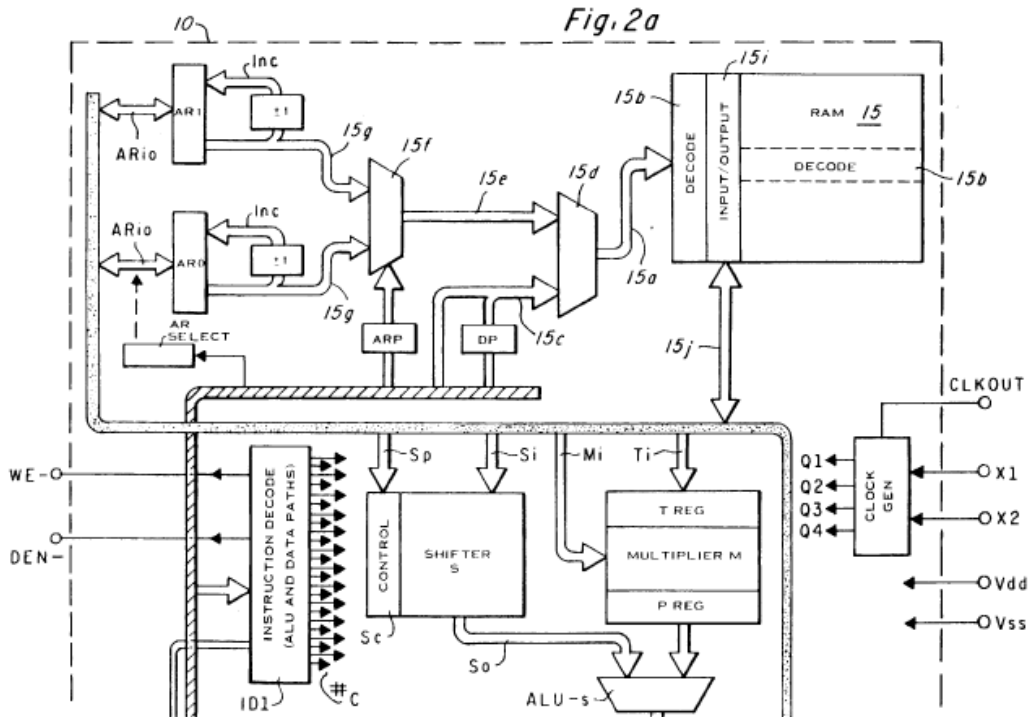
product “is not used to generate the signal.” *Id.* “Rather, its clock is used only to compare with the phase of the ring oscillator’s already generated clock signal that has been steeply divided by the frequency divider” in the PLL. *Id.*

C. The Magar and Sheets References in the File History Disclose No On-Chip Oscillator to Provide a Clock Signal for the CPU; Rather, Magar and Sheets Only Disclose Off-Chip Oscillators to Provide a Clock Signal for the CPU.

HTC relies heavily on the file history to import improper limitations into the “entire oscillator.” But the “Magar” and “Sheets” prior art references bore no resemblance to HTC’s infringing products, and the applicants did not come close to making the disclaimer sought by HTC. Indeed, the applicants distinguished the ’336 invention from Magar and Sheets because each reference used an *off-chip* oscillator to clock the CPU. Neither disclosed *any* on-chip oscillator that could generate a clock signal, let alone a clock signal that could be adjusted with an off-chip reference crystal, as in the PLLs of HTC’s infringing chips.

1. Magar

Referring to Fig. 2a of Magar, the applicants pointed out that “the clock disclosed in the Magar reference is in fact driven by a *fixed frequency crystal* [connected to terminals X1 and X2], which is *external* to the Magar integrated circuit.” A1174 (emphasis added) (July 7, 1997 Response to Office Action).



A5462 (Magar, Fig. 2a). Unlike the claimed invention, Magar lacked an on-chip variable speed clock:

[I]t is clear that the element in Fig. 17 [of the '336 patent] missing from Fig. 2a in Magar is the **ring counter variable speed clock 430**, and that Magar is merely representative of the 'most microprocessors' acknowledged as prior art in the above description from the present application, which prior art microprocessors use a "conventional crystal clock." Because the **variable speed clock is a primary point of departure from the prior art**, independent claims 19, 65, 73 and 78 all recite a system including a variable speed clock or a method including using a variable speed clock. . . .

A1175 (emphasis added). Because Magar's crystal clock is fixed frequency and off-chip, PVT cannot affect the Magar CPU and its clock similarly to achieve the advantage of the invention as discussed above:

[O]ne of ordinary skill in the art should readily recognize that the speed of the cpu and the clock [in Magar] **do not vary together** due to manufacturing variation, operating voltage and temperature of the IC in the Magar microprocessor . . . **Crystals are by design fixed-frequency devices** whose oscillation speed is designed to be tightly controlled and to vary minimally due to variations in manufacturing, operating voltage and temperature. The Magar microprocessor in no way contemplates a variable speed clock as claimed. . . . [C]rystal oscillators have never, to Applicants' knowledge, been fabricated on a single silicon substrate with a CPU.

A1175-76 (emphasis added).

The applicants explained that the clock signal for the Magar microprocessor was generated by an external crystal. In other words, Magar completely lacked an on-chip oscillator, as in the '336 patent:

In making the rejection based on Magar, the examiner appears to be confusing the multiple uses and meanings of the technical term "clock." A clock is simply an electrical pulse relative to which events take place. **Conventionally, a CPU is driven by a clock that is generated by [a] crystal. The crystal might be connected directly to two pins on the CPU, as in Magar.** . . . An oscillator must exist someplace in the circuit from which a periodic clock is derived. [Conventionally, as in Magar], the crystal (or the entire oscillator . . .) is external to the CPU, and the output of the oscillator circuitry is a "clock." This clock is typically modified to produce additional required clock signals for the system. . . . Other cited reference have similar examples, see Palmer, U.S. Patent 4,338,675, Fig. 1, item 24; Pohlman et al., U.S. Patent 4,112,490 Fig. 1, item 22. . . . **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.**

A1176-77 (emphasis added). The applicants continued:

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. And with the crystal, the clock rate generated is also conventional in that it is at a fixed, not a

variable, frequency. The Magar clock is . . . not at all like the clock on which the claims are based. . . . Magar's clock gen is distinguished from an oscillator in at least that it lacks the crystal or **external generator** that it **requires**. . . . [The oscillator in the claimed invention] oscillates without external components (unlike the Magar reference). . . . **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.**

A1170-72 (emphasis added). Thus, the distinction between the claimed invention and Magar stems from **the location of the component that actually generates the oscillating clock signal** used to clock the CPU. The claimed invention requires the clock/oscillator to be located on the same chip as the CPU for the microprocessor. Magar, on the other hand, relies on an oscillating clock signal that is generated by an off-chip crystal oscillator (attached at pins X1 and X2). After the clock signal is generated by the external crystal oscillator, the "clock gen" block in Magar merely divides it into clock signals that are used in different parts of the Magar chip. However, unlike the on-chip oscillator of the '336 patent, the Magar "clock gen" block contains no oscillator of its own to generate a clock signal. The Magar system "requires" the "external generator." A5485 (Magar, 15:26-28); A1171.

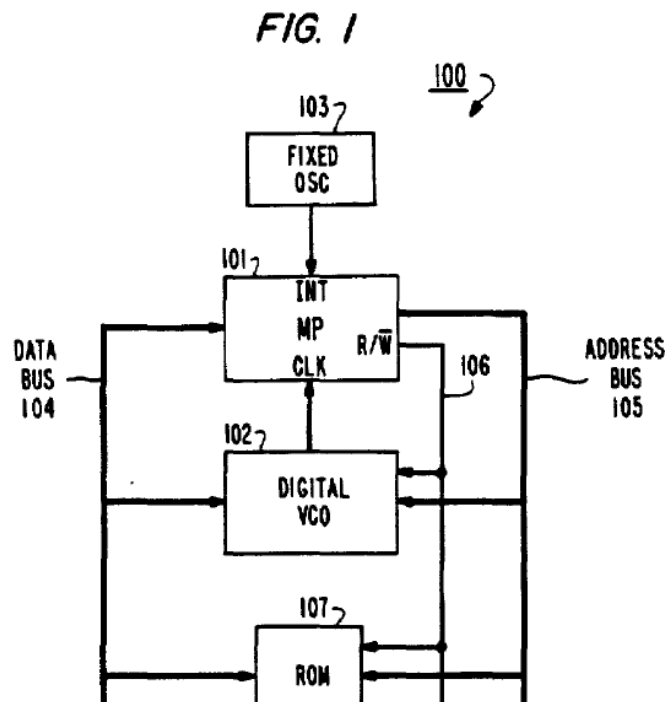
2. Sheets

Distinguishing the claimed invention from Sheets, the applicants wrote:

Sheets describes the use of discrete, commercially available microprocessor chips [101 in Fig. 1], e.g., the Motorola 68000 (col. 5, line 16), driven by a separate clock (VCO [102] of FIG. 1). As is well known, such microprocessor chips include terminals or pins, such as the CLK and INT

terminals of microprocessor (FIG. 1), for receiving inputs from external devices like the VCO [102] and fixed oscillator 103. Because the **VCO [102] is not integral with the microprocessor 101**, Sheets has proposed a technique for adjusting the frequency of VCO [102] in accordance with a desired operating frequency of the microprocessor 101. Specifically, a digital word indicative of this desired operating frequency is written by microprocessor 101 to VCO [102] by way of data bus 104 as a means of adjusting clock frequency.

A1188 (April 11, 1996 Response to Office Action) (emphasis added).



A5495 (Sheets, Fig. 1). As with Magar, the applicants distinguished Sheets based on the location of the component that generates the clock signal that clocks the CPU. The claimed invention requires an on-chip oscillator to generate the clock

signal. However, the Sheets reference uses a clock signal that is generated by the off-chip oscillator VCO 102.¹

Therefore, the claimed microprocessor of the '336 patent does not *need* “the type of frequency control information described by Sheets”:

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. . . .

A1188. Indeed, the operation of the '336 patent's ring oscillator has nothing to do with providing “frequency control information to an external clock.” The '336 ring oscillator is not an “external clock” – it is on the same chip as the CPU.

In Sheets, a command input *is required* to change the clock speed. In the present invention, the clock speed varies correspondingly to variations in operating parameters of the electronic devices of the microprocessor because both the variable speed clock and the microprocessor are fabricated together in the same integrated circuit. *No command input is necessary* to change the clock frequency.

¹ The applicants disagreed with the examiner that system 100 was on a single chip. A1179 (“Sheets does not say that the system 100 is on a single chip, only that it is implemented in MOS technology.”) The applicants also explained that Sheets would not meet the claims even if the Sheets clock were located on the same integrated circuit as the microprocessor (which it was not) (A1189):

Moreover, the VCO [102] clearly is not comprised of transistors having operating characteristics disposed to vary similarly to those of transistors within the microprocessor 101. Rather, the VCO [102] is seen to be comprised of an LC oscillator (col. 3, line 58 and FIG. 6), which clearly is not adapted to mimic variation in the speed of transistors within the microprocessor 101.

A1179 (January 8, 1997 Response to Office Action) (emphasis added). In disclaiming the Sheets **requirement** of frequency control information to an **external** clock, the applicants never suggested that the '336 invention would **prohibit** the use of frequency control for the '336 patent's **on-chip** oscillator.

Summary of the Argument

A. Summary of the Argument Concerning HTC's Cross-Appeal.

The district court correctly held that “entire oscillator” should be “properly understood to exclude any external clock used to **generate** the signal used to clock the CPU.” A0078.002 (emphasis added). Under this construction, the jury properly found (and the district court confirmed) that HTC infringed. A0130. HTC urged the district court multiple times – before, during, and after trial – to go far beyond the scope of any possible prosecution history disclaimer to exclude any oscillator that uses an external clock to help determine or set the oscillator's frequency. HTC even asked the district court to exclude **on-chip** oscillators that generate the CPU clock as described in the claims. But the district court repeatedly (and properly) rejected HTC's invitations.

The district court was correct. Whatever the applicants may have disclaimed during prosecution was not as broad as HTC contends. The '336 invention achieves high CPU speed by generating the clock signal for the CPU with an **on-chip** ring oscillator, which was how the applicants distinguished the invention from

the Magar and Sheets references. During prosecution, the applicants observed that Magar and Sheets, unlike the claimed invention, used *off-chip* oscillators to *generate* the CPU clock. Thus, the district court correctly held that “entire oscillator” excludes “any *external* clock used to *generate*” the CPU clock.

HTC argues that in distinguishing Magar and Sheets, the applicants broadly disclaimed even an *on-chip oscillator* that relies on an *external clock to determine* or *set* the on-chip oscillator’s *frequency*. But it was impossible for the applicants to have disclaimed such a combination: neither Magar nor Sheets included both an on-chip oscillator and an external clock to set or determine the frequency of the on-chip oscillator. Indeed, neither Magar nor Sheets disclosed *any* on-chip oscillator at all; rather, they only disclosed external oscillators to provide a clock signal for the CPU. The applicants could not have possibly disclaimed a combination that did not exist in the references they distinguished.

Therefore, as discussed below in detail, HTC’s latest attempt to go beyond any possible prosecution history disclaimer and improperly narrow the claim scope should be rejected. The district court’s construction of “entire oscillator” should be affirmed. In addition, because substantial evidence supports the jury verdict of infringement, the district court’s denial of HTC’s renewed motion for judgment as a matter of law should also be affirmed.

B. Summary of the Argument Concerning TPL's Appeal.

The district court committed reversible error by entering orders against TPL premised on inconsistent interpretations of the scope of the original versus the reexamined claims of the '890 patent. On one hand, the district court precluded TPL from asserting certain claims of the '890 patent because the original and post-reexamination claims were purportedly redundant. On the other hand, however, the district court found that the claims had substantively changed, thereby entitling HTC to summary judgment on its belated assertion of the affirmative defense of absolute intervening rights. The district court also erred in narrowly construing the term "separate DMA CPU."

The district court should not have even considered, let alone granted, HTC's motion for summary judgment based on intervening rights because it was an affirmative defense that HTC raised for the first time in a motion for summary judgment filed just before trial. Because HTC failed to plead intervening rights until the eve of trial, TPL was unduly prejudiced by HTC's ability to obtain orders based on an inconsistent interpretation of the scope of the original and post-reexamination claims. This discrepancy would not have occurred had the district court considered contemporaneously HTC's opposition to TPL's attempt to add claims 7 and 9 (in 2011) and HTC's tardy intervening rights defense – raised weeks before trial in 2013. TPL suffered further prejudice because HTC's belated

assertion of its intervening rights defense left TPL unable to fully develop evidence that one of ordinary skill in the art would consider the substance of the reexamined claims to be the same as the substance of the original claims.

HTC's intervening rights argument is substantively flawed as well. The language added to claim 1 to create claim 11 of the '890 patent merely served to clarify that a stack pointer points into a push-down stack – something one of ordinary skill in the art would have already known. HTC counters that, because claim 11 requires the pointer to point into the “first” push-down stack, and a microprocessor could theoretically have multiple stacks, claim 11 is narrower than claim 1, which would have been satisfied by a pointer pointing into *any* stack. But, as illustrated in Figure 21 of the '890 patent and confirmed by the expert testimony of record, each stack has its own pointer, and each pointer only points into its particular stack. Accordingly, even with multiple stacks, there will always be a “first” stack, and there will always be a dedicated pointer pointing into that stack. Clarifying that the stack pointer points into the first push-down stack does not add any new limitation to claim 1, as that language merely describes how stack pointers work and is intrinsic to claim 1. Thus, the new language added to claim 1 to create claim 11 did not change the scope of the '890 patent.

With respect to the construction of the term “separate DMA CPU,” the district court erred by improperly limiting the term to only a “DMA co-processor,”

and excluding a traditional DMA controller. The '890 specification calls two components "DMA CPUs": component 72 of Figure 2, and component 314 of Figure 9. DMA CPU 72 is a "DMA co-processor" because it "controls itself and has the ability to fetch and execute instructions," and "operates as a co-processor to the main CPU." On the other hand, DMA CPU 314 is a "more traditional DMA controller," because it must be "used with the microprocessor 310" in a way "supported by the microprocessor 310." By limiting "DMA CPU" only to that which "fetches and executes instructions," the district court improperly limited "DMA CPU" to a "DMA co-processor," while the specification also uses "DMA CPU" to also refer a "DMA controller." In addition, during prosecution, the Patent Office restricted the invention that requires a DMA co-processor to a separate application that is *not* the application that resulted in the '890 patent. Therefore, "separate DMA CPU" should be construed simply as "electrical circuit for reading and writing to memory that is separate from a main CPU," in order to include "DMA controller."

Argument Regarding HTC's Cross-Appeal

I. BASED ON THE INTRINSIC EVIDENCE, THE DISTRICT COURT CORRECTLY CONSTRUED “ENTIRE OSCILLATOR” AS A CPU/SYSTEM CLOCK ON THE SAME SILICON CHIP AS THE CPU THAT DOES NOT USE AN EXTERNAL CLOCK TO GENERATE THE CLOCK SIGNAL USED TO CLOCK THE CPU.

A. Legal Standards Applicable to Claim Construction.

Claim interpretation is a legal issue to be decided by the court. *Markman v. Westview Instruments, Inc.*, 517 U.S. 370, 372 (1996). To determine the meaning of claim terms, a court must examine the intrinsic evidence: the claims, specification and file history. *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 979 (Fed. Cir. 1995), *aff'd*, 517 U.S. 370, 116 S. Ct. 1384, 134 L. Ed. 2d 577 (1996). The court should begin the claim construction process by reviewing the claims. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (*en banc*). Claim terms are not construed in a vacuum, however, “but in the context of the entire patent, including the specification.” *Id.* at 1313. “[T]he specification ‘is always highly relevant to the claim construction analysis. Usually, it is dispositive; it is the single best guide to the meaning of a disputed term.’” *Id.* (citing *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)). In addition to the claims and specification, a review of the file history can help determine whether the applicant has made “any express representations . . . regarding the scope of the claims.” *Vitronics*, 90 F.3d at 1582.

HTC relies on the doctrine of prosecution history disclaimer or “disavowal” for its proposed construction of “entire oscillator.” “Disavowal” is a rule of claim construction that is frequently invoked but rarely applicable. Before a patentee’s statement during prosecution can be regarded as a disavowal, the court must find that the statement is “so clear as to show reasonable clarity and deliberateness, and so unmistakable as to show unambiguous evidence of disclaimer.” *Omega Eng’g, Inc. v. Raytek Corp.*, 334 F.3d 1314, 1325 (Fed. Cir. 2003) (citations omitted). Stated another way, the “disavowal” doctrine only applies where a disavowal is “both clear and unmistakable.” *Cordis Corp. v. Medtronic AVE, Inc.*, 511 F.3d 1157, 1177 (Fed Cir. 2008). “Moreover, the scope of such a disavowal will depend on the nature of the argument made by the patentee . . . [E]ven in the case of an unequivocal disavowal of claim scope, the court must construe the claim ‘congruent with the scope of the surrender.’” *Id.*

B. The Claims and Specification of the ’336 Patent Support the District Court’s Construction of “Entire Oscillator,” and Do Not Support the Improper Limitations Sought by HTC.

The district court correctly construed “entire oscillator” in independent claims 6 and 13 based on the intrinsic evidence. As an initial matter, claims 6 and 13 recite “an entire oscillator” as a system/CPU clock that is “disposed upon [the same] integrated circuit substrate” as the CPU. A0276-77. Similarly, although not asserted at trial, claims 10 and 16 also recite “an entire variable speed clock” that is

“disposed upon said integrated circuit” – in other words, the same silicon chip as the CPU. A0276-77; *see also* A0041-42 (construing “providing an entire variable speed clock . . .” as clock that is “located entirely on the same semiconductor substrate as the central processing unit”). The district court later clarified that the “entire oscillator” of claims 6 and 13 is “properly understood to exclude any external clock used to **generate** the signal used to clock the CPU.” A0078.002 (emphasis added). This construction is consistent with the claims, specification and file history of the ’336 patent.

Contrary to HTC’s proposed construction of “entire oscillator,” nothing in the claim language suggests that the CPU/system clock can never use either an external crystal/clock – or an input control signal from such an off-chip clock – to help set or determine the **frequency** of the clock signal that was already generated by the “entire oscillator.” Rather, the claims simply make clear that the transistors or electronic components the CPU/system clock – the “entire oscillator” – must be entirely on the same silicon substrate as the CPU.

Similarly, the ’336 specification supports the district court’s construction of “entire oscillator,” but not HTC’s. The patent states that the CPU/system clock “is the familiar ‘ring oscillator’ . . . fabricated on the same silicon chip as the rest of the microprocessor.” A0254 ’336 16:56-58; *see also* A0242-43 Figs. 17, 18. Because the on-chip system clock/oscillator is fabricated of transistors on the same

substrate as the rest of the microprocessor, the transistors of the system clock and the CPU will be similarly affected by manufacturing process variances, and voltage and temperature swings. A0254-55 at 16:63-17:10. Thus, for example, if the processing of a particular die is not good, the transistors of both the CPU and the on-chip oscillator will operate slower than normal. *Id.* at 17:2-10.

HTC argues that “entire oscillator” should exclude an on-chip oscillator that uses an external crystal/clock to set or determine the frequency of the on-chip oscillator, because “the purpose of the claimed invention was [] to provide an on-chip oscillator whose frequency would automatically vary in response to variations in manufacturing process or operating parameters such as temperature and voltage.” HTC Br. at 19, 32, 40-41. HTC is wrong, for several reasons. First, the requirement that the frequency of the CPU and “entire oscillator” should “vary . . . in the same way” based on PVT parameters is already in other parts of claims 6 and 13. *See, e.g.*, A0262-63 (’336 claim 6) (“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”). There is no need to duplicate such a limitation in the construction of the “entire oscillator” limitations. *See Becton, Dickinson & Co. v. Tyco Healthcare Grp., LP*, 616 F.3d 1249, 1254 (Fed. Cir. 2010) (“Where a claim

lists elements separately, ‘the clear implication of the claim language’ is that those elements are ‘distinct component[s]’ of the patented invention”); *Elekta Instrument S.A. v. O.U.R. Scientific Int’l, Inc.*, 214 F.3d 1302, 1305-07 (Fed. Cir. 2000) (rejecting claim construction that would render claim language superfluous).

Second, nothing in the specification suggests that the ring oscillator (*i.e.*, the CPU/system clock) cannot be used in conjunction with **additional** PLL components – such as an external clock – that provides a reference or control signal to help determine the **frequency** of the clock signal that was **already generated** by the ring oscillator. By mischaracterizing an isolated passage from the file history – not the specification – HTC incorrectly implies that the specification requires the invention to always run “at its fastest safe operating speed.” See HTC Br. at 40. While the ’336 invention provides advantages because the ring oscillator CPU/system clock resides on the same silicon chip as the CPU, there is no teaching that prohibits the use of other components to set or control the frequency of the ring oscillator. See, *e.g.*, *A.B. Dick Co. v. Burroughs Corp.*, 713 F.2d 700, 703 (Fed. Cir. 1983) (“It is fundamental that one cannot avoid infringement merely by adding elements if each element recited in the claims is found in the accused device.”) (citing *Temco Elec. Motor Co. v. Apco Mfg. Co.*, 275 U.S. 319, 328 (1928)).

For example, the specification says nothing to indicate that the CPU/system clock cannot refer to an external crystal ***as a reference***, as in a PLL. *See, e.g.*, A0254-55 '336 16:43-17:10. As described above, a typical PLL uses an external crystal as a reference – like a speed limit sign or a metronome – to adjust the frequency of the on-chip ring oscillator clock. The ring oscillator generates the clock signal; the external crystal is merely used to adjust its frequency. The addition of PLL circuitry is not inconsistent with the patent's teaching that the CPU should be clocked by an oscillator that is disposed on the same chip as the CPU – thus enabling both components to vary similarly with PVT parameters.

C. **The File History Does Not Support HTC's Improper Construction of "Entire Oscillator" to Exclude Frequency Adjustment of the Clock Signal Generated by an On-Chip Oscillator by Reference to an Off-Chip Crystal.**

HTC argues that the file history compels a construction of "entire oscillator" that precludes the use of an off-chip crystal to help adjust or set the frequency of a clock signal that was already generated by an on-chip oscillator. HTC is wrong, and its argument mischaracterizes the file history. As explained below, the applicants never disclaimed the use of an external crystal/clock as a ***reference*** – like a speed limit sign or metronome – as in a PLL. Rather, they distinguished the '336 invention – which includes the ***generation*** of the clock signal for the CPU by an oscillator that is ***entirely on the same silicon chip as the CPU*** – from prior art in which the oscillator that ***generates*** the CPU clock signal is ***off the chip***.

1. Controlling or adjusting the *frequency* of a clock signal is conceptually distinct from *generating* a clock signal.

As an initial matter, HTC improperly attempts to conflate the applicants' disclaimer of an external clock used to ***generate*** a clock signal with a much broader disclaimer of anything used to ***control, determine*** or ***set*** the ***frequency*** of the clock signal. However, "generating a clock signal" is ***not the same*** as "determining or setting the frequency of the clock signal." These are not "inseparable concepts" as HTC contends. Frequency is a ***characteristic*** of an already generated clock signal. *See, e.g.*, A7568 (Tr. 270:17-20); A7826-27 (Tr. 527:10-17, 528:5-13). The difference between a ***clock signal*** and its ***frequency*** is apparent from the specification and claims of the '336 patent:

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.

A0254 '336 16:63-67 (emphasis added). In other words, the "performance" of the clock – *i.e.*, its speed or frequency – is ***not*** the same as the clock itself.

Another way to understand the difference between the ***generation*** of a clock signal and ***setting*** or ***controlling*** the ***frequency*** of the clock signal is to think of a sports car that is stuck driving behind a slow motorhome or RV on a winding mountain road. This was an analogy used at trial. A8684 (Tr. 1381:16-1382:14); A8855 (Tr. 1552:7-24). Think of the sports car as a high-speed microprocessor that practices the '336 patent, while the motorhome is analogous to a much slower

off-chip crystal oscillator/clock. The sports car generates its own power with its own engine, much like a microprocessor chip with a ring oscillator generates its own clock signal. However, when the sports car is stuck driving behind the slower motorhome, the motorhome limits or controls the speed of the sports car.

**The PLL's External Reference Crystal Is Not
"Used to Generate" the Clock Signal of the Ring Oscillator**

The slow external clock limits the frequency (speed) of the ring oscillator, but does not generate the clock signal of the ring oscillator



Case No. 5:08-cv-00882 PSG

DDX-401

The manner in which the motorhome limits or controls the speed of the sports car is directly analogous to how an external crystal/clock is used to control or limit the frequency of the clock signal generated by the on-chip ring oscillator. The ring oscillator generates the clock signal – just like the sports car's engine generates its own power. But the off-chip crystal/clock can limit the frequency of

the already generated clock signal – just like the motorhome limits the speed of the sports car.

By contrast, microprocessors in the prior art (like Magar and Sheets) did not include an on-chip oscillator to generate a clock signal, so they received a clock signal from an external crystal/clock. This is analogous to a sports car (or VW Beetle, in this case) being towed by a motorhome:

Microprocessor Clocking Before the '336 Patent

The slow external crystal generates the clock signal for the CPU



Case No. 5:08-cv-00882 PSG

DDX-402

In this case, the VW is analogous to a prior art microprocessor chip. Here, the motorhome actually **generates** the power for the VW to move, because the motorhome is towing it. This is just like a prior art microprocessor in which the

clock signal was **generated** by the off-chip crystal/clock; the off-chip clock (*i.e.*, the motorhome) also controls the speed or frequency of the microprocessor chip (*i.e.*, the VW). However, these examples show that the generation of a clock signal is a distinct concept from the control or limitation of its frequency.

2. The district court’s construction of “entire oscillator” captures the full scope of prosecution history disclaimer.

Consistent with the plain language of claims 6 and 13, the district court recognized that the claimed “entire oscillator” is a system/CPU clock that is “disposed upon [the same] integrated circuit substrate” as the CPU. A0276-77; *see also* A0041-42 (construing “providing an entire variable speed clock . . .” as clock that is “located entirely on the same semiconductor substrate as the central processing unit”). Based on the prosecution history, the district court later clarified that “entire oscillator” is “properly understood to exclude any external clock used to **generate** the signal used to clock the CPU.” A0078.002 (emphasis added).

HTC complains that the district court’s construction does not “capture the full scope of the disclaimers made by the applicants during prosecution.” HTC Br. at 37. Specifically, HTC argues that the applicants broadly disclaimed even an **on-chip oscillator** that relies on an **off-chip clock** to “**determine the frequency**” of the on-chip oscillator. But the file history shows that HTC is wrong. Neither Magar nor Sheets included both an on-chip oscillator to **generate** a clock signal **and** an external clock to set the **frequency** of that clock signal; rather, they only disclosed

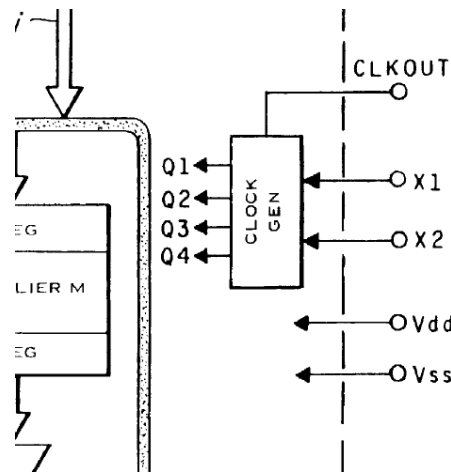
external clocks. The applicants could not have made a “clear and unmistakable” disavowal of claim scope regarding a combination that did not even exist in the references being distinguished. *See Cordis*, 511 F.3d at 1177 (Fed Cir. 2008) (disavowal only applies where it is “both clear and unmistakable.”).

As discussed below, the applicants pointed out that the claimed invention achieves high CPU speed by including a ring oscillator – which **generates** the CPU clock signal – on the same silicon chip as the CPU. A0242-43 ’336 Figs. 17, 18; A0254-55 16:54-17:2; A2580-81. During prosecution, the applicants distinguished the invention from the Magar and Sheets references because they lacked this important inventive feature.

a. The applicants distinguished Magar on the basis that it lacked an on-chip oscillator, unlike the invention of the ’336 patent with its on-chip ring oscillator.

In distinguishing Magar, the applicants for the ’336 patent did not disclaim the use of an off-chip crystal to set or determine the frequency of a clock signal generated by an on-chip oscillator. Rather, the applicants observed that Magar lacked any on-chip oscillator, as opposed to the ’336 invention, which includes an on-chip ring oscillator to generate the CPU clock signal.

Magar teaches the use of an off-chip crystal oscillator to **generate** the clock signal used by the microprocessor. Figure 2a of Magar shows external pins X1 and X2 to which the external crystal oscillator is connected. A5462.



A5462 (Magar, Fig. 2a). Magar's "clock gen" block in Fig. 2a includes circuitry to divide the oscillating signal generated by the external crystal to provide a timing signal to the CPU:

The chip 10 includes a clock generator 17 which has two external pins X1 and X2 to which a crystal (or external generator) is connected. **The basic crystal frequency is up to 20 MHz and is represented by a clock 0 of FIG. 3a. This clock 0 has a period of 50 ns, minimum, and is used to generate four quarter-cycle clocks Q1, Q2, Q3 and Q4 seen in FIGS. 3b-3e, providing the basic internal timing for the microcomputer chip 10. A set of four quarter cycle clocks Q1 to Q4 defines one machine state time of 200 ns, minimum; the states are referred to as S0, S1, S2, in FIG. 3.**

A5485 (Magar 15:26-36). Figure 3a of Magar confirms that the external crystal oscillator **generates** a clock signal with a period of 50 nanoseconds. A5464 (Fig. 3a). The divider circuitry within the "clock gen" block simply divides the oscillating clock signal from the crystal oscillator to create four slower clock signals (Q1-Q4), each with a period of 200 nanoseconds. *Id.* (Figs. 3b-3e). Thus, it is clear that the **source** of the oscillating clock signal used by the microprocessor is **not** the "clock gen" block (which is only a divider). Rather, the off-chip crystal

oscillator (connected to terminals X1 and X2) is the source component that **generates** the clock signal for the CPU.²

During prosecution, the applicants explained this significant difference between Magar – which uses an external crystal to **generate** the CPU’s clock signal – and the ’336 invention, which includes an on-chip ring oscillator to **generate** the CPU’s clock signal (A1176-77):

In making the rejection based on Magar, the examiner appears to be confusing the multiple uses and meanings of the technical term “clock.” A clock is simply an electrical pulse relative to which events take place. **Conventionally, a CPU is driven by a clock that is generated by [a] crystal. The crystal might be connected directly to two pins on the CPU, as in Magar,** and be caused to oscillate by circuitry contained in the CPU with the aid of possibly other external components. . .

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. . . Thus in this example, the user designs the ring oscillator (clock) to oscillate at a frequency appropriate for the driven device when both the oscillator and the device are under specified fabrication and environmental parameters. . .

HTC latches on to phrases like “frequency controlled” and “frequency determined” in the prosecution history to argue that the applicants disclaimed even an on-chip oscillator that relies on an off-chip clock to “determine” the oscillator’s

² This was also confirmed by NEC, a litigant that requested the first reexamination of the ’336 patent: “[Magar’s] CLOCK GEN circuitry, however, has crystal oscillator inputs X1 and X2. This leads to the supposition that CLOCK GEN is not a resonator itself, but rather circuitry that amplifies, filters or otherwise prepares the crystal resonator output for use as a CPU clock.” A5516-17.

frequency. HTC Br. at 18. But the file history never discussed – much less disclaimed – the use of PLL circuitry (including an off-chip reference crystal) to determine or adjust the frequency of a clock signal that was already **generated** by an **on-chip** oscillator. HTC has presented no intrinsic evidence to support this limitation, let alone a “clear and unambiguous disavowal.” Indeed, Magar disclosed no on-chip oscillator, the frequency of which could be determined or adjusted by an off-chip clock.

Moreover, the Magar off-chip crystal only “determines” the frequency of the CPU clock because it **generates** the CPU clock itself. HTC ignores the critical distinction that applicants repeatedly made between the claimed invention and Magar: the ’336 invention requires an on-chip oscillator to generate the CPU clock signal, while Magar generates the CPU clock with an off-chip crystal. A1176-77 (“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.”); A1170-72 (“The Magar teaching 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**.”) (emphasis added).

While an off-chip oscillator that “generates” a clock signal necessarily “determines” its frequency, the reverse is not always true. The external oscillator

in Magar both generated the clock signal and determined its frequency, just like a motorhome towing a VW. At most, the '336 applicants disclaimed systems in which an off-chip crystal “determines the frequency” of the CPU clock signal ***because it generates that signal***. Manifestly, the applicants did ***not*** disclaim an on-chip oscillator to generate a clock signal, the frequency of which could be set or controlled by an external clock – like a sports car stuck driving behind a motorhome. Thus, the district court’s construction excluding only “any external clock used to ***generate***” the CPU clock properly and fully captures the disclaimer.

b. Like Magar, the applicants distinguished Sheets because it had no on-chip oscillator.

With respect to Sheets, HTC incorrectly asserts that the applicants disclaimed an on-chip oscillator that relies on an input control from an external clock to determine the on-chip oscillator’s frequency. HTC Br. at 14-15. HTC is wrong. The applicants distinguished Sheets because it lacked any on-chip oscillator. Rather, the microprocessor in Sheets provided control information, in the form of a “digital word,” to an ***external clock***:

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. . . 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.

A1188; *see also* A5498 (Sheets) 2:54-68 (“Microprocessor 101 . . . writes a **digital word** . . . via data bus 104 to VCO 102”). Thus, Sheets discloses neither an on-chip oscillator nor an “input control *from* an external clock.” Rather, the Sheets oscillator is the off-chip VCO 102; it is not on the same chip as microprocessor 101. A5494-5500 (Sheets) Fig. 1, 2:57-68, 5:12-17; A1188 (“Sheets describes the use of **discrete, commercially available** microprocessor chips [101 in Fig. 1], e.g., the Motorola 68000 . . . driven by a **separate clock (VCO [102] of FIG. 1)**. . . [S]uch microprocessor chips include terminals or pins, such as the CLK and INT terminals of microprocessor (FIG. 1), for receiving inputs from external devices like the VCO [102] and fixed oscillator 103. . . **VCO [102] is not integral with the microprocessor 101** . . .”). Moreover, the only “input control” is a signal *from* the microprocessor chip 101 *to* the off-chip clock 102. A5498 (“Microprocessor 101, which communicates with VCO 102 via data bus 104 . . . writes a digital word defined by the computed frequency via data bus 104 to VCO 102. VCO 102 gradually adjusts the frequency of the clock signal transmitted to microprocessor 101 to the computed frequency in response to the digital word.”).

Thus, there is no basis for the disclaimer advocated by HTC, which is the antithesis of a disavowal that is “both clear and unmistakable.” *See Cordis*, 511 F.3d at 1177 (Fed Cir. 2008).

Significantly, Sheets “required” frequency control information to be provided *from* the microprocessor chip (which lacked any on-chip oscillator) *to* the *off-chip* oscillator. A1179. Quite clearly, this arrangement has nothing to do with the claimed invention, which is a microprocessor with both a ring oscillator and the CPU on the same silicon chip. In distinguishing Sheets, nowhere did the applicants make any statement to disclaim the use of an external clock to adjust the frequency of an on-chip oscillator. Sheets did not include an on-chip oscillator, let alone discuss the use of an external clock to adjust its frequency. Thus, there is no basis for the broad disclaimer for “entire oscillator” sought by HTC.

In short, the district court correctly construed “entire oscillator” to exclude only an external clock “used to *generate* the signal used to clock the CPU.” A0078.002. The district court’s construction completely captures the scope of any possible prosecution history disclaimer. HTC’s proposed construction would exclude even an on-chip oscillator that uses an external clock to set, control or adjust the frequency of a clock signal *that was already generated by the on-chip oscillator* – a combination found nowhere in the distinguished references. HTC’s proposed construction should be rejected.

II. THE DISTRICT COURT CORRECTLY DENIED HTC’S RENEWED MOTION FOR JUDGMENT AS A MATTER OF LAW.

HTC argues that its products do not infringe because they “operate precisely as those disclaimed in the intrinsic evidence.” HTC Br. at 4, 33. Not so. As the

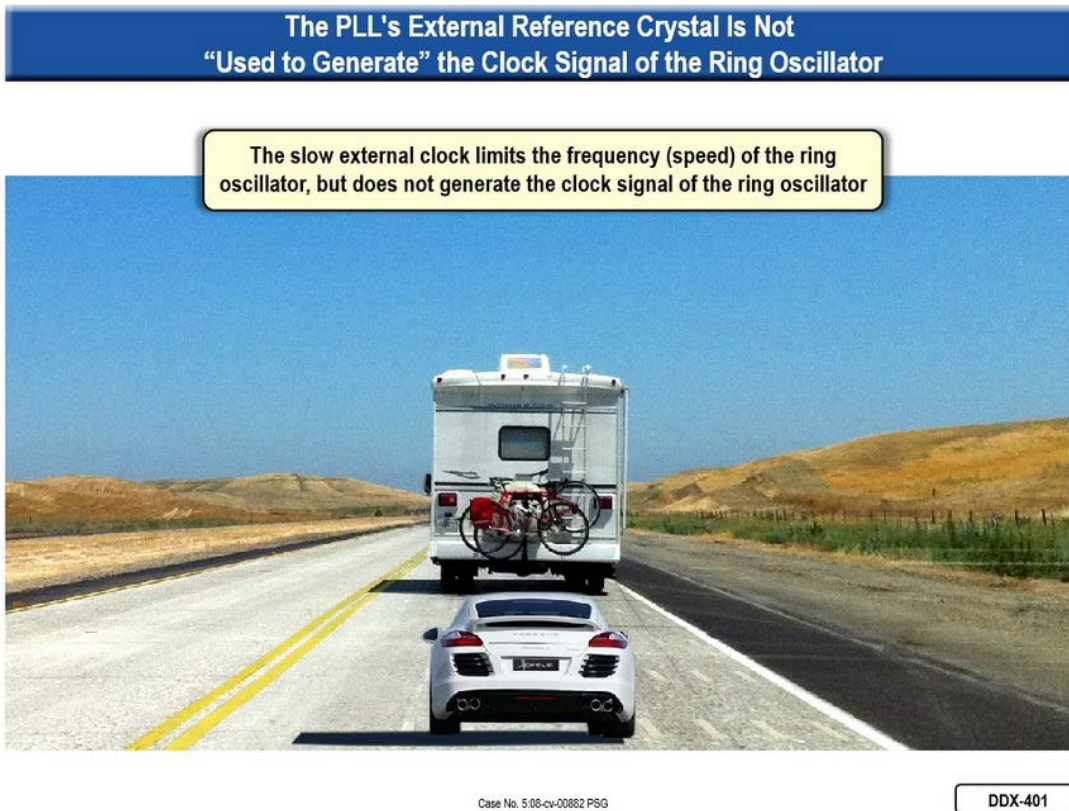
district court correctly found, the applicants only disclaimed off-chip oscillators that “**generate** the signal used to clock the CPU.” In contrast, the district court found substantial evidence to support the jury verdict that an “entire oscillator” exists in each HTC accused product. Specifically, the court reviewed evidence that an on-chip ring oscillator – not an external crystal/clock – generates the CPU clock signal in each of the accused products. *See, e.g.*, A7864, A7866-68, A8320-21, A8666-68. In its thorough order denying HTC’s renewed JMOL motion, the district court found:

[TPL’s expert] Oklobdzija took the stand and offered expert testimony that, after considering the accused products, his opinion was that the CPU was clocked by an **on-chip** [oscillator]. He emphasized that a ring oscillator in an HTC accused product does **not** use an external crystal/clock to generate a clock signal used by the CPU. In particular, he repeatedly clarified that a ring oscillator generates a clock signal on its own, without relying on external crystals. HTC’s technical expert, Mr. Gafford, also admitted that it is the ring oscillator that generates the clock signal for the CPU. Gafford further admits that the **external crystal is not used to generate the signal**. Rather, its clock is **used only to compare** with the phase of the ring oscillator’s already generated clock signal that has been steeply divided by the frequency divider. As Oklobdzija explained, the ring oscillator generates a very high frequency clock signal on its own, which must then be divided to obtain a lower frequency so that its phase can be compared to the phase of the external reference. After that, the PLL can make adjustments to the analog voltage/current provided to the ring oscillator **to regulate – but not to generate** – its frequency.

A0139-40 (January 21, 2014 Order) (citations omitted, emphasis added). As the evidence shows, unlike the Magar or Sheets off-chip oscillators, HTC’s off-chip crystals are not used to “generate” the CPU clock.

After losing on claim construction by misconstruing the prosecution history, HTC now attempts to misconstrue the district court's construction. HTC argues that it still does not infringe under the court's construction because its products "use" an external crystal clock "in the process of generating" the CPU clock. HTC Br. at 26, 33, 45-46. HTC's word play glosses over the important difference in meaning and scope between oscillators that "generate a clock signal" and those that "determine the frequency of the clock signal" – which HTC now argues are "used" "in the process of generating." The district court found that substantial evidence supports the jury's finding that microprocessors in HTC products use an external crystal "only to compare," "to regulate," "but not to generate." A0139-40.

As explained above, a modern high speed microprocessor chip in an infringing HTC product is like a powerful sports car. Although it may be stuck driving behind a slow moving motorhome, the sports car generates its own power with its own engine – just like a fast microprocessor generates its own high speed CPU clock signal with an on-chip ring oscillator. While the motorhome may force the sports car to travel at a slower speed, the motorhome is not "generating" the power that propels the sports car – just like an off-chip crystal/clock does not "generate" the clock signal of the on-chip ring oscillator. Rather, the off-chip crystal/clock merely regulates or controls the frequency of the ring oscillator.



Thus, under the district court's correct construction of "entire oscillator," the jury properly found infringement based on substantial evidence.³

³ HTC also complains that the jury asked for clarification of the word "generate" in the court's claim construction. HTC Br. at 8, 26-27, 32. This is irrelevant. The verdict shows that the jury applied the correct understanding of the court's claim construction, consistent with the intrinsic evidence. To the extent HTC argues that "the district court legally erred in declining to clarify for the jury" its claim construction in response to the jury's question (HTC Br. at 37), HTC is mistaken. District courts have broad discretion in refusing to augment its instructions in response to juror questions. *Elliott v. S.D. Warren Co.*, 134 F.3d 1, 7 (1st. Cir. 1998). Indeed, "[t]his sort of judgment call is uniquely within the trial judge's discretion, and [appellate courts] are reluctant to second-guess it." *Id.* (finding no error in district court's refusal to elaborate on initial, accurate instructions, despite jury request for clarification). The district court was well within its discretion when it refused to augment its correct claim construction.

In short, the district court correctly denied HTC's renewed motion for judgment as a matter of law, given that substantial evidence supported the jury verdict that HTC's accused products used an on-chip oscillator, not an off-chip crystal, to generate the CPU clock.

Argument Regarding TPL's Appeal

I. STANDARD OF REVIEW

HTC agrees that the district court's decision granting summary judgment is subject to *de novo* review. HTC Br. at 47-48. HTC argues, however, that the district court's decision to consider HTC's affirmative defense of absolute intervening rights should be reviewed for an abuse of discretion, rather than *de novo*. *Id.* at 47. HTC is incorrect.

Relying on *Ultra-Precision Mfg., Ltd. v. Ford Motor Co.*, 411 F.3d 1369, 1376 (Fed. Cir. 2005), HTC recognizes that the standard of review is dictated by the law of the regional circuit. In *Ultra-Precision* – an appeal from a district court in the Sixth Circuit – the Court applied the abuse of discretion standard, because “[t]he Sixth Circuit reviews a finding that a party did not waive an affirmative defense for abuse of discretion.” *Id.* HTC asserts that it was unable to find any Ninth Circuit authority setting forth the applicable standard of review, but it “believes that Ninth Circuit law is consistent with an abuse of discretion standard here[.]” HTC Br. at 47 n.18.

However, the Ninth Circuit reviews *de novo* a district court's decision whether or not to consider an affirmative defense. "A question concerning the waiver of an affirmative defense involves the interpretation of Rule 8(c) of the Federal Rules of Civil Procedure and, as such, is a question of law reviewed *de novo*." *Harbeson v. Parke Davis, Inc.*, 746 F.2d 517, 520 (9th Cir. 1984). For example, the district court granted dismissal based on res judicata in *Owens v. Kaiser Foundation Health Plan, Inc.*, 244 F.3d 708, 711 (9th Cir. 2001). On appeal, the appellants argued "that Kaiser waived its right to assert the doctrine of res judicata by failing to raise it as an affirmative defense in its answer or in its prior motions to dismiss." *Id.* at 713. Per the Court: "We review this issue *de novo*." *Id.*, citing *Kern Oil & Refining Co. v. Tenneco Oil Co.*, 840 F.2d 730, 735 (9th Cir.1988). *See also In re Hanford Nuclear Reservation Litig.*, 534 F.3d 986, 1000 (9th Cir. 2007) ("We review *de novo* the district court's conclusion that the affirmative defense is unavailable"), citing *United States v. Griffin*, 440 F.3d 1138, 1143 (9th Cir. 2006); *Stauber v. Cline*, 837 F.2d 395, 397 (9th Cir. 1988) (Appellant argued that district court erred in considering "immunity because defendants failed to raise the issue as an affirmative defense. . . . We review *de novo* the district court's decision to consider appellees' late claim of intramilitary immunity."); *United States v. Backlund*, 689 F.3d 986, 995 (9th Cir. 2012) ("We also review *de novo* the district court's decision to preclude an affirmative

defense.”), citing *United States v. Gurolla*, 333 F.3d 944, 952 n. 8 (9th Cir. 2003)). Accordingly, because the Ninth Circuit would review the district court’s decision to consider HTC’s affirmative defense of intervening rights *de novo*, the appropriate standard of review here is *de novo*.

II. THE DISTRICT COURT IMPROPERLY APPLIED THE DOCTRINE OF INTERVENING RIGHTS TO PRECLUDE CLAIMS OF INFRINGEMENT OF THE ’890 PATENT.

A. The District Court Should Not Have Considered HTC’s Intervening Rights Defense, Because HTC’s Assertion of the Affirmative Defense for the First Time on the Eve of Trial Unduly Prejudiced TPL.

HTC recognizes that, under Ninth Circuit law, a party may only raise an affirmative defense for the first time in a motion for summary judgment if the assertion does not prejudice the opposing party. HTC Br. at 48. Because TPL was unduly prejudiced by HTC’s belated assertion of intervening rights, HTC’s failure to promptly raise its affirmative defense should be deemed a waiver. *Underwater Devices Inc. v. Morrison-Knudsen Co., Inc.*, 717 F.2d 1380, 1389 (Fed. Cir. 1983), *overruled on other grounds*, *In re Seagate Tech., LLC*, 497 F.3d 1360 (Fed. Cir. 2007); Fed. R. Civ. P. 8(c).

As TPL argued to the district court, it was unduly prejudiced by HTC’s failure to promptly assert its intervening rights affirmative defense. *See, e.g.* A6171. Had TPL known that HTC planned to assert an intervening rights defense, it would have conducted the litigation differently by, among other things, taking

additional expert discovery and eliciting other evidence to help establish that adding language to claim 1 to create claim 11 did not substantively alter the claims, but rather served to clarify the claim language to make plain what a person of ordinary skill in the art would have already understood.

HTC argues that, because the issue relates to claim construction and is purely legal in nature, additional discovery would not have made a difference. HTC Br. at 50-51. However, it is well established that extrinsic evidence can be considered in claim construction. “If the intrinsic evidence is insufficient to establish the clear meaning of a claim, a court may resort to an examination of the extrinsic evidence.” *Certain Wireless Consumer Elecs. Devices & Components Thereof*, Inv. No. 337-TA-853, Order No. 31 (corrected), 2013 ITC LEXIS 622, at *8 (U.S.I.T.C. Apr. 18, 2013), citing *Zodiac Pool Care, Inc. v. Hoffinger Indus., Inc.*, 206 F.3d 1408, 1414 (Fed. Cir. 2000). Extrinsic evidence consists of all evidence external to the patent and prosecution history. *Id.* This evidence may help shed light on the relevant art, and includes “expert and inventor testimony, dictionaries, and learned treatises.” *Phillips v. AWH Corporation*, 415 F.3d 1303, 1317 (Fed. Cir. 2005) (*en banc*). Expert testimony is helpful where it “identifies what the accepted meaning in the field would be to one skilled in the art.” *Symantec Corp. v. Computer Assoc. Int’l, Inc.*, 522 F.3d 1279, 1290-91 (Fed. Cir.

2008). But TPL was denied the opportunity to fully develop the extrinsic evidence to defeat HTC's intervening rights defense and, thus, suffered undue prejudice.

HTC does not dispute that it failed to plead its affirmative defense until just before trial. Rather, HTC claims that TPL was not prejudiced because "HTC notified TPL of the intervening rights issue at multiple points early in the litigation." HTC Br. at 49. However, the purported notice is a few sentences and a footnote in HTC's briefs in support of its motion to stay the case pending reexamination. HTC Br. at 50, citing A0328.007 at 6:20-28; A0328.029 at 3 n.2. There, HTC argued that a stay was appropriate because the reexamination *may* lead to a narrowing of issues in various ways, including through the doctrine of intervening rights in the event that any claims were substantively amended. *Id.* But this generic reference to one of many potential defenses that *may be available* to HTC (depending on how the then-pending reexamination was resolved) and, if available, that HTC *may choose to assert* (depending on its overall litigation strategy) is inadequate to put TPL on notice and trigger a shift in TPL's discovery and litigation strategy. Indeed, because TPL did not view the new claim language as a substantive change, TPL had no reason to believe that HTC had proper grounds to, or would, assert an intervening rights defense. Moreover, HTC *negated* any purported implication that it intended to raise the affirmative defense of intervening rights when HTC *failed to raise it* in an amended answer following reexamination.

HTC now points to assertions in its brief filed on April 8, 2011 alleging that the reexamined claims in the '890 patent were purportedly narrower.⁴ HTC Br. at 50, n. 19, citing A0409 at n.2, A0413 at 10:3-4). If HTC believed in April 2011 that the '890's claims were significantly narrowed, it should have asserted its intervening rights defense then. But HTC failed to raise the affirmative defense of intervening rights until July 2013. A5972-83. TPL justifiably relied on HTC's inaction, and HTC's unreasonable delay should result in a waiver of the defense.

Moreover, HTC fails to address the prejudice TPL suffered due to the dichotomy between the district court's order precluding TPL from asserting claims 7 and 9 of the '890 patent because it would have been "redundant" given the identical scope of claims 1 and 11 (A0075), and its order granting summary judgment because the scope of claims 1 and 11 are substantially different (A0020). Had HTC asserted its intervening rights affirmative defense shortly after the reexamination, the district court could have contemporaneously resolved any issues regarding the scope of the claims once and for all. Either the scope was substantially the same – and the assertion of claims 7 and 9 would be redundant but there would be no intervening rights defense – or the scope would have been

⁴ Nevertheless, the district court noted that, in their opposition to TPL's motion to amend, "Plaintiffs argue that TPL's attempt to assert claims 7 and 9 of the '890 patent in addition to claims 17 and 19 is unnecessary and prejudicial because the latter are mirror images of the former." A0075. The district court's denial of TPL's motion was premised on this alleged redundancy. *Id.*

substantively different, and HTC could have asserted intervening rights, but TPL would have been permitted to assert claims 7 and 9. Instead, HTC gets the best of both worlds: TPL was precluded from asserting claims 7 and 9, and HTC obtained summary judgment based on its intervening rights defense. This is plainly prejudicial to TPL. In light of such unfair prejudice, the district court should have rejected HTC's efforts to plead the affirmative defense on the eve of trial.

B. The Claim Language Added in the Reexamination Did Not Substantively Change the Claim Scope of the '890 Patent.

HTC does not dispute that “a claim amendment made during reexamination following a prior art rejection is not *per se* a substantive change.” *Laitram Corp. v. NEC Corp.*, 163 F.3d 1342, 1347 (Fed. Cir. 1998) (*Laitram IV*). Rather, “in determining whether substantive changes have been made, [the court] must discern whether the scope of the claims are identical, *not merely whether different words are used.*” *Marine Polymer*, 672 F.3d at 1373 (citing *Laitram IV*, 163 F.3d at 1346) (emphasis in original). An amendment that clarifies the text of a claim “to make specific what was always implicit or inherent,” or that “makes it more definite without affecting its scope” is not a substantive change. *Laitram Corp. v. NEC Corp.* (“*Laitram I*”), 952 F.2d 1357, 1361 (Fed. Cir. 1991); *Bloom Eng'g Co. v. North American Mfg. Co.*, 129 F.3d 1247, 1250 (Fed. Cir. 1997). This is just such a situation: the addition of the language “said stack pointer pointing to said first push down stack” to claim 1 to create claim 11 did not significantly change the

scope of the '890 patent. As detailed in TPL's opening brief, the new language was added only to provide an explicit clarification of a preexisting implicit limitation, not to substantively change its scope. *See* TPL Br. at 18-22.

Specifically, the new language addressed the examiner's concern that the prior art referred to an **instruction** pointer which, if permitted to point to any position in any stack, could (under the broadest interpretation) be considered a **stack** pointer as disclosed in the '890 patent. A6041-6042. As the Examiner recognized, however, the pointers discussed in the prior art did not point **into** a push-down stack. A6068. The importance of the new language included in claim 11 is that it simply clarified that the stack pointer had to point **into** a push-down stack: "whereby new independent claim 11 includes the features of 'said stack pointer pointing into said first push down stack', the examiner notes that this claim is believed to be patentable, as the pointers described in the May '948 reference are **not particularly seen to point 'into said [push-down stack]'**". *Id.*⁵ (emphasis added). Pointing into a push-down stack is the defining feature of a stack pointer as understood by one of ordinary skill in the art. Because new independent claim

⁵ Specifically, regarding the two pointers referenced in May (WPTR and IPTR): "[T]he stack pointer WPTR points to a memory location for the top register A of the push-down stack. But the WPTR is not seen to point into the push-down stack. Similarly, the IPTR is not seen to point 'into the push-down stack.'" A6068.

11 explicitly clarified that the stack pointer points into a push-down stack, the Examiner found the claim to be patentable over the cited prior art. *Id.*

HTC argues that the new language substantively changed the scope of the claims because claim 1 did not require the stack pointer to point into the first push-down stack. HTC Br. at 56. But that is exactly what stack pointers do: they point into push-down stacks (unlike the **instruction** pointer referenced in the prior art, which points to the location in memory of the next instruction, and not into a particular stack). *See, e.g.*, A6047; A6546-6547 at ¶ 57. Accordingly, specifying explicitly that the stack pointer points into a push-down stack did not substantively change the claims, because that functionality was already implicit in the claims.

HTC further contends that, because claim 1 could have covered a microprocessor with multiple push-down stacks, the original claim would have been satisfied with a stack pointer that pointed to **any** of those stacks, while claim 11 is only satisfied with a stack pointer pointing into the “**first** push down stack.” HTC Br. at 57-58 (emphasis added). As an initial matter, however, the Examiner found that claim 11 was patentable over the prior art because the prior art did not show a pointer pointing into any push-down stack at all, whereas claim 11 did. A6068. Whether it pointed to the “first” stack does not appear to be significant. *Id.* Moreover, even if a microprocessor had multiple push-down stacks, there would necessarily always be a “first” push-down stack, and there would always be a stack

pointer pointing into that “first” push-down stack. Each stack has its own stack pointer, which is considered an integral part of the stack. A6547 at ¶ 58. Contrary to HTC’s unsupported argument, a stack pointer cannot point to *other* stacks. See *id.* (“Interchanging the stacks (or content of the stacks) is not permitted because that would create an unpredictable and unmanageable situation, which would cause the program to crash. Thus, if the stack pointers of the ’890 patent were interchanged, *i.e.*, if the stack pointer did not point into the first push down stack, but instead pointed into the return push down stack, the same undesirable situation would occur.”). Indeed, Figure 21 of the ’890 patent illustrates a microprocessor with three stacks, each with its own pointer. A0299 (’890 Fig. 21); A0309 (’890 18:15-45). Importantly, each pointer points only into its own stack, and not into any other stacks. *Id.* Although claim 1 was silent as to where the stack pointer pointed, one of ordinary skill would understand that the stack pointer could only point into its own stack; if there were multiple stacks, one stack would necessarily be considered the “first” stack, and would always have its own stack pointer pointing into it. *Id.*; A6547 at ¶ 58. In other words, to address the Examiner’s overly broad interpretation of “stack pointer,” “claim 11 clarified this situation by stating what is obvious to someone of the ordinary skill in the art: that stack pointers can only point to the stack with which they are associated.” A6547 at ¶ 58. This is not a substantive change. HTC’s intervening rights defense should fail.

III. THE DISTRICT COURT INCORRECTLY CONSTRUED THE PHRASE “SEPARATE DIRECT MEMORY ACCESS CENTRAL PROCESSING UNIT.”

HTC argues that the term “separate direct memory access central processing unit” (separate “DMA CPU”) excludes the “more traditional DMA controller 314” disclosed in the ’890 specification. *See* A0306 (’890 Patent) 12:64-65. HTC is wrong. The term “DMA CPU” as used in the patent encompasses a “DMA controller,” because the specification uses the terms “DMA CPU” and “DMA controller” interchangeably. ’890 Fig. 9 (“DMA CPU 314”), 10:52 (“DMA CPU 314”), 12:64-65 (“a more traditional DMA controller 314”), 13:3 (“DMA controller 314”).

HTC argues that the specification does not use the term “DMA controller 314” to refer to the “DMA CPU 314” depicted in Figure 9, because the “more traditional DMA controller” passage “makes no reference to Figure 9.” HTC Br. at 62-63. Again, HTC is wrong. The relevant “DMA controller” passage discusses the same DMA CPU 314 depicted in Figure 9, which shows microprocessor 310, containing “DMA CPU 314.” ’890 8:66-67, 10:52. The specification states: “The microprocessor 310 is equivalent to the microprocessor 50 in FIGS. 1-8.” *Id.* 9:5-6. However, “[t]here are certain differences between the microprocessor 310 and the microprocessor 50 that arise from providing the microprocessor 310 on the same die 312 with the DRAM 311.” *Id.* 11:5-8. The specification then enumerates eight

differences between the two microprocessor embodiments. *Id.* 11:23-13:15. For the eighth, the specification states:

8. The microprocessor 310 CPU 316 resides on an already crowded DRAM die 312. To keep chip size as small as possible, **the DMA processor 72** of the microprocessor 50 has been replaced with **a more traditional DMA controller 314**. DMA is used with the microprocessor 310 to perform the following functions:

Video output to a CRT

Multiprocessor serial communications

8-bit parallel I/O

The **DMA controller 314** can maintain both serial and parallel transfers simultaneously.

Id. 12:61-13:4 (emphasis added). The passage discusses the same microprocessor 310 depicted in Figure 9, except that here the applicants use the term “DMA **controller** 314” to refer to “DMA **CPU** 314” – to distinguish it from DMA CPU 72 of microprocessor 50 (Fig. 2), which is referred to as the “DMA processor 72.” Clearly, the patent uses the term “DMA CPU” to cover both a DMA **controller** (314, Fig. 9) and a DMA **processor** (50, Fig. 2).

The distinction between component 314 (Fig. 9) and component 72 (Fig. 2) is that 314 is a DMA **controller** and 72 is a DMA **processor**. The distinction is **not** between a DMA controller and a DMA CPU. Both components, 72 and 314, are DMA CPUs. *See, e.g., id.* 6:19-20 (DMA CPU 72), Fig. 9, 10:52 (DMA CPU 314). DMA CPU 72 is a “DMA processor” because it “controls itself and has the ability to fetch and execute instructions,” and “operates as a co-processor to the main CPU.” *Id.* 8:22-24. On the other hand, DMA CPU 314 is a “more traditional

DMA controller” because it must be “used with the microprocessor 310” in a way “supported by the microprocessor 310.” *Id.* 12:65-13:12. But both components are called “DMA CPUs.” Therefore, the term “DMA CPU” in the ’890 patent covers both a “DMA processor” and a “more traditional DMA controller.” By limiting “DMA CPU” only to that which “fetches and executes instructions,” the district court improperly limited “DMA CPU” to a “DMA processor,” even though the specification also uses the term “DMA CPU” to refer to a “DMA controller.”

HTC points to a dictionary definition of “CPU” as a component that fetches, decodes, and executes instructions. But extrinsic evidence, such as dictionary definitions, cannot overcome contrary intrinsic evidence in the specification. *Rolls-Royce, PLC v. United Technologies Corp.*, 603 F.3d 1325, 1337 (Fed. Cir. 2010). The specification is “the single best guide to the meaning of a disputed term,” and the specification “acts as a dictionary when it expressly defines terms used in the claims or when it defines terms **by implication.**” *Phillips v. AWH Corp.*, 415 F.3d 1303, 1321 (Fed. Cir. 2005) (emphasis added) (citing *Vitronics*, 90 F.3d at 1582; *Irdeto Access, Inc. v. Echostar Satellite Corp.*, 383 F.3d 1295, 1300 (Fed. Cir. 2004) (“Even when guidance is not provided in explicit definitional format, the specification may define claim terms by implication such that the meaning may be found in or ascertained by a reading of the patent documents.”) (citations omitted); *Novartis Pharms. Corp. v. Abbott Labs.*, 375 F.3d 1328, 1334-

35 (Fed. Cir. 2004) (same); *Bell Atl. Network Servs., Inc. v. Covad Communications Group, Inc.*, 262 F.3d 1258, 1268 (Fed. Cir. 2001) (“[A] claim term may be clearly redefined without an explicit statement of redefinition.”)). Because patent claims “must be read in view of the specification,” the term “separate direct memory access CPU” should simply be construed as “electrical circuit for reading and writing to memory that is separate from a main CPU,” so that the term includes a “DMA controller,” as used in the specification. *Phillips*, 415 F.3d at 1315.

HTC argues that one object of the invention is a processor “in which DMA does not require use of the main CPU during DMA requests and responses.” HTC Br. at 60. But the mere fact that this object is one of the many objects of the invention does not mean that the particular object or feature was adopted as a limitation in each claim of the patent. *See Yoon Ja Kim v. ConAgra Foods, Inc.*, 465 F.3d 1312, 1319 (Fed. Cir. 2006) (“The mere fact that one object of the invention is to produce a slow acting oxidant which is functional throughout the entire manufacturing process does not mean that this particular feature was adopted as a limitation in each claim of the patent.”). The specification does not prohibit using the main CPU during DMA requests and responses. Just because one of the patent’s advantages may be a microprocessor with a DMA **co-processor** does not mean that all the claims must include such a microprocessor. *See id.* Indeed, as

discussed below, due to a restriction requirement, the applicants chose to claim a microprocessor that specifically includes a DMA **co-processor** in a different divisional application from the one that led to the '890 patent. The '890 patent, on the other hand, was directed to a DMA CPU that includes a more traditional DMA controller “[t]o keep chip size as small as possible,” as “[o]ne solution to the bus bandwidth/bus path problem.” '890 8:64, 12:9-10.

HTC argues that the restriction requirement carries little weight because it was not accompanied by a discussion of the disputed claim language. HTC Br. at 64-66. But HTC conveniently overlooks the fact that one cause of the restriction requirement was two different claims in the original patent application: original claims 13 and 48. A2172-2173. Both claims required direct memory access processing units. However, the DMA processing unit of claim 13 (which went to another divisional application that has since been abandoned) required “means for fetching instructions for said central processing unit on said bus and for fetching instructions for said direct memory processing unit on said bus.” A2143. In other words, original claim 13 required a DMA **co-processor**. The DMA CPU of claim 48 – which ultimately became claim 11 of the reexamined '890 patent, the claim at issue here – had no such requirement. A2153-2154. This demonstrates that the term “DMA CPU” as used in the '890 patent is broader than HTC contends. Because claim 11 of the reexamined '890 patent does not include the explicit

limitation of fetching instructions found in original claim 13, the term “DMA CPU” in claim 11 encompasses both “DMA controller” and “DMA processor.” Thus, “separate DMA CPU” should be construed simply as “electrical circuit for reading and writing to memory that is separate from a main CPU.”

Conclusion and Statement of Relief Sought

For the forgoing reasons, regarding HTC’s cross-appeal, this Court should affirm the district court’s construction of “entire oscillator,” and affirm the district court’s denial of HTC’s renewed motion for judgment as a matter of law.

With respect to TPL’s appeal, the Court should reverse the district court’s January 21, 2014 and September 17, 2013 orders to the extent that they hold that the doctrine of intervening rights applies to the ’890 patent to preclude any claims of infringement before the date of the issuance of the reexamination certificate. The Court should also reverse the district court’s construction of the term “separate DMA CPU,” and construe it as “electrical circuit for reading and writing to memory that is separate from a main CPU.”

Respectfully Submitted,

September 2, 2014

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**UNITED STATES COURT OF APPEALS
FOR THE FEDERAL CIRCUIT**

HTC Corporation v. Technology Properties Limited, 2014-1076, -1317

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September 2, 2014

/s/ Elissa Matias.
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