

No. 19-16122

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

FEDERAL TRADE COMMISSION,
Plaintiff-Appellee,

v.

QUALCOMM INCORPORATED,
Defendant-Appellant.

APPEAL FROM DECISION OF THE UNITED STATES DISTRICT
COURT FOR THE NORTHERN DISTRICT OF CALIFORNIA

No. 17-cv-00220-LHK

Hon. Lucy H. Koh

**BRIEF OF ASSOCIATION OF GLOBAL AUTOMAKERS AND
ALLIANCE OF AUTOMOBILE MANUFACTURERS
AS *AMICI CURIAE* SUPPORTING APPELLEE**

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CORPORATE DISCLOSURE STATEMENT

Pursuant to Rule 26.1 of the Federal Rules of Appellate Procedure, the undersigned counsel certifies that:

Amicus Association of Global Automakers is a nonprofit trade association based in Washington D.C., charged with promoting the interests of its members in the United States. Global Automakers is not a publicly held corporation and it has no parent companies. No companies have a ten percent or greater ownership interest in Global Automakers.

Amicus Alliance of Automobile Manufacturers, Inc., is a 501(c)(6) tax-exempt Delaware corporation. It has no parent corporation, and no publicly held company owns 10% or more of its stock.

TABLE OF CONTENTS

	Page
CORPORATE DISCLOSURE STATEMENT.....	i
INTEREST OF <i>AMICI CURIAE</i>	1
INTRODUCTION AND SUMMARY OF ARGUMENT	4
ARGUMENT	6
Qualcomm’s Patent Licensing Practices Deter Innovation And Injure Competition.	6
A. Non-exhaustive sales of patented goods are anticompetitive and contrary to the public interest.....	6
B. The auto industry provides another example of the harm to innovation and competition from Qualcomm’s non-exhaustive sales and licensing scheme.	14
C. The adverse consequences from denying exhaustive licensing to suppliers will soon spread throughout the economy.	22
CONCLUSION.....	25

TABLE OF AUTHORITIES

	Page(s)
Cases	
<i>Cont’l Auto. Sys., Inc. v. Avanci, LLC</i> , 19-cv-02520 (N.D. Cal. July 23, 2019).....	19
<i>FTC v. Qualcomm Inc.</i> , No. 17-cv-00220 (N.D. Cal. May 21, 2019), ECF No. 1490	4
<i>Impression Prods., Inc. v. Lexmark Int’l, Inc.</i> , 137 S. Ct. 1523 (2017).....	<i>passim</i>
<i>Kirtsaeng v. John Wiley & Sons, Inc.</i> , 568 U.S. 519 (2013).....	12
<i>Motion Picture Patents Co. v. Universal Film Mfg. Co.</i> , 243 U.S. 502 (1917).....	7
<i>Quanta Computer, Inc. v. LG Elecs., Inc.</i> , 553 U.S. 617 (2008).....	4, 5, 6, 14
<i>Straus v. Victor Talking Mach. Co.</i> , 243 U.S. 490 (1917).....	7
<i>United States v. Univis Lens Co.</i> , 316 U.S. 241 (1942).....	8
Other Authorities	
Aaron Perzanowski & Jason Schultz, <i>The End of Ownership: Personal Property in the Digital Economy</i> 159 (2016)	11
<i>Automotive Industry: Employment, Earnings, and Hours</i> , Bureau of Labor Statistics, http://bit.ly/2snk9Ig	3
<i>Automotive Overview</i> , SelectUSA, http://bit.ly/2OTnmqs	4

TABLE OF AUTHORITIES
(continued)

	Page(s)
Beatriz Gallego & Josef Drexl, <i>IoT Connectivity Standards: How Adaptive is the Current SEP Regulatory Framework?</i> , 50 Int'l Rev. of Intell. Prop. & Competition L. 135, 136 (2019)	23
Christina Rogers, <i>A Shape-Shifting Car? Patent Filings Point to Auto Industry's Future</i> , Wall St. J. (Sept. 18, 2017).....	16
Einer Elhauge, <i>Tying, Bundled Discounts, and the Death of the Single Monopoly Profit Theory</i> , 123 Harv. L. Rev. 397, 400 (2009).....	8
Fair Standards Alliance, <i>Fair Standards Alliance an Introduction</i> (Nov. 12, 2015).....	10
Herbert Hovenkamp, <i>Post-Sale Restraints and Competitive Harm: The First Sale Doctrine in Perspective</i> , 66 N.Y.U. Ann. Surv. of Am. L. 487, 538 (2011)	10
Herbert Hovenkamp, <i>Reasonable Patent Exhaustion</i> , 35 Yale J. Reg. 513, 545 (2018).....	12
<i>The Internet of Things</i> , Carnegie Mellon University, http://bit.ly/2qEZsqR	23
Jacob Morgan, <i>A Simple Explanation of 'The Internet of Things'</i> , Forbes (May 13, 2014)	23
Kilpatrick Townsend & GreyB Servs., <i>Trends in Automotive</i> , http://bit.ly/2Y1SGrv	16
Mark Lemley, <i>Rational Ignorance at the Patent Office</i> , 95 Nw. U. L. Rev. 1, 12 (2001).....	12

TABLE OF AUTHORITIES
(continued)

	Page(s)
Matt Burgess, <i>What is the Internet of Things?</i> , WIRED, http://bit.ly/2OqoLpx (Feb. 16, 2018).....	23
Natalie Leh & Natalie Pous, <i>What to Expect in Licensing and Litigation as the Internet of Things Comes to the Automotive Industry</i> , Bloomberg Law (Dec. 3, 2018).....	20
Olena Ivus, <i>Patent Exhaustion in the United States and Canada</i> , Centre for Int’l Governance Innovation Working Paper No. 159, at 10 (Jan. 2018)	17, 18
Policy Dep’t for Citizens’ Rights and Constitutional Affairs, <i>Standard Essential Patents and the Internet of Things</i> , Directorate Gen. for Internal Policies of the European Union 5 (Jan. 2019)	24
Robin Feldman, <i>Rethinking Patent Law</i> 146 (2012)	12
Samuel F. Ernst, <i>Patent Exhaustion for the Exhausted Defendant</i> , 2014 U. Ill. J. of L., Tech., & Pol’y 445, 476 (2014).....	13
Shefali Kapadia, <i>Moving Parts: How the automotive industry is transforming</i> , Supply Chain Dive, http://bit.ly/34pqEbv (Feb. 20, 2018).....	17
Tim Syrett & Natalie Pous, <i>The Developing Landscape of Internet of Things Standards for Cars</i> , Bloomberg Law (Nov. 5, 2018)	21
<i>US Economic Contributions</i> , American Automotive Policy Council, http://bit.ly/2OON2Vp	3

INTEREST OF *AMICI CURIAE*

Amici are nonprofit trade associations that promote a responsible, open, and competitive automotive marketplace in the United States. They advocate for public policies that improve vehicle safety, encourage innovation, and promote responsible environmental stewardship.¹

The Alliance of Automobile Manufacturers represents twelve automakers accounting for seventy percent of all car and light truck sales in the United States. Its members are the BMW Group, FCA US LLC, Ford Motor Company, General Motors Company, Jaguar Land Rover, Mazda, Mercedes-Benz USA, Mitsubishi Motors, Porsche Cars N.A., Toyota, Volkswagen Group of America, and Volvo Car USA.

The Association of Global Automakers represents the U.S. manufacturing and distribution subsidiaries of thirteen international motor vehicle manufacturers. Its members are American Honda Motor Co., Inc.; Aston Martin Lagonda of North America, Inc.; Ferrari North America, Inc.; Hyundai Motor America, Inc.; Isuzu Motors America,

¹ Pursuant to Federal Rule of Appellate Procedure 29, *amici* state that no party's counsel authored this brief either in whole or in part, and further, that no party or party's counsel, or person or entity other than *amici*, *amicus's* members, and their counsel, contributed money intended to fund preparing or submitting this brief. The parties have consented to the filing of this brief.

Inc.; Kia Motors America, Inc.; Maserati North America, Inc.; McLaren Automotive, Ltd.; Nissan North America, Inc.; Subaru of America, Inc.; Suzuki Motor of America, Inc.; and Toyota Motor North America, Inc.

Amici and their members have a strong interest in this case for two key reasons. First, although the FTC's action focuses on Qualcomm's behavior toward cellphone manufacturers, automakers are subject to similar harm. Because some technology incorporated into today's automobiles involves connecting to mobile communications networks, automakers purchase components that include modem chips, and therefore—like cellphone manufacturers—are subject to Qualcomm's licensing policies.

Without the relief provided by the District Court, moreover, those harms will increase. Automakers are designing new features that connect their cars not only to cellphones, but also to pedestrians, other vehicles, and even road infrastructure. This technology will make cars safer and more efficient. But its development and deployment into the market may be delayed and otherwise harmed if Qualcomm is permitted to engage in the practices prohibited by the District Court.

Second, if Qualcomm's tactics are protected against antitrust liability, other patent owners will be encouraged to adopt a similar approach. Automobiles are among the most intricate products in the world. They have tens of thousands of parts that pass through elaborate global supply chains. At best, automakers repeatedly will be forced to participate in unnecessary, costly, and inefficient licensing negotiations, when the suppliers that incorporate chips into their products likely are ready to negotiate with Qualcomm. Worse, automakers will struggle even to find out which patents their cars implicate. That inevitably will result in delay, increased cost, uncertainty, and the failure to incorporate otherwise-viable technologies and designs into vehicles. Moreover, automakers may become subject to after-the-fact royalty and injunction claims based on unknown patents that should have been resolved through licenses to their suppliers.

The automobile industry alone accounts for 3% of the United States' GDP²; employs over 3 million Americans³; spends approximately

² *US Economic Contributions*, American Automotive Policy Council, <http://bit.ly/2OON2Vp> (last visited Nov. 27, 2019).

³ *Automotive Industry: Employment, Earnings, and Hours*, Bureau of Labor Statistics, <http://bit.ly/2snk9Ig> (last updated Nov. 20, 2019).

20 billion dollars a year in research and development in the United States; is responsible for \$60 billion a year in American exports; and has attracted more than \$75 billion in foreign investment in the last three decades.⁴ The adverse consequences of Qualcomm’s conduct for automakers are thus by themselves significant. In addition, those harms are likely to spread throughout the economy as other sectors employ communications technology.

Accordingly, Qualcomm’s conduct threatens *amici*, their members, and American consumers. The Court should therefore affirm the judgment below.

INTRODUCTION AND SUMMARY OF ARGUMENT

This case involves Qualcomm’s practice—which the district court found to be “unique in the industry”—of “refus[ing] to sell . . . modem chips exhaustively.” Findings of Fact and Conclusions of Law at 44, *FTC v. Qualcomm Inc.*, No. 17-cv-00220 (N.D. Cal. May 21, 2019), ECF No. 1490 (Op.). The general rule for patents, supplied by patent law’s exhaustion doctrine, is that “the initial authorized sale of a patented

⁴ International Trade Administration, *Automotive Overview*, SelectUSA, <http://bit.ly/2OTnmqs> (last visited Nov. 27, 2019).

item terminates all patent rights to that item.” *Quanta Computer, Inc. v. LG Elecs., Inc.*, 553 U.S. 617, 625 (2008). Exhaustion eliminates market frictions and promotes innovation and competition by ensuring that downstream purchasers can use, resell, or innovate around a patented product with no risk of infringement liability. *Id.* at 625-626.

The purpose and effect of Qualcomm’s restraints is to circumvent the exhaustion doctrine. Its practices produce all of the adverse effects on innovation, competition, and markets that the doctrine is designed to prevent.

That Qualcomm inflicted those harms on the cellphone industry is bad enough. But the characteristics of the cellphone market enabling Qualcomm’s behavior—a technologically advanced product, a complex supply chain, and the need for products to talk with each other, making standardization essential—appear throughout the economy.

And they appear particularly in the auto industry. In the last decade, cars have become immensely complex machines with tens of thousands of parts acquired through elaborate global supply chains. Cars contain advanced computers and cellular modem chips. While these innovations have brought tremendous benefits to consumers, they also

put automakers in a very similar position as cellphone manufacturers: vulnerable to patent exploitation. For example, automakers have been forced into unnecessary and inefficient SEP licensing negotiations—even though chip sales that exhaust patent rights (including rights from other patent holders that exhaustively license the chipset maker) would negate the need for such negotiations while allowing the patentee to be compensated for its inventions based on the price charged for a chip. And if courts ratify Qualcomm’s practices, those adverse consequences will only worsen.

Finally, the auto industry is a bellwether for the rest of the economy. Within the next decade, billions of consumer items will connect to the “Internet of Things.” They too will need standardized network components. And therefore, they too will be susceptible to the same type of abuses.

ARGUMENT

Qualcomm’s Patent Licensing Practices Deter Innovation And Injure Competition.

A. Non-exhaustive sales of patented goods are anticompetitive and contrary to the public interest.

Patent exhaustion is the principle that “the initial authorized sale of a patented item terminates all patent rights to that item.” *Quanta*

Computer, Inc. v. LG Elecs., Inc., 553 U.S. 617, 625 (2008). The adverse consequences for innovation and competition that underlie patent law’s conclusion that non-exhaustive sales are “obnoxious to the public interest” and “hateful to the law,” *Impression Prods., Inc. v. Lexmark Int’l, Inc.*, 137 S. Ct. 1523, 1532 (2017) (internal quotation marks omitted), apply equally to Qualcomm’s non-exhaustive sales practices.

To begin with, the Supreme Court’s consistent affirmation of the exhaustion rule⁵ accords with sound economics. Non-exhaustive sales let patentees parlay one monopoly into two.

Patentees legitimately get a monopoly in at most one market: that for licenses to practice the patent or to produce and sell a product embodying the patent. Without patent exhaustion, however, the patentee

⁵ *E.g.*, *Impression Prods.*, 137 S. Ct. at 1529 (holding that Lexmark could not abuse its toner cartridge patents to monopolize the cartridge resale market); *Motion Picture Patents Co. v. Universal Film Mfg. Co.*, 243 U.S. 502, 517 (1917) (holding that the Motion Picture Patents Company could not force purchasers of its patented film projectors to display only films created with other technology from the company, and recognizing that the company’s plain and illegitimate goal was “extending the [patentee’s] power . . . to fix the price to the public of the unpatented supplies as effectively as he may fix the price on the patented machine”); *Straus v. Victor Talking Mach. Co.*, 243 U.S. 490, 494-95 (1917) (holding that the Victor Talking Machine Company could not use a licensing notice to compel purchasers of its patented phonograph to use the device only with the company’s records and needles).

could sell a patented item but forbid its use in another market (a “derivative market”)—unless that use was separately authorized by the patentee. Since every transaction in the derivative market would therefore have to involve the patentee, the patentee would get a second monopoly.

However, as the Court has “uniformly recognized,” a second monopoly is unnecessary to promote innovation. *United States v. Univis Lens Co.*, 316 U.S. 241, 251 (1942). Patentees can extract a full royalty from their initial licensed sale, and that “fulfill[s]” “the purpose of the patent law.” *Ibid.* “[O]nce that purpose is realized the patent law affords no basis for restraining the use and enjoyment of the thing sold.” *Ibid.*

The popular retort to this observation—in fact, one Qualcomm urged the Supreme Court to adopt in an *amicus* brief in the *Impression Products* case⁶—is the claim that, because a patentee gets only one monopoly profit, it should be free to apportion that profit into multiple monopolies if it wants. In *Impression Products*, the Supreme Court unanimously rejected that position. 137 S. Ct. at 1531-32.

⁶ Brief for Qualcomm Inc. as *Amicus Curiae* Supporting Respondent at 19-20, *Impression Prods.*, 137 S. Ct. 1523 (No. 15-1189) (Qualcomm *Impression Prods.* Br.).

Rightly so. Modern “antitrust economics actually shows that the single monopoly profit theory” is wrong in most cases. Einer Elhauge, *Tying, Bundled Discounts, and the Death of the Single Monopoly Profit Theory*, 123 Harv. L. Rev. 397, 400 (2009). That is particularly true when a patentee uses non-exhaustive sales to expand its monopoly power into a derivative market—for many reasons.

First, non-exhaustive sales make it easier for patentees to take a cut of the profits from innovations created by others. The patentee of a subcomponent of a device is able to extract a royalty payment based on the value of the entire new device—essentially imposing a tariff on every innovation—which is exactly what Qualcomm does.

For example, suppose that company X owns a patent on a transistor; company Y purchases the transistor from X and incorporates the transistor into a computer; and automaker Z buys the computer and integrates it into its cars. If patent exhaustion applies, X cannot interfere with Z’s affairs. Once X sells its transistor to Y, it loses all patent rights in that particular transistor, and therefore it cannot interfere with Z’s use of the item.

But non-exhaustive sales empower X to meddle with Z. For even after X makes an authorized sale to Y, X's patent rights in the item are not exhausted. Instead, Z too must purchase a license from X. X can therefore argue for a royalty from Z that is removed from the value of the patented transistor; for example, a fixed percentage of Z's car sale revenue. But as a result, "the patent holder . . . [will obtain] compensation for the value of others' work or contributions." Fair Standards Alliance, *Fair Standards Alliance an Introduction*, 6 (Nov. 12, 2015). For example, if Z boosts profits by building a better engine, X will get a cut. This is not only unfair but also inefficient; X has effectively imposed a tax on all of Z's inventions, reducing Z's incentive to innovate.

That is just one pattern. Non-exhaustive sales can destroy innovation in many other ways as well. For example, patentees have outright tried to "[sell] a patented product subject to the condition that the purchaser does not develop a competing product." Herbert Hovenkamp, *Post-Sale Restraints and Competitive Harm: The First Sale Doctrine in Perspective*, 66 N.Y.U. Ann. Surv. of Am. L. 487, 538 (2011). That result is even more overtly anticompetitive, and its cost to innovation can be "substantial." *Id.* at 538-539.

Second, non-exhaustive sales also deter innovation by discouraging the full use of patented items. While all monopolies lower output, double monopolies can do so in a uniquely harmful way. Double monopolies “m[inimize] the incentives to distribute new inventions to as many people as possible and at the same time [dis]courage[] purchasers [from] fully utiliz[ing] the products they buy.” Aaron Perzanowski & Jason Schultz, *The End of Ownership: Personal Property in the Digital Economy* 159 (2016). For example, a popular restriction on sales of patented items (before the Supreme Court held it prohibited by the exhaustion doctrine) was the rule that the buyer could use the patented item only once and not resell it. Patentees liked this rule because it let them get a monopoly over the resale market. But

single use restrictions can be more harmful than simple output restrictions because they consume actual resources. Suppose a patented good is capable of being used twice before it wears out and under competition 1000 copies of the good, or 2000 uses, would be sold. Suppose further, however, that the patentee maximizes its profits by cutting output back to 1000 uses and setting a higher royalty rate. It could attain this result either by (1) producing 500 copies of the good without a restriction, leading each customer to use a copy twice; or (2) producing 1000 copies of the good but imposing a single use restriction on each. While both alternatives yield 1000 uses, the second one consumes more resources. In that case the single use restriction is a socially harmful solution to the durability problem. It not only pre-

vents the rise of a used goods market but limits the use of each good to a single cycle.

Hovenkamp, *supra* at 530.

Third, non-exhaustive sales create enormous transaction costs that “clog the channels of commerce.” *Impression Prods.*, 137 S. Ct. at 1532. “[T]he farther a patent holder can reach in the life of an object, the more the stickiness and friction of each interaction can gum up the system.” Robin Feldman, *Rethinking Patent Law* 146 (2012).

Most obviously, non-exhaustive sales multiply the number of licensing negotiations that must occur. See Herbert Hovenkamp, *Reasonable Patent Exhaustion*, 35 Yale J. Reg. 513, 545 (2018) (“Overbroad enforcement rights may lead to splintering of royalty obligations, producing high transaction costs and double marginalization.”); cf. *Kirtsaeng v. John Wiley & Sons, Inc.*, 568 U.S. 519, 544 (2013) (explaining how non-exhaustive licensing of copyrights would require a “complex permission-verifying process”).

Referring back to the transistor-computer-car example, without patent exhaustion, not only must Y (the computer manufacturer) negotiate with X (the patent owner), but also all of Y’s automaker customers—Z₁, Z₂, Z₃, and so on—must do so as well.

The cost of a single licensing negotiation is high—nearly two decades ago it was estimated at \$50,000 to \$100,000. Mark Lemley, *Rational Ignorance at the Patent Office*, 95 Nw. U. L. Rev. 1, 12 (2001). No matter what, the market incurs this deadweight loss once per patented component. But if patentees sell the components non-exhaustively, the market incurs the cost once per component *per downstream user*. This needless multiplication of negotiations can add tens, perhaps even hundreds, of millions of dollars to the cost of manufacturing and selling downstream products.

But the negotiations do not just multiply. They also become less efficient. In our example, the intermediary Y will be far better than the automakers at negotiating with X effectively. Since Y uses the transistor, it knows which transistor patents the design implicates and how much they are worth. What is more, Y is a repeat player and will come to the negotiating table with equal bargaining power to X.

Neither is true for the Zs. “Because the downstream purchasers . . . do not possess the technical information to effectively defend against the patents,” their negotiations are likely to take longer, be more expensive, and end up at an inefficient price. Samuel F. Ernst, *Patent Ex-*

haustion for the Exhausted Defendant, 2014 U. Ill. J. of L., Tech., & Pol’y 445, 476 (2014). Not only are the Zs unaware of the subcomponents’ value, but they have no reason to know even which patents their cars rely on. Why should they? The whole benefit of vertical specialization is that a manufacturer need not worry about how the products it buys were made. But without patent exhaustion, it must worry. It must either take additional time intensively investigating components outside its area of expertise, or else take X’s word about what royalties it should pay.

Thus, “[t]he doctrine of patent exhaustion, with its limitation on how many iterations the patent holder can reach out to, embodies a cap on the amount of friction that one patent holder can create.” Feldman, *supra* at 146.

B. The auto industry provides another example of the harm to innovation and competition from Qualcomm’s non-exhaustive sales and licensing scheme.

Qualcomm initially tried to convince the Supreme Court to overturn the patent exhaustion doctrine,⁷ but the Court reaffirmed that doc-

⁷ See Qualcomm *Impression Prods. Br.*; Brief for Qualcomm Inc. as *Amicus* Supporting Respondent, *Quanta Computer, Inc. v. LG Elecs., Inc.*, 553 U.S. 617 (2008) (No. 06-937).

trine in *Impression Products*. But Qualcomm’s patent licensing strategy effectively creates non-exhaustive sales of goods embodying its patents.

Qualcomm knows that if it licenses its patents to any intermediary in the supply chain, then under the exhaustion doctrine, any downstream purchaser will not be subject to infringement liability. So it does not authorize manufacturers to sell the chips and instead forces the manufacturers at the *end* of the supply chain—the OEMs—to buy a license directly. Op. at 211-12.

The FTC’s case focuses on the harm to cellphone manufacturers from these tactics. But automakers and their customers face very similar adverse consequences.

In *Impression Products* (a case about printers), the Supreme Court pointed to the auto industry to illustrate why non-exhaustive sales are “obnoxious to the public interest.” 137 S. Ct. at 1532 (internal quotation marks omitted).

The Court’s choice of example was utterly unsurprising. While non-exhaustive sales always harm markets, “advances in technology, along with increasingly complex supply chains, magnify the problem.” *Impression Prods.*, 137 S. Ct. at 1532. And the auto industry is among

the most technologically advanced and complex in the world. Manufacturers are integrating hundreds of new features into their cars, from driver-assist software, to in-vehicle health monitors, to new self-driving car hardware. Christina Rogers, *A Shape-Shifting Car? Patent Filings Point to Auto Industry's Future*, Wall St. J. (Sept. 18, 2017). They have even been “expanding into data analytics and artificial intelligence.” *Ibid.*

“This wave of innovation is reflected in the steep rise in the number of patent filings by the automotive industry.” Kilpatrick Townsend & GreyB Servs., *Trends in Automotive*, <http://bit.ly/2Y1SGrv> (last visited Nov. 27, 2019). “Auto makers . . . have sharply boosted their U.S. patent filings. . . . In 2016, 10 of the world’s largest car makers submitted 9,700 patent applications, up 110% from 2012.” Rogers, *supra*.

This burst of innovation resembles the experience of the cellphone industry during the last two decades. But that analogy is a double-edged sword. Automakers’ innovation has left them, like cellphone OEMs, particularly vulnerable to anticompetitive practices like the refusal to offer exhaustive FRAND licenses to industry suppliers. As the Supreme Court observed, the “smooth flow of commerce would sputter if

companies that make the thousands of parts that go into a vehicle could keep their patent rights after the first sale.” 137 S. Ct. at 1532. Four notable features of the auto industry confirm that observation.

First, “[a]utomotive supply chains are among the most complex in the world, with each vehicle containing more than 20,000 parts originating from thousands of different suppliers.” Shefali Kapadia, *Moving Parts: How the automotive industry is transforming*, Supply Chain Dive, <http://bit.ly/34pqEbv> (Feb. 20, 2018).

That fact is highly relevant because economic research confirms what common sense dictates: “[a]s the number of components in a given product that are patented increases . . . the loss of efficiency [from not requiring] exhaustion rises.” Olena Ivus, *Patent Exhaustion in the United States and Canada*, Centre for Int’l Governance Innovation Working Paper No. 159, at 10 (January 2018). That is because the more complex the supply chain, the easier it is for SEP owners that seek to avoid exhaustion to gum up the system.

Absolute exhaustion reduces the transaction cost inefficiency by requiring fewer inbound licence agreements to manufacture the product. Additionally, absolute exhaustion may reduce the costs of using patented components in further innovation- or commercialization-related activities by downstream entities. Complex products often require further

downstream innovation and commercialization to achieve viability, and so absolute exhaustion may be more attractive in complex-product industries.

Id. at 11 (citation omitted).

Second, modern automobile supply chains not only are complex but also are characterized by substantial information asymmetries. As we have explained, non-exhaustive device sales would permit patentees to exploit information asymmetries between them and downstream users. The greater the asymmetry, the more that non-exhaustive sales practices help the monopolist at the consumers' expense. This problem is equally applicable when some SEP owners refuse to offer licenses to suppliers as a tactic to avoid exhaustion, regardless of whether they—like Qualcomm—are chipset manufacturers themselves.

It therefore is not surprising that Qualcomm not only forces every OEM to negotiate separately with it, but also “refuses to provide OEMs lists of [its] patents or patent claim charts during license negotiations.” *Op.* at 45.

The information asymmetries in the auto industry are even greater than those in the cellphone industry, and they are getting worse. At least some cellphone OEMs *do* build chips. *See, e.g., Op.* at 120. But au-

tomakers do not, and it is inefficient and unnecessarily burdensome to require them to negotiate with chip manufacturers or other SEP owners over the scope of their patent claims and the appropriate royalty. Non-exhaustive practices in the auto industry will thus lead to particularly high negotiating costs and particularly inefficient royalties.

Indeed, patentees are already exploiting this asymmetry. The burdens they have put on automakers through their denial of exhaustive licenses to suppliers are the subject of another case in this circuit. *See Cont'l Auto. Sys., Inc. v. Avanci, LLC*, 19-cv-02520 (N.D. Cal. July 23, 2019). The *Continental* complaint makes the obvious point that “[u]nderstanding [chip] patents in a way that promotes productive licensing negotiations” should not be the job of car manufacturers. First Amended Complaint ¶ 138, *Cont'l Auto. Sys.*, ECF 97. But the current inefficient negotiations will continue (and likely multiply) unless the Court holds that Qualcomm’s licensing policy is illegal.

Third, the new technologies being incorporated into automobiles likely will rely on industry standards. If Qualcomm’s tactics are upheld, then manufacturers could well face similar abusive practices by other patentees.

“Licensing . . . by automobile companies has historically been relatively limited. Automotive-specific technologies such as transmissions . . . [we]re typically developed by the automobile companies themselves.” Natalie Leh & Natalie Pous, *What to Expect in Licensing and Litigation as the Internet of Things Comes to the Automotive Industry*, Bloomberg Law (Dec. 3, 2018). But “[t]echnology advancements in the automotive industry have become more software based,” *ibid.*, and must communicate with other devices. Thus, like cellphones, these features must be interoperable, and therefore need to conform to standards. The industry is coalescing around standards right now. For example,

[a] fundamental standard for connected cars will address how a car connects to the world around it. This type of connectivity is commonly referred to as “vehicle to everything” or V2X. The “everything” refers to a range of connections made by the car: vehicle-to-vehicle (V2V), vehicle-to-infrastructure (V2I), vehicle-to-pedestrian (V2P), and vehicle-to-network (V2N) connections.

Today there are two leading candidates to be the V2X standard: (1) Direct Short Range Communication (DSRC) based on the 802.11p standard and (2) and the Cellular-V2X (C-V2X) standard. . . .

DSRC and C-V2X . . . are not interoperable. The lack of interoperability means that a choice will have to be made about which standard is the right path forward for V2X.

Tim Syrett & Natalie Pous, *The Developing Landscape of Internet of Things Standards for Cars*, Bloomberg Law (Nov. 5, 2018). Likewise, “[t]hough automakers have begun to implement open source infotainment systems in cars, there is not yet a consensus as to which platform will become the leader going forward.” *Ibid.*

But this critical standard-setting process will be much more difficult if holders of standard-essential patents are not required to license exhaustive sales of chips and similar components. Downstream manufacturers would then be forced to take into account the possibility of unfair and burdensome licensing demands by holders of those patents. See Timothy J. Muris,⁸ *Why the FTC Is Right to Go After Qualcomm For Manipulating Cell Phone Costs*, The Federalist (Mar. 4, 2019) (noting that Qualcomm’s conduct “is likely, in general, to reduce output by deterring participation in or raising the cost of standard-setting activities”).

Fourth, the auto industry is particularly susceptible to patentees’ extraction of royalties based on innovations wholly unattributable to the patented invention.

⁸ Former Chairman of the Federal Trade Commission, 2001-2004.

That is what has happened to cellphone manufacturers. “[C]onsumers pay for improved displays, storage, or facial recognition; yet Qualcomm’s royalty terms capture 5 percent of that increased value, which has nothing to do with Qualcomm’s patents.” Muris, *supra*.

Automobiles are much more expensive than even the highest-end cellphones—and therefore computer subcomponents are a far smaller portion of a car’s value than a phone’s. Basing a modem patentee’s royalty on the value of an entire car is thus even more egregious. Moreover, cars have components that are even less related to computer chips than cellphone cameras. If the Court ratifies Qualcomm’s behavior, then Qualcomm and its peers could demand a cut of the profits attributable to even a car’s *leather seats*.

C. The adverse consequences from denying exhaustive licensing to suppliers will soon spread throughout the economy.

The burdens on the auto industry caused by Qualcomm’s licensing practices are the leading edge of harms that would soon be experienced by the entire economy. That is because the communications technology that is revolutionizing the auto industry is part of a broader phenomenon known as the “Internet of Things” (IoT).

Virtually any product can be connected to a computer network and thus become part of the Internet of Things, which “is made up of devices—from simple sensors to smartphones and wearables—connected together” over the internet. Matt Burgess, *What is the Internet of Things?*, WIRED, <http://bit.ly/2OqoLpx> (Feb. 16, 2018). “This includes everything from cellphones, coffee makers, washing machines, headphones, lamps, wearable devices and almost anything else you can think of. This also applies to components of machines, for example a jet engine of an airplane or the drill of an oil rig. . . . [I]f it has an on and off switch then chances are it can be a part of the IoT.” Jacob Morgan, *A Simple Explanation of ‘The Internet of Things,’* Forbes (May 13, 2014).

These applications will soon encompass a colossal amount of commerce. “The number of internet-enabled data devices is rapidly outpacing the number of humans on the planet. By 2020, it’s estimated that there will be over 50 billion connected products.” Integrated Innovation Institute, *The Internet of Things*, Carnegie Mellon University, <http://bit.ly/2qEZsqR> (last visited Nov. 27, 2019). Moreover, “the IoT could reach a level of US\$4-11 trillion in global economic value per year by 2025.” Beatriz Gallego & Josef Drexler, *IoT Connectivity Standards:*

How Adaptive is the Current SEP Regulatory Framework?, 50 Int'l Rev. of Intell. Prop. & Competition L. 135, 136 (2019).

IoT devices share a key characteristic with cellphones and cars: they are complex products that communicate with each other. And therefore, they require standardization. Policy Dep't for Citizens' Rights and Constitutional Affairs, *Standard Essential Patents and the Internet of Things*, Directorate Gen. for Internal Policies of the European Union 5 (Jan. 2019) (Directorate General Statement). For some devices, that standard is 4G. Many IoT devices already connect to mobile networks. And those that do are subject right now to Qualcomm's licensing policies.

But even IoT devices that are not currently on mobile networks could well face the abuses discussed above. There are a "huge number of standards being developed and worked on for different applications." Burgess, *supra*. Each new standard will have standard-essential patents, and thus each will be vulnerable to patent hold-up. See Directorate General Statement, *supra* ("The existence of [standard essential patents]—and associated litigation—has potentially disruptive conse-

quences for the manufacture, marketing and distribution of . . . IoT ‘networked’ products.”).

If Qualcomm (or a similar company) decides to repeat its past behavior in new IoT markets, it could demand a cut of every single improvement to millions of different products that just happen to be connected to the internet—even if the improvements have nothing whatever to do with that connectivity. That will impose a huge burden on innovation and competition throughout the economy.

CONCLUSION

The judgment of the district court should be affirmed.

Dated: November 29, 2019

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CERTIFICATE OF COMPLIANCE

The undersigned hereby certifies that:

1. The brief is proportionally spaced, has a typeface of 14 points or more, and contains 4811 words, exclusive of the exempted portions of the brief.

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CERTIFICATE OF SERVICE

I hereby certify that on November 29, 2019, I caused this *Amici Curiae* Brief to be electronically filed with the Clerk of the Court for the United States Court of Appeals for the Ninth Circuit using the CM/ECF system. I certify that service will be accomplished by the CM/ECF system, which will send notice to all users registered with CM/ECF.

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