United States Court of Appeals for the Federal Circuit

BROADCOM CORPORATION,
Plaintiff-Appellee,

v.

EMULEX CORPORATION,
Defendant-Appellant.

2012-1309

Appeal from the United States District Court for the Central District of California in No. 09-CV-1058, Judge James V. Selna.

Decided: October 7, 2013

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JONATHAN J. LAMBERSON, of Redwood City, California, and THOMAS H. REGER, II, of Dallas, Texas.

Before RADER, *Chief Judge,* LOURIE, and WALLACH, *Circuit Judges.*

RADER, *Chief Judge*.

After a trial and post-trial motions, the United States District Court for the Central District of California determined that Emulex Corporation (Emulex) infringed Broadcom Corporation's (Broadcom) U.S. Patent No. 7,058,150 (the '150 patent). On appeal, the only issues remaining relate to the '150 patent, and the district court's grant of a permanent injunction and modifications to that permanent injunction. Second Amended Notice of Appeal, *Broadcom Corp. v. Emulex Corp.*, No. 2012-1309 (Fed. Cir. August 10, 2012) (No. 43). Upon review of the record, this court affirms the district court's finding that Emulex infringed the '150 patent. Similarly, this court affirms the district court's determination that the '150 patent would not have been obvious at the time of invention and hence invalid. Finally, because the district court properly exercised its discretion in granting a permanent injunction with a well-crafted sunset period, this court also affirms that determination.

I.

This case concerns digital communication systems with data transceivers capable of receiving multiple, analog, high-speed, serial data signals. '150 patent Abstract, col. 2 ll.17–26. Once received, the analog data signal needs to be converted into a digital signal through a process called "sampling." Sampling is the process of measuring the amplitude of the analog signal at precisely timed intervals in order to extract the data carried in the analog signal. To do so, the receiver needs a way to discern the proper rate at which to sample the analog

signal and needs a means for generating a sampling signal having the appropriate frequency. In addition, when data is sent through cables over long distances, the incoming signal frequency can vary over time. To compensate for such variances, receiver circuits adjust the sampling signal to match the frequency and phase of the incoming data signal. Circuits for aligning and sampling data in this manner are known as Clock/Data Recovery (CDR) circuits.

The '150 patent discusses that communication devices with transceivers for transmitting and receiving data signals were known in the art. '150 patent col. 1 ll. 18–25. And, integrating transceiver circuits on an integrated circuit (IC) chip to reduce size and power dissipation of the transceiver was also known in the art. '150 patent col. 1 ll. 26–28. The circuits typically operate in accordance with timing signals, such as sampling signals, generated by oscillators. '150 patent col. 1 ll. 26–41. Because there are multiple transceiver circuits on an IC chip, there are also multiple oscillators on a common IC chip. '150 patent col. 1 ll. 26–41. However, the presence of multiple oscillators on one IC chip can cause one oscillator to deleteriously influence the operation of another oscillator. '150 patent col. 1 ll. 37–47. Thus, the need to integrate transceiver circuits on an IC chip and the related need to reduce the number of oscillators on the IC chip were long felt by those of skill in the art. '150 patent col. 1 ll. 42–47.

To reliably process a data signal, a receiver needs to match its operating characteristics with the characteristics of the data signal. '150 patent col. 1 ll. 48–50. To do so, it was known in the art to employ a receiver that uses a sampling signal to sample the data signal at sample times to produce optimal data recovery and thus minimize errors. '150 patent col. 1 ll. 48–55. Such timing control includes control of the phase and frequency of a sampling

signal used to sample the received data signal. '150 patent col. 1 ll. 59–61.

Sampling of high data rate signals also presented challenges. '150 patent col. 2 ll. 7–9. In prior art systems, as the received data signal rate increased into the multi-gigabit-per-second range, the difficulty in effectively controlling sampling processes in the receiver correspondingly increased. '150 patent col. 1 ll. 62–66. At lower rates, the sampling proceeds by making multiple copies of the same high-speed signal and distributing those copies to several sampling circuits operating in parallel. '150 patent col. 29 l. 65–col. 30 l. 6.

The '150 patent solves the problems in the prior art by using a phase interpolator to perform high speed sampling of a signal using a technique known as clock and data recovery. Specifically, the '150 patent addresses the sampling problem at high data rates by using four parallel data paths, each operating at a quarter of the rate of the incoming data signal. '150 patent col. 31 ll. 10–37. Further, to solve the problems related to the presence of multiple oscillators on an IC chip, the '150 patent eliminates the need for multiple oscillators by "advantageously" using a single master oscillator "in a multiple receiver" environment on an IC chip. '150 patent col. 3 ll. 22–40.

The invention thus relies on a single, master oscillator because the phase interpolator, not the oscillator, tunes the phase and frequency of the sampling signal. '150 patent col. 3 ll. 22–25. Instead of changing the oscillator frequency, the '150 patent discloses adjusting the phase of the sampling signal forward or backward so that the sampling rate, i.e., the number of rising edges per unit time, matches the data rate. '150 patent col. 23 ll. 15-41. For a change in phase to cause the same ultimate result as a change in frequency, the phase must be continually "rotated" at a specific rate—otherwise the sampling signal

will not keep up with the desired sampling frequency. '150 patent col. 23 ll. 17–55.

Claim 8, the only claim at issue, recites:

> **8. A COMMUNICATION DEVICE CONFIGURED TO RECEIVE MULTIPLE SERIAL DATA SIGNALS, COMPRISING:**
>
> a master timing generator adapted to generate a master timing signal;
>
> multiple receive-lanes each configured to receive an associated one of the multiple serial data signals, each receive-lane including
>
> > a phase interpolator adapted to produce a sampling signal having an interpolated phase, and
> >
> > a data path adapted to sample and quantize the associated serial data signal in accordance with the sampling signal; and
>
> an interpolator control module coupled to each receive-lane, the interpolator control module being adapted to cause the phase interpolator in each receive-lane to rotate the interpolated phase of the sampling signal in the receive-lane at a rate corresponding to a frequency offset between the sampling signal and the serial data signal associated with the receive-lane so as to reduce the frequency offset between the sampling signal and the serial data signal.

'150 patent col. 38 l. 53–col. 39 l. 5.

Thus, claim 8 recites a communication device with "multiple receive-lanes each configured to receive an associated one of the multiple serial data signals." '150 patent claim 8. Each receiving lane has a data path—a path for the analog signal to move through the circuit so that it may be sampled and turned into digital data—and

a phase interpolator to adjust the sampling signal to match the incoming data in the data path. '150 patent claim 8. Claim 8 also recites an interpolator control module (ICM)—a mechanism that varies outputs of the phase interpolators in order to achieve the desired rate of phase rotation. '150 patent claim 8. Further the ICM rotates the phase of the sampling signal at a rate that corresponds to the difference in frequency between the sampling signal and the data signal—the frequency offset. '150 patent claim 8.

On appeal, the relevant prior art is European Patent No. EP0909035, the Pickering reference (Pickering). J.A. 245. Pickering teaches "an apparatus for producing an oscillating signal," i.e., a clock, and "devices for synchronising an output signal with an input signal." J.A. 218. Pickering also discloses "recover[ing] a corresponding clock signal at the receiver in order to demodulate the received signal." J.A. 218. The record shows that Pickering discloses each limitation of claim 8 except for a "data path"—also referred to as a "receiving path." *See* J.A. 245; Appellant's Br. 34; Appellee's Br. 37–38. In other words, Pickering teaches recovering the clock, but *not the data*; in contrast, the '150 patent teaches recovering both the clock *and the data*. *See* J.A. 748–49.

II.

Broadcom filed suit in the Central District of California in September 2009 asserting infringement of ten patents. Broadcom then amended the complaint to add an eleventh patent—the '150 patent, and later, a twelfth patent was added through consolidation of lawsuits. Six patents, including the '150 patent, remained in the case at the time of a fourteen-day jury trial, which was held from September 20, 2011–October 12, 2011. At the close of evidence, Broadcom moved for JMOL on the issue of infringement of the '150 patent; Emulex similarly moved for judgment as a matter of law (JMOL) on the issue of

non-infringement. J.A. 33. The district court granted Broadcom's motion and ruled, as a matter of law, that Emulex infringes the '150 patent. J.A. 32, 35; *see* J.A. 1179. The jury subsequently found that Emulex had not shown the invention of the patent would have been obvious, that Broadcom should receive $387,922 in damages for the infringement, and that Emulex's infringement was not willful. J.A. 1178–81.

At a post-trial hearing, the district court denied Emulex's renewed motion for JMOL on the issue of infringement which turned on whether the accused products "reduced the offset between the sampling signal and the data signal all of the time or only some of the time." J.A. 35. The district court found that Emulex's expert, Dr. Nikolic, had conceded that the accused device "reduced the offset at least some of the time." J.A. 35. The district court also determined that Broadcom presented sufficient evidence that the accused device met all other claim limitations. J.A. 36. The district court also rejected Emulex's motion for reconsideration of JMOL of infringement based on Emulex's challenge of the "at a rate corresponding to" limitation which was raised for the first time during oral argument. J.A. 37–39. Accordingly, because "part-time infringement . . . is sufficient to establish infringement," the district court denied Emulex's motion and sustained its earlier conclusion that Emulex infringed claim 8 of the '150 patent. J.A. 35, 39.

After trial, both parties moved for JMOL on the issue of obviousness of the '150 patent. J.A. 235. The jury trial produced factual findings on obviousness, as well as the jury's verdict that the '150 patent would not have been obvious at the time of invention. J.A. 235, 243; *see* J.A. 1179–81. Specifically, the jury found that (1) the claimed invention was not independently invented by others in the same time frame; (2) the products incorporating the claimed invention experienced commercial success; (3) the claimed invention met a long-felt need for a smaller, more

efficient CDR circuit; and (4) the invention occurred after unsuccessful attempts by others to find the novel solution. J.A. 238–39, 243–44, 1179–81. The jury also found copying and unexpected results, but the district court held that the record did not support these findings with substantial evidence. J.A. 244. Finally, the jury concluded that the level of ordinary skill was "[a]n electrical engineer with at least a bachelor's degree in electrical engineering and several years of post-graduate experience with CDR circuits, implemented in complementary metal-oxide-semiconductor (CMOS) integrated circuit devices, or the equivalent." J.A. 243, 1179.

Though Emulex challenged some of the jury's factual findings on nonobviousness, the primary dispute was over the teachings of Pickering. J.A. 243–45. As noted earlier, the record shows that Pickering teaches each limitation of Claim 8 except for a "data path." *See* J.A. 245. By contrast, the '150 patent claims recovering both the clock *and the data*. J.A. 748–749. And the district court found that Pickering addressed a different problem than the '150 patent. J.A. 247–48. Emulex argued that a person of ordinary skill in the art would have been able to adapt Pickering to recover data in the same fashion as the '150 patent. J.A. 247. The district court, however, determined that Emulex had not proved this invalidity theory by clear and convincing evidence. J.A. 247. Thus, the district court held that claim 8 would not have been obvious at the time of invention. J.A. 248.

The district court also made several factual findings leading up to the entry of an injunction on April 3, 2012 against Emulex. J.A. 1–9. The district court applied the four-factor test in *eBay Inc. v. MercExchange LLC*, 547 U.S. 388, 391 (2006). First, the district court concluded that Broadcom suffered irreparable harm and was likely to continue to do so because of evidence that Emulex achieved design wins and market share gains at Broadcom's expense. J.A. 16–20. Second, the district court

concluded that money damages would be inadequate to compensate Broadcom because of evidence that Emulex's design wins caused unquantifiable secondary benefits to Emulex. J.A. 20. Third, the district court found that the balance of hardships favors an injunction because Emulex's sales of infringing products amounted to only a small portion of its revenues. J.A. 20–22. Fourth, the district court concluded that, to balance the public interest and equitable factors, the permanent injunction should include a sunset period to protect certain of Emulex's customers from supply disruptions. J.A. 22–29.

The district court determined that an eighteen-month sunset period starting on October 12, 2011, was reasonable. J.A. 26–27. The district court made allowances for "the needs of Emulex customers." J.A. 26–27. Specifically, Emulex was allowed to sell infringing products to customers who had "qualified an infringing product" in a specific device and "placed a firm order for production quantities" of the infringing product prior to the start of the sunset period. J.A. 27. And, Emulex was permitted to make sales "for the specific customer device(s) for which the infringing product has been qualified" prior to the start of the sunset period. J.A. 27. Finally, the district court permitted sales to meet "the emergency needs of an end user affecting health of the public . . . , public safety, . . . and governmental agencies engaged in national defense." J.A. 5888–89.

Emulex appeals the district court's grant of JMOL that Emulex infringed the '150 patent and that the '150 patent was not invalid as obvious. Emulex also appeals the district court's grant of a permanent injunction. This court has jurisdiction under 28 U.S.C. §§ 1292(a)(1), (c)(1) and 1295.

III.

Rule 50(a)(1) permits a grant of JMOL "[i]f a party has been fully heard on an issue during a jury trial and

the court finds that a reasonable jury would not have a legally sufficient evidentiary basis to find for the party on that issue." Fed. R. Civ. P. 50(a)(1). "[A]n admission made by a plaintiff's witness can be sufficient to support entry of a JMOL in favor of a defendant . . . even where the defendant bears the burden of proof on the decided issue." *Nobelpharma AB v. Implant Innovations, Inc.*, 141 F.3d 1059, 1065 (Fed. Cir. 1998).

This court reviews the grant or denial of a motion for JMOL under the law of the regional circuit—here, the United States Court of Appeals for the Ninth Circuit. *See ClearValue, Inc. v. Pearl River Polymers, Inc.*, 668 F.3d 1340, 1343 (Fed. Cir. 2012). In the Ninth Circuit, a district court's grant of JMOL receives no deference. *See Lucent Techs., Inc. v. Gateway, Inc.*, 543 F.3d 710, 717 (Fed. Cir. 2008) (citing *City Solutions, Inc. v. Clear Channel Commc'ns*, 365 F.3d 835, 839 (9th Cir. 2004)).

At trial, the district court granted Broadcom's motion for JMOL that Emulex infringed the '150 patent. J.A. 33 (the district court used the term directed verdict instead of JMOL). Then, at a post-trial hearing, the district court denied Emulex's renewed motion for JMOL of noninfringement. J.A. 35.

The issue of infringement turns on the following language of claim 8:

> the interpolator control module being adapted to cause the phase interpolator in each receive-lane to rotate the interpolated phase of the sampling signal in the receive-lane *at a rate corresponding to a frequency offset* between the sampling signal and the serial data signal associated with the receive-lane *so as to reduce the frequency offset* between the sampling signal and the serial data signal

'150 patent claim 8 (emphases added).

The first infringement question is whether the "rate" in Emulex's half-rate architecture "correspond[s] to a frequency offset" as required by claim 8. The accused devices' "half-rate" architecture uses two parallel data paths that take turns sampling the same data signal. J.A. 638. By using two data paths, each data path only needs to sample at half the frequency of the incoming data signal. J.A. 638. Emulex argues that "corresponding to" in claim 8 limits it to full rate architecture and would not cover half-rate architecture. Appellant's Br. 32.

The record, especially the intrinsic evidence of the patent's meaning, does not support Emulex's argument. The claim language itself does not necessitate that "corresponding to" limits claim 8 to full rate architecture. Indeed the claim does not use language of equation but of correspondence, a much broader concept. Moreover the record does not contain evidence that the patentee acted as his own lexicographer to define "corresponding to" as "equal to."

The specification even more definitively addresses this issue. The specification states that the "sampling frequency [] and serial data signal frequency [] need to be *related* to one another, but *not necessarily equal* to one another." '150 patent col. 26 ll. 4–13 (emphases added). Also, the specification teaches, as one example, a quarter-rate architecture. '150 patent col. 31 ll. 19–41. Consequently, limiting claim 8 to full rate architecture, as suggested by Emulex, would improperly exclude a disclosed embodiment, i.e., the quarter-rate architecture. This court has clarified that an interpretation which "excludes a [disclosed] embodiment from the scope of the claim is rarely, if ever, correct." *Accent Pkg., Inc. v. Leggett & Platt, Inc.*, 707 F.3d 1318, 1326 (Fed. Cir. 2013); *see Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–13 (Fed. Cir. 2005) (en banc). Thus, the specification shows that the "corresponding to" claim term does not limit the invention to full rate architecture.

Thus, because Emulex's argument rests on the incorrect notion that the "corresponding to" language limits claim 8 to full rate architecture, this court confirms the district court's ruling that the record shows that Emulex meets this limitation by employing half-rate architecture in its accused products. *See* J.A. 39.

Emulex also contests the sufficiency of evidence to support the trial court's grant of JMOL of infringement based on the "at a rate . . . so as to reduce" limitation of claim 8. Appellant's Br. 30. In the first place, this court notes that Emulex did not specifically argue at trial that it did not practice the "at a rate" limitation. Rather, Emulex's references at trial to "at a rate" were limited to blanket statements by Emulex's expert about large portions of the claim or general explanations about reasons that certain accused products did not practice claim 8. *See* J.A. 602–604. Further, Emulex elected not to cross-examine Broadcom's expert on this issue. *See generally* J.A. 496–501.

At trial, the district court found that, at bottom, infringement turned on whether the accused products "reduced the offset between the sampling signal and the data signal all of the time or only some of the time." J.A. 35. Importantly, the district court found that Emulex's expert, Dr. Nikolic, conceded that the accused device "reduced the offset at least some of the time." J.A. 640; *see* Oral Argument at 1:19–1:48, *Broadcom Corp. v. Emulex Corp.*, No. 2012-1309, *available at* http://www.cafc.uscourts.gov/oral-argument-recordings/12-1309/all. It is well settled that an accused device that "sometimes, but not always, embodies a claim[] nonetheless infringes." *Bell Commc'n Research, Inc. v. Vitalink Commc'n Corp.*, 55 F.3d 615, 622–23 (Fed. Cir. 1995). Accordingly, this court affirms the district court's grant of JMOL that Emulex's accused products infringed the '150 patent and denial of Emulex's JMOL of noninfringement.

IV.

> Obviousness is a question of law based on underlying findings of fact. An analysis of obviousness must be based on several factual inquiries: (1) the scope and content of the prior art; (2) the differences between the prior art and the claims at issue; (3) the level of ordinary skill in the art at the time the invention was made; and (4) objective evidence of nonobviousness, if any.

In re Kubin, 561 F.3d 1351, 1355 (Fed. Cir. 2009); *see also Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). Based on the underlying fact findings, whether a claimed invention would have been obvious under 35 U.S.C. § 103(a) is a question of law reviewed de novo. *Power-One, Inc. v. Artesyn Techs., Inc.*, 599 F.3d 1343, 1351 (Fed. Cir. 2010). Underlying factual findings by the judge are reviewed for clear error. *Id.* Factual findings by the jury receive substantial evidence review. *W. Union Co. v. MoneyGram Payment Sys., Inc.*, 626 F.3d 1361, 1369 (Fed. Cir. 2010). Because the '150 patent is presumed valid, to prevail on its motion for JMOL, Emulex needed to prove that the '150 patent would have been obvious at the time of invention by clear and convincing evidence. *Power-One*, 599 F.3d at 1351.

The obviousness analysis here asks whether a person of ordinary skill in the art at the time of the invention—an electrical engineer with at least a bachelor's degree and several years of CDR experience—would have had a reason to modify Pickering to include a "data path." Pickering teaches recovering clock signals and phase synchronization. J.A. 245. However, Pickering neither teaches a data path nor teaches adjusting the phase for data recovery. Based on the evidence presented at trial, the district court concluded that Pickering and the '150 patent addressed two different problems—clock recovery versus clock and data recovery, respectively. J.A. 245.

While a prior art reference may support any finding apparent to a person of ordinary skill in the art, prior art references that address different problems may not, depending on the art and circumstances, support an inference that the skilled artisan would consult both of them simultaneously. *See Kinetic Concepts, Inc. v. Smith & Nephew, Inc.*, 688 F.3d 1342, 1366 (Fed. Cir. 2012) (finding invention nonobvious when none of the "reference[s] relate to the [problem] described in the patents" and no evidence was proffered "indicating why a person having ordinary skill in the art would combine the references").

Specifically, at trial the expert testimony indicated that there was no "motive or reason [for Pickering] to seek a data path in order to broaden its function." J.A. 751. Pickering's system was described as a "self-contained" system. J.A. 751. Its task and purpose was to recover the clock data and to phase synchronize the signal—Pickering's system accomplished its objective and provided no suggestion to broaden that objective. J.A. 751.

In addition to solving a different problem than the '150 patent, Pickering does not address the '150 patent's critical "data path," i.e., the data recovery function. As the district court found, the record does not support Emulex's contention that Pickering implicitly requires a data path. Pickering's device is designed to match transition points, or cross-over points, on a waveform. At the cross-over points there is no data to recover, so Pickering cannot inherently require recovering data. J.A. 245–46. Moreover, contrary to Emulex's suggestion, Pickering's Figure 16 shows only clock recovery, not data recovery. J.A. 246. Further, Pickering does not teach data outputs or recovered data.

Even assuming that a person of ordinary skill might have some motivation to add a data path to Pickering, the record does not show any reasonable expectation that this

significant change would be successful. An invention is not obvious just "because all of the elements that comprise the invention were known in the prior art;" rather a finding of obviousness at the time of invention requires a "plausible rational [sic] as to why the prior art references would have worked together." *Power-One,* 599 F.3d at 1351; *Amgen Inc. v. F. Hoffman-LA Roche Ltd.*, 580 F.3d 1340, 1362 (Fed. Cir. 2009) ("An obviousness determination requires that a skilled artisan would have perceived a reasonable expectation of success in making the invention in light of the prior art."). Indeed, expert testimony indicated that the proposed combination of Pickering with a data path would not have resulted in the invention of the '150 patent's claim 8 and would not have worked for its intended purpose. Broadcom's expert, Dr. Stojanovic, testified that combining Pickering with a data path function would result in an "unfunctional circuit." J.A. 749–51. The combination of Pickering with a data path would have caused sampling in undefined zones resulting in undefined values. J.A. 750–51. In other words, adding data recovery functionality to Pickering would have defeated the ability to recover data. J.A. 750–51.

Further, the record contains evidence of objective indicia of nonobviousness. Objective indicia of nonobviousness are "not just a cumulative or confirmatory part of the obviousness calculus but constitute independent evidence of nonobviousness . . . [and] enable the court to avert the trap of hindsight." *Leo Pharm. Prods., Ltd. v. Rea*, No. 2012-1520, 2013 WL 4054937, at *11 (Fed. Cir. Aug. 12, 2013) (internal citations and quotation marks omitted). Here the district court averted the trap of hindsight by considering the evidence of the objective indicia as part of the obviousness analysis, and not just as an afterthought. *See id.* (citing *In re Cyclobenzaprine Hydrochloride Extended-Release Capsule Patent Litigation*, 676 F.3d 1063, 1073 (Fed. Cir. 2012)).

Substantial evidence supports the jury's finding of commercial success. The products embodying the '150 patent enjoyed acknowledged commercial success. But more important, the record contains unrebutted testimony establishing a nexus between the claimed technological advance of claim 8 and the success of the products. J.A. 243. In fact, Broadcom continues to claim technological advance in products even eleven years after this initial invention. J.A. 477. Further, the technological advance claimed in the '150 patent's claim 8 was critical in solving the demand for a chip that operates reliably at low cost and higher throughput. J.A. 752.

The jury's finding of long-felt, but unsolved need is also supported by substantial evidence. The testimony reflected that others had tried and failed to develop a clock and data recovery circuit for use in a multi-lane product. One of the biggest obstacles identified by the expert testimony was noise-coupling issues. J.A. 751. Even Broadcom's own attempts and resultant failures support the jury's findings. J.A. 473.

Taken in sum, the district court found that the objective indicia of nonobviousness "strongly support[ed]" a conclusion that the claimed invention would not have been obvious at the time of invention. J.A. 245 n. 6. This court agrees and affirms the district court's denial of Emulex's JMOL regarding the validity of the '150 patent on the basis of obviousness.

V.

This court reviews a decision to grant or deny an injunction for an abuse of discretion. *Innogenetics, N.V. v. Abbott Labs.*, 512 F.3d 1363, 1379 (Fed. Cir. 2008). Similarly, the scope of an injunction is reviewed for abuse of discretion. *Streck, Inc. v. Research & Diagnostic Sys., Inc.*, 665 F.3d 1269, 1293 (Fed. Cir. 2012). An abuse of discretion occurs when a district court exercises its discretion "based upon an error of law or clearly erroneous

factual findings" or commits "a clear error of judgment in weighing relevant factors." *Innogenetics*, 512 F.3d at 1379.

Before assessing irreparable harm and public interest, the district court reviewed the characteristics of the market place. The district court found that Emulex and Broadcom competed in a market characterized by "design win" scenarios. J.A. 13. Their customers were original equipment manufacturers (OEMs)—Dell, HP, IBM, Cisco—who integrated various component parts into finished products like servers for data centers. J.A. 13. OEMs hold competitions to determine which supplier will provide a given chip or component for each generation of a product. These design competitions often occur well in advance because integrating various component parts together into the OEM's final product can take extensive planning and modification. Once an OEM designs a supplier's component part into the OEM's final product, it is very difficult to alter the design of the OEM product. The district court noted that "[in] this kind of market, the exclusion has an effect on firms even if they do not have an immediately available product." J.A. 13. The OEM essentially commits itself to a single supplier until the next design cycle.

The district court further found that suppliers who prevail in design-win competitions enjoy two benefits beyond merely making sales. First, a design-win effectively locks the OEM into using the winner's component part and thus temporarily immunizes the winner from competition. J.A. 14. Second, winners enjoy an "incumbency effect" making them more likely to win subsequent design competitions because the OEM's familiarity with the winning supplier creates goodwill. J.A. 14.

The district court then analyzed the *eBay* factors through the lens of these market conditions. First, the district court found that the parties were direct competi-

tors in the relevant product market. J.A. 14. The district court noted that Emulex alleged as much in a related antitrust lawsuit, and that Emulex's senior executives had admitted competition at trial. J.A. 14.

The record showed conclusively that Broadcom had lost market share to Emulex. J.A. 17. The trial court also noted that requiring a "precise product-by-product replacement is too narrow and ignores th[e] true scope of competition in the market place." J.A. 17. Finally, the district court emphasized that Broadcom had never licensed the '150 patent individually; and Broadcom only licensed the '150 patent where some pressing reason to do so existed, such as avoiding litigation by completing a cross-licensing deal. J.A. 18–19.

In light of these findings, the district court concluded that Broadcom received an irreparable harm from the infringement. The district court also determined that money damages were inadequate to compensate Broadcom largely due to incumbency effects from the design-win market conditions. J.A. 20. Accordingly, the district court entered an injunction, but provided an eighteen-month sunset period ending in April 2013 for certain existing accused products, including BE2 and BE3. J.A. 24–28. Emulex had already "won" these products, so immediately enjoining their sale would have penalized the OEMs and disrupted the supply of servers with no corresponding benefit to Broadcom. J.A. 27–28.

Relying primarily on *Apple, Inc. v. Samsung Electronics Co.,* 678 F.3d 1314 (Fed. Cir. 2012), Emulex argues that the district court abused its discretion in granting the injunction. Emulex argues a lack of irreparable harm because there was no link between Emulex's and Broadcom's market share changes and there was no causal nexus "show[ing] that the infringement caused harm in the first place." Appellant's Reply Br. 28 (quoting *Apple*, 678 F.3d at 1324). Specifically, Emulex contends that

Broadcom has shown no evidence of demand for the features claimed in the '150 patent and the patented feature is only a "small" component of the infringing products. *Id.* at 28–29.

In *Apple,* the district court found that there was considerable evidence that the patented feature was not a determinative factor in sales and that the alleged infringement "at most" caused an "insignificant amount of lost sales." *Apple*, 678 F.3d at 1324. Consequently, in those specific circumstances, this court affirmed the district court and agreed that a showing of a causal nexus between infringement and the alleged harm was required:

> To show irreparable harm, it is necessary to show that the infringement caused harm in the first place. Sales lost to an infringing product cannot irreparably harm a patentee if consumers buy that product for reasons other than the patented feature. If the patented feature does not drive the demand for the product, sales would be lost even if the offending feature were absent from the accused product.

Id.

However, contrary to Emulex's assertions, the evidence here shows that the infringement *did cause* the harm. Emulex and Broadcom were competitors in a "design wins" market, which is fundamentally different from the market in *Apple.* In a design wins market, the sales are "design wins," not a steady flow of discrete product sales as in *Apple.* Further, this market has a limited set of customers, e.g., the four "tier one" OEMs. J.A. 2436. And once a supplier is chosen to meet the needs of a new product line, the supplier's component is essentially designed into the OEM product for its life cycle. J.A. 2438–39. Finally, in a design wins market, there is an incumbency effect which enhances a winning supplier's ability to successfully compete in successive

design competitions. J.A. 2439–40. All of these characteristics contrast the market in *Apple* where there were discrete sales to numerous consumers.

Because of these market characteristics, the district court properly concluded that Broadcom's "exclusion from a fair opportunity to compete for design wins constitutes irreparable harm." J.A. 16. The evidence showed that Broadcom lost market share as a result of Emulex's competition—a clear measure of competition and harm. J.A. 2625–26. Moreover, the incumbency effect compounded these ramifications because Broadcom and Emulex competed for design wins from a limited number of tier one OEMs. J.A. 2436, 2590. Further, the undisputed evidence at trial linked the claimed invention of the '150 patent to the success of the products incorporating it. J.A. 752. As direct competitors in a limited market, Broadcom's harm was clearly linked to Emulex's infringement of Broadcom's patent property rights. *Douglas Dynamics, LLC v. Buyers Prods. Co.*, 717 F.3d 1336, 1345 (Fed. Cir. 2013) ("Where two companies are in competition against one another, the patentee suffers the harm—often irreparable—of being forced to compete against products that incorporate and infringe its own patented inventions.")

Furthermore, Emulex is more than just a *likely* infringer, as was the accused infringer in *Apple*—Emulex is an adjudicated infringer. *See Apple*, 678 F.3d at 1323 (citing *Winter v. Natural Res. Def. Council, Inc.*, 555 U.S. 7, 20 (2008) ("A plaintiff seeking a preliminary injunction must establish that he is likely to succeed on the merits, that he is likely to suffer irreparable harm . . . ."). Broadcom has shown—not that it is *likely* to succeed on the merits and *likely* to suffer irreparable harm—but that it in fact *has* succeeded on the merits and *has* suffered irreparable harm. Thus, the balancing in *Apple* was done in the context of a preliminary injunction, not a permanent injunction. In this case, the district court properly

acknowledged the import of an adjudicated harm and Broadcom's entitlement to a permanent injunction. J.A. 32, 35.

The courts have a long history of remedying trespass on property rights—including patent rights—by removing the trespasser. *See, e.g., Presidio Components, Inc. v. Am. Tech. Ceramics Corp.*, 702 F.3d 1351, 1362 (Fed. Cir. 2012). This history of removal stems from a constitutional and statutory grant to exclude others from one's property. U.S. Const. art. I, § 8, cl. 8 ("by securing for limited times to . . . inventors the *exclusive* right to their respective . . . discoveries") (emphasis added); 35 U.S.C. § 154(a)(1) ("Every patent shall contain . . . a grant to the patentee . . . of the *right to exclude others* from making, using, offering for sale, or selling the invention . . . .") (emphasis added).

However, in the interest of equity and with an eye towards protecting the public interest, the decision to grant or deny a permanent injunction remains within the equitable discretion of the district courts. *Presidio*, 702 F.3d at 1362. Equity dictates a four-factor test that a district court uses when removing a trespasser from infringed intellectual property. *Id.* (citing *eBay*, 547 U.S. at 391). And the analysis by the district court proceeds under the "long tradition of equity practice" granting "injunctive relief upon a finding of infringement in the vast majority of patent cases." *eBay*, 547 U.S. at 395 (Roberts, C.J., concurring). Patent property rights are especially difficult to protect with solely monetary relief because "a calculating infringer may thus decide to risk a delayed payment to obtain use of valuable property" without the owner's permission. *Presidio*, 702 F.3d at 1362–1363.

To protect Broadcom's property rights, the district court did not abuse its discretion in granting a permanent injunction. The district court determined that Broadcom

and Emulex were competitors and that Broadcom lost market share while Emulex gained it—thus Broadcom established irreparable harm. *See Douglas Dynamics, LLC v. Buyers Prods. Co.,* 717 F.3d 1336, 1345 (Fed. Cir. 2013). The district court also determined that monetary damages were insufficient, that the balance of hardships tipped in Broadcom's favor, and that the public interest was served by a tailored injunction. J.A. 22. Thus, this court affirms the district court's analysis of the factors and exercise of its discretion in granting a permanent injunction.

And in exercising its discretion for equitable remedies, the district court formed a well-crafted sunset period. The terms of the sunset period permit continued sales for any combination of "specific customer device" and infringing products already on the market as of October 12, 2011. J.A. 27. The district court selected the October date because, by then, "a reasonably prudent firm accused of infringement would have either ceased infringement and/or begun design-around efforts." J.A. 27.

Further, the district court's selection of an eighteen month sunset period was not an abuse of discretion. The eighteen months allowed for time to remove the infringing product from the market without causing significant downstream disturbance for OEMs and consumers. And the eighteen-month period is a compromise between the wide range of time estimates in the record relating to the design process and product qualification. J.A. 25 (30 month product redesign period); J.A. 26 (14–16 month product development period); J.A. 27 (4–6 month qualification period).

The "district courts are in the best position to fashion an injunction tailored to prevent or remedy infringement." *Edwards Lifesciences AG v. CoreValue, Inc.*, 699 F.3d 1305, 1315 (Fed. Cir. 2012) (quoting *TiVo Inc. v. EchoStar Corp.,* 646 F.3d 869, 890 n. 9 (Fed. Cir. 2011) (en banc)).

The district court did just that—it tailored a permanent injunction to meet unique market concerns with a well-crafted sunset period. This court finds no abuse of discretion; in fact, this is an exemplary exercise of discretion in crafting a tailored equitable remedy. Therefore, this court affirms the district court's grant of a permanent injunction with the sunset period.

VI.

For the foregoing reasons, this court affirms the district court's finding that the '150 patent was infringed and nonobvious, and the grant of a permanent injunction with a sunset period.

AFFIRMED