

# The Tethered Economy

Chris Hoofnagle

Amsterdam Privacy Conference Keynote

Friday, October 5, 2018

Paper will be published as: Chris Jay Hoofnagle, Aniket Kesari & Aaron Perzanowski, *The Tethered Economy*, 87(4) GEO. WASH. L. REV. \_\_\_\_ (forthcoming 2019).

## Introduction

Today, I present joint work with my PhD student, Aniket Kesari, and my longtime co-author Aaron Perzanowski of Case Western Reserve School of Law. Kesari specializes in economics, and our previous work examines the role of intermediary liability in cybercrime. We show how enforcers have “hacked” the law, and have used standard civil litigation procedures to bring dramatic cases against botnets and people trading luxury goods. With Perzanowski, we have contributed to the literature by performing consumer surveys concerning issues in the digital product universe. For instance, in our last study, we showed how the language “buy now” misleads consumers in purchases of digital goods. Specifically, consumers think they are getting a different bundle of property rights than digital goods sellers offer.

## Roadmap

In this work, forthcoming in the George Washington University Law Review, we describe the market effects of “tethered products.” Tethered products maintain an ongoing connection between a consumer good and its seller that often renders that good dependent on the seller. I will describe the merits of tethering, the demerits of the practice, and conclude by contemplating public and private law approaches to tethered goods.

- Collaborators Aniket Kesari (UCB/Yale), Aaron Perzanowski (CWRU), and Damon McCoy (NYU)
- Part of a legal/empirical, multidisciplinary research agenda on the economic dynamics of new consumer technologies



*University of Pennsylvania Law Review* [Vol. 165: 315]

ARTICLE

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WHAT WE BUY WHEN WE BUY NOW

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AARON PERZANOWSKI<sup>1</sup> & CHRIS JAY HOOFNAGLE<sup>1\*</sup>

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## Roadmap

- Tethered products
  - Ongoing connection w/ seller
  - Dependent for ordinary operation
- How tethering occurs
- Merits of tethering
- Demerits of tethering
- Approaches for a fair tethered economy

### THE TETHERED ECONOMY

*Chris Hoofnagle, Aniket Kesari & Aaron Perzanowski*

*Forthcoming 87(4) Geo Wash. L. Rev. \_\_\_\_ (2019)*

#### Abstract

Imagine a future in which every purchase decision is complex as choosing a mobile phone. Will it work at home and in the office? Can you move data across devices? What will ongoing service cost? Is it compatible with other devices you already own? Can you switch providers? These are just some of the questions one must consider when a product is “tethered” or persistently linked to the seller. The Internet of Things, but more broadly, consumer products with embedded software are already tethered.

We are inspired by Michel Callon, who wrote with colleagues that when academics, experts, consumers, and industry discuss products, the dialogue itself shapes what consumers and industries expect in the marketplace.

In the spirit of Shoshana Zuboff, our work names the forces behind a new kind of business practice that if allowed to run amok, could become pathological. Once named, it can be tamed.

Zuboff would also highlight the larger economic priorities and consequences in play. First, business schools are pushing subscription models over the sale of products, and so we will have an entire generation of entrepreneurs who are convinced—rightly so—that they can extract more value from consumers using subscriptions instead of sales. Second, firms have begun, in subtle and obvious ways, to rethink the basic nature of consumer transactions. Specifically, the line separating product and service is much harder to identify. Thus the purchaser of a \$400 Sonos 5 may think she has bought a high-end speaker, but Sonos conceives of its product differently—as software that has an unparalleled ability to manage multi-room music. Third, much of tethering is about the extraction imperative as defined by Zuboff. Fourth, the consequence is that consumers now have a contracting landscape similar to a business-to-business world. In B2B, companies develop deep expertise to avoid bilateral monopoly and to prevent opportunism that flows from lock in.

Finally, in the spirit of Zuboff, I say that we have a choice as a society about these economic imperatives.

## The economy of qualities

Michel Callon, Cécile Méadel and  
Vololona Rabeharisoa

the hierarchy of commodities goods (as when one talks of the quality of a service or second-hand car). Talking of quality means raising the question of the controversial processes of qualification, processes through which qualities are attributed, stabilized, objectified and arranged. It therefore consists of giving oneself the means to go, with no solution of continuity, from the good to the product, from the result to the process and its organization.

### Economic forces and trends

- Desire to sell subscriptions rather than products
- Services that present as products
  - Search goods become experience goods
- Extraction imperative (Zuboff)
- Consequences = more sophisticated contracting landscape
  - Bilateral monopoly, no exit
  - Opportunities for opportunism



## The tools of tethering

Is there anything new here? Historically, sellers have long attempted to control buyers post-transaction. The U.S. bell monopoly opposed the attachment of any device to the phone, including answering machines and the privacy-preserving “hush a phone.” The instinct to control has long existed, but it is my task to convince you that today’s landscape is different in kind from these early attempts.

Turning to the tools of tethering, code and law combined enable unprecedented forms of post-sale control. Tethered devices’ operation is determined largely by software code. We know from Joel Reidenberg and Larry Lessig about the power and the characteristics of code-based restrictions. And we know that this code can be paired with sensors to detect post-sale user behavior. Finally, persistent network connections can constrain the functionality of these devices.

Law complements code-based restrictions. The common law has long imposed a duty to read contracts. Over the last twenty years, courts embraced a trend towards notice-based contracting. Rather than requiring mutual understanding and assent of the contracting parties, courts bind consumers to license provisions and so on with just constructive notice.

Because notice is the new assent, firms can unilaterally change their own terms. Sometimes terms do need to be changed, and the standard way of doing that is to impose a good faith and fair dealing standard on the party seeking changes. Instead, courts are increasingly allowing cancellation as a remedy for changed terms. As we shall see, in the tethered environment, cancellation does not create a clean exit for the consumer, because the seller keeps the personal information.

## Post-transaction control is not new

- Edison designed the phonograph to be incompatible with competing devices
- Bell monopoly’s opposition to “foreign attachments”
- Threats that 3<sup>rd</sup> party repair = voided warranty
- But we hope to convince you that today’s tethering is different in kind



## The tools of tethering

- Design
  - Code
  - Sensor-detected non-compliance
  - Persistent network connections
- Law
  - Contract: notice is the new assent
    - Modification = cancellation right instead of good faith + fair dealing
  - Copyright
  - Anticircumvention
  - Computer Fraud and Abuse Act
  - Patents

Copyright also imposes post-sale restrictions. Sellers insist that the copies of software in consumer devices are merely licensed, not owned by the consumer. If that's true, a consumer who tweaks the code in her own car or tractor to escape tethering may be liable for copyright infringement, because they have created a derivative work.

The Digital Millennium Copyright Act reinforces tethering. If, as they commonly do, a device maker implements encryption to restrict access to software code, bypassing that lock constitutes a distinct violation of federal law.

Sellers can also limit tinkering by hosting software in the cloud, where a tethered device sends queries and interacts with servers controlled by the seller. When software is in the cloud, the Computer Fraud and Abuse Act (CFAA) provides a broad set of protections against testing and tinkering.

Finally, patent law provided a legal method for post-transaction control for 20 years. During that period, the Federal Circuit maintained that patentees could sell a product to members of the public while restricting how that product could be used or transferred by its owner.

## Merits

Consumers will want tethered goods because of their obvious potential advantages: automation, remote control, new functionality, and the other benefits of interconnection and data collection. Let me highlight some surprising implications.

First, tethered products could be safer. The seller can monitor how the product is actually used by consumers and notify them of unsafe uses or the need to recall. In modern recalls, only 65% of products are "corrected," meaning a third may still be out there.

## Merits of tethering

- Safety
  - Consider goals of recall: mitigate harm, to communicate risks, change consumer behavior
  - Could tethering result in duty to protect?
- New functionality
- New economic models
- Controlled user experiences
- End of theft
- Sometimes tethers are technically necessary

Consider this: in the grocery store shopper card context, sellers saw loyalty programs a tool for tracking. But when purchases were later recalled because of pathogens and other safety risks, grocers felt impelled to warn consumers through the card programs. Similarly, what if the tether creates a moral or legal obligation to ensure greater safety post transaction?

When it comes to functionality, critics of tethering like Jonathan Zittrain invoke the right to repair and the ability to tinker. Well, tethers may prevent *user* tinkering, but this restriction might be offset by gains from expert updates performed by the seller. For instance, Sonos recently enabled Airplay 2 on its speakers, an interesting development because the inclusion of the Apple standard loosens Sonos' grip on the product.

On a larger level, we seem to be on the cusp of a rental society. Ownership has its advantages but at the same time, ownership involves rivalrous resources that go unused for most hours of the day. Some consumers could reasonably conclude that ownership is an albatross, that our things keep us from being mobile, spontaneous, even from being happy.

The advantages of tethering are not discrete. They are cumulative and could enable entirely new business models and knock-on services. In fact, tethers may enable moonshot advances in products. Just as today's middle class lives like the kings of earlier centuries, tethered products could enable a leap for today's average consumers into the world of the ultra rich. Consider that as of this writing, the Fin personal assistant service, which uses people to complete basic, time-intensive yet tedious tasks, such as booking hotels and flights, is available to almost anyone. Imagine a day when those capabilities are built into \$100 Amazon or Google voice assistants.

## Demerits

With strong competition, informed consumers, zero-switching costs, and accountability measures, incentives might align to create a consumer utopia. However, without those incentives, sellers, as a strategic objective, will use tethers to reduce competition and maximize profit at the expense of consumer surplus. This isn't evil; it is rational seller opportunism.

I think tethering will result in a dramatic reduction in product longevity. In fact, the idea of planned obsolescence—something I consider to be a kind of paranoid fiction about sellers—could become real in tethered environments. Consider the IlluMask light therapy device. With components rated for over 30,000 hours of use, embedded software limits them to a mere fifteen minutes a day for thirty days.

Then there is bricking, the remote disabling of a device. The Revolv hub was a \$300 home automation tool that had some success. It was sold with a "lifetime" service subscription. But after Nest acquired and supported the Revolv for two years, Nest announced it would push an involuntary software update to the devices that would render them entirely inoperable.

Aside from bricking, the basic notion of a product's "lifetime" is illusory for tethered products. Product lifetime is dictated not only by the quality of its hardware, but also how long its manufacturer supports it. There is no standard definition for lifetime. To illustrate, consider that TomTom GPS devices are sold with "lifetime support." The company defines this as "the period of time that TomTom continues to support your device..."

## Demerits of tethering

- Dramatic reduction in product longevity
- Bricking
  - Revolv \$300 "lifetime" service > Nest acquisition > Remote bricking: "The Revolv app won't open and the hub won't work."
    - Google ultimately refunded
- Arbitrary product lifetime
  - "Lifetime support" = "...the period of time that TomTom continues to support your device with software updates, services, content or accessories. A device will have reached the end of its life when none of these are available any more."

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Other functional degradations are more subtle. Rather than killing a device in one fell swoop, tethering offers the option of incrementally removing features or degrading quality over time. In one recent example, Sonos announced a new privacy policy enabling greater information collection that if not accepted would result in feature reduction.

Sometimes the terms of the bargain change in ways out of control of even the seller. Take the example of cord-cutters—consumers who have canceled expensive cable television service in favor of IP-based video services, delivered by tethered devices such as the Google Chromecast.

In December 2017, Google blocked Amazon Fire users from accessing YouTube, in order to put competitive pressure on Amazon to sell the Google Home. When Amazon provided its consumers technical workarounds, Google blocked those too.

On a high level this means that consumers lost device functionality because of a competitive tussle far removed from the consumer’s control.

Firm failure is also a problem. Just look at the cloud-dependent Emberlight light socket, or Juicero, the company that made \$700 juicers with DRM limited juice packs.

Finally, software can fail in surprising ways and there may be no fixing the problem. Few remember the Therac 25, the radiation machine that suffered from a software flaw that resulted in some receiving massive overdoses of radiation. Today’s version is the St. Jude Medical pacemaker. Over 400,000 people have these devices. They have hard coded passwords and can be remotely attacked using this device available on ebay for \$30. Yet the patch for this vulnerability created new problems, including a risk of device malfunction. The cost-benefit analysis led some doctors to tell patients to assume the risk of

## Demerits continued

- Feature reduction / forced policy changes
  - “...if a customer chooses not to acknowledge the privacy statement, the customer will not be able to update the software on their Sonos system, and over time the functionality of the product will decrease [and] may cease to function.”
- What was bought?
  - Amazon Fire / Google Youtube dispute: locus of control
- Firm failure
  - Emberlight (cloud-dependent light socket)
  - Juicero (expensive juicer w/ DRM juice packs)

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## Demerits continued continued

- Software will fail in surprising ways
  - Remember the Therac 25 (Leveson, 1995)
- Abbott pacemakers



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hacking lest the pacemaker malfunction during the upgrade process.

## Approaches

Tethering changes the nature of the relationships among sellers, buyers, and other economic actors. Tethering turns search products into experience goods. Tethering extends the relationship among actors, meaning that minor misalignments between sellers and buyers can deepen with time, and become maladaptive. These risks seem only to increase, as sellers will thirst for platform power. The tether will present irresistible opportunities for guile, for increasing costs to consumers, and to denying consumers the ability to defect to competitors.

How might law shape the tethered economy? And don't we need to change the focus of consumer law to address the post-transaction pathologies that tethering raises? Let me suggest some approaches, and observe that we don't need to create a prescriptive regulatory regime to get some incentives right.

First, tethers make planned obsolescence possible, so perhaps we could embrace that problem and require labeling of it. For instance, Microsoft, as part of its Windows Product Lifecycle, has long set a specific date when support will be ended. Setting such a date will help the consumer understand the actual longevity of a product.

## Approaches

- Goals of consumer law are to promote competition and reduce information asymmetries
  - Search > experience goods
  - Initial misalignments can worsen and become maladaptive
  - Desire for platform status
  - Opportunities for opportunism
  - Arbitrary cost imposition, denial of switching
- Post-transaction becomes the most important phase
- ∴ consumer law's focus on pre-transaction self-help (truthful advertising, consumer education) needs a rethink

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## Obsolescence labeling

Windows 10 version history	Date of availability	End of service for Home, Pro, and Pro for Workstation editions	End of service for Enterprise and Education editions
Windows 10, version 1803	April 30, 2018	November 12, 2019	November 10, 2020

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There are mechanisms to ensure that services last for their advertised period. Consider extended service contracts—those agreements that sellers offer to consumers at the register to protect their purchase. These are regulated by insurance law in the U.S. They have to be licensed and to have sufficient funds to cover the term of protection. Similar regulatory approaches could ensure that product obsolescence guarantees are reliable.

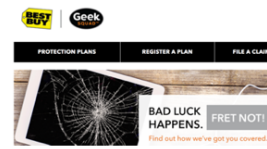
California law incorporates an interesting approach that has extended the support life of some devices. Device makers have to make service literature and functional parts available for 7 years. Although the law simply requires parts to be available, it has resulted in Apple extending service from five years to seven for California consumers. One could imagine a 21st-century adaptation of this law that required software support, or even that software become open source if abandoned by the maker.

As tethered products monitor us in our homes, they will collect sensitive data about our activities that would be embarrassing if revealed publicly. Sometimes service providers implicitly threaten users by invoking their use of the service. There are now publicly-available examples of the problem.

Consider what happens when you sue Facebook. In one case, a Plaintiff filed a protective order and eventually dropped out of the suit because Facebook’s strategy was to make the plaintiff discuss all of her embarrassing posts. More generally, services learn a lot about us, creating opportunities for straight up blackmail.

Here’s an example of a suit where a pornography site sues users under copyright theories, and then tells the user that the company will file a press release about the case if they do not pay up. Now imagine a protection where services were limited in using that they have learned about you to blacken your reputation.

## Obsolescence mechanisms



- Extended service contracts are regulated as insurance in the U.S.
- State law requires licensure, holdback of \$\$ to cover full term
- “Geek Squad Protection Plans are...underwritten by American Bankers Insurance Company of Florida.”
- BTW: these are a bad deal

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## Repair options limit obsolescence

- In California, home appliances with wholesale prices over \$100 have to make service literature and functional parts available “to effect the repair of a product for at least seven years after the date a product model or type was manufactured”.
  - Cal. Civ. Code 1793.03
- Apple’s “vintage products” classification have support under this mandate for 7 years
- Limit: enacted in 1986, the statute doesn’t contemplate software
- Some bad precedent limits the statute to first-party repair only

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## Need for non-disparagement norms

- Services can blackmail you.

UNITED STATES DISTRICT COURT  
NORTHERN DISTRICT OF CALIFORNIA  
SAN JOSE DIVISION

ANGEL FRALEY; PAUL WANG; SUSAN MAINZER; JAMES H DUVAL, a minor, by and through JAMES DUVAL, as Guardian ad Litem; and WILLIAM TAIT, a minor, by and through RUSSELL TAIT, as Guardian ad Litem; individually and on behalf of all others similarly situated;	)	Case No. CV 11-01726 LHK <b>DECLARATION OF ANGEL FRALEY IN SUPPORT OF MOTION FOR A PROTECTIVE ORDER</b>
Plaintiff,	)	Hearing Date: February 21, 2012 Time: 10:00 a.m. Courtroom: 5 Judge: Hon. Paul S. Grewal
vs.	)	Trial Date: December 3, 2012
FACEBOOK, INC., a corporation and DOES 1 to 100, inclusive	)	
Defendants.	)	

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I did not expect that every single post I had ever made on Facebook would potentially be reshared in an interrogatory responses and deposition. At the time I made these posts, I intended for them to be shared with only a limited number of recipients to whom I am connected through Facebook’s social network.

## 'Public Figure' Says Gay Porn Site Extorts With IP Claims

Share us on: By [Dave Simpson](#)

Law360, New York (August 15, 2017, 10:40 PM EDT) -- An anonymous Los Angeles resident who claims he is a public figure says that gay porn site Flava Works Inc. makes bogus allegations about the pirating of copyrighted videos as a front for extorting users who don't want their association with the website known, according to a lawsuit filed in California federal court Tuesday.

John Doe v. Flava Works, Inc. et al, 2:17-cv-06053 (CD Cal. 2017)

On the other hand, I believe that consumers should be free to disparage companies, on the theory that such critiques provide the market with signals that can help other consumers. Tethered product sellers should not be able to cut off a consumer for writing a bad review.

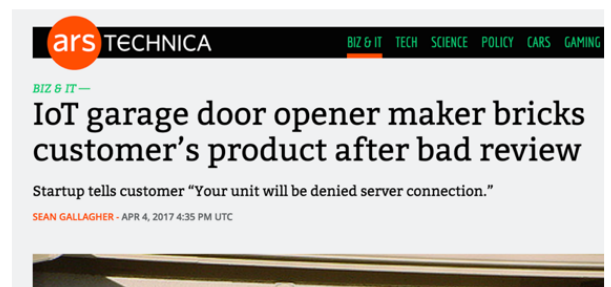
Tethered product makers have the power to disconnect a consumer's device from essential software and services; perhaps the opposite should be possible as well: the consumer should be empowered to disconnect the tether.

Insecurity and other pathologies will ramp up in tethered devices as they age. Tethers will provide an attack surface or simply a failure point for devices. On one hand, tethered devices could be thrown away, but this would be a painful option for expensive ones, such as the connected refrigerator. The refrigerator may still cool efficiently for decades, so why should it become obsolete because of software obsolescence?

As a mechanism to diffuse new norms, we might revisit the Uniform Commercial Code's distinction between products and services. At the time the UCC was created it primarily dealt with products and explicitly excluded the rendering of services from its provisions. The problem with tethered products is that they could be considered services under some tests of the product/service divide.

On the other hand, there may also be situations where service-style regulation is appropriate in a tethered product, as when the device performs some function traditionally entrusted to a licensed professional. For instance, a consumer may expect that an app that claims to detect melanoma to perform similarly to a physician, to have done research to support its efficacy, to keep data confidential consistently with professional norms,

Yet, consumers should be able to disparage



### Tether kill switch

- Tethered products can be bricked. Should users be able to brick the connection?
  - Insecurity ramps up over time
  - Disposal of device is a bad option for product with non-network functions



### UCC product/service distinction

- The UCC provides a now-familiar set of default, unwaivable rules for product purchases. It imposes a general duty of good faith that if violated voids the contract. Statements about goods generally become warranties that are difficult to disclaim.
- Legal tests for product/service divide: "predominant purpose" and "gravamen of the claim"
  - "Functionality approach" (Stacy-Ann Elvy)

and to have options to complain to a board of qualified experts if it fails.

Finally, at a higher level, Apple, Google, and Amazon are competing to be the operating system of the home. If one buys a \$40 smart assistant, one is likely to choose the compatible doorbell or camera.

At a high level, we suggest that policymakers should be considering a “microservices switch over” principle. Classically, switch over is provided for big purchases. This is because consumers cannot easily offload expensive lemons. As such, the government actively implemented extensive regulations protecting consumers in car purchases and financial services, and these regulations’ effects are well studied.

Portability has been the remedy most celebrated by consumer advocates, but we are skeptical that portability has worked in practice, particularly for average consumers without EFF-level skills and interests.

Consumer inertia is powerful. And even with a portability right, consumers need scaffolding to use it. Even in competitive markets, switching can have impossible to surmount costs. Consider banking. For many people, a bank relationship lasts longer than a marriage.

Presumably, much more switching should be taking place as different banks offer better interest rates and services. The UK started a program in 2013 to ease consumer switching in banking, and it has proved to require complex considerations. Detailed procedures were needed as well as participation by banks to effectuate switches while not causing overdrafts.

Turning back to microservices, a similarly complex set of concerns are likely to emerge in switching digital service providers. Institutional, procedural,

## Competition

- The point of entry level voice assistants is to pitch consumers toward a platform

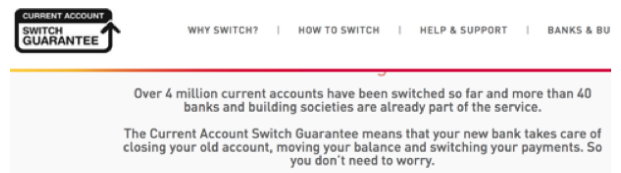


- Is there any good technical reason for them to be tethered to a single provider?

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## Microservices switch over

- More than portability
- Need something like UK’s account switch



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and substantive safeguards are likely needed when one switches over the services that manage not just their banking, but their digital/physical lives.

## Conclusion

Services and products are merging as a result of a series of technological and economic forces. The tethered product may become ubiquitous, and in so doing raise consumer and market-level problems that are not neatly addressed by existing law. As a matter of both product and business model design, tethering is likely here to stay. The question confronting both consumers and policy makers is how to best harness its potential while avoiding a tethered economy.

## Many thanks

- Many scholars commented on and contributed to this effort. We thank Qiuyu Chen, Ankur Dave, Timo Fritz Honsel, Marten Lohstroh, Blake Meredith, Carina Sauter, Heather Hudson, Michael Buckland, Clifford Lynch, Shazeda Ahmed; participants in Chicago-Kent workshop, particularly, Richard Warner, Lori Andrews; and students in the Berkeley Law Spring 2018 Law and Technology Scholarship Seminar.
- We're also relying on good work of Zittrain and the careful deconstruction of digital consumer rights by Helberger et al.