2014-1492

United States Court of Appeals for the Federal Circuit

CARNEGIE MELLON UNIVERSITY,

Plaintiff-Appellee,

v.

MARVELL TECHNOLOGY GROUP, LTD., and MARVELL SEMICONDUCTOR, INC.,

Defendants-Appellants.

Appeal from the United States District Court for the Western District of Pennsylvania in No. 2:09-CV-00290-NBF, Judge Nora Barry Fischer

CORRECTED BRIEF FOR DEFENDANTS-APPELLANTS

Susan R. Estrich
Michael T. Zeller
QUINN EMANUEL URQUHART & SULLIVAN, LLP
865 South Figueroa Street, 10th Floor
Los Angeles, CA 90017
Telephone: (213) 443-3000
Facsimile: (213) 443-3100

Kevin P.B. Johnson
QUINN EMANUEL URQUHART & SULLIVAN, LLP
555 Twin Dolphin Drive, 5th Floor
Redwood Shores, CA 94065
Telephone: (650) 801-5000
Facsimile: (650) 801-5100

James L. Laufman
R. Roy Wang
MARVELL SEMICONDUCTOR, INC.
5488 Marvell Lane
Santa Clara, CA 95054
Telephone: (408) 222-2500
Facsimile: (408) 333-9827

Kathleen M. Sullivan
Edward J. DeFranco
Joseph Milowic III
Cleland B. Welton II
QUINN EMANUEL URQUHART & SULLIVAN, LLP
51 Madison Avenue, 22nd Floor
New York, NY 10010
Telephone: (212) 849-7000
Facsimile: (212) 849-7100

Derek L. Shaffer
QUINN EMANUEL URQUHART & SULLIVAN, LLP
777 6th Street, NW, 11th Floor
Washington, D.C. 20001-3706
Telephone: (202) 538-8000
Facsimile: (202) 538-8100

Counsel for Defendants-Appellants

CERTIFICATE OF INTEREST

Counsel for Defendants-Appellants certifies the following:

1. The full name of every party or amicus represented by me is:

Marvell Technology Group, Ltd. and Marvell Semiconductor, Inc.

2. The name of the real party in interest (if the party named in the caption is not the real party in interest) represented by me is:

N/A

3. All parent corporations and any publicly held companies that own 10 percent or more of the stock of the party or amicus curiae represented by me are:

Marvell Technology Group, Ltd. is a publicly traded company. No publicly held company owns 10 percent or more of Marvell Technology Group, Ltd.'s stock. Marvell Semiconductor, Inc. is a subsidiary of Marvell Technology, Inc. and Marvell Israel (M.I.S.L.) Ltd., and is an indirect subsidiary of Marvell Technology Group, Ltd.

4. The names of all law firms and the partners or associates that appeared for the party or amicus now represented by me in the trial court or are expected to appear in this court are:

QUINN EMANUEL URQUHART & SULLIVAN, LLP
Susan R. Estrich
Kathleen M. Sullivan
Steven G. Madison
Edward J. DeFranco
Raymond N. Nimrod
Faith E. Gay
Kevin P.B. Johnson
Robert B. Wilson
Derek L. Shaffer
Melissa J. Baily
Joseph Milowic III
Mark Tung
Andrew J. Bramhall
Heather Belville McCarthy

Brian E. Mack
Ketan Patel
Carolyn H. Thomas
Cleland B. Welton II
Michael T. Zeller
David C. Radulescu (no longer with firm)
Melissa Chan O'Sullivan (no longer with firm)
Anna M. Ison (no longer with firm)
Gregory S. Maskel (no longer with firm)

MARVELL SEMICONDUCTOR, INC.
James L. Laufman
R. Roy Wang

ECKERT, SEAMANS, CHERIN & MELLOTT
John E. Hall
Timothy P. Ryan

WEIL, GOTSHAL & MANGES LLP
Jared Bobrow
Anish Desai
Edward Jou (no longer with firm)
Etai Lahav (no longer with firm)

HAYNES AND BOONE, LLP
Nicolas S. Gikkas (no longer with firm)
Jason M. Gonder
Edward C. Kwon (no longer with firm)
Steven M. Levitan (no longer with firm)
Donald C. Templin (no longer with firm)

TABLE OF CONTENTS

TABLE OF AUTHORITIES

Page

Cases

Statutes

STATEMENT OF RELATED CASES

No appeal from this civil action has previously been before this Court or any other appellate court. There is no case pending in this Court or any other court that will directly affect or be directly affected by the Court's decision here. There are no other cases related to this dispute.

PRELIMINARY STATEMENT

No patent infringement judgment for more than a billion dollars has ever received this Court's imprimatur,[1] and the $1.535 billion judgment here should not be the first. That judgment, entered by the Western District of Pennsylvania (Fischer, J.) in favor of Plaintiff-Appellee Carnegie Mellon University ("CMU") and against Defendants-Appellants Marvell Technology Group, Ltd. ("MTGL") and Marvell Semiconductor, Inc. ("MSI") (collectively, "Marvell"), involves two method-patent claims relating to microchips used to improve the accuracy of data read from hard-disk drives. But CMU's patents were incapable of commercial implementation in a semiconductor chip. Thus, when CMU sent letters in 2003 to ten companies inquiring about interest in licensing its patents, not one nibbled. And in 2005, when CMU offered to license one of the two patents as part of a group of patents to Intel for a flat fee of $200,000, Intel declined. Yet upon finding that Marvell's commercially-successful chips infringed CMU's patent on a theoretical algorithm, the district court awarded a ***running royalty of fifty cents per chip*** on the more than 2 billion chips that Marvell sold ***worldwide*** over nearly a decade. In short, the largest extant judgment in patent history, resting on

[1] *See Centocor Ortho Biotech, Inc. v. Abbott Laboratories*, 636 F.3d 1341 (Fed. Cir. 2011) (vacating judgment of $1.7 billion); *Lucent Techs., Inc. v. Gateway, Inc.*, 543 F.3d 710 (Fed. Cir. 2008) (affirming judgment for defendant following jury verdict exceeding $1 billion); *Litton Sys., Inc. v. Honeywell Inc.*, 238 F.3d 1376 (Fed. Cir. 2001) (same).

hypothetical per-unit royalties on worldwide sales, was awarded for infringement of two patents that no one has ever paid a penny in per-unit royalties to license in the commercial marketplace.

How did this happen? The district court itself doubted that this could be a billion-dollar case. *See* A42659:2-3 (doubting that "there's going to be a billion dollar judgment myself"). The answer turns on a series of legal errors by the district court that require this Court's reversal:

To begin with, the CMU patents should have been found invalid as anticipated by the prior art. The two claims that went to trial both disclose precisely the same elements as the Worstell patent.[2]

The district court likewise erred in denying JMOL of noninfringement. Because CMU did not assert infringement under the doctrine of equivalents, every element of the asserted claims must read exactly onto an accused device. But they do not. Marvell's NLD chips use a pre-filter circuit, *outside* the Viterbi "trellis," to determine a *single* signal sample. CMU's claims, by contrast, require a branch-metric function to be performed on a *plurality* of signal samples, *inside* the trellis. Likewise, Marvell's MNP chips use a

[2] In pending reexamination proceedings, the PTO has initially rejected as invalid both claim 4 of CMU's '839 patent, Office Action in Ex Parte Reexamination, 90/013,125 (June 4, 2014), and claim 2 of the '180 patent, Office Action in Ex Parte Reexamination, 90/013,124 (July 31, 2014), over prior art not at issue in this appeal.

conventional Viterbi detector and a post-processor where the output of the Viterbi is compared to two alternative sequences to correct errors. By contrast, according to the inventor, CMU's invention addresses media noise "in a trellis and NOT in post-processor." Finally, CMU's claims are directed to the use of detectors, and Marvell's simulations are not detectors.

Even if the judgment of liability could stand, the jury's damages award of $1.17 billion cannot. The court improperly admitted expert testimony conjuring a hypothetical-license royalty of $.50 per chip on worldwide sales despite uncontroverted evidence that the only licenses CMU had ever granted were modest flat fees. Nor was there any legal basis for the award of some $900 million based on Marvell's sale of ***foreign chips***—chips that were manufactured, sold, and used abroad, without ever entering the United States. This extraterritorial application of U.S. patent law, if affirmed, would lead global companies to locate their research, development, and customer-relations activities outside the United States, harming not only U.S. companies and workers, but also the U.S. universities with whom they partner.

In any event, the $.50-per-chip rate is unsupported by any evidence that any similar patents command such a figure in the real world, and cannot be sustained by (i) an "excess profits" theory that uses Marvell's business-wide profit goal as its benchmark or an (ii) "operating profit premium" theory that rests on a tiny amount

of unrepresentative sample chips, both conjured for this litigation by CMU's damages expert.

The award of $287 million in enhanced damages for willfulness should also be vacated, for Marvell had objectively reasonable invalidity and non-infringement defenses.

And once the district court found that CMU had "inexcusably" and "unreasonably" delayed for more than six years before bringing suit, to Marvell's prejudice, it should have excluded $620 million in pre-suit damages as barred by laches.

JURISDICTIONAL STATEMENT

The district court had jurisdiction over this patent case pursuant to 28 U.S.C. §§ 1331 & 1338. This Court has jurisdiction over Marvell's appeal of the district court's May 7, 2014 final judgment pursuant to 28 U.S.C. § 1295(a)(1). Marvell filed a timely notice of appeal on May 14, 2014. A40460-61.

STATEMENT OF THE ISSUES

1. Whether the judgment should be reversed on the ground that CMU's two patent claims are invalid as anticipated and/or obvious in light of the Worstell patent.

2. Whether the judgment should be reversed on the ground that claim 4 of CMU's '839 patent and claim 2 of CMU's '180 patent are not infringed by Marvell's MNP/EMNP or NLD chips or simulations.

3. Whether the award of $1.17 billion in hypothetical-license reasonable-royalty damages should be reversed because it is erroneously based upon (a) a per-chip running royalty rather than a flat-fee license; (b) a royalty base consisting overwhelmingly of chips manufactured, sold, and used only outside of the United States; and/or (c) a royalty rate of $.50 per chip that exceeds any comparable real-world rate and is not properly apportioned to the technology covered by CMU's patent claims.

4. Whether the award of $287 million in enhanced damages should be vacated for lack of willfulness because Marvell had objectively reasonable invalidity and noninfringement defenses.

5. Whether the $620 million in damages accrued prior to suit should be vacated based on laches given that CMU inexcusably and unreasonably delayed nearly six years in bringing its claim, to Marvell's prejudice.

STATEMENT OF THE CASE

This is an appeal from a final judgment to CMU of ***$1.535 billion*** for supposed infringement of two claims of CMU patents directed to improving the accuracy of data read from a hard disk drive ("HDD"): U.S. Patent Nos. 6,201,839

(the "'839 patent"), and 6,438,180 (the "'180 patent"). A1-3. The judgment comprises $1.17 billion in reasonable-royalty damages awarded by the jury, plus supplemental damages of $79.5 million and a willfulness enhancement of $287.2 million (A2); in addition, the court ordered Marvell to pay CMU an ongoing royalty calculated at $.50 per chip. (A3).

A. The Parties

MSI is a leading designer of semiconductor microchips headquartered in Santa Clara, California. A161; A43650-51; A43742-43. It designs a wide range of chips that are manufactured by third-party manufacturers in Asia and then incorporated by downstream customers into their own larger products (*e.g.*, HDDs installed in laptop computers) sold throughout the world. A166-67. MTGL, MSI's indirect parent, is a Bermuda corporation. A161.

CMU is a research university located in Pittsburgh, Pennsylvania. It neither manufactures nor sells semiconductor chips or HDDs. A42; A41313:15-17.[3]

B. The Technology And The Prior Art

This case involves sequence detectors designed to account for errors when bits of data (1s and 0s) are read from an HDD.[4] A450. Data is stored on an HDD in long sequences of tiny magnetic "domains," each with a north and a south

[3] CMU inventors Aleksandar Kavcic and José Moura stand to obtain 50% of any award to CMU in this case. A42521:2-3.

[4] A more detailed background on sequence detection technology can be found at Marvell's April 7, 2010 Technology Tutorial (A2557-63).

pole. A41227. The domains create magnetic fields, which a "read head" measures and sends to a read channel to translate into a series of 1s and 0s. A150. At increased data densities, "media noise" can cause errors in the measurements, causing signals that should be read as 0s to be interpreted instead as 1s. A41229-30. Media noise takes two principal forms: "signal-dependent noise," which refers to noise attributable to a specific sequence of bits, and "correlated noise," which refers to the tendency of noise associated with adjacent bits to vary together. A45462-63. Unless addressed, media noise impairs the accuracy with which data can be read from an HDD. A41229-30. And because the problem becomes increasingly acute as data is stored more densely, accounting for media noise facilitates higher-density data storage. A41352-53.

Conventional detectors named for Qualcomm co-founder Andrew Viterbi ("Viterbi detectors") identify the most likely sequence of data through an iterative process involving the calculation of "branch metric values" for each branch in a "trellis"[5] representing every possible sequence of bits. A442; A45463-64.[6] One

[5] A "branch" means "a potential transition between two states (nodes) immediately adjacent in time ***in a 'trellis.'***" A45463 (emphasis added). A "trellis" is "a graphical representation of the progression of states of a communications channel in time, wherein states are depicted as nodes and potential transitions between states are depicted as lines or arrows. An example of a trellis is illustrated in Figure 4 of the 839 patent." A45464.

such Viterbi detector uses a "Euclidean" branch-metric function (a simple squaring of the difference between the measured signal (r_i) and the expected signal (m_i) at each instant) to determine branch-metric values (M_i): $M_i = (r_i - m_i)^2$. A452 at 6:10-14. This Euclidean branch-metric function does not account for media noise. A41359.

In the last two decades, companies and researchers have developed sequence detectors that do account for media noise by using modified versions of the Viterbi branch-metric function. For example, in 1992, teams led by Dr. Weining Zeng (now a Marvell engineer) and Dr. Inkyu Lee independently developed modified Viterbi detectors that account for signal-dependent noise by using a noise statistic called a variance (σ^2) in their branch-metric functions. A450 at 1:38-56; A452 at 6:15-35; A53634-40. In early 1995, a Seagate engineer named Glen Worstell developed a modified Viterbi detector that accounted for *both* signal-dependent noise *and* correlated noise. A7082-83. Worstell's invention accounted for *signal-dependent* noise by using a statistic called transition noise standard deviation (σ), which is the square root of the variance (σ^2) that Zeng and Lee had used. A53697 at 9:45-10:67. Worstell also accounted for *correlated* noise by applying his branch metrics not only to the signal sample being measured at a given moment, but also

---

[6] At a basic level, branch metrics represent a measure of the difference between actual signal reading (r_i) and ideal reading (m_i) associated with a branch of the trellis. A452 at 6:10-14.

to *previous* signal samples. A53693 at 2:1-7. The Patent & Trademark Office ("PTO") granted Worstell a patent on his invention (U.S. Patent No. 6,282,251) in August 2001. A53686.

C. CMU's '839 And '180 Patents

In late 1995, a CMU graduate student, Aleksandar Kavcic, working on his thesis with his professor Dr. José Moura, developed an "optimal," theoretical sequence-detection algorithm to account for both signal-dependent and correlated noise using complex statistics called covariance matrices. A41583. As Kavcic acknowledged in his thesis prospectus, his optimal approach was "too complicated for implementation in a detector" because it involves "computing correlation matrices and vectors from sample data and storing them in memory, which in a real-time application needs to be done adaptively on the fly." A53673; *see* A53677 ("The optimal receiver … implementation is difficult since the metric computations are too intense.").

In March 1997, Kavcic and Moura submitted an invention disclosure to CMU's Office of Technology Transfer, titling their invention "Correlation-Sensitive Adaptive Sequence Detector." A46086-96. The first sentence of the disclosure acknowledged that Viterbi-like detectors had *already* become the industry standard in magnetic recording. A46088. Kavcic and Moura claimed, however, that "[t]he current detectors ignore correlation between noise samples"

(*id.*; A46092) while their invention uses "correlation matrices." A46089-90. Kavcic and Moura acknowledged that their theoretical work was "embryonic" and needed "substantial work to bring to market." A46093.

Shortly after Kavcic and Moura submitted their invention disclosure, CMU forwarded it to Worstell, the Seagate engineer. A46099. In an email dated April 15, 1997, Worstell informed CMU of his earlier work in the same area**:**

> A couple of years ago I did some work on a ***Viterbi detector modification to account for noise correlation***. This invention is related but goes beyond my work and is probably more interesting. I also know of work at UCSD and IBM which is related, but again as far as I know [Kavcic's] work is different enough to warrant investigation. An important issue is the circuit complexity required. I'll try to look at that, too.

Id. (emphasis added). Worstell thus acknowledged that CMU's optimal detector using correlation matrices went beyond his work but noted that his own work had been correlation-sensitive. *Id*.

CMU filed a provisional patent application on May 9, 1997. A439. Notwithstanding Worstell's e-mail, CMU's patent application did not disclose Worstell's work on a correlation-sensitive detector. *Id.* The application acknowledged the prior-art Zeng and Lee Viterbi detectors that account for *signal-dependent noise* by modifying the Euclidean branch metrics, but claimed that "[t]hese references ***ignore the correlation*** between noise samples." A450 at 1:38-56 (emphasis added). On April 3, 1998, CMU filed a non-provisional application,

claiming priority to the provisional application. A439. On March 1, 1999, CMU filed a continuation-in-part application claiming priority to the same provisional application. A460. Neither of these applications remedied CMU's prior failure to disclose Worstell's prior art. A439; A460. The PTO granted the non-provisional applications on March 13, 2001 (the '839 patent), and August 20, 2002 (the '180 patent). *Id.*

Almost a decade later, on March 6, 2009, CMU sued Marvell, accusing it of infringing both the '839 patent and the '180 patent. A483-88. As narrowed for trial, only two claims remained at issue. Claim 4 of the '839 patent asserts:

> A method of determining branch metric values for branches of a trellis for a Viterbi-like detector, comprising:
>
> ***selecting*** a branch metric function for each of the branches at a certain time index from a set of signal-dependent branch metric functions; and
>
> ***applying*** each of said selected functions to a plurality of signal samples to determine the metric value corresponding to the branch for which the applied branch metric function was selected, wherein each sample corresponds to a different sampling time instant.

A456 (emphasis added).

Claim 2 of the '180 patent (dependent on claim 1) asserts:

> 1. A method of determining branch metric values in a detector, comprising:
>
> receiving a plurality of time variant signal samples, the signal samples having one of signal-dependent noise, correlated noise, and both signal dependent and correlated noise associated therewith;

selecting a branch metric function at a certain time index; and

applying the selected function to the signal samples to determine the metric values.

2. The method of claim 1, wherein the branch metric function is selected from a set of signal-dependent branch metric functions.

A481 (emphasis added). As in Worstell's work, each claim accounts for *correlated* noise through a modified Viterbi detector using a branch metric based on a *plurality* of signal samples, and each accounts for *signal-dependent* noise by using a set of signal-dependent branch-metric functions.

In May 2001, just three months after the '839 patent issued and nearly eight years before CMU filed suit, CMU realized that, while its "patent [was] optimal," others in the industry were "working on suboptimal" solutions to either "get around" the patent or provide a "simpler solution," because the "optimal implementation is complex." A54316; A80-81. Moura testified at trial that, although he did not have "concrete proof," he "suspect[ed]" that Marvell was infringing CMU's patents as early as 2001. A41271:12-272:4.

D. Marvell's Media-Noise Post Processor And '585 Patent

Marvell developed a post-processor architecture in 1998, and began developing a media-noise post processor ("MNP") in 2001. A43905. The MNP uses a conventional Viterbi detector followed by post-processor circuitry to identify and correct likely errors in the sequence emerging from the Viterbi detector. A48203. Marvell chose this approach largely because (as Kavcic and

Moura had recognized) modifying a Viterbi trellis to achieve a theoretically optimal detector would require too much computational complexity to implement in a real-world chip. A42080-82; A43905-06; A43920-21; A44716-20. Indeed, Marvell engineer Greg Burd (using a software simulation that he had developed in March 2001 and named "KavcicViterbi") determined in December 2001 that Marvell "can not implement" the Kavcic detector, because it is "too large." A46140; *see* A44716-17. In view of this conclusion, Marvell set about developing a different kind of media-noise ***post processor*** that would be suboptimal but operationally practicable, naming its simulation of the detector "KavcicPP" (Kavcic post processor) in homage to Kavcic and his optimal detector. A44716-20.

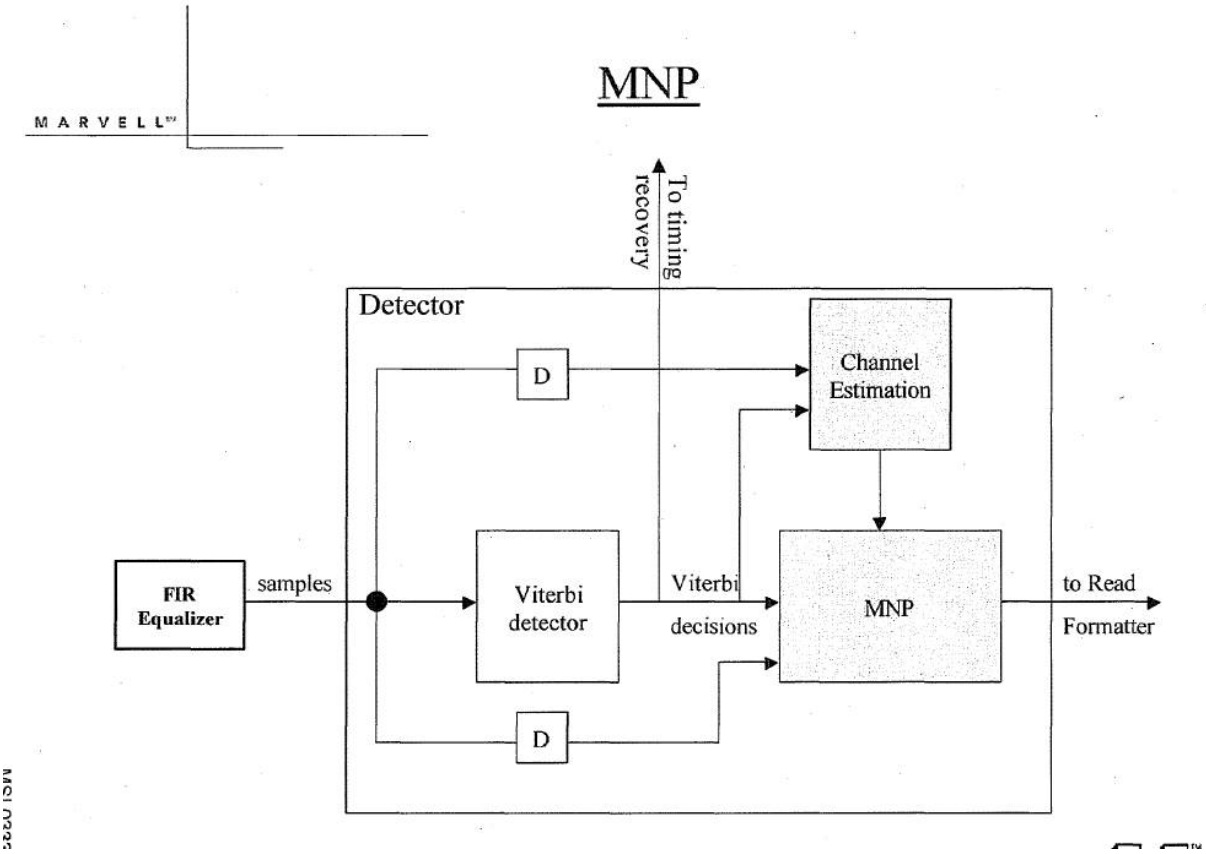
On January 3, 2002, Marvell filed a provisional patent application for its post processor (A54259-67) in which it disclosed Kavcic's work as prior art, explaining that, "[e]ven though Kavcic's detector provides significant gains over conventional Viterbi detector in the presence of media noise, it is not very appealing due to implementation complexity" (A54264; *see* A43945:11-15; A53793). The provisional application included the results of simulations comparing the optimal Kavcic approach with the KavcicPP. A54267. Marvell filed a non-provisional application in July 2002 (A53793), and its patent (No. 6,931,585, the "'585 patent") issued in August 2005 (A53793-804). Both

CMU's '839 and '180 patents are identified on the face of Marvell's '585 patent as "References Cited." A53793.

Marvell thereafter invested substantial resources into developing, producing, and marketing its chips. A234; A31979-80; A43752-53; A46232. Marvell's chips are manufactured in Asia and sold to HDD manufacturers, which incorporate the chips into laptops and other devices sold around the world. A166-67; A43449-50. Marvell shipped its first MNP chips in late 2002. A42252-53; A42262:5-17; A42268:16-25. Marvell has continually improved its chips, introducing "enhanced" MNP chips ("EMNP") and Non-Linear Detector ("NLD") chips between 2003 and 2009. A97; A36191-92. CMU's suit accuses both Marvell's MNP/EMNP chips and its NLD chips, as well as detector simulations that Marvell used during its design process. A182.

Marvell's MNP/EMNP Chips—Marvell's MNP/EMNP chips apply a conventional Viterbi branch-metric function to a *single* signal sample, rather than to a plurality of samples. A48194. A post processor then compares the sequence output by the Viterbi detector to two alternative error sequences to correct errors caused by media noise. A41977:14-20. The parties prepared a stipulation on Marvell's chip technology called the "Chip Stipulation" and agreed that the details set forth therein are true and accurate depictions of the circuits within Marvell's products. A168. The stipulation includes the following MNP design document,

which shows that Marvell's MNP uses a simple Viterbi detector whose output sequence is then processed by a media-noise post processor (MNP):



A48203.

Marvell's design document also shows that the Viterbi detector uses a conventional branch-metric function of the form $BM_i = (r_i - m_i)$.[2] A48194. The design document next explains that the MNP computes, through its "non-linear error filter," the difference between two metrics—the Viterbi path and an error path:

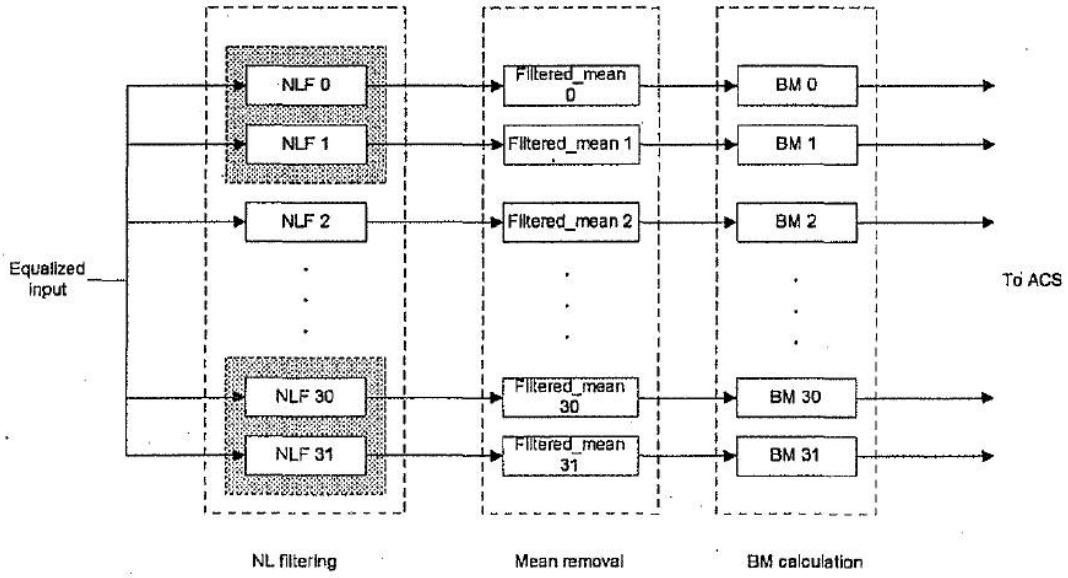
- Just as linear counterpart, Non-Linear Error Filter computes

$$\sum_{\substack{\text{all branches effected} \\ \text{by an error event}}} [\text{BM(viterbi+ error path)} - \text{BM(viterbi path)}]$$

A48207. Marvell's provisional application shows that this equals the difference between two path metrics. A54266.

Determining such a difference between two ***path metrics*** is not the same as determining the values for the potential transitions (branches) in a trellis. As Marvell's expert Dr. Richard Blahut testified at trial, Kavcic himself admitted that "the difference between two path metrics" is not a branch metric. A44522-24. Kavcic explained as much in an October 2001 email exchange with Seagate: asked whether CMU's "claim specif[ies] that the data dependent (DD) part happen[s] in the trellis or in a post processor" (A53701), Kavcic explained that CMU's patent claims "address the 'data dependent' nature of the algorithm … ***in the trellis and NOT in the post processor***," and admitted that "the [patent] examiner had us write extra material to ***make sure that we do not use a post processor***, which is a patent by Kelly Fitzpatrick" (A53700-04 (emphases added)).

Marvell's NLD Chips—Marvell's NLD chips use a non-linear filter ("NLF") to generate a *single* signal sample, which serves as an input into a simple Euclidean squaring metric. A41994-96; A48240; A48271; A48249. The following block diagram from the Chip Stipulation shows that the NLFs ***precede*** the branch metric calculation (see labels at bottom of diagram):



A48240. Thus, as CMU's expert admitted at trial, in Marvell's NLD chips the result of the "application step" is a "single signal sample" (f_y), not a branch-metric value. A41994-96. This is consistent with Marvell's design specifications in the Chip Stipulation, which identify Marvell's branch-metric function as $BM = (f_y - f_m)^2$ (A48271). As the diagram below shows, Marvell's NLD circuitry first pre-processes signals using an FIR filter (shown below on the left as receiving a signal, y, into a series of delay blocks, tap weights and a summation). The output of the FIR filter is a single signal sample f_y (highlighted here). A simple Euclidean squaring metric is then applied to the single sample, f_y, minus the ideal filtered mean f_m:

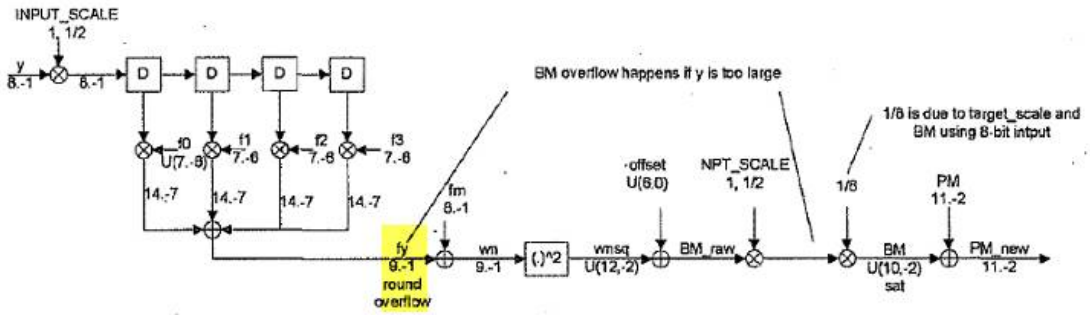


Figure 7. BM and PM calculation

A48249.

Marvell's Simulations—Marvell uses detector simulations during the design process. A190-91; A43666-67. Simulations are computer programs that simulate a detector (for purposes of research, study, or benchmarking) by processing synthetic sequences of symbols, or data files containing copies of wave forms recorded from HDDs. *Id.*; A43943; A43990; A41756:20-22; A41745:16-746:7. Marvell's simulations of detectors are not actually detectors. *Id.*

E. CMU's Unsuccessful Licensing Efforts

CMU never licensed the patents-in-suit on a per-unit royalty basis. CMU allowed any company to become an Associate of CMU's Data Storage Systems Center ("DSSC"), and thereby to obtain a royalty-free license to any CMU patent conceived during the term of its membership in exchange for a mere ***$250,000 annual fee***. A42361:13-18; A43429:7-23. In May 2001, CMU contacted two such Associates, Seagate and IBM, encouraging them to exercise their royalty-free licenses and to adopt CMU's methods in their HDDs. A53683-84; A53685. But

neither Seagate nor IBM ever made a chip using the CMU patents. A43588:3-13; A53744-46.

In August 2003, CMU wrote to HDD manufacturers and chip suppliers soliciting them to license CMU's patents. A42461-67. Although CMU sent at least fourteen letters, not a single recipient expressed interest. A46980; A46981; A53751; A53752; A53753; A53754; A53756; A53757; A53758; A53759; A53761; A53762; A53763. Most of the companies (including Marvell) did not respond (A160), and CMU never followed up (A42470-72).[7]

In 2005, CMU offered Intel the chance to license *any* patent in a specified group of patents (including the '180 patent) for ***a flat $200,000 per-patent fee***. A53765-A53781. CMU's internal communications described this amount as "reasonable." A53783; *see* A42506-07. Kavcic and Moura requested that the '839 patent also be added to the group, at the same $200,000 rate. A53785-91. Intel never licensed the patents. A160-61; A42418:20-22.

In January 2006, CMU prepared a spreadsheet labeled "Highly Speculative Income Streams" identifying potential future royalty sources "over and above [CMU's] conservative" estimates. A53806. This "speculative" document

[7] Marvell's customer Fujitsu inquired about Marvell's opinion on the CMU patents, but by the time CMU filed suit years later, there was no record of any correspondence or follow-up by Fujitsu on the issue. A25.

projected that CMU might be able to obtain, at most, ***a $2 million annual license fee*** from Marvell for the patents-in-suit, starting in 2007. *Id*.

F. The Proceedings Below

CMU filed its complaint (A483-88) on March 6, 2009, nearly eight years after Moura and CMU "suspected" Marvell's infringement. A84-85; A41268-73.[8]

1. The Summary Judgment Orders

Marvell moved for summary judgment of invalidity on the ground that CMU's patents were anticipated by the Worstell patent. The district court denied the motion (A7064-88), ruling that Worstell did not disclose the "selecting" step of CMU's claims because it did not disclose a "set" of functions (A7078-79). To reach that conclusion, the district court construed the term "function" to mean "a mathematical relation that uniquely associates members of a first set with members of a second set," and then reasoned that "adding another variable into a function … does not operate to convert that single function into multiple functions." A7079. Because the district court found that the Worstell patent used variables in its equations, the court concluded that it did not disclose a *set* of branch metric functions from which one function is selected. *Id.* Because it lacked a set of functions to select from, the court concluded Worstell did not anticipate. *Id.*

[8] CMU asserted 12 claims against Marvell (A38562), the court granted summary judgment of noninfringement as to 5 claims (A17384-96), and CMU dropped 5 more claims on the eve of trial (*compare* A19326 *with* A30525).

In the course of its decision on anticipation, the court observed that its "reasoning would seem to render the CMU claims invalid under 35 U.S.C. § 112" for lack of written description, because under the court's definition, the equation on which CMU's claims rest (the '839 patent's equation 13), which also uses variables, would likely "also be[] considered a *single* function" and not "a set of functions from which one function may be selected." A7079-80. But because Marvell's initial motion had been based on anticipation alone, the court did not decide the written-description issue. A7080.

Marvell then moved for summary judgment of invalidity for lack of written description. The court denied this motion too (A8108-27), reasoning that while CMU's equation did contain variables, they were *parameter* variables representing multiple functions rather than *input* variables as in Worstell (A8119-20; A8122; A8126).[9]

2. The Trial

The district court held an eighteen-day jury trial in November and December 2012. A399-412. With respect to validity, the undisputed trial evidence was that the Worstell patent discloses a modified Viterbi detector that accounts for both correlated and signal-dependent noise; its very *title* is a "Modified Viterbi Detector

[9] Two other summary-judgment decisions, reported at 888 F. Supp. 2d 637 (W.D. Pa. 2012); 890 F. Supp. 2d 602 (W.D. Pa. 2012), and the district court's ruling on Marvell's motion in limine, reported at 906 F. Supp. 2d 399 (W.D. Pa. 2012), are not at issue on appeal.

Which Accounts For *Correlated* Noise" (A53686 (emphasis added)), and CMU's expert *admitted* that Worstell's patent also accounts for *signal-dependent* noise in the form of "transition" noise (A44968).

As to whether Marvell's MNP chips infringe, it was undisputed that CMU's claims address media noise "in a trellis and NOT in [a] post processor," as Kavcic confirmed in contemporaneous correspondence with Seagate (A53700-04). In contrast, the MNP chips use a "linear [conventional] Viterbi" component to determine the best path through the Viterbi trellis and *only then* invoke post-processor circuitry "to see if either [of two] alternate paths is better than the best path," as CMU's expert admitted. A41977:14-20. As to whether Marvell's NLD chips infringe, while CMU's claims require that the branch-metric value be determined by applying a branch-metric function to a *plurality* of signal samples, CMU's expert admitted that Marvell's pre-filter puts out a "*single* signal sample" (f_y) as the result of the application step in Marvell's NLD chips. A41995-96. With respect to Marvell's simulations, it was undisputed that CMU's patents cover only detectors (A41939:10-13), that simulations are computer programs that simulate detectors (A41756:14-22), and that, as CMU's expert put it, the "[d]etector is in the chip" (A41745:16-746:7).

As to willfulness, the evidence showed that Marvell was aware of CMU's patents, disclosed them as prior art in its own patent applications (A53793), and

attempted to work around them by developing a "suboptimal" post processor that would eliminate the "implementation complexity" inherent in Kavcic's approach (A54264). But the district court allowed the jury to infer that Marvell had not sought an opinion of counsel on this issue (A25-26; A285-89), despite Marvell's assertion of attorney-client privilege over conversations between Marvell engineer Zining Wu and in-house attorney Eric Janofsky concerning CMU's patents (A43944:9-22; A281).

CMU's damages case rested entirely on the testimony of its damages expert, Catherine Lawton (admitted over Marvell's repeated objections, *see, e.g.*, A17367-81; A24637-44; A31957-62; A33398-425; A33893-94; 286 F.R.D. 266 (W.D. Pa. 2012)). Lawton is a career litigation consultant with no background in economics, accounting, microchips, or intellectual-property licensing. A42811-12; A33404; A43414-16; A42786-88; A42793-94; A43476:7-21.

It was undisputed that the sole real-world evidence concerning CMU's efforts to license the asserted patents involved flat fees rather than per-unit royalties: CMU issued licenses to the patents to IBM, Seagate, and 3M based on their payment of $250,000 flat fees, along with all CMU patents conceived during the term of their memberships. A42440-41; A53614-23, A53641-47, A53648-56. CMU offered to license the '180 patent to Intel for a $200,000 per-patent flat fee. A53765-81; A42498:10-17, A42502:2-9. And CMU made an internal estimate

that it could license the '839 and '180 patents to Marvell for at most a $2,000,000 annual fee. A53806; A53828-29. Lawton testified nonetheless that the parties would have entered into a hypothetical per-unit license (A43412-13; A43439-40), reasoning that CMU had previously entered into one such license and Marvell had entered into three (A43353-54). None of those licenses concerned the patents-in-suit, and it was undisputed that they are not comparable licenses. A44237.

Lawton used Marvell's *worldwide* sales as the base for calculating hypothetical-license royalties (A5; A31961-62, A43439-40), and used a $.50-per-chip royalty rate (A43412:5-9). She derived that rate as intermediate between the numbers yielded by each of two supposed economic theories: Under a supposed "excess profits" theory, she hypothesized that, if Marvell aimed at a minimum profit margin of 50% (A43312-13; A43500), then Marvell's earnings of $.42 in "excess profits" per chip represented a premium from infringement (A43312:12-18; A43326-28). Under a supposed "operating profit premium" theory, she hypothesized that Marvell had earned an "operating profit premium" of up to $.72 on those chips that contained MNP as a "key" or "principal" feature. A43328-32; A43335-40; A32800. She based that analysis on a sample set of 9,855 chips, amounting to 0.0004% of Marvell's total chips at issue (A43487-88), that Marvell had offered to Maxtor, its smallest customer (A43484-85). Lawton admitted that no other customer had paid a comparable premium. A43486-87. The $.50 per-

chip rate represented 23% of Marvell's average per-chip profit and 11% of its per-chip price (A43325-26).

On December 26, 2012, the jury returned a verdict finding CMU's patents both valid and infringed. A45544-47. The jury also found that the infringement was willful. A45547-48. The jury awarded damages of $1,169,140,271.00: fifty cents for each of the 2.34 billion chips Marvell had sold around the world between March 6, 2003 and July 28, 2012. A45547; A43412-13; A5-6.

3. The Post-Trial Orders

In an Order entered September 23, 2013, the district court denied Marvell's motions for JMOL or new trial on invalidity, non-infringement or damages. A149-274; 986 F. Supp. 2d 574 (W.D. Pa. 2013). With respect to invalidity, the district court ruled that CMU's expert's "conclusions were left to the jury to accept or reject as it was for them to determine credibility and the weight given to such evidence." A212. With respect to infringement, the court concluded that the "jury was free to accept either expert's opinions or reject them, as the 'credibility of the parties' competing experts is an issue for the jury to resolve, not the Court.'" A194 (citation omitted).

With respect to damages, the court concluded that Lawton's testimony was sufficient to support the jury's determination to award a royalty based on per-chip fees rather than a flat-fee license, reasoning that "there is *no* established royalty for

the patents-in-suit in this case." A258. With respect to the royalty base, the district court upheld the inclusion of Marvell's worldwide sales, regardless of whether the chips were manufactured, sold, or used abroad. A255-56. And the district court upheld Lawton's use of a $.50-per-chip royalty rate (A263-64), despite Marvell's challenges to Lawton's qualifications, methodology, and data and even though that rate was out of all proportion to any real-world chip sales (A264-66).

The district court also upheld the jury's finding that Marvell's infringement was willful (A214-32), deferring to the jury's willfulness finding (A221; A227) despite its earlier acknowledgement that Marvell's invalidity defense was a "close call" on a summary judgment motion that would have disposed of both claims (A226-27). The district court also denied Marvell's post-trial motion to preclude $620 million in pre-suit damage on grounds of laches (A76-148), despite its holding that "CMU ***unreasonably and inexcusably delayed*** filing this lawsuit for a period of five years and eleven months, and that Marvell sustained evidentiary prejudice as a result" (A143-44 (emphasis added)), concluding that Marvell's willfulness tilted the equities in favor of CMU (A145).

Based on the award of a $.50-per-chip running royalty on each infringing chip, the district court awarded CMU $79.55 million in supplemental damages, accounting for chips sold between the close of the damages period considered by

the jury (July 29, 2013) and the date the court entered judgment on the jury's verdict (January 14, 2014). A74. Based on that same finding, the court ordered Marvell to pay an ongoing $.50-per-chip royalty on its worldwide post-judgment sales. *Id.* The court denied CMU's motion for a permanent injunction. *Id.*

Based on the jury's finding that Marvell had willfully infringed, the district court enhanced the damages award (including the supplemental damages) by a factor of 23%—yielding a penalty of $287,198,828.60. A74.

The district court entered its Final Judgment on May 7, 2014, awarding a total of $1.535 billion in damages, plus the ongoing $.50-per-chip royalty for the life of CMU's patents. A1-3.

SUMMARY OF ARGUMENT

This is a case that should never have gone to trial, much less produced a record-breaking judgment.

First, the modified Viterbi detector claimed by CMU sets forth precisely the same elements as the Worstell patent, rendering it invalid as anticipated by prior art. The specific steps involving covariance matrices that might have distinguished Worstell were dismissed from the case at summary judgment because they clearly were not infringed; what was left was just as clearly anticipated by Worstell. The district court erred in denying summary judgment by creating an artificial distinction between inputs and parameters to distinguish Worstell from the patent

claims, and then by denying JMOL without identifying a single element that distinguished CMU's claims from Worstell.

Second, the accused chips and simulations do not infringe because infringement here requires that every element of the claims must read exactly onto an accused device. In the words of Kavcic himself, there were key differences between what CMU theorized (but could never realize in silicon in the real world) and what Marvell incorporated into its chips. The NLD chips use a pre-filter circuit to determine a *single* signal sample f_y which is then used as an input to a branch- metric computation: BM = $(f_y - f_m)^2$. CMU's claims require that a branch-metric function be applied to a *plurality* of signal samples to determine branch-metric values for branches in a trellis. The MNP chips use a conventional Viterbi detector followed by a post processor, which compares the output of the Viterbi to two alternative error sequences. But as Kavcic explained, his invention addresses media noise "in a trellis and NOT in post-processor." And the simulation is just that: a simulation, not a detector. The district court denied JMOL without even addressing the undisputed differences between the claims and the accused products.

Third, the judgment as to damages fails on multiple grounds. CMU's damages expert should not have been permitted to testify in the first instance, for she lacked relevant expertise and used unreliable methodologies to select the wrong measure, the wrong base, and the wrong rate. Where, as here, all the real-

world evidence supports a flat-fee license, which is all CMU ever offered, received, or contemplated for these patents, a court is not free to impose a per-unit royalty instead. The district court compounded that error by adopting what it termed CMU's "novel" theory that the royalty base should include chips that were made, sold, and used abroad, even though doing so amounts to extraterritorial application of U.S. patent law—exposing Marvell and its end users to double recovery in every country where these chips are used and encouraging global companies to do their research and development anywhere but here. And to make a perfect storm, the court's $.50-per-chip rate is based on made-up theories and is contrary to all real-world evidence: an "excess profits" theory that actually showed that Marvell's supposed "excess profits" from infringement were *higher* on chips that didn't have MNP; and an "operating profit premium" theory based on a quote for a tiny batch of high-priced sample chips and then applied to the billions of chips accused, virtually every one of which was sold to larger customers at much lower production prices.

Fourth, enhancing the damages by $287 million in a case where Marvell had reasonable invalidity and noninfringement defenses (and the district court even acknowledged that Marvell's invalidity defense was a "close call") violates this Court's precedent that enhancement requires both objective and subjective willfulness.

And *fifth*, pre-suit damages in the amount of $620 million should have been barred by laches, as the district court agreed but for its view that Marvell's conduct blocked the application of laches. But that was error, for Marvell was entirely open in its conduct, for example citing the CMU patents as prior art, and thus committed no inequity linked to CMU's delay.

STANDARDS OF REVIEW

Under applicable Third Circuit law, the denial of a motion for JMOL is reviewed *de novo*, "viewing the evidence in the light most favorable to the nonmovant." *Seachange Int'l, Inc. v. C-COR, Inc.*, 413 F.3d 1361, 1367-68 (Fed. Cir. 2005) (quoting *Rinehimer v. Cemcolift, Inc.*, 292 F.3d 375, 383 (3d Cir. 2002)). The district court's claim construction is a question of law reviewed *de novo*. *Id.* at 1367.

An award of enhanced damages for willful infringement is reviewed for abuse of discretion. *Powell v. Home Depot U.S.A., Inc.*, 663 F.3d 1221, 1228-29 (Fed. Cir. 2011). "Subjective" willfulness is a question of fact, but "objective" willfulness is an issue of law reviewed *de novo*. *Bard Peripheral Vascular, Inc. v. W.L. Gore & Assocs., Inc.*, 682 F.3d 1003, 1006 (Fed. Cir. 2012); *see In re Seagate Tech., LLC*, 497 F.3d 1360, 1371 (Fed. Cir. 2007) (*en banc*).

The court's admission of expert testimony is reviewed for abuse of discretion. *Pineda v. Ford Motor Co.*, 520 F.3d 237, 243 (3d Cir. 2008).

Instructional error is reviewed *de novo*, and where a "district court's instruction on damages was erroneous … a new trial on damages is required." *Tigg Corp. v. Dow Corning Corp.*, 962 F.2d 1119, 1131 (3d Cir. 1992).

The district court's laches determination is reviewed for abuse of discretion, and should be overturned if it rests on a "clearly erroneous factual underpinnings," "an unreasonable judgment in weighing relevant factors," or "an erroneous interpretation of the law." *Serdarevic v. Advanced Med. Optics, Inc.*, 532 F.3d 1352, 1358 (Fed. Cir. 2008).

The district court's denial of a motion for new trial because the verdict is against the weight of the evidence is reviewed for abuse of discretion. *Seachange*, 413 F.3d at 1368. In the Third Circuit, a court "exercises its own judgment in assessing" the weight of the evidence when considering a motion for a new trial. *Marra v. Phila. Hous. Auth.*, 497 F.3d 286, 309 n.18 (3d Cir. 2007).

ARGUMENT

I. THE DISTRICT COURT ERRED IN DENYING JMOL THAT CLAIM 4 OF THE '839 PATENT AND CLAIM 2 OF THE '180 PATENT ARE ANTICIPATED BY THE WORSTELL PATENT

In denying Marvell's motion for JMOL on invalidity (A210-14), the court did not identify a single element of the CMU claims not anticipated by the Worstell patent, saying only that the jury was free to credit CMU's expert over Marvell's (A212). Expert opinion is not a substitute for an assessment of the

actual evidence. In assessing invalidity, the jury is not "free to discard probative admissions and undisputed facts," *Newell Cos. v. Kenney Mfg. Co.*, 864 F.2d 757, 767 (Fed. Cir. 1988), which here establish the invalidity of the asserted claims.

CMU's claims address correlated and signal-dependent noise by determining branch-metric values for branches of a trellis in a detector (or Viterbi-like detector) by using a two-step process. A456; A481. Specifically, claim 4 of the '839 patent is directed to a "method of determining branch metric values for branches of a trellis for a Viterbi-like detector" comprising: (1) "*selecting* a branch metric function for each of the branches at a certain time index from a set of signal dependent branch metric functions"; and (2) "*applying* each of said selected functions to a plurality of signal samples to determine the metric value corresponding to the branch." A456. Claim 2 of the '180 patent is similarly directed to a "method of determining branch metric values in a detector" comprising (1) "*selecting* a branch metric function at a certain time index" from a set of signal-dependent branch metric functions; and (2) "*applying* the selected function to [a plurality of time variant signal samples] to determine the metric values." A481. In both claims, the claimed "selecting" step requires the selection of a mathematical function for determining branch-metric values in a trellis (defined as a progression of "potential transitions") from a set of multiple signal-dependent mathematical functions, and the "applying" step requires the application

of the selected functions to a *plurality* of signal samples to determine branch-metric values for branches in a trellis. *Id.*; A45462-64.

The Worstell patent ("Worstell, or the "Seagate patent"), is directed to a modified Viterbi detector that accounts for *both* correlated noise and signal-dependent noise:

> To this Court, it is clear that the Seagate Patent discloses a detector that receives correlated noise samples. Not only is the Seagate Patent entitled '[m]odified viterbi detector which accounts for correlated noise,' but it repeatedly refers to correlated noise…
>
> …The Seagate Patent also accounts for signal-dependent noise. The Court construed the term 'signal-dependent noise' to mean 'media noise ... whose noise structure is attributable to a specific sequence of symbols.' [A7083]. Transition noise is a type of media noise which is attributable to the sequence of symbols recorded on the recording media. Transition noise is, therefore, a form of signal-dependent noise.

A7082-83. Worstell addresses the media noise in the same way as the asserted claims:

First, Worstell's branch-metric functions are applied to a "plurality" of signal samples. Worstell explains that "***the present invention*** uses a branch metric in a Viterbi detector which is based on a current signal sample, as well as one or more previous signal samples. In this way, the Viterbi detector according to the present invention accounts for ***correlated noise*** in the system." A53693 at 2:3-7 (emphasis added).

Second, Worstell discloses the selection of a branch-metric function from a set of signal-dependent branch-metric functions. Specifically, Worstell discloses methods by which its modified metric (*see* Eq. 20 at 9:50) can be "further modified" to account for transition noise using a transition noise standard deviation (σ), which is simply the square root of the variance (σ^2) (A53697 at 10:48-67):

> The ***modified metric*** used in accordance with the ***present invention can be further modified to take into account transition noise as well.*** If it is assumed that ***the standard deviation of the noise component of each sample is greater where there is a transition in the signal written to the disc than where there is no transition, then each branch metric can be modified by multiplying the metrics which correspond to transitions by a fraction which depends on the transition noise standard deviation***. Implementing this in a fairly straightforward way would require 8 multipliers, one for each 'one' branch leading to each state in the appropriate trellis diagram.

A53697 at 10:48-59 (emphasis added). As recounted by Marvell's expert at trial, when asked about this passage at deposition, CMU's expert conceded that the transition noise differs depending on whether there is a transition or not, and thus the standard deviation of the noise for a transition (σ_1) differs from the standard deviation associated with noise for *no* transition (σ_2). A44648-49. Thus, Worstell's detector selects one branch-metric function for branches corresponding to a transition and a different function for branches corresponding to no transition.

Even under the court's construction of the elements of a function (where only a parameter variable as opposed to an input variable can produce a set of

functions), Worstell's use of a fraction dependent on the transition-noise standard deviation (σ) (a parameter that varies depending on whether there is a transition or not) explicitly discloses a "set" of signal-dependent branch-metric functions. A7079; A8119-22. As a standard deviation (σ) is simply the square root of the variance (σ^2), Worstell's "further modified metric" constitutes a set of variance-dependent branch-metric functions in the same way as the variance-dependent branch-metric functions disclosed (σ^2) in the Zeng and Lee papers. A44635-36; A53634-40. As Marvell's expert recounted at trial, both CMU's expert and inventor, Dr. Moura, agreed that the use of a variance (σ^2), as in Zeng and Lee, represents a set of functions because the variance (σ^2) depends on whether there is a 1 or 0 written on the disk (A44635:13-24; A44636:6-19). These admissions confirm the disclosure of the selecting step—in the Worstell patent.

Moreover, even if, as CMU's expert opined at trial, the fraction dependent on the transition-noise standard deviation (σ) were a constant (A44956-57), Worstell *still* would disclose a "set" of signal-dependent branch metric functions. In what Worstell describes as a "fairly straightforward" embodiment, a fraction that depends on the transition-noise standard deviation (σ) can be multiplied by the function only for each "one" branch. A53697 at 10:48-59. That is, a first branch-metric function (multiplied by a transition-noise fraction) is applied only to the branches corresponding to a transition (the "one" branches). *Id.* And a second

branch-metric function (not multiplied by a transition-noise fraction) is applied only to the branches corresponding to no transition (the "zero" branches). *Id.* Both functions must be used to account for signal-dependent noise, together constituting a "***set***" of signal-dependent branch metric functions. *Id.*

Thus, even assuming the standard deviation were constant, the Worstell patent by its terms *still* discloses *at least* two functions that must together be used to account for signal-dependent noise—one to be selected for use on branches with a transition and the other to be selected for use on branches without a transition. If there were any doubt as to whether Worstell discloses a "set" of functions or only a single function, it would have been obvious, in view of Worstell's disclosure, or in view of the work of Zeng and Lee, to provide a set of signal-dependent branch-metric functions. A44654-56. As described in the background of the CMU patents, Zeng and Lee "derived a branch metric computation method for combating the signal-dependent character of media noise" but "ignore[d] the correlation between noise samples." A450 at 1:45-52. Worstell extended their work to account for correlation by applying his branch metrics to a plurality of signal samples. Indeed, the asserted claims are directed to nothing more than the teaching of the prior art. Notably, the evidence at trial shows an absence of secondary considerations—as the prior art already accounted for media noise, and there is no evidence of anyone seeking to license or commercialize the asserted claims. A53744 ("[W]e are not

aware of anyone utilizing the claims in the Kavcic-Moura patent."); A42496:2-13; A42450:6-12; A160-61; A17392-93; A53634-37; A53638-40; A53686-99.

CMU first accused Marvell of infringement on 12 claims (A38562; A17384-96), including a set of claims directed to an optimal detector using an "adaptively updated" set of "covariance matrices" (A17385)—the optimal detector that Worstell said went "beyond my work" and was "probably more interesting" (A46099) and that Marvell found too complex to implement (A43905-06; A43920-21; A44716-20; A46140). The court found no basis for infringement of those claims before trial (A17384-96), leaving CMU to assert only a very broad method of determining branch-metric values in a trellis using two steps that were disclosed in Worstell.

II. THE DISTRICT COURT ERRED IN DENYING JMOL THAT CLAIM 4 OF THE '839 PATENT AND CLAIM 2 OF THE '180 PATENT ARE NOT INFRINGED

As with invalidity, the court denied Marvell JMOL of noninfringement. (A182-94) based simply on the argument that the "jury was free to accept either expert's opinions or reject them, as the 'credibility of the parties' competing experts is an issue for the jury to resolve, not the Court'" (A194). That was error. In order to infringe, each and every element set forth in the claims must read on an accused device or method ***exactly***[10] and when carefully assessed against Marvell's

[10] CMU did not assert infringement under the doctrine of equivalents.

pre- and post-processing circuitry, no reasonable jury could find that Marvell infringed.[11]

According to the claims, the branch-metric function must be applied to a ***plurality*** of signal samples to ***determine*** branch metric values for the potential transitions in a trellis. A456; A481 A45462-64. But in Marvell's NLD chips, it is undisputed that the application of the NLD filter generates a ***single*** signal sample (f_y) as its output, and thus the branch-metric function is applied to a ***single*** sample output by the NLD filter (A41994-96; A48249).

According to the claims, as Dr. Kavcic himself conceded was critical (A53700-04), media noise is accounted for ***in the trellis and NOT in a post-processor***. But in Marvell's MNP chips, media noise is accounted for in a post-processor, not in the trellis. A48203; A48194. And the claimed ***detectors*** must operate on ***signal samples*** at a certain time instant. A456; A481. But Marvell's simulations are not "detectors" but rather ***simulations*** of detectors (A43943; A43990; A41756:20-22), and they operate not on signal samples but on synthetic sequences or data files of wave forms copied from HDDs (A192-93). As CMU's expert put it, the "[d]etector is in the chip." A41745:16-746:7.

[11] As a rational jury could not find the predicate direct infringement, neither could it find indirect infringement.

A. The NLD Chips Do Not Infringe

CMU's claims require the application of the selected branch-metric function to a ***plurality*** of signal samples ***to determine*** branch metric values for branches ***in a trellis***. A456; A481; A45462-64. That is, CMU's asserted claims require a branch-metric function to be applied to a ***plurality*** of signal samples to ***determine*** branch-metric values for the potential transitions (branches) in a trellis. *Id.*

The problem Marvell identified in Kavcic's approach is a speed bottleneck, and the undisputed evidence shows that Marvell avoided the bottleneck by moving its filter out of the Viterbi trellis—so that a pre-filter circuit (NLF), using tap weights that can be shared by more than one branch, first generates a ***single*** signal sample (f_y) which can then be used as an input to a simple branch-metric function ($BM_1 = (f_y - f_m)^2$). A41994-96; A48240; A48249; A48271.

At trial, CMU's expert admitted that the output of the NLF, and the result of the "application step" in Marvell's chips, is a ***single*** signal sample (f_y) which indisputably is *not* a branch metric value:

> Q So it's fair to say that the signal that's labeled F-sub-Y that we're discussing, that is a single signal sample, isn't it true, sir?
>
> A ***It's a single signal sample*** that's—that's the output, ***the result of the application, the application step.***

A41996:6-10. CMU's claims, however, require that the determination of a branch-metric value result specifically from the "application step." A456 at 14:15-16; A481 at 15:47-48.

Rather than addressing these specific defects, the district court repeatedly relied upon a Marvell document recognizing that Dr. Kavcic's branch metric uses FIR filters *within* the Viterbi trellis. A24; A196; A218; A224. In that January 10, 2003 email, Marvell's engineer Zining Wu stated that he had "discussed the approach of using a different noise whitening filter in each branch. It turns out to be the original structure that Kavcic proposed in his paper." A46779. But in the very next sentence, Wu explains that "We also found a way to move the noise whitening filter ***out of the Viterbi***," thus reducing "the speed bottleneck … in the branch metric calculation." *Id.* (emphasis added). Moving the filter out of the trellis reduces the computations—such that only one difference need be computed for each branch ($BM = (f_y - f_m)^2$), as shown in this figure highlighting the single signal sample (f_y) output by the NLF filter:

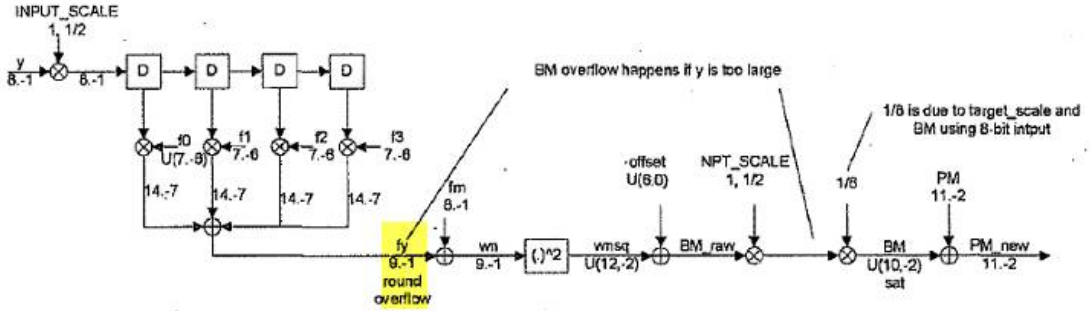
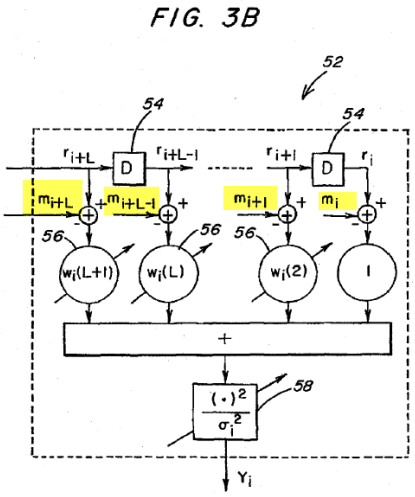


Figure 7. BM and PM calculation

A48249 (Marvell's NLD Specifications).

In contrast, CMU's claimed FIR filter resides in a trellis and requires numerous computations of differences between each of a plurality of signal samples (r_{i+L}, r_{i+L-1}, r_{i+1}, r_i) and their respective expected values (m_{i+L}, m_{i+L-1}, m_{i+1}, m_i) in the trellis, as shown highlighted below:



A443 (Fig. 3B of the CMU Patents). Given these differences, Marvell's NLD chips cannot infringe the asserted claims.

B. The MNP/EMNP Chips Do Not Infringe

CMU's claims require that the application of the selected branch-metric function to a plurality of signal samples result in the determination of a branch-metric value for the potential transitions (branches) "***in a trellis***." A456; A481; A45462-64. As Dr. Kavcic's own October 2001 email about his invention to Gregory Silvus of Seagate confirms, his invention addresses media noise "***in a trellis and NOT in [a] post processor***." A53700-04 (emphasis added). *See*

Gemalto S.A. v. HTC Corp., 2014 WL 2766195, *6 (Fed. Cir. June 19, 2014) (inventor testimony confirmed he had invented a microcontroller—not a microprocessor as used in the accused product).

In contrast, Marvell's MNP/EMNP chips use a conventional Euclidean Viterbi detector and then use ***a post-processor***, where the sequence output by the Viterbi detector is compared to two alternative error sequences. A48203; A48194; A41977:14-20. At trial, CMU's expert acknowledged that Marvell's MNP chips use a "linear Viterbi" that determines the best path through the trellis and *then* uses post-processor circuitry where "an evaluation is done to see if either [of two] alternate paths is better than the best path." A41977:14-20. By accounting for media noise in a post-processor rather than in the Viterbi trellis, Marvell's invention is capable of commercial implementation, for it uses a conventional Viterbi detector to compute branch-metric values and then outputs an actual sequence for comparison with two alternative error sequences, rather than computing potential transitions in a trellis using a complex branch metric function.

As Marvell's expert, Dr. Blahut, recounted at trial, Dr. Kavcic himself admitted that "the difference between two path metrics" is not a branch metric. A44522-24. To be sure, Marvell documents include references to computing path metrics in the MNP post-processor and refer to branch metrics in the context of discussing the post processor, and Marvell named its post-processing simulation

"KavcicPP" before changing its name to MNP—a fact the lay jury may have deemed suspect without appreciating the distinctions in the technology. But the undisputed evidence of Marvell's actual MNP implementation in circuitry shows that Marvell's post-processor operates outside of the Viterbi detector (A48203) and compares the difference between two metrics of actual sequences, and does not compute branch-metric values for the potential transitions (branches) in a trellis (A54266).

No Marvell documents refer to the use of a "trellis" in the post-processor—and the references in Marvell's patents to path-metric computations for the error metrics are not referring to branch-metric computations for the transitions (branches) in a trellis. *See Monsanto Co. v. Bayer Bioscience N.V.,* 363 F.3d 1235, 1244 (Fed. Cir. 2004) ("similar terms can have different meanings in different patents depending on the specifics of each patent"). The only document CMU pointed to in arguing that the MNP uses a "pruned" trellis (*see* A47923; A41817) was a high-level document intended for a sales audience (A41817), which should have been given no weight. *Scantibodies Lab., Inc. v. Immutopics, Inc.,* 374 Fed. App'x. 968, 971 (Fed. Cir. 2010) ("The use of language in [even a patentee's own] marketing materials often means something quite different from the language used in a patent."); *Aspex Eyewear, Inc. v. Altair Eyewear, Inc.*, 288 F. App'x 697, 704

(Fed. Cir. 2008) (according no weight to accused infringer's marketing materials in infringement analysis).

No reasonable jury could have found infringement in view of this evidence.

C. Marvell's Simulations Do Not Infringe

Claim 4 of the '839 patent is directed to a "method of determining branch metric values for branches of a trellis for a Viterbi-like ***detector***." A456 (emphasis added). Similarly, claim 2 of the '180 patent is directed to a "method of determining branch metric values ***in a detector***." A481 (emphasis added). But as CMU's expert rightly put it, the "[d]etector is in the chip" (A41745:16-746:7), and a *simulation* of a detector is not itself a detector.

The asserted claims also require "applying" selected functions to a "plurality of signal samples" (claim 4) or "signal samples" (claim 2). A456; A481. Yet Marvell's simulators are incapable of detecting actual signal samples. All they do is process artificially created (simulated) data or data files (copies of actual wave forms). A43943; A43990; A41756:20-22; A41745:16-746:7.

If running a simulation program could infringe claimed methods for processing signal samples in a detector, then the claims would cover an abstract idea not otherwise subject to patenting. This Court already rejected such an effort in *Harris Corp. v. Ericsson Inc.*, 417 F.3d 1241 (Fed. Cir. 2005), holding that use of simulation programs for testing algorithms did not infringe a method of using a

signal-processing communication system, because the claimed method was not "actually carried out, rather than simulated" when the program for testing its algorithms is run. *Id.* at 1256.

The same reasoning and result should hold here—as CMU's expert conceded that Marvell's accused simulators are just computer programs, and the claims are not directed to simulation programs.[12] A41756:20-22 ("Q. And the accused simulators, that's the Marvell computer programs? A. That's correct."); A41939:10-13 ("Right. There's—the word 'simulator' is not in either one of the claims."). Accordingly, no reasonable jury could have found that Marvell's MNP and NLD simulation programs infringe.[13]

III. THE $1.17 BILLION DAMAGES AWARD CANNOT BE SUSTAINED

A. CMU's Expert Damages Testimony Should Have Been Excluded

The award of $1.17 billion in damages rested entirely on the testimony of CMU's damages expert Ms. Lawton, but she lacks relevant expertise and her testimony "finds no support in the facts in the record." *LaserDynamics, Inc. v. Quanta Computer, Inc.*, 694 F.3d 51, 81 (Fed. Cir. 2012). The district court thus

[12] Marvell's simulations of MNP and NLD chips also do not infringe for the same reasons set forth *supra* in Part II.A-B.

[13] Because the jury's verdict draws no distinction between the accused technologies, any reversal on liability would necessitate retrial as to all damages. *See Verizon Servs. Corp. v. Vonage Holdings Corp.*, 503 F.3d 1295, 1309-10 (Fed. Cir. 2007).

erred in rejecting Marvell's motions to exclude her testimony. A17433-44; A17445; A33398-425; A42691-99; A42714-15; A42978-79.

First, by her own admissions, Ms. Lawton lacks any qualifications entitling her to opine on the value of a hypothetical license to CMU's claims: she has never negotiated a patent license, and has no experience setting or negotiating chip pricing. A42811-12; A43414-16. She also disavows any experience with "technical matters concerning Marvell's business, the semiconductor industry [or] the market for computer chips and the patented technology." A33422. She does not have a technical degree, graduate degree or CPA. A42786-88; A42793. Instead, her "entire career since college has essentially been as a consultant or professional witness." A42788; A42794. Such lack of experience should have at least weighed against the admissibility of her testimony. *See Uniloc USA, Inc. v. Microsoft Corp.*, 632 F.3d 1292, 1318 (Fed. Cir. 2011) (finding damages expert testimony unreliable, in part because he had limited negotiation experience); *see also State Contracting & Eng'g Corp. v. Condotte Am., Inc.*, 346 F.3d 1057, 1073 (Fed. Cir. 2003); *Elcock v. Kmart Corp.*, 233 F.3d 734, 749 (3d Cir. 2000) .

Second, Ms. Lawton's theories "lack the hallmarks of genuinely useful expert testimony" because they rest on unreliable methodologies. *Power Integrations, Inc. v. Fairchild Semiconductor Int'l, Inc.*, 711 F.3d 1348, 1374 (Fed. Cir. 2013); *see id.* at 1372-74; *see also Uniloc*, 632 F.3d at 1315. Specifically, Ms.

Lawton disregarded evidence that CMU's patents were actually valued and licensed on a flat-fee rather than per-unit basis (A43431-33), dismissing contemporaneous examples (A53614-23, A53641-47; A53648-56; A53765-81) as "special agreements" (A43086-87); took no meaningful account of CMU's actual offers to license one of the patents-in-suit for $200,000 (A43420-21; A43114) or CMU's own projections valuing the patents-in-suit at $2 million annually, purporting to consider those real-world data points only to posit calculations altogether divorced from them based on irrelevant differences in timing (A43115); and based her opinion instead on isolated instances of Marvell paying running royalties for technologies that are not comparable to the patents-in-suit (A43353-56). Her failure to account for "[a]ctual licenses to the patented technology," which "most clearly reflect the economic value of the patented technology in the marketplace," *LaserDynamics*, 694 F.3d at 79, and her reliance instead upon "license agreements that were 'radically different from the hypothetical agreement under consideration' to determine a reasonable royalty," *Uniloc*, 632 F.3d at 1316 (citations omitted), rendered her testimony inadmissibly unreliable.

Ms. Lawton's use of a global, 556,812,091-chip royalty base was similarly speculative and unreliable, for it was based on industry reports for PC products further downstream. A246; A43405-06. This number was extrapolated without explanation, without reference to data specific to Marvell's chips, and without

benefit of any technical or industry expertise. *See Power Integrations*, 711 F.3d at 1374 (excluding expert damages testimony that extrapolated on worldwide industry import data without providing evidence that the specific infringing circuits were present in the imports).

Moreover, Ms. Lawton's failure to properly apportion the relative contributions of the asserted claims to the accused products independently renders her opinion unreliable. *See Uniloc*, 632 F.3d at 1318 (excluding expert damages testimony for failure to apportion correctly, and granting new trial on damages). Ms. Lawton testified that she did not "value the other patents within Marvell's read channel" because she instead undertook "***a different approach to apportionment***, which is what I referred to as my excess profits analysis." A42790 (emphasis added). But as she herself explained it, her "excess profits" calculation bears no relationship to the value of CMU's patented methods. A43483 ("excess profits" are "not necessarily attributable to the patented technology"); A43475 (agreeing that "excess profits is [not] attributable to the technology of the patents in suit"); A43500 ("excess profits analysis goes to the issue of what does Marvell say is adequate profit for its business"). Indeed, her method indicated *negative* value for the accused MNP feature. A43481-82; A54443. Likewise, she acknowledged that her "operating profit premium" analysis accounts neither for Marvell's actual implementation of the MNP and NLD circuits in silicon separate and apart from

CMU's claimed invention (A43471-72; A43609-10), nor for features *other than* MNP and NLD that varied among the chips she was comparing (A43472-73). Such failure to apportion the infringement damages here should have foreclosed admission of her testimony.

Finally, Ms. Lawton used unreliable methodology in extrapolating a key part of her per-chip royalty-rate analysis from a highly unrepresentative mini-sample of sample chips sold to Marvell's smallest customer (A43486-87; *see infra* Part III.D.2). When asked on redirect to explain why she extrapolated as she did, Ms. Lawton answered that the data available "was very, very limited." A43498. But that neither immunizes expert analysis from the need to use relevant data nor renders valid what amounts to an unrepresentative, cherry-picked sample. *See, e.g.*, *E.E.O.C. v. Kaplan Higher Educ. Corp.*, 748 F.3d 749, 754 (6th Cir. 2014); *Espenscheid v. DirectSat USA, LLC*, 705 F.3d 770, 775 (7th Cir. 2013) (Posner, J.); *Dick's Sporting Goods, Inc. v. Dick's Clothing & Sporting Goods, Inc.*, 188 F.3d 501 (4th Cir. 1999); *United States v. Washington*, 157 F.3d 630, 654 (9th Cir. 1998). Notably, Ms. Lawton (or an expert with the requisite qualifications) could have sought to determine the value of the patented method to Marvell's chips by collecting data on that subject directly from Marvell's customers via third-party discovery or survey analysis, but CMU elected not to pursue that route.

Even if Ms. Lawton's testimony were admissible, however, the damages award is erroneous as a matter of law for the reasons that follow.

B. The District Court Erred In Allowing A Hypothetical License To Be Measured By A Per-Unit Royalty Rather Than A Flat Fee

Actual licenses are the most probative evidence of "the proper form of the royalty structure," *LaserDynamics*, 694 F.3d at 79-80, and this Court has not hesitated to vacate damages judgments that exceed the benchmarks set by actual licenses to a claimed invention, *see ResQNet v. Lansa*, 594 F.3d 860, 869-72 (Fed. Cir. 2010); *Riles v. Shell Exploration & Prod. Co.*, 298 F.3d 1302, 1313 (Fed. Cir. 2002); *Unisplay, S.A. v. Am. Elec. Sign Co.*, 69 F.3d 512, 519 (Fed. Cir. 1995). Here, the only evidence of any contemporaneous, actual licensing showed that CMU contemplated and received flat-fee sums rather than per-unit royalties, and contained no comparable license involving a per-chip royalty. The district court erred in denying Marvell JMOL on damages (or new trial or remittitur) for this reason alone.

Specifically, the record contains three "DSSC Agreements" whereby CMU issued lump-sum licenses encompassing the patents-in-suit to IBM, Seagate and 3M. A53614-23; A53641-47; A53648-56; A42361-62.[14] In a fourth "Subscription Agreement" (A53765-81), CMU provided Intel with an option to license one of the

[14] Notably, these DSSC agreements allowed licensing of *all* patents CMU conceived during a membership period in exchange for an annual $250,000 membership fee. A53615-17; A42439-42; A42226-27.

patents-in-suit—while omitting the second, related patent, which the inventors sought to include on the same terms (A53785-90)—for a single lump-sum payment of $200,000 (A53768; A42501-02). Even CMU's best-case, speculative licensing projection for 2006 and 2007 contemplated only a *flat*, annual rate of $2 million. A53805-06; A53827-31; A42529-30; A42536:8-15.

In denying JMOL on damages, the district court held (A273) that such flat-fee licensing evidence was not dispositive because, as Ms. Lawton noted, the DSSC Agreements were executed "well before the date of the hypothetical negotiation," "were special," and involved extra-contractual collaboration with CMU (A265; A43085-87; A43429-30; A265-66), and that the Intel Subscription Agreement took place "three-and-a-half years after the date of the hypothetical negotiation" (A265; A265-66; A43420-21). That was error, for if CMU was willing to license the patents-in-suit at flat rates both *before* and *after* the hypothetical negotiation, then the only rational inference is that it would have done so *during* negotiations. The record contains no explanation why, in the hypothetical world where Marvell and CMU were negotiating a license, Marvell would not have obtained a $250,000 lump-sum license to the patents-in-suit rather than agreeing to pay running royalties amounting to $1.17 billion. *See, e.g.*, *Gaylord v. United States*, 678 F.3d 1339, 1343 (Fed. Cir. 2012) ("It is incorrect in

a hypothetical negotiation inquiry for a court to limit its analysis to only one side of the negotiating table[.]")

In denying JMOL, the district court also found sufficient Ms. Lawton's reliance on certain actual per-unit royalty agreements (A246; A259), but that too was error because those examples involved licenses unrelated and not comparable to the CMU claims here. Specifically, Ms. Lawton testified that CMU had (in 1998, years *before* the hypothetical negotiation) entered into one running-royalty license agreement and that Marvell had (between April 2000 and April 2001) entered into three running-royalty license agreements. A43353-54; A171; A258-17. Apart from that mere reference to a running royalty, the record contains no analysis of the terms and substance of those licenses, much less how they compare to any hypothetical patent license here.

C. The District Court Erred In Including Foreign Chips In The Royalty Base

The district court also erred in denying JMOL (and new trial or remittitur) striking the portion of the damages award that rested on sales of foreign chips that were manufactured, sold, and used abroad without ever entering the United States. While the district court correctly acknowledged that CMU may not recover direct or indirect infringement damages "in connection with sales of chips that are never used in the United States" (A17380), it nonetheless reasoned that damages from a supposed initial infringing use in the United States (here, during research, design,

and customer-relations activities) may sweep in all ensuing sales, including those of *foreign* chips manufactured, sold, and used exclusively abroad (A239-48; A31957-62; A17380). This purportedly "novel" circumvention of the territorial limits of U.S. patent laws cannot be squared with this Court's decision in *Power Integrations*, 711 F.3d at 1371-72.[15]

1. *Power Integrations* Forecloses Inclusion Of Foreign Chips In The Royalty Base

The Patent Act, 35 U.S.C. § 284, makes no provision for any award for foreign sales, and it is well-established that the presumption against the extraterritorial application of U.S. law "applies with particular force in patent law," *Microsoft Corp. v. AT&T Corp.*, 550 U.S. 437, 454-55 (2007); *see Pellegrini v. Analog Devices, Inc.*, 375 F.3d 1113, 1118 (Fed. Cir. 2004); *Deepsouth Packing Co. v. Laitram Corp.*, 406 U.S. 518, 531 (1972); *Brown v. Duchesne*, 60 U.S. 183, 195 (1856). The presumption may be overcome only by "a clear congressional indication of intent," *Microsoft*, 550 U.S. at 444 (citation omitted), and Congress has made no such statement here.

This Court reaffirmed the rule against extraterritoriality in *Power Integrations*, upholding invalidation of a patent damages award to the extent it was "based on worldwide sales." 711 F.3d at 1372. The Court rejected the plaintiffs'

[15] At minimum, the court below erred by instructing jury that it could include Marvell's global chip sales in determining a reasonable royalty. This error independently warrants a new trial, as explained in Part III.C.2, *infra*.

argument in that case that, because "it was foreseeable that [the defendant's] infringement in the United States would cause [the plaintiff] to lose sales in foreign markets," those sales could be included in a lost profits analysis. The Court stated that "the entirely ***extraterritorial production, use, or sale*** of an invention patented in the United States is an ***independent, intervening act*** that, under almost all circumstances, cuts off the chain of causation initiated by an act of domestic infringement." *Id*. at 1371-72 (emphases added).

That holding forecloses a damages theory that, as here, reaches extraterritorial sales based upon a supposed "chain of causation initiated by an act of domestic infringement." *Id*. *Power Integrations* cannot be distinguished, as the court below attempted (A240-41), on the ground that the *infringing activity* here was supposedly domestic use that foreseeably resulted in foreign sales, rather than the foreign sales themselves. For *Power Integrations* expressly rejected such an attenuated chain of causation:

> Power Integrations is incorrect that, having established one or more acts of direct infringement in the United States, it may recover damages for Fairchild's worldwide sales of the patented invention because those foreign sales were the direct, foreseeable result of Fairchild's domestic infringement.

711 F.3d at 1371. The fact that the chips at issue here are produced, sold and used abroad presents an "independent, intervening act" that should "cut[] off the chain

of causation initiated by an act of domestic infringement" no less than was true in *Power Integrations*. A166-67; A44204-05.

Nor can *Power Integrations* be distinguished on the ground that it involved an apparatus claim (infringed by sales) rather than a method claim (infringed by use), and that here, Marvell's global sales serve only as a supposed proxy for the value of infringing domestic use (*see* A37464-65 A43439-40; A43442:1-10). For this Court requires that damages for a method claim correlate with "the extent the infringing method is used," *Lucent Techs. v. Gateway, Inc.*, 580 F.3d 1301, 1334 (Fed. Cir. 2009), and to the extent that Marvell's sales may be considered an estimated measure of ***use***, total sales are an impermissible measure of damages because they correlate with the number of chips ***used worldwide***, and thus do ***not*** estimate use of the patented method ***in the United States***.[16] Indeed, *Power Integrations* speaks to territorial limits on both "use" and "sale" of any "invention patented in the United States." *Power Integrations*, 711 F.3d at 1371. And, as the Supreme Court has explained, the presumption against extraterritorial application of U.S. law is not overcome merely because "*some* domestic activity is involved in the case." *Morrison v. Nat'l Austrl. Bank Ltd.*, 561 U.S. 247, 266 (2010); *accord Power Integrations*, 711 F.3d at 1371.

[16] *See, e.g.*, *Sutton v. Gulf Smokeless Co.*, 77 F.2d 439, 441 (4th Cir. 1934).

If affirmed, the district court's novel theory that foreign chip sales may be included in a royalty base for determining consequential damages for an infringing domestic use would have numerous adverse practical consequences for U.S. patent policy. *First*, such an approach would create potential conflicts with foreign law by imposing liability based on sales that do not violate the patent laws applicable where they occur. *See, e.g.*, *Microsoft*, 550 U.S. at 454-55 (noting that "foreign law may embody different policy judgments about the relative rights of inventors, competitors, and the public in patented inventions") (citation omitted).

Second, where a foreign sale does violate a foreign nation's patent laws, a U.S. defendant might be subject under the district court's approach to double recovery for sales that both infringe foreign patents and have some attenuated connection to an allegedly infringing use of a U.S. patent in the United States.

Third, inclusion of foreign sales in the measure of damages from domestic use would invite an end-run around well-established limitations on liability for indirect infringement. To establish liability for a third party's domestic acts of direct infringement, a patentee must prove not only the underlying direct infringement but also the additional elements of a claim for inducement or contributory infringement under 35 U.S.C. §§ 271(b) and (c).[17] But the trial

[17] *See Global-Tech Appliances, Inc. v. SEB S.A.*, 131 S.Ct. 2060, 2068 (2011); *Commil USA, LLC v. Cisco Sys., Inc.,* 720 F.3d 1361, 1368-69 (Fed. Cir.

court's approach opens the door for a patentee to recover damages for third-party use or sales without satisfying any of these liability requirements so long as the third party's use or sales are the "result of" even a single infringing use by the defendant. And permitting damages for third-party ***sales*** to flow from the defendant's ***use*** of the patented technology, however limited, would also enable a patentee to avoid establishing the requisite correlation between the amount of the damages sought and the extent of actual third-party use.[18]

Finally, if a hypothetical negotiation to pay for U.S.-based patent rights is construed to encompass an obligation to take a license with respect to foreign sales, companies with a U.S. presence will predictably have every incentive to move overseas for fear that any alleged infringing use in the United States would expose them to U.S.-based claims for recovery on their global operations. Reversal or vacatur of the judgment below is necessary to avoid these consequences.

2013) ; *DSU Med. Corp. v. JMS Co.*, 471 F.3d 1293, 1305 (Fed. Cir. 2006) (*en banc*) .

[18] *See Lucent*, 580 F.3d at 1334-35; *Dynacore Holdings Corp. v. U.S. Philips Corp.*, 363 F.3d 1263, 1274 (Fed. Cir. 2004) ("A defendant's liability for indirect infringement must relate to the identified instances of direct infringement.").

2. The District Court Erred In Instructing The Jury To Use A Worldwide Royalty Base

The court instructed the jury that, although "Marvell cannot be found to have directly or indirectly infringed in connection with chips that are never used in the United States," it was proper to consider *all* of Marvell's "sales resulting from Marvell's alleged infringing use [in the United States] during the sales cycle … in determining the value of the infringing use"—including sales of chips manufactured and sold abroad without entering the United States. A45456; *see* A237; A253-58. Marvell categorically objected to that instruction as soon as it was proposed. *See* A45143-48; *see also* A17367-81; A31957-62.

That instruction was error for the reasons set forth *supra* in Part III.C.1, warranting at a minimum a new trial on damages. Even assuming *arguendo* that inclusion of foreign chips in the royalty base is not altogether foreclosed, the instruction is further erroneous because it permitted the jury to consider any and all "sales resulting from Marvell's alleged infringing use during the sales cycle" without requiring the jury to find, as Marvell proposed (A45145; A45148), that such foreign sales were "solely" the result of Marvell's supposed infringing use of CMU's algorithm, and indeed without imposing any causal-nexus requirement whatsoever. The instruction thus fell well short of the "full and complete instructions" that are required to relate "the law to the relevant evidence in the case" for the jury's benefit. *Smith v. Borough of Wilkinsburg*, 147 F.3d 272, 279-

80 (3d Cir. 1997); *Dressler v. Busch Entm't Corp*, 143 F.3d 778, 783 (3d Cir. 1998) (instruction must advise "jury of concepts it needs to know to properly discharge its duties").

3. Marvell Preserved Its Objection To The Royalty Base

Contrary to the district court's suggestion (A248-50), Marvell never waived its contention that CMU's attempt to recover on foreign chips is foreclosed as a matter of law.[19] Nor can Marvell be faulted, as the district court erroneously suggested, for failing to present evidence at trial "that any aspect of its sales took place outside the United States" (A248). Once the court endorsed CMU's novel legal theory for recovering on "non-infringing foreign sales," because "use of these chips in this, quote, sales cycle, end quote, ultimately is the issue" (A42714-15), any such proof was beside the point. Moreover, it was CMU's burden to prove infringement and damages, and CMU's own damages testimony shows that most of Marvell's chips included in the royalty base are in fact manufactured and used exclusively outside the United States. *Compare* A43406-07 (testimony extrapolating supposed global sales of 556,812,091 chips) *with* A43449 (testimony

[19] As the court noted in denying Marvell's post-trial motions, Marvell's concerns surrounding extraterritoriality were "addressed numerous times in this case, from the earliest days of discovery disputes (Docket No 195), to summary judgment (Docket No. 441), in motions *in limine* (Docket No. 493) and 'emergency' motions (Docket No. 656), during trial (Docket No. 713), and now again post trial." A234; *see also* A239 ("The Court first ruled on the inclusion of extraterritorial conduct at summary judgment. (Docket No. 441)." Marvell also timely objected to the erroneous instruction on this point. *See supra* Part III.C.2.

tracing to actual customer data 329,297,798 chips, thus indicating possible U.S. sales); A43440-41. While the district court suggested post-trial that there was "sufficient evidence for a jury to find that [all relevant] sales occurred inside the United States" (A250), any such suggestion lacks foundation in the record and cannot be reconciled with the court's own jury instruction.

D. The District Court Erred In Imposing A $.50-Per-Chip Royalty Rate

Separate and apart from the legal error as to the royalty base, the district court erred in denying JMOL as to the $.50-per-chip royalty rate on which judgment was entered (A261-68; A73).

1. The "Excess Profits" Theory Fails To Support The Royalty Rate

The district court first erred in crediting (A261; A17442-44) Ms. Lawton's "excess profits" analysis despite its failure to identify what value the patented technology adds to the chips. There is no support in the record for the assumption (A43326-28; A43474-75; A43483:7-17) that a "target" 50% gross profit margin for a business unit, let alone the entire company, accounts for Marvell's contributions to the specific chips at issue here or that any "excess" profits are attributable solely to the patented feature. To the contrary, Ms. Lawton's own analysis shows that Marvell's chips *without* the patented technology had *greater or equal* "excess profits" than chips *with* the accused circuits. A43481-82; A54443

(showing that the gross margin of "Accused Infringing SOCs" is equal to or less than the gross margin of "All SOCs").

The district court brushed this problem aside by citing testimony from Ms. Lawton that "non-infringing products" included a "non-read channel chip for Seagate that sells at a premium" as well as "a chip that Marvell indicated had an MNP but CMU could not absolutely confirm" had an MNP. A267. Far from rehabilitating Ms. Lawton's "excess profit" analysis, however, those observations only indicate that Marvell makes *less* on chips that specifically embed the accused technology. At best, therefore, a rational jury would conclude that a variety of factors contribute to Marvell's total margins on chips ***with and without*** the accused circuits, such that the mere happenstance that Marvell's *gross* margins (as distinct from actual operating margins) may exceed an abstract target of 50% for a particular chip is not attributable to the accused technology.

Moreover, this Court's precedents require proper apportionment of patent damages "between the patented feature and the unpatented features," *Uniloc*, 632 F.3d at 1318; *see LaserDynamics*, 694 F.3d at 67, 81 (disapproving a royalty rate "untethered from the patented technology at issue"), and the "excess profits" analysis approved below fails to reflect the requisite apportionment. To the contrary, Ms. Lawton disavowed any such apportionment. *See* A43483:7-17 (acknowledging that "excess profits" are "not necessarily attributable to the

patented technology"); A43500:12-13 ("excess profits analysis goes to the issue of what does Marvell say is adequate profit for its business"); A43474-75 (agreeing that she made "no determination" that excess profits are "attributable to the technology in the asserted claims in the patents in suit"). What Marvell estimates is an "adequate profit" obviously has nothing to do with the value the patented method adds relative to other features of Marvell's products, especially considering that Marvell's chips contain dozens of valuable features quite apart from any that are accused. *See* A54231-33; A43844-47; 43904.

In all events, the 50% target reflects a mere goal. As Ms. Lawton testified, the 50%-margin target simply represents Marvell's estimate of an "adequate profit for its business," not an actual or expected margin tied to any particular product or combination of technologies. A43500:12-13; A43327:9-25; A43483:7-17.[20] Such aspirations, quite removed from actual, operating margins,[21] illuminate nothing

[20] While this Court has suggested that the value of a patented feature may, in an appropriate case, be determined with reference to *actual, empirical operating* margins associated with products that lack the accused feature, *see Energy Transp. Grp., Inc. v. William Demant Holding*, 697 F.3d 1342, 1356-57 (Fed. Cir. 2012); *Lucent*, 580 F.3d at 1324; *TWM Mfg. Co. v. Dura Corp.*, 789 F.2d 895, 899 (Fed. Cir. 1986), Marvell's goals here were merely *aspirational* and concerned an *entire business unit*.

[21] Ms. Lawton further purported to measure excess gross profit rather than excess operating or net profit (A43326-28) and thus by her own acknowledgement neglected to account for research and development, sales and marketing and general and administrative costs surrounding the accused chips in calculating excess profits (A42996-99).

about whether or to what extent a particular line of chips is helping or hurting Marvell's actual operations.

2. The "Operating Profit Premium" Analysis Fails To Support The Royalty Rate

It was similarly error for the district court to credit Ms. Lawton's use of her supposed global "operating profit premium" theory as a basis for deriving the royalty rate. With this analysis, Ms. Lawton purported to calculate the "difference between the sale price of [a] chip that had the MNP minus the price of [a] chip that didn't have the MNP" and thereby to determine the "operating profit premium" that was "associated with the MNP." A43337-38; A32800.[22] Based on that theory, Ms. Lawton extrapolated a per-chip "premium" of up to $.72. A43338-39.

That calculation relied on far too small and unrepresentative a sample to support a $.50-per-chip royalty on all 2,338,280,542 chips in the royalty base. Ms. Lawton reached the upper bound of her $0.72 premium only by cherry-picking a tiny sample of merely 9,855 sample chips that Marvell offered to Maxtor—Marvell's smallest customer—from 2003-04, a one-year slice that post-dated the hypothetical negotiation. A43345-46; A43484-88. Assuming that Ms. Lawton's calculations were correct, Maxtor paid what she relied upon as the upper bound of

[22] Ms. Lawton is not an expert in "Marvell's business, the semiconductor industry [or] the market for computer chips and the patented technology," (A33422), and admitted that she has no relevant expertise when it comes to pricing the relevant chips (A42811-12)—all further reasons why her testimony should have been excluded (*see supra* Part III.A).

her price premium only for those less than 10,000 sample chips—less than 0.0005% of the total number of accused chips. A43345-46. In fact, Ms. Lawton's analysis shows that when *total* 2003-04 sales of the chips she compared to arrive at the Maxtor $1.00 price premium and $.72 profit premium are examined, both price per chip and gross margin per chip are *higher* for chips *without* MNP than for chips with MNP. A32796; A43330-32.

The Maxtor sample is not only trivial but unrepresentative. The Maxtor chips were *sample* chips. A43484:3-12; A43486:14-24. It was undisputed that low-volume sample chips are priced significantly higher than high-volume production chips. A43603-05; A44398:17-99:11. And Ms. Lawton was unable to show that Marvell's major customers like Western Digital, Samsung, Fujitsu, Hitachi, or Seagate ever paid *any* premium for the MNP. A43484-87; *see* A43486:6-13 (Western Digital "wanted a price reduction because the MNP was in it"); A44413-14; A44417-18; A44451-52 (Western Digital was not "willing to pay even one penny per chip" for MNP). To the contrary, the same "premium" analysis, once applied to Toshiba—a much larger and more representative purchaser at the relevant times (purchasing more than 46 times the number of chips Maxtor did)— yielded an alleged profit premium of at most only ***$.06*** per chip judged by Ms. Lawton's analysis. A32800; A43334-39; A43484-87; A44374-76; A39227.

Thus, no rational jury could extrapolate up-to-$.72 global "operating profit premiums" from certain "sample" chips offered to Maxtor alone, especially in light of Ms. Lawton's acknowledgements that that chip "price will [] vary by customer," "varies from chip to chip" and "will vary based on time" (A43329:3-15), particularly because, "in this industry, the price is always going down" (A43347:25-48:4).[23] For all these reasons, even if a rational jury might credit a $.72 "premium" as to 9,855 sample chips offered to Maxtor in 2003-04, it could not leap to the same conclusion as to the 99.9996% of the remaining chips in the royalty base over the entire time period at issue.

Finally, even if a rational jury could extrapolate from such a tiny sample at one point in time to the entire universe of Marvell's chips and sales across the entire period, the "premium" calculated by Ms. Lawton contravenes this Court's settled apportionment requirement. *See supra* Part III.A. Ms. Lawton did not differentiate the value of the *asserted algorithm* from the value of *Marvell's implementation in silicon*, nor credit Marvell with so much as a penny for the undisputed value of its own contributions—even though it was undisputed that

[23] At trial, Ms. Lawton testified that Marvell's margins on the accused chips increased over time even though "the price is always going down" (A43347-48), but no evidence supports any margin increase relative to non-accused chips that would offset the drop in price. To the contrary, margins for non-accused chips were the same as or higher than margins for accused chips during the relevant time period. A43481-82; A54443.

making a commercially viable circuit to implement the patented method "require[d] effort by Marvell's engineers" (A43471-72; *see* A46093).

Indeed, the record fails to support the inference that the "operating profit premium" was even attributable *to MNP* (*i.e.*, the CMU-patented method *plus* Marvell-designed hardware), much less to its allegedly patented aspects. Ms. Lawton testified that she understood MNP to be a "key" or "principal" difference between the Maxtor chips she compared in calculating the "premium" (A43334:2-13; A43339-40),[24] but she failed to analyze, much less account for, the value attributable to additional features apart from the MNP (A43471-73) like Marvell's "flagship" ten-bit error-correction code, which was introduced into Marvell's chips at the same time as the MNP (A44807-08; A42243:15-18; A44449-50). In contrast, when comparing theToshiba chips that yielded a $.06 "premium" (Part Nos. 88C5575 and 88C5575M), Ms. Lawton testified that MNP was the "only" difference. A43334-40; A32800. Thus, far from setting the lower bound of the range of any price "premiums" for the patented method, the $.06 Toshiba "premium" should have set the upper limit. On this record, any valuation of the MNP (or NLD) in excess of $.06 "encompass[es] components not covered by the patent." *LaserDynamics*, 694 F.3d at 70.

[24] Given her own lack of expertise, *see supra* Part III.A, Ms. Lawton could only cite testimony from Marvell's VP of Marketing, Dr. Armstrong, about comparable criteria (A43328-29; A43335-37) for this proposition.

E. Alternatively, The Damages Award Should Be Vacated And Remanded For New Trial Or Remittitur

For all the above reasons, this Court should reverse and direct entry of judgment for Marvell, or at a minimum direct entry of judgment based on a base that excludes foreign chips and a rate that does not exceed $.06. Alternatively, this Court should vacate and remand for a new trial as to damages or remittitur. The district court erred in instructing the jury to include foreign sales in the royalty base (*see supra* Part III.C.2). And the great weight of the evidence shows that the royalty base is improperly inflated by foreign sales (*see supra* Part III.C); and that the $.50-per-chip royalty rate is orders of magnitude removed from any real-world license values actually obtained or contemplated by CMU for its patents and untethered from any proportional value the claims added to Marvell's chips (*see supra* Parts III.B & D). Moreover, the district court abused its discretion in admitting Ms. Lawton's unreliable testimony (*see supra* Part III.A) and in failing (A261-68; A73) to weigh the evidence for itself in deciding Marvell's new-trial motion.

IV. THE DISTRICT COURT'S $287 MILLION WILLFULNESS ENHANCEMENT SHOULD BE VACATED

The district court's separate enhancement of $287 million (A2) should be vacated, for Marvell had objectively reasonable invalidity and noninfringement defenses that preclude a finding of willfulness and the record fails to support the

jury's finding of subjective willfulness to which the district court deferred. To adjudge Marvell a willful infringer, the court needed to identify "clear and convincing evidence" that the infringement was both objectively and subjectively willful. *See Seagate*, 497 F.3d at 1371. This requires proof that Marvell "acted despite an objectively high likelihood that its actions constituted infringement of a valid patent," and that "this objectively-defined risk … was either known or so obvious that it should have been known to" Marvell. *Id.* The court decides objective willfulness, as a matter of law, from the vantage point of a reasonable defendant. *Bard*, 682 F.3d at 1006-07; *iLOR, LLC v. Google, Inc.*, 631 F.3d 1372, 1377 (Fed. Cir. 2011). "[W]here an accused infringer relies on a reasonable defense to a charge of infringement," objective willfulness rarely exists. *Spine Solutions, Inc. v. Medtronic Sofamor Danek USA, Inc.*, 620 F.3d 1305, 1319 (Fed. Cir. 2010).

A. Marvell Had Objectively Reasonable Invalidity And Noninfringement Defenses

First, Marvell had an objectively reasonable invalidity defense (*see supra* Part I), particularly in light of the court's own acknowledgement that Marvell's invalidity defense made for a "close call" on summary judgment (A7064; A8111 ("[I]t was a close case" on anticipation.)).[25] An invalidity defense that presented a

[25] The court below discounted the importance of the "close call" it confronted by saying: "A defense may be unreasonable even if the Court had

"close call" on anticipation cannot be "objectively baseless." *See, e.g.*, *DePuy Spine, Inc. v. Medtronic Solamor Danek*, Inc., 567 F.3d 1314, 1336-37 (Fed. Cir. 2009); *Cohesive Techs., Inc. v. Waters Corp*., 543 F.3d 1351, 1374 n.4 (Fed. Cir. 2008); *Apple, Inc. v. Samsung Elecs. Co.*, 920 F. Supp. 2d 1079, 1109-10 (N.D. Cal. 2013); *see also Spine Solutions*, 620 F.3d at 1319-20. The district court erred by nonetheless deferring *to the jury* on objective willfulness, first sending the question to the jury and then treating "the reasonableness of [Marvell's] reliance on [its] invalidity defense [as] the prerogative of the jury." A227. This Court has reserved the question of objective reasonableness for the judge, not the jury, to decide. *See Power Integrations*, 711 F.3d at 1356-57; *Bard*, 682 F.3d at 1007.

This Court has instructed further that, "[u]nder … *Seagate*, objective baselessness 'does not depend on the plaintiff's state of mind at the time the action was commenced, but rather requires an objective assessment of the merits.' State of mind is irrelevant to the objective [willfulness] inquiry." *iLOR*, 631 F.3d at 1377 (citation omitted); *see also Bard,* 682 F.3d at 1008; *DePuy Spine,* 567 F.3d at 1336. The district court thus further erred in demanding proof that Marvell had *subjectively* envisioned its objectively reasonable defense when it infringed (A227),

---

earlier found there to be genuine dispute of materials facts." A226. But that elides the critical point, which is *not* that the court found (as is typical) a "genuine dispute of material facts" but that it nearly found Marvell's invalidity defense so strong as to *foreclose* any such dispute.

faulting Marvell for maintaining attorney-client privilege rather than "raising advice of counsel as a defense to the willfulness claims" (A222). Defendants may not be penalized on an objective willfulness analysis for invoking a legitimate privilege and declining to present proof of the specific defenses their counsel may have identified for them. *See Knorr-Bremse Systeme Fuer Nutzfahrzeuge GmbH v. Dana Corp.*, 383 F.3d 1337, 1341 (Fed. Cir. 2004) (*en banc*) (jury is not permitted to draw adverse inference from "failure to obtain or produce an exculpatory opinion of counsel"); *Insituform Technologies, Inc. v. CAT Contracting, Inc.*, 385 F.3d 1360, 1377 (Fed. Cir. 2004).

In addition, the district court erred (A228) in faulting Marvell for not presenting certain aspects of its invalidity defense to the jury at trial, including the one she had characterized pre-trial as making for a "close call."[26] But that is irrelevant: Objective willfulness is a question for the court, not the jury, and the district court should not have flip-flopped on the *legal* merits of Marvell's invalidity defense solely because the jury did not pass on that defense *factually*. *See, e.g.*, *Lee v. Mike's Novelties, Inc.*, 543 F. App'x 1010, 1017 (Fed. Cir. 2013) ("Because the objective inquiry is a question of law, if the court decides that 'the infringer's reliance on a defense was not objectively reckless, it cannot send the

[26] Marvell sought summary judgment of anticipation based on Worstell's "further modified" disclosure, as discussed herein, but the court declined to address the argument, focusing instead on a separate tap weight argument.

question of willfulness to the jury.'") (quoting *Powell*, 663 F.3d at 1236); *Spine Solutions*, 620 F.3d at 1319-20 (reversing denial of JMOL on willfulness given finding elsewhere that defendant's "obviousness arguments were 'reasonable'").

Second, Marvell's noninfringement defenses are at the very least reasonable, thereby independently defeating objective willfulness. *See Uniloc,* 632 F.3d at 1310 ("If the accused infringer's position is susceptible to a reasonable conclusion of no infringement, the first prong of *Seagate* cannot be met."). Objective willfulness is negated by CMU's own inventors' pre-suit admissions about what they invented. *See* A53700-01; A41541-46; *see also* A53846; A53851; A54316.

B. The Record Fails To Support Subjective Willfulness

Although the Court need not separately reach the issue of subjective willfulness in order to reverse, there is insufficient evidence to support the judgment below on this point. The record demonstrates that Marvell took care to work around Kavcic's algorithm en route to its own patentable solution. To be sure, Marvell evaluated Dr. Kavcic's algorithm when designing the MNP, determining that the algorithm was too complex and not commercially viable. A54259-67; A42080-82; A43905-06; A43920-21; A44716-20; A46140. That is why Marvell then diverged in its approach, developed what it believed to be a distinct technology, sought a patent for it, and in its provisional application

expressly acknowledged and distinguished Kavcic's detector. A54264-67. Indeed, Marvell's patent references Kavcic's patents and papers on the first page. A53793.

Marvell's open approach to pursuing and patenting its own invention over that of CMU (A53793; A54259-67; A44054) is incompatible with any finding of willful infringement. Even assuming *arguendo* that Marvell was somehow mistaken as a technical matter that its post-processor implementation in silicon diverged from what Kavcic described and CMU patented, it cannot follow that it was subjectively willful.

V. THE DISTRICT COURT'S AWARD OF $620 MILLION IN PRE-SUIT DAMAGES SHOULD BE VACATED AS FORECLOSED BY LACHES

In an order entered January 14, 2014 (A76-148), the district court expressly found that CMU had engaged in "unreasonable and inexcusable delay" (A129-30; *see* A119) by waiting to sue for nearly six years after it had notice of possible infringement; as the court noted, CMU "did not conduct a reasonable investigation" in 2003,[27] and even when it received "additional information concerning Marvell's potential infringement, it "did not change its position in any meaningful way" (A114-16). The court also found that Marvell was prejudiced by that delay. A130-36. CMU's inventors "purged" evidence that could have

[27] In fact, because CMU suspected Marvell of infringement in 2001 (A41271:12-72:4; A54315-16), its delay properly dates back even earlier to more than six years before it filed suit.

bolstered Marvell's defenses (A79; A132-34), and Marvell invested millions in R&D related to the accused products (A137-38). Those developments might have been obviated had CMU made timely infringement allegations. While conceding that laches would otherwise attach under the traditional factors (A143-44), the court below nonetheless found laches foreclosed (A144-48) on the supposed ground that "the equities clearly favor CMU, which acted negligently in delaying to enforce its patents against Marvell, rather than Marvell, which copied CMU's patents consciously and deliberately for an entire decade" (A145).

That was legal error. As explained above, far from undertaking "particularly "particularly egregious conduct" (A144-45), Marvell submitted its own different, practical solution in a publicly filed patent. But even accepting the district court's erroneous conclusion *arguendo*, laches should *still* bar pre-suit damages as a matter of law, for Marvell's alleged misconduct had nothing to do with CMU's delay in filing suit.

The court's reliance on Marvell's supposed inequitable conduct in respects *wholly divorced* from CMU's relevant delay contravenes this Court's ruling in *Serdarevic*, which held that "a plaintiff relying on the unclean hands doctrine to defeat a defense of laches must show not only that the defendant engaged in misconduct, but moreover that ***the defendant's misconduct was responsible for***

the plaintiff's delay in bringing suit." 532 F.3d at 1361 (emphasis added).[28] In this case, there is no evidence that Marvell behaved surreptitiously in an effort to deceive CMU, to lull it into complacency, or to capitalize on its trust. A144-48. To the contrary, Marvell openly patented its own technology (A53793-804; A53807-26), and, in doing so, even disclosed its references to Kavcic, without making any misrepresentations or frustrating any inquiries by CMU. As the district court acknowledged, "CMU did not conduct an actual investigation which was thwarted by Marvell's policies and was never misled by Marvell." A122. Thus, CMU's delay was a far cry from being the predictable or desired result of Marvell's alleged misconduct; the two had nothing to do with each other. In such a case, a district court does not have discretion to suspend laches as a defense.

Similarly, this Court has held that, where an accused infringer was openly infringing, even the allegedly "willful nature of the defendants' alleged infringement" will not excuse untimely suit. *Hall v. Aqua Queen Mfg., Inc.*, 93 F.3d 1548, 1554-55 (Fed. Cir. 1996) (affirming grant of summary judgment on laches where willful infringement contentions remained outstanding). Accepting CMU's theory as ultimately advanced, it had ample basis to complain of infringement long before it sued. It follows that CMU has only itself to blame for

[28] Although *Serdarevic*'s laches ruling arose in the context of an inventorship dispute, its reasoning as to the doctrine applies with equal force here.

its delay, just as the court below found. *See Gossen Corp. v. Marley Mouldings, Inc.*, 977 F. Supp. 1346, 1352 (E.D. Wis. 1997) ("[E]gregious copying … should have been an impetus for Gossen to file a timely suit rather than an excuse for delay.").

To suspend laches in a case like this would effectively reward gamesmanship and invite calculated delay by patent-holders that may prefer to sit silent about infringement allegations (while accruing claims for astronomical royalties) instead of promptly pressing suspected infringers to license their patents on actually prevailing market terms. In these circumstances, the district court was obliged to hold that laches limits CMU's recovery to post-suit damages, and this Court should at a minimum direct entry of judgment reducing the award by $620 million.[29]

CONCLUSION

The judgment should be reversed. In the alternative, the judgment should be vacated and the case remanded for a new trial.

[29] If this Court reverses the district court's willfulness finding (see Part IV, *supra*), it should likewise reverse the district court's laches ruling (which depends on the conclusion that Marvell engaged in "particularly egregious conduct" through "conscious and deliberate copying" (A144-45)), thereby tilting the equities back in Marvell's favor even by the district court's reasoning.

Dated: August 4, 2014

Respectfully submitted,

By: /s/ Kathleen M. Sullivan

Kathleen M. Sullivan
Edward J. DeFranco
Joseph Milowic III
Cleland B. Welton II
QUINN EMANUEL URQUHART
& SULLIVAN, LLP
51 Madison Avenue, 22nd Floor
New York, NY 10010
Telephone: (212) 849-7000
Facsimile: (212) 849-7100
kathleensullivan@quinnemanuel.com

Susan R. Estrich
Michael T. Zeller
QUINN EMANUEL URQUHART
& SULLIVAN, LLP
865 S. Figueroa St., 10th Floor
Los Angeles, CA 90017
Telephone: (213) 443-3000
Facsimile: (213) 443-3100

Derek L. Shaffer
QUINN EMANUEL URQUHART
& SULLIVAN, LLP
777 6th Street, NW, 11th Floor
Washington, D.C. 20001-3706
Telephone: (202) 538-8000
Facsimile: (202) 538-8100

Kevin P.B. Johnson
QUINN EMANUEL URQUHART
& SULLIVAN, LLP
555 Twin Dolphin Drive, 5th Floor
Redwood Shores, CA 94065
Telephone: (650) 801-5000
Facsimile: (650) 801-5100

James L. Laufman
R. Roy Wang
MARVELL SEMICONDUCTOR, INC.
5488 Marvell Lane
Santa Clara, CA 95054
Telephone: (408) 222-2500
Facsimile: (408) 333-9827

Attorneys for Defendants-Appellants