UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF NEW YORK

CORNELL UNIVERSITY, a nonprofit New York corporation, and CORNELL RESEARCH FOUNDATION, INC., a nonprofit New York corporation,

Plaintiffs,

-v- **01-CV-1974**

HEWLETT-PACKARD COMPANY, a Delaware corporation,

Defendant.

HEWLETT-PACKARD COMPANY, a Delaware corporation,

Counterclaimant,

-v-

CORNELL UNIVERSITY, a nonprofit New York corporation, and CORNELL RESEARCH FOUNDATION, INC., a nonprofit New York corporation,

Counterdefendants.

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Hon. Randall R. Rader, Circuit Judge, United States Court of Appeals for the Federal Circuit, sitting by designation:

SECOND AMENDED ORDER

This court conducted an eight-day jury trial running May 19-30, 2008 to determine the validity and infringement of U.S. Patent No. 4,807,115 (the '115 patent). Finding the '115 patent valid and infringed, the jury awarded damages to Cornell. Hewlett-Packard now moves this court to enter judgment as a matter of law (JMOL) that the '115 is invalid for failure to satisfy the written description requirement, and that Hewlett-Packard did not infringe the patent

literally, under the doctrine of equivalents, through inducement, or through contributory infringement. Hewlett-Packard further requests this court to revise the claim construction relied on by the jury and enter JMOL that Hewlett-Packard did not infringe the '115 patent under that amended claim construction. As an alternative to JMOL, Hewlett-Packard requests a new trial on each of these issues. Because the initial claim construction is correct and the jury did not err in finding the '115 patent valid and infringed, this court denies Hewlett-Packard's motion.

I.

In other orders, this court has described the technology at issue in this case in great detail. Therefore, this order presents only those aspects of the '115 patent pertinent to this motion for JMOL. The '115 patent, entitled "Instruction Issuing Mechanism For Processors With Multiple Functional Units," issued to Dr. Hwa C. Torng on February 21, 1989. The patent describes technology for issuing multiple and out-of-order computer processor instructions in a single machine clock cycle. This technique employs a dispatch stack and precedence count memory to facilitate multiple and out-of-order processing and enhance the throughput of processors with multiple functional units.

In the computing context, instructions "specify operations a computer is to perform." Cornell Univ. v. Hewlett-Packard Co., 313 F. Supp. 2d 114, 118 (N.D.N.Y. 2006) (Markman Order). Importantly, instructions do not employ a universal format. Rather, "[e]ach instruction is placed in a certain format, or sequence of fields, each field corresponding to a separate part of the instruction." Id.

The invention claimed in the '115 patent attempts to remedy a limitation of early computer processors. Historically, processors could only issue and execute one instruction at a

time. This limitation derived, in part, from the difficulties posed by dependencies between instructions. Such dependencies arise when one instruction cannot be executed until completion of another. The '115 patent discloses "an instruction issuing mechanism capable of detecting and issuing those instructions which are not dependent and therefore can be performed during the same clock cycle without conflict or error." Id. at 119.

The '115 patent addresses two categories of dependencies: "essential" and "nonessential" dependencies. Essential dependencies come in just one flavor—"read-after-write" (RAW) dependencies. These RAW dependencies "occur where the result of one operation is needed for the performance of another." Id. The following two instructions provide an example of a RAW dependency: 1) add A and B, place result in C, and 2) divide C by D, place result in E. The RAW dependency arises because instruction 2) performs an operation on the value resulting from execution of instruction 1). Accordingly, the processor must execute instruction 1) before instruction 2), because instruction 2) depends on instruction 1). Put differently, the processor cannot divide C by D until it computes C by adding A and B together.

Nonessential dependencies, in contrast, come in two flavors—"write-after-read" (WAR) and "write-after-write" (WAW) dependencies. Although the '115 patent addresses both of these nonessential dependency types, only WAR dependencies are relevant to this discussion. Extending the example above, suppose a third instruction is added to the mix: 3) multiply X by Y, place result in C. As is apparent from examining all three instructions, a conflict could potentially arise between instruction 1) and instruction 3) because both write their result to C and instruction 2) uses the value in C in its operation. Thus, if instruction 3) executes after instruction 1) but before instruction 2) the product of X and Y will overwrite the sum of A and B, and instruction 2) will execute using the wrong value, resulting in a WAR error.

The '115 patent addresses RAW, WAR, and WAW dependencies by detecting instructions that are dependency-free—i.e., "concurrencies"—and issuing these dependency-free instructions simultaneously and non-sequentially. The claimed invention achieves this multiple and out-of-order issuance by "enriching" the instruction buffer to make it contain "an additional field or fields to keep track of the dependencies, if any, associated with each source or destination field of the instruction." Id. at 120. "This enrichment enables the instruction buffer to detect instructions which are free of dependencies and thus ready for execution. The patent refers to the enriched instruction buffer as a 'dispatch stack.'" Id.

The '115 patent describes a single "preferred embodiment" of the claimed invention. That embodiment includes:

> (1) a dispatch stack ("DS"), i.e., an "enriched" instruction buffer, which cooperates with a precedence count memory ("PCM") to detect "concurrently executable (i.e., dependency free) instructions"; and (2) a reservation circuit which then issues these multiple, possibly non-sequential, instructions to the execution unit within a single clock cycle. In the preferred embodiment, the dispatch stack is "enriched" in that it (1) has additional fields and accompanying logic for resolving dependencies in instructions; and (2) stores instructions whose dependency values are "initialized" (i.e., initially as-signed by the PCM). The dispatch stack and PCM eliminate the time-consuming comparison of all the instructions that would otherwise be necessary to ascertain whether the instructions contained dependencies. The preferred embodiment of the present invention is described as operating on a sample set of instructions that have a common instruction format (i.e., OP, S1, S2, D) and contain both essential and false dependencies.

Id. at 122.

Although the preferred embodiment describes a single instruction environment containing both essential and nonessential dependencies, the claims of the '115 patent allow for different instruction sets with different dependency configurations. For example, while independent claims 1, 14, and 15 "broadly teach an invention which detects instructions which

are dependency free," id. at 136, "the dependent claims specify limitations relative to particular instruction formats and particular types of dependencies," id.

This court conducted a three-day Markman hearing, Chief Judge Mordue presiding, to entertain evidence about the scope and meaning of the claims in the '115 patent, and the level of ordinary skill in the art. This court then adopted Cornell's proposed constructions for the terms "dispatch stack" and "means for detecting" as used in the various claims of the '115 patent. Importantly, this court rejected Hewlett-Packard's singular definition of "dispatch stack" and "means for detecting," which Hewlett-Packard sought to apply indiscriminately to all of the pertinent claims in the '115 patent without regard for the specific limitations of those claims. This court instead examined the specific limitations set forth in each claim from the vantage point of an ordinary artisan. With this understanding, this court determined that a β(D) field for detecting nonessential dependencies is not required for every claim that recites a "dispatch stack" or "means for detecting."

From May 19, 2008 through May 30, 2008, this court conducted a jury trial, Circuit Judge Rader presiding, during which Cornell presented evidence to support its contentions that the '115 patent was valid and infringed. Cornell offered testimonial and documentary evidence of the scope and nature of the prior art and the disclosures set forth in the '115 patent. In particular, Cornell offered expert testimony from Dr. James Smith that one of ordinary skill in the relevant art would have known that register renaming is a technique for eliminating nonessential dependencies at the time of Dr. Torng's invention. Dr. Smith further provided detailed and convinced evidence that an artisan of ordinary skill would have appreciated the application of that technique to the claimed invention, even though it is not explicitly set forth in the specification. Dr. Smith also offered testimony that every limitation of the asserted claims

was infringed literally and under the doctrine of equivalents by Hewlett-Packard's accused products. In addition, Cornell offered evidence that Hewlett-Packard's customers directly infringed the '115 patent, and that Hewlett-Packard knew or should have known that its actions would induce infringement. Further evidence presented by Cornell revealed that Hewlett-Packard knew or should have known that the accused combination was both patented and infringing, and that the accused products had no substantial non-infringing uses.

In light of this evidence, and applying this court's claim construction, the jury found the '115 patent valid and infringed. In particular, relevant to this motion for JMOL, the jury determined that Hewlett-Packard did not clearly and convincingly prove that the '115 patent violated the written description requirement. The jury also found that Hewlett-Packard's products infringed the '115 patent literally and under the doctrine of equivalents. Finally, the jury concluded that Hewlett-Packard induced its customers to infringe the '115 patent and that it committed contributory infringement.

Dissatisfied with the court's claim construction decision, Hewlett-Packard has repeatedly challenged the court's claim construction decision. In its motion for JMOL, Hewlett-Packard reiterates its complaint, relying primarily on the same arguments previously rejected by this court. Hewlett-Packard also asks for JMOL that the '115 patent is invalid for failure to satisfy the written description requirement, that its products do not infringe the '115 patent literally or under the doctrine of equivalents, and that it did not induce infringement or engage in contributory infringement of the patent.

II.

A district court may only grant a party's motion for JMOL if "a reasonable jury would not have a legally sufficient evidentiary basis to find for the party on that issue" under controlling law. Fed. R. Civ. P. 50(a)(1). Under Second Circuit Law, JMOL is appropriate if "the evidence is such that, without weighing the credibility of the witnesses or otherwise considering the weight of the evidence, there can be but one conclusion as to the verdict that reasonable [persons] could have reached." Nadel v. Isaksson, 321 F.3d 266, 272 (2d Cir. 2003) (internal quotation omitted). To prevail on a motion for JMOL, the moving party must show that the jury's findings are not supported by substantial evidence, where "substantial evidence is such relevant evidence from the record taken as a whole as might be accepted by a reasonable mind as adequate to support the finding under review." Tex. Instruments Inc. v. Cypress Semiconductor Corp., 90 F.3d 1558, 1563 (Fed. Cir. 1996) (internal quotation omitted).

Similarly, a motion of a new trial may only be granted if 1) the jury instructions were erroneous or inadequate, 2) the court made incorrect and prejudicial admissibility rulings, or 3) the verdict is contrary to the great weight of the evidence. See, e.g., Fed. R. Civ. P. 59(a); DLC Mgmt. Corp. v. Town of Hyde Park, 163 F.3d 124, 133 (2d Cir. 1998); Advanced Cardiovascular Sys., Inc. v. Medtronic, Inc., 265 F.3d 1294, 1308 (Fed. Cir. 2001). Before granting a motion for a new trial, the trial court must be convinced that the jury has reached "a seriously erroneous result" or that the verdict represents "a miscarriage of justice." DLC, 163 F.3d at 133.

Hewlett-Packard's first argument in its motion for JMOL or alternatively a new trial is that the court erred in its claim construction. Claim construction is a question of law for the court. See Markman v. Westview Instruments, Inc., 517 U.S. 370, 388 (1996). "It is a 'bedrock principle' of patent law that 'the claims of a patent define the invention to which the patentee is

entitled the right to exclude.'" Phillips v. AWH Corp., 415 F.3d 1303, 1312 (Fed. Cir. 2005) (en banc) (quoting Innova/Pure Water, Inc. v. Safari Water Filtration Systems, Inc., 381 F.3d 1111, 1115 (Fed. Cir. 2004)). "It is well-settled that, in interpreting an asserted claim, the court should look first to the intrinsic evidence of record, i.e., the patent itself, including the claims, the specification and, if in evidence, the prosecution history." Vitronics Corp. v. Conceptronic, Inc., 90 F.3d 1576, 1582 (Fed.Cir.1996). Claim terms are generally given their ordinary and customary meaning, which is "the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention." Phillips, 415 F.3d at 1313. Thus, "although the specification often describes very specific embodiments of the invention, [the Federal Circuit has] repeatedly warned against confining the claims to those embodiments." Id. at 1323. Nevertheless, "repeated and definitive remarks in the written description could restrict a claim limitation to a particular structure." Computer Docking Station Corp. v. Dell, Inc., 519 F.3d 1366, 1374 (Fed. Cir. 2008).

In construing means-plus-function language, a court must identify the function recited for the disputed limitation, and then identify the structure corresponding to that function as described in the patent itself. See Micro. Chem., Inc. v. Great Plains chem.. Co., 194 F.3d 1250, 1257-58 (Fed. Cir. 1999). In so doing, a court must exercise care to avoid "incorporation of structure from the written description beyond that necessary to perform the claimed function." Asyst Techs., Inc. v. Empak, Inc., 268 F.3d 1364, 1369-70 (Fed. Cir. 2001).

Hewlett-Packard also argues that it is entitled to JMOL that the '115 patent did not comply with the written description requirement, or in the alternative, a new trial on that issue. A patent satisfies the written description requirement so long as it "indicate[s] to persons skilled

in the art that as of the [filing] date the applicant had invented what is now claimed." All-Dental Prodx, LLC v. Advantage Dental Prods., Inc., 309 F.3d 774, 779 (Fed. Cir. 2002). A patent need not, however, disclose unclaimed subject matter. Amgen Inc. v. Hoeschst Marion Roussel, Inc., 314 F.3d 1313, 1333 (Fed. Cir. 2003). Compliance with the written description requirement is a question of fact. Pandrol USA, LP v. Airboss Ry. Prods., Inc., 424 F.3d 1161, 1164 (Fed. Cir. 2005).

In addition to challenging the claim construction and the validity of the '115 patent, Hewlett-Packard challenges the jury's findings of literal, doctrine of equivalents, induced, and contributory infringement. "JMOL in favor of a party is properly granted in the context of literal infringement if no reasonable jury could determine that every limitation recited in the properly construed claim is either not, or is, found in the accused device." Karlin Tech., Inc. v. Surgical Dynamics, Inc., 177 F.3d 968, 974 (Fed. Cir. 1999). In the context of a means-plus-function claim, "[l]iteral infringement of a § 112, ¶ 6 limitation requires that the relevant structure in the accused device perform the identical function recited in the claim and be identical or equivalent to the corresponding structure in the specification. Functional identity and either structural identity or equivalence are both necessary." Odetics, Inc. v. Storage Tech. Corp., 185 F.3d 1259, 1267 (Fed. Cir. 1999).

Infringement under the doctrine of equivalents, in contrast, requires "'equivalence' between the elements of the accused product or process and the claimed elements of the patented invention." Warner-Jenkinson Co., Inc. v. Hilton Davis Chem. Co., 520 U.S. 17, 21 (1997). A patentee must show that the accused product performs substantially the same function, in substantially the same way, to achieve substantially the same result. See Graver Tank & Mfg. Co., Inc., v. Linde Air Prods. Co., 339 U.S. 605, 608 (1950). "In order to arrive at its verdict of

infringement under the doctrine of equivalents, the jury must have found that one or more claim elements were met by equivalents, and could have found the remainder of the claim elements were met literally." Comark Commc'ns, Inc. v. Harris Corp., 156 F.3d 1182, 1188 (Fed. Cir. 1998). In a case such as this one, where no special verdict interrogatory was used to determine which elements were met literally and which were met equivalently, "this court must uphold the jury verdict if there is sufficient evidence of equivalents and linking testimony such that a reasonable jury could have found that at least one element was met by equivalents." Id. This "particularlized testimony" standard does not, however, require that an expert witness "re-start his testimony at square one when transitioning to a doctrine of equivalents analysis." Paice LLC v. Toyota Motor Corp., 504 F.3d 1293, 1305 (Fed. Cir. 2007). Instead, an expert may incorporate earlier testimony, either explicitly or implicitly into his doctrine of equivalents analysis. Id.

The jury's finding that Hewlett-Packard induced its customers to infringe the '115 patent is not vulnerable to JMOL so long as there is substantial evidence that a third party directly infringed the '115 patent, and that Hewlett-Packard knew or should have known that its actions would induce infringement. DSU Med. Corp. v. JMS Co., Ltd., 471 F.3d 1293, 1305 (Fed. Cir. 2006). Direct evidence of intent to induce infringement is not required, instead, circumstantial evidence may suffice. Id. at 1306. Moreover, evidence of active steps taken to induce infringement, such as advertising an infringing use, show an affirmative intent that the product be used to infringe. Id. at 1305 (citing MGM Studios Inc. v. Grokster, Ltd., 545 U.S. 913, 932 (2005)). Similarly, where the normal and intended use of an accused product involves an infringing use, a patentee may prove inducement where the accused infringer intends for the

product to be used in its normal manner. Chiuminatta Concrete Concepts, Inc. v. Cardinal Indus., Inc., 145 F.3d 1303, 1307, 1311-1312 (Fed. Cir. 1998).

Likewise, the jury's finding of contributory infringement must stand unless there is no substantial evidence that a third party infringed the '115 patent; that Hewlett-Packard knew that the combination for which its components were especially made was both patented and infringing; and that the accused products have no substantial noninfringing uses. See Golden Blount, Inc. v. Robert H. Peterson Co., 365 F.3d 1054, 1016 (Fed. Cir. 2004).

III.

Hewlett-Packard challenges this court's claim construction, asserting that the term "dispatch stack" should be construed consistently throughout the '115 patent to always include a β(D) field to account for nonessential, WAR dependencies. Similarly, Hewlett-Packard advocates for amendment of the construction of "means for detecting" to include "the structure of a β(D) field." JMOL Mtn at 6.

A.

As an initial matter, Cornell contends that this court is not entitled to entertain Hewlett-Packard's claim construction arguments in its motion for JMOL. To the contrary, the procedural law of patents as administered by the Federal Circuit entitles litigants to challenge an objectionable claim construction throughout the proceedings – with a motion for reconsideration, an objection to jury instructions or trial proceedings, or with a motion for JMOL. Only a failure to properly maintain a continued objection to a disputed claim construction will bar this court from reconsidering its construction during JMOL proceedings. See CytoLogix Corp. v. Ventana Medical Systems, Inc., 424 F.3d 1168, 1177 (Fed. Cir. 2005) ("Neither party objected to the

instructions at trial. Under these circumstances 'the issue [is] limited to the question of whether substantial evidence supported the verdict under the agreed instruction.' The question is thus whether the testimony presented by CytoLogix through its expert witnesses constitutes substantial evidence of infringement under the district court's definitions of the claim terms.") (internal citation omitted). Thus, this court is permitted to, and indeed must, consider Hewlett-Packard's claim construction arguments on JMOL.

B.

As an initial matter, this court cannot agree with Hewlett-Packard's insistence on a singular definition for "dispatch stack." As this court has repeatedly explained, "[t]here is no universal instruction format" used in all processors. Markman Order, 313 F. Supp. 2d at 118. Accordingly, as stated in the Markman Order:

> Because there is no single universal format or set of instruction fields, it follows that the number and types of dependency fields in the dispatch stack may differ according to the nature of the instructions and the possible dependencies inherent in them. For this reason, the number and types of dependency fields in the dispatch stack differ in the context of different patent claims.

Id. at 133. Rather than acknowledging the flexibility inherent in the term "dispatch stack," or even the different combinations of fields and dependencies set forth in the patent claims, Hewlett-Packard seizes on the preferred embodiment of Dr. Torng's invention as supplying a concrete definition of the term. The Federal Circuit has cautioned against revising broad patent claims to encompass only the preferred embodiment of the invention recited in the written description. Phillips, 415 F.3d at 1323.

As this court explained before, Hewlett-Packard's proposed inflexible and all-encompassing construction of "dispatch stack," derived from the preferred embodiment, is

incorrect because "a number of the limitations defendant lists are not found in all of the claims." Markman Order, 313 F. Supp. 2d at 136. The preferred embodiment shows a particular dispatch stack as an example of a dispatch stack that addresses essential and nonessential dependencies. It includes α(S1), α(S2), and β(D) fields to address these multiple dependency types. However, nonessential dependencies, accounted for by the β(D) field in the preferred embodiment, are "not inherent in the nature of the instructions themselves." Id. at 119. Accordingly, this court concluded that "the '115 patent teaches an invention which can be used in a variety of different environments, including environments in which there are no false dependencies, whether because they were eliminated by register renaming or for some other reason." Id. at 138. In such an environment without nonessential dependencies, no β(D) field is necessary. After all, this computing environment has no nonessential dependencies to detect.

Expert and inventor testimony presented at the Markman hearing and at trial, along with study of the prior art, reinforces this court's definition of the dispatch stack. The court heard evidence, including expert testimony, during the three-day Markman hearing. After consideration of that evidence, the court concluded that a person of ordinary skill in the pertinent art

> would have understood register renaming, would have known that it was a technique which was separate and distinct from detection of dependencies, would have known that it could remove or eliminate nonessential dependencies in computer instructions, and would have known that it could not remove or eliminate essential dependencies.

Id. 313 F. Supp. 2d at 128. Drs. Torng and Smith reinforced this conclusion with their trial testimony. Thus the record reinforces this court's conclusion that the "dispatch stack" of the

claimed invention need not always include a β(D) field because one of ordinary skill would know that such a field is not necessary in many computing environments.

C.

Hewlett-Packard also disputes the propriety of this court's conclusion that the means-plus-function limitation "means for detecting" does not require a β(D) field. Hewlett-Packard again relies on the preferred embodiment of the '115 patent to support its argument. In particular, Hewlett-Packard concludes that because the preferred embodiment discloses a β(D) field, the structure corresponding to the "means for detecting" limitation necessarily includes a β(D) field. This argument depends from a misapprehension of the claimed invention and the preferred embodiment. The fields disclosed in the preferred embodiment are independent implementations of Dr. Torng's invention that can be added or subtracted from the dispatch stack as needed to account for the instruction format and types of data dependencies. The β(D) field in particular stands out as optional. Nonessential dependencies are just that, and one of ordinary skill would know how to eliminate them without use of a β(D) field. Because the β(D) field is unnecessary, it should not be read into the '115 patent's means-plus-function claims. See Asyst, 268 F.3d at 1369-70.

Hewlett-Packard nevertheless attempts to buttress this argument by pointing out that the '115 patent does not explicitly disclose register renaming as a way to eliminate nonessential dependencies. This court accords this absence of disclosure no weight. Register renaming is not a structure implemented in the dispatch stack. Instead register renaming is a method for removing nonessential dependencies independent of the dispatch stack. Thus, so long as one of ordinary skill in the art at the time of invention would have known of register renaming and its

utility for eliminating nonessential dependencies and recognized this method as independent from any dispatch stack, Hewlett-Packard's argument does not affect the structure that performs the claimed function.

Importantly, Hewlett-Packard does not dispute "that as of 1983 it was known in the field (1) that register renaming can eliminate all false dependencies before the instruction enters the dispatch stack and (2) that register renaming always results in a β (D) count of zero." Markman Order, 313 F. Supp. 2d at 137. The only argument raised by Hewlett-Packard is that this court inappropriately relied on register renaming as a method for eliminating nonessential dependencies. To the contrary, this court merely relied on evidence presented during the Markman hearing, including testimony by experts for both parties, for the proposition that "as of 1983 and thereafter, a person of skill in the field would have known that register renaming could eliminate all false dependencies before the instruction entered the dispatch stack and that register renaming always results in a β (D) count of zero." Id. at 137-38. This court further found that "a person of skill in the art as of the time of the patent would not view a false dependency field (β(D)) as a necessary feature of the invention, because it would not be required for the invention to work in a processor that used register renaming." Id. at 137-38. Accordingly, the absence of an explicit discussion of register renaming from the '115 patent specification does not undermine this court's claim construction. Thus, because a β(D) field is not necessary structure corresponding to the "means for detecting," and because register renaming is not part of the claimed structure, this court perceives that the record – particularly the intrinsic evidence -- upholds the claim construction upon which the jury based its verdict.

D.

Because it rejects Hewlett-Packard's motion to amend the claim construction, this court need not address Hewlett-Packard's argument that the accused products do not have a β(D) field.

IV.

As an alternative to its claim construction argument, Hewlett-Packard asserts that the jury erred in finding that claims 1, 6, 14, 15, and 18 of the '115 patent satisfied the written description requirement.

JMOL of invalidity for failure to satisfy the written description requirement is only appropriate where no reasonable jury could conclude that Hewlett-Packard failed to prove, by clear and convincing evidence, that the '115 patent does not meet the written description requirement. Through Dr. Smith, Cornell offered testimony that every limitation of the "dispatch stack" in claims 1, 6, 14, and 15 is sufficiently disclosed by the '115 patent to demonstrate to a skilled artisan that Dr. Torng invented what is claimed, thereby providing a firm basis for the jury to conclude that Dr. Torng fulfilled the written description requirement. See Moba, B.V. v. Diamond Automation, Inc., 325 F.3d 1306, 1321 (Fed. Cir. 2003) (per curiam).

Moreover, Hewlett-Packard's focus on Dr. Torng's failure to explicitly describe register renaming in the specification as support for its written description argument is misplaced. As explained above, register renaming is not part of the claimed invention. Rather, it is a technique for eliminating nonessential dependencies so that there is no need for the "dispatch stack" or "means for detecting" to detect such dependencies. Accordingly, for purposes of the written description requirement, it is sufficient that one of ordinary skill in the art at the time of invention would have recognized register renaming as a prior art technique for eliminating

nonessential dependencies. See S3 Inc. v. nVidia Corp., 259 F.3d 1364, 1371 (Fed. Cir. 2001) (explaining that a patent "need not include subject matter that is known in the field of invention and is in the prior art, for patents are written for persons experienced in the field of the invention").

Likewise, Hewlett-Packard's resort to LizardTech, Inc. v. Earth Resource Mapping, Inc., 424 F.3d 1336 (Fed Cir. 2005), as support for its position is misplaced. This is not a case where Dr. Torng described just one way to implement his invention in the specification and then claimed a "generic" version of that invention. See LizardTech, 424 F.3d at 1344. Rather, the '115 patent sets forth a preferred embodiment capable of detecting both essential and nonessential dependencies, and then claims different configurations of dependency detection using the disclosed techniques. The patent does not attempt to claim a generic method for dependency detection, but simply claims methods of dependency detection tailored to different environments, e.g., those with nonessential dependencies and those without. Put differently, there is no dependency between the claimed techniques for detecting essential and nonessential dependencies. Thus, because prior art methods exist for eliminating nonessential dependencies, claims referring exclusively to the detection of essential dependencies (using the techniques described in the specification) do not, as a matter of law, violate the written description requirement. Accordingly, this court will not disturb the jury's verdict or grant Hewlett-Packard's motion for a new trial.

V.

In addition to its validity arguments, Hewlett-Packard also challenges the jury's infringement verdicts as to literal, doctrine of equivalents, inducement and contributory infringement. As with the written description verdict, on motion for JMOL a jury's infringement

verdicts are reviewed for substantial evidence. Because substantial evidence supports each of the jury's infringement verdicts, this court will not overturn those verdicts or grant Hewlett-Packard's motion for a new trial.

A.

Cornell presented extensive evidence, including expert testimony, in support of its infringement position. The jury was well within its rights to credit Cornell's witnesses and documentary evidence. Indeed, Hewlett-Packard's own expert acknowledged that Dr. Smith, who testified on behalf of Cornell, is "one of the foremost experts in the world" in the field. Trial Tr., Tran., May 27, 2008, at 203:14-19, 204:16-25, 205:14-18, 206:8-14, 207:13-208:3. Thus, the jury was entitled to credit Dr. Smith's testimony and Cornell's infringement arguments.

In support of Cornell's literal infringement position, Dr. Smith testified that the IRB of the accused products has a field for each source register (S1, S2) specified by the instruction, concluding that each such field can be an unrenamed or renamed register, depending on whatever type of register is specified at the time the instructions are residing in the IRB and data dependencies are being considered. Dr. Smith also testified that the IRB of the accused products has a field for each destination register specified by the instruction. Moreover, Cornell offered substantial evidence that each of the S1D and S2D "flags" in Hewlett-Packard's IRB correspond to the α(S1) and α(S2) fields in the dispatch stack. Finally, Cornell presented substantial evidence that the IRB and its accompanying arbitration logic satisfy the "means for detecting" and "means for issuing" limitations of claims 1 and 14. Accordingly, the jury's finding of literal infringement stands.

The jury's finding of infringement under the doctrine of equivalents must likewise stand. In addition to presenting evidence of literal infringement, Cornell's witnesses, and Dr. Smith in particular, provided testimony that each of the elements above was either literally or at least substantially identical to the claimed invention under the function/way/result test.

B.

Hewlett-Packard contends that there is no substantial evidence that it induced infringement by its customers because Cornell did not present evidence that that any third party directly infringes the '115 patent and Cornell did not demonstrate that Hewlett-Packard had the requisite intent to cause infringement by any third party after Hewlett-Packard had notice of the patent.

The record reveals, however, that Cornell provided the jury with substantial evidence that Hewlett-Packard's customers directly infringed the '115 patent. To begin, the Stipulation and Order concerning the Purchase and Use of HP's Accused Products by Customers issued by this court establishes that Hewlett-Packard's customers purchased the accused products and operated them according to the manner in which they were designed to operate. In addition, Cornell presented substantial evidence that the accused products satisfy each element of the asserted claims, that HP encouraged its customers to purchase and use these products, and that their normal intended use results in use and performance of the claimed methods. See MGM Studios, 545 U.S. at 932. Cornell also offered substantial evidence that after Hewlett-Packard had notice of the '115 patent it encouraged its customers to use the accused products in an infringing fashion. Cornell offered evidence that Hewlett-Packard encouraged its customers to use the accused products in an infringing manner through advertisements and other materials, and that

Hewlett-Packard knew its customers were using the accused products in an infringing manner. See DSU Med. Corp. v. JMS Co., 471 F.3d 1293, 1305 (Fed. Cir.).

C.

Finally, Hewlett-Packard challenges the jury's finding that it committed contributory infringement. In particular, Hewlett-Packard claims that Cornell failed to present evidence of direct infringement by third parties, and that Cornell failed to demonstrate that the accused products have no substantial noninfringing uses. As explained above, Cornell did present substantial evidence of direct infringement by Hewlett-Packard's customers. In addition, Cornell presented evidence that a reasonable jury could credit as proving that there is no substantial noninfringing use for the accused products. For example, Cornell offered evidence that the accused products were designed to issue multiple instructions out of order and the other features of the claimed invention. See MGM Studios, 545 U.S. at 932 (explaining that the contributory infringement doctrine "was devised to identity instances in which it may be presumed from distribution of an article in commerce that the distributor intended the article to be used to infringe another's patent, and so may justly be held liable for that infringement."). Accordingly, the jury did not err in finding that Hewlett-Packard committed contributory infringement.

VI.

Accordingly, Hewlett-Packard's motion for JMOL that the '115 patent is invalid and not infringed, or in the alternative, for a new trial on validity and infringement is denied.

IT IS SO ORDERED.

April 24, 2009
Washington, District of Columbia

/s/ Randall R. Rader
Randall R. Rader
Circuit Judge