Equitable Interoperability: The "Supertool" of Digital Platform Governance

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I. Introduction

This Article is concerned with competition in digital platform markets where network effects are strong. As is widely acknowledged, these markets have an inherent tendency towards concentration, leaving consumers with little competition in the market. We explain how interoperability regulation can help stimulate competition *in* the market in a way that benefits consumers. There are different types of regulations that involve different levels of regulatory control of firms' strategies and products. Interoperability is a form of regulation that is less intrusive than many others and is particularly suited to digital business models and fast changing digital technology. The report solicited by the European Commission on "Competition Policy for the Digital Era" (the Vestager Report) made this point in 2019,[1] and we build on it here. Policy tools in this area include data portability and open standards, as well as interoperability. We will distinguish among these tools below, but we note here that the focus of this Article is on interoperability.[2]

Regulators can set prices and rates of return, require adoption of certain technologies, mandate nondiscrimination, and more. Unless deregulated by the state, the retail sale of electricity in the United States has the attributes of "classic" regulation. Among other things, a regulator sets or limits the price of electric power paid by consumers and approves or disapproves utilities' investments in generation, transmission, and distribution facilities.[3] But very specific requirements for prices and product design like these require the regulator to make choices that risk creating inefficiencies. In the digital platform context, these concerns are heightened because of the rapid change of products and prices over relatively short periods of time. We caution that heavy-handed regulation risks resource misallocation and the loss, degradation, or delay of products that consumers do or might enjoy. Regulation can, however, avoid these costs while unlocking considerable consumer benefits.

A regulator aiming to reduce market power while increasing consumer surplus therefore wants to use a tool that involves minimal regulation of the product itself, while at the same time promoting as much efficient entry and expansion as possible. Interoperability can achieve both goals. Interoperability in digital platform markets lowers entry barriers by giving new market entrants the ability to join the platform and compete; similarly, it gives existing

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1. Jacques Crémer, Yves-Alexandre de Montjoye & Heike Schweitzer, *Final Report on Competition Policy for the Digital Era*, at 6-9 (2019), https://ec.europa.eu/competition/publications/reports/kd0419345enn.pdf [perma.cc/AX4D-BD8P] [hereinafter Vestager Report].

2. Interoperability requires effective interfacing, which need not include general open standards for other parts of the product. Services built on very different proprietary standards can nonetheless interface effectively with good interoperability, as in the case of U.S. wireless phone networks 20 years ago. Effective data portability requires some level of interoperability, but it could also involve conduct that goes above and beyond pure interoperability. This is not an Article about data portability. Nor do the uses of interoperability we suggest here, to our understanding, require open standards; APIs routinely facilitate interoperability between systems that rely on differing, proprietary standards.

3. *See* Robert J. Michaels, *Electricity and Its Regulation*, Econlib, https://www.econlib.org/library/Enc/ElectricityandItsRegulation.html [perma.cc/Y4Q3-MUDN].

competitors the ability to access the platform and grow. In a market with direct network effects, in which users benefit from other users' activity (e.g., owning a telephone), this will take the form of interconnection between users—either directly using the platform's standard, or through the platform. In a market with indirect network effects, in which broader use incentivizes platform and content development (e.g., businesses opening in a popular mall, which further increases the mall's appeal), interoperability allows complementors—the business users who provide services on one side of the platform that complement those of the platform—to enter and compete for consumers using an accessible public interface (API). The entry of complementors not only enhances the platform's value, but can, with time, create competition for the platform's own services and for other complementors.

"Equitable interoperability" means that an entrant can not only join the platform, but join on qualitatively equal terms as others, without being discriminated against by the dominant platform that might have its own competing service.[4] Equitable interoperability facilitates competition in innovation and differentiation by digital services but entails oversight by a regulator that determines when advances should become part of the regulated interface. It effectively prohibits self-preferencing and discrimination against firms that are not part of the dominant ecosystem.

A simple example is an entering internet service provider (ISP) wishing to join the World Wide Web and its system of interconnection. Such a firm can adopt open standards like TCP/IP and Network Access Points to offer the same functionality as rival ISPs, and, importantly, connect its users to just as large a network size.[5] Similarly, the creation of the "Open Banking" regulation in the United Kingdom established an interface that licensed financial technology (fintech) companies could use, with customer permission, to connect to the bank accounts of their customers.[6] The existence of the banks and their data attracted fintech applications, all of which entered on a level playing field using the same interface. Even the customers of a small bank can have full access, due to that interface, to all participating fintech providers, strengthening competition

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4.   In the policy solutions below, we envision competition in innovation and differentiation by digital services but describe oversight by a regulator that determines when advances should become part of the regulated interface. Giving this power to a regulator will help prevent a dominant platform from "innovating" in ways that, in truth, simply impose costs on rivals by requiring frequent updates and modifications as they transition to the innovation after innovation. It also ensures that a third party can examine and test the new technology to ensure it doesn't degrade complementors' systems or worsen their user experiences.

5.   *See* Tim Greene, *What is the Internet Backbone and How it Works*, NETWORK WORLD (Mar. 12, 2020, 4:57 PM EDT), https://www.networkworld.com/article/3532318/what-is-the-internet-backbone-and-how-it-works.html [perma.cc/ZK3M-8UD2].

6.   *Regulatory*, OPEN BANKING (2023), https://www.openbanking.org.uk/regulatory [https://perma.cc/7M8M-LCDQ]. *See also* COMPETITION MARKETS AUTHORITY, THE RETAIL BANKING MARKET INVESTIGATION ORDER 20 (2017), https://assets.publishing.service.gov.uk/media/58 93063bed915d06e1000000/retail-banking-market-investigation-order-2017.pdf [https://perma.cc/74VA-KP8W].

between banks.[7] By contrast, Google's Android operating system (OS) offers interoperability to entrants, but it does not do so equitably because Google restricts access to various valuable apps and features in the interoperable version of Android OS.[8]

The equitable interoperability concept is less restrictive for firms than many other forms of regulation because it mandates only the ability to interface and leaves companies with flexibility to design their products. Moreover, when the interface is designed by industry itself, the regulator need not take on this role, but can focus on exercising oversight to ensure the interface promotes competition and is not captured by the dominant platform. For this reason, we describe equitable interoperability as a light-touch regulatory governance scheme. And although interoperability is light touch, it must still be mandated, because a monopolist will typically not voluntarily adopt a policy that erodes its monopoly profit. Indeed, settings where interoperability would reduce entry barriers and promote competition in the market are exactly the instances where incumbents will *not* want to adopt it.

At the same time, however, equitable interoperability need not lead to a free-for-all in which all platforms must make all functions interoperable with all comers, thereby depriving platforms of control over their own systems or security. Rather, equitable interoperability—like all regulatory tools—should be used with precision and restraint, and it should be mandated only with respect to platform functions for which the regulator is convinced that interoperability will further the goals of contestability and fairness. In a similar vein, not everyone should be allowed to interoperate, especially those firms that cannot guarantee data security and safety. To participate in the ecosystem created by the UK's Open Banking regulation described above, for example, fintech companies must enroll onto a directory maintained by the Open Banking Implementation Entity (OBIE), which maintains a "whitelist" of developers who have certified, among other items, their satisfaction of security and home-state licensing requirements, thus entitling them to participate and gain access to customer information; customer permission alone is not enough.[9] We note in the remainder of the Article other specific examples in which the regulator should consider robust licensing or registration requirements for firms that seek to interoperate with regulated platforms.

This Article applies the idea of an equitable interoperability mandate to several well-known competition bottlenecks in digital platforms. In each setting, we provide a way to think about how competition problems might be lessened with a suitable interoperability regime. We offer these ideas as a starting point for a discussion about how to use the interoperability tool; there are many

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7. For an example of a product that is interoperable but not equitably so, we discuss the Android OS. *See infra* Section IV.B.

8. We return to this instance in Section IV.B.

9. *Enrolling Onto the OBIE Directory: How To Guide,* OPEN BANKING LTD 3 (Sept. 2021), https://www.openbanking.org.uk/wp-content/uploads/Enrolling-Onto-Open-Banking-Guide.pdf [https://perma.cc/M3FC-AW34].

difficult governance, privacy, and technical issues to consider, and further research on these details is needed. One of these issues is whether it is optimal to include an interconnection (termination or access) fee in each situation.[10] We have purposefully studied platform settings where we can make analytical progress without addressing this complex question. It is one where economic analysis can make contributions going forward.

We have engaged in conversations with industry participants and technical experts about the difficulty and cost of carrying out interoperability from a technical perspective. The working hypothesis we use in this Article is that governance issues are more of a challenge than technical issues. The economic analysis proceeds under this assumption.

We also note a diversity of opinion among authors such that not all agree each interoperability policy we discuss will be effective for each platform competition problem presented here. And, of course, equitable interoperability will not fix every competition problem. As with most tools, it will work better in some settings than in others. In some cases, alternative or supplemental tools like divestitures will be needed to achieve competition.[11] In other cases, interoperability and nondiscrimination may be an alternative to divestitures. And importantly, successful deployment of equitable interoperability requirements in important and complex markets will require a regulator with sectoral expertise and enough staff to ensure the regulations increase competition and are fully enforced.

Economic analysis, however, demonstrates that equitable interoperability is a powerful tool with several uniquely valuable characteristics. Because of its ability to create competition *in* the market, all authors believe a digital regulator should add interoperability to its regulatory toolkit and use it where appropriate. Although interoperability comes with potential risks, various regulatory designs, including licensing and oversight, could help mitigate such issues. We discuss some options below.

II. How Equitable Interoperability Increases Welfare

Interoperability is a tool that can increase both the contestability and fairness of digital platform markets. The Digital Markets Act (DMA) of the European Commission adopts these goals.[12] In a companion Article, we explain

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10.   *See* Mark Armstrong, *Network Interconnection in Telecommunication*s, 108 ECON. J. 545, 555-61 (1998). In models without network externalities, the socially optimal interconnection fee is the marginal cost of providing access; interconnection fees above such levels favor incumbents.

11.   In our companion Article on competition in the general search market, we recommend certain divestitures. In other cases, interoperability and non-discrimination may be an alternative to structural separation. Mobile operating systems and app stores are settings where the two policy approaches could be substitutes. *See* Paul Heidhues, Alessandro Bonatti, L. Elisa Celis, Gregory S. Crawford, David Dinielli, Michael Luca, Tobias Salz, Monika Schnitzer, Fiona M. Scott Morton, Michael Sinkinson & Jidong Zhou, *More Competitive Search Through Regulation* 40 YALE J. ON REGUL. 915 (2023).

12.   *See* Council Regulation 2022/1925, 2022 O.J. (L 265) 1, art. 1.1.

that they are valuable regulatory goals because, from an economic perspective, contestability and fairness typically benefit consumers.[13] In addition, the concept of fairness embraced in the DMA—fairness of commercial opportunity for business users—is enabled by equitable interoperability. We argue here that equitable interoperability also increases innovation. An overview of these points follows.

A. *Interoperability and "Fairness" in Digital Platform Markets*

A current source of discontent with digital platforms stems from the perception by both consumers and small businesses that the rents from digital technology are unfairly accruing to a handful of large platforms, rather than being distributed more equitably according to each party's contribution to surplus. The economic reason for this is explained in more detail in the Vestager Report.[14] As the authors detail, when a platform enjoys network effects, an individual user or complementary business makes very little marginal contribution to the creation of surplus.[15] Thus, when an individual user or business bargains for a share of surplus, its leverage is low, and the platform's is high. The resulting bargain leaves the platform with the vast majority of the surplus. However, *all users* as a group make a very large contribution to total surplus because it is likely that most of the surplus derives from their ability to interact with each other on the platform, rather than the specific features of any particular, dominant platform. If one considers the marginal impact of *users as a group* on platform profits, it is very large. If all users together could credibly threaten to move to another platform they could bargain for a fairer share of the surplus.[16]

Interoperability increases fairness in this setting because it allows entrants to share the same network effects the dominant firm enjoys. Proprietary network effects are the essential cause of consumers' low surplus share. With interoperability, rivals to the dominant firm could compete on dimensions that consumers or business users value, such as privacy and access fees, while also maintaining access to the dominant firm's user base(s). In essence, interoperability redefines the "property rights" on the network externalities as belonging to users, on both sides of the platform, and not the firm owning the dominant platform.

B. *Interoperability and "Contestability" in Digital Platforms*

Network effects raise the benefit to a user of a platform or product when many other users are also consumers of that platform or product. The phone

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13.   Jacques Crémer, Gregory S. Crawford, David Dinielli, Amelia Fletcher, Paul Heidhues, Monika Schnitzer & Fiona M. Scott Morton, *Fairness and Contestability in the Digital Markets Act*, 40 YALE J. ON REGUL. 973 (2023).

14.   *See generally* Vestager Report, *supra* note 1.

15.   *See id.* at 22-24, 36-37.

16.   *See id.*

system, email, and social networks have strong direct network effects. Indirect network effects work through software, content, or services on one side that attract users on the other side, who, in turn, attract more content. As an app store gains more developers and apps, it attracts more users, which reinforces the virtuous circle; in a similar way, a car service that has many drivers is more attractive to riders and vice versa.

The economics of the competition problems generated by large digital platforms have been well-covered in other writings.[17] In brief, when network effects are strong, competition occurs *for* the market rather than *in* the market: the network effects form an entry barrier that requires a new entrant to unseat the incumbent monopolist and become the new monopolist.

But competition for the market is inefficient. First, competition enforcers must protect nascent competitors so that the dominant firm cannot "buy or bury" them, and this protection is notoriously difficult.[18] Second, the arrival of a rival with a sufficient competitive advantage to overthrow the entrenched incumbent monopolist may not occur at all, or at least not occur with a frequency consistent with maximization of social welfare. Third, users must pay a switching cost to change from one monopolist to the next. A more effective form of competition is therefore competition *in* the market. When multiple firms are competing directly for the business of consumers and/or business users, all users are likely to experience lower prices, higher quality, and supercharged innovation, regardless of which firm they use.

Interoperability can play a key role in enabling and enhancing competition in the market. It can lower entry barriers so that more firms can enter and existing firms can expand. It can also allow competition in (or contestability of) complementary markets. Interoperability is especially valuable for creating competition when complementary markets are themselves platform markets (e.g., the Facebook and YouTube apps are complements to app stores), or where there is a risk of leverage of market power from a core platform with market power due to network effects to a complementary line of business.[19] Effective competition in complementary markets is also important because complementary markets can provide the basis for competition in the core platform market,

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17.   *See, e.g.*, Jason Furman, Diane Coyle, Amelia Fletcher, Derek McAuley & Philip Marsden, *Unlocking Digital Competition: Report of the Digital Competition Expert Panel*, DIGIT. COMPETITION EXPERT PANEL (Mar. 2019), https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/785547/unlocking_digital_competition_furman_review_web.pdf [perma.cc/2VL3-PZLM]; Mkt. Structure & Antitrust Subcomm., *Report*, *in* STIGLER COMM. ON DIGIT. PLATFORMS: FINAL REPORT, STIGLER CTR. FOR THE STUDY OF THE ECON. & THE STATE 23 (Sept. 2019), https://research.chicagobooth.edu/-/media/research/stigler/pdfs/digital-platforms---committee-report---stigler-center.pdf [perma.cc/X9YP-C96K]; Vestager Report, *supra* note 1.

18.   *See generally* C. Scott Hemphill & Tim Wu, *Nascent Competitors*, 168 U. PA. L. REV. 1879 (2020) (considering enforcement difficulties that stem from the uncertainty in the context of nascent competitors).

19.   For example, Apple Pay relies on a wireless payment technology—an near-field communications (NFC) chip—with which Apple as a general matter does not allow third parties to interoperate. Such a policy might allow Apple to leverage from the core Apple OS into payments.

whether by direct entry, by fostering entry from a third party, or through disintermediation.

C. Interoperability and Innovation

Dominant platforms that do not face competition, or a risk of diversion of users in response to innovation by others, have little incentive to innovate in ways that benefit consumers of their core service. Rather, such platforms have incentives to invest in better ways to exploit consumers (increasing surplus extraction from consumers) or in better ways to leverage their market power into adjacent markets by excluding existing competitors (increasing surplus extraction from competitors) in adjacent markets.[20]

Another purpose of interoperability is to increase innovation. This can be achieved partly by the entry of more competitors into the marketplace. In addition, the security of the interface lets competitors already in the market innovate with the knowledge that they can continue to reliably connect to the interface and attract consumers.

Interoperability allows innovation on both sides of the interface. Past examples demonstrate how an open interface leads to a cascade of innovation on the complementary business side of platforms. After the Federal Communication Commission's (FCC) registration program for telecommunications equipment was in place and connections between the network (telephone wires) and devices (phones and equipment) were opened, households could buy not only brightly colored and lightweight phones, but cordless phones, answering machines, and many other devices. Similarly, when IBM began selling computer systems in the 1960s that could connect with peripheral devices through a standard interface, that move encouraged other electronics companies to develop their "plug-compatible" devices that often were higher quality lower priced than their IBM equivalents.[21] The basic protocols enabling the connection of networks, TCP/IP,

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20. The economic literature concluding that possession of monopoly power decreases the incentive to innovate is, in our view, powerfully convincing. Nonetheless, there remains some significant resistance to the notion, typically on the basis that the big platforms appear to be innovating at a vigorous pace. Facebook develops new ways to connect, Google adds places and information to its map app, Apple constantly releases new versions of the iPhone, and Amazon introduces popular programs like free Prime shipping. In our view, those who advocate such positions fail to consider that, but for the fact that the platforms possess monopoly power in one or more markets, the platforms might innovate even more. Companies quite obviously do not simply stop innovating as soon as they acquire monopoly power. Indeed, companies may conclude that it advances their economic interests to continue innovating, albeit at a reduced pace. Innovation in product design and new features, for example, can keep customers engaged with products and ensure they remain loyal to the brand and continue to buy the companies' products, even at monopoly prices. The Antitrust Division maintains on its website an internal article exploring questions about the interplay of monopoly and innovation that gathers much of the then-current literature on the topic. From that literature, it makes the empirical case, based on data about a collection of monopolists of U.S. markets, that each of them innovated at substantially depressed levels when they held monopoly power, as compared to when they did not. F. M. Scherer, *Technological Innovation and Monopolization*, U.S. DEP'T JUSTICE 6-8, 21-22, 30-33, 44 (2006), https://www.justice.gov/sites/default/files/atr/legacy/2006/10/30/218697.pdf [https://perma.cc/2PWR-7533].

21. *See* Lawrence A. Sullivan, *Monopolization: Corporate Strategy, the IBM Cases, and the Transformation of the Law*, 60 TEX. L. REV. 587, 600-03 (1982).

led to an explosion of content that we now know as the World Wide Web.[22] The creation of Open Banking in the United Kingdom standardized the APIs for sharing transaction data from consumer bank accounts. That banking interface spawned an entirely new financial technology sector that was unanticipated by regulators and is popular with consumers.[23] Across decades and industries, interoperability has allowed for tremendous innovation and consumer benefit.

III. Regulatory Solutions

Using regulation to combat a problem like network effects has particular advantages. A regulator can reduce entry barriers by requiring interoperability as well as by mandating policies that promote multihoming, establish default property rights, restrict allowable business models, and mandate behavior such as non-discrimination. Regulatory solutions for these problems are now enshrined in the Digital Markets Act,[24] and are also proposed in bills put forward by the U.S. House Antitrust Subcommittee.[25]

Multihoming and interoperability both ameliorate or even eliminate the detriment to fairness and contestability that otherwise flows from network effects. Multihoming occurs when users make use of more than one platform for the same or similar service, and therefore switch between them in response to price or quality differences. The way that multihoming stimulates competition between platforms is evident in ride-sharing markets where riders and drivers may have multiple accounts (e.g., with both Uber and Lyft). Multihoming requires users to engage actively with more than one platform, such as by entering a destination in Lyft *and* entering a destination in Uber. But when many users participate in many platforms in this way, it is possible to generate positive network effects while also preserving competition in the market. This type of competitive pressure is brought to bear on ride-sharing services in geographic markets where both drivers and riders multihome and a rider can easily choose the service with the lower wait time or price.[26]

Because multihoming increases competition, dominant firms may wish to limit it using devices like loyalty discounts or technical barriers, whereas

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22.   *See generally* Vinton G. Cerf, David D. Clark, Robert E. Kahn, Leonard Kleinrock, Barry M. Leiner, Daniel C. Lynch, Jon Postel, Larry G. Roberts & Stephen Wolff, *A Brief History of the Internet*, 39 ACM SIGCOMM COMPUTER COMM. REV. 22 (2009).

23.   *See* Hamish Thomas & Anita Kimber, *How Regulation Is Unlocking the Potential of Open Banking in the UK*, ERNST & YOUNG (Mar. 28, 2019), https://web.archive.org/web/20220122053928/https://www.ey.com/en_gl/banking-capital-markets/how-regulation-is-unlocking-the-potential-of-open-banking-in-the-uk [https://perma.cc/73HG-B4TQ].

24.   Council Regulation 2022/1925, 2022 O.J. (L 265) 1, Arts. 5.3-5.10, 6.3-6.13 (imposing interoperability requirements on gatekeepers across various circumstances).

25.   *House Antitrust Subcommittee Unveils Five Big Tech Antitrust Bills*, REUTERS (June 14, 2021, 4:09 PM EDT), https://www.reuters.com/legal/legalindustry/house-antitrust-subcommittee-unveils-five-big-tech-antitrust-bills-2021-06-14 [https://perma.cc/U6JV-YGWQ] (describing the five proposed bills).

26.   Sangeet Paul Choudary, *What the Uber-Lyft War Teaches Us About Success and Failure in the On-Demand Economy*, PRODUCT NATION (Oct. 5, 2015), https://pn.ispirt.in/what-the-uber-lyft-war-teaches-us-about-success-and-failure-in-the-on-demand-economy [perma.cc/9HE7-ZU43].

regulators may wish to encourage it. However, the intrinsic nature of the product, the technology, or consumer behavior can make multihoming costly or impractical, such that it does not work to create competition between platforms with network effects. Most people do not want to purchase, carry, and operate two mobile phones, for example. Likewise, it may take too much time and effort to load holiday photos and news onto multiple social networks. Multihoming can be especially difficult in certain business settings in which the user has integrated its systems with those of the provider, as is the case with certain functions in the digital advertising market. Publishers, for example, tend to use only one "publisher ad server," the systems of which are integrated into those of the publisher to allow near-instantaneous offers of ad space.[27] Switching from one ad server to another is complex and can lead to lost sales and data, which discourages multihoming.[28] Thus, multihoming alone will not be able to generate competition in the market in some settings.

A second tool available to a regulator is equitable interoperability. We argue here that interoperability is both "light touch" and effective. It is "light touch" because it only defines an interoperable interface while allowing firms free choice about other aspects of their products and strategies. But such an interface significantly lowers entry barriers for rivals, allowing them to enter and compete in the market, and it therefore increases contestability. Interoperability, as applied to dominant platforms with network effects, substantially reduces barriers to entry by new competitors, converts proprietary network effects to market-wide network effects, and reduces gatekeeper power. These reduced barriers allow more competitors to enter an industry, increasing choice, competition, and innovation that benefits consumers. Interoperability can also be valuable for facilitating multihoming, with the benefits outlined above. Interoperability can shift competition from being *for* the market to being *in* the market. It is a regulatory governance tool that stimulates innovation and works in a broad variety of settings.

For maximum effectiveness, interoperability must be paired with a prohibition against discrimination. We call this requirement "equitable interoperability," to reflect that the terms of such interconnection must give all businesses using the platform access to the market and to consumers that is qualitatively equivalent (in terms of scope, ease, cost, utility, and the like). In the case of direct network effects this requires no discrimination between the connecting entities served by the platform's interface. In the case of indirect network effects, the prohibited discrimination is both among complementary businesses using the platform and between those businesses and any vertically integrated service provided by the platform. Nondiscrimination ensures that nascent rivals or other competitive threats are not disadvantaged as they attempt

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27. Fiona M. Scott Morton & David C. Dinielli, *Roadmap for a Digital Advertising Monopolization Case Against Google*, OMIDYAR NETWORK 16 (May 2020), https://omidyar.com/wp-content/uploads/2020/09/Roadmap-for-a-Case-Against-Google.pdf [perma.cc/2AW2-GU6H].

28. *Id.*

to connect or compete in the market, or as a nascent threat to the platform itself. As is true with all competitive markets, final outcomes such as revenue or popularity with consumers will reflect competition and need not be the same.

A critical step in the regulatory process is identifying the bottleneck where an equitable interoperability mandate is necessary and effective. The regulator must first designate the core platform services that require interoperability using criteria such as size, the presence of network effects, the absence of multihoming, and entrenched market power. After a dominant digital platform has been identified, the next step is to determine the most effective location for the interface as well as its design and functionality. These tasks can be carried out in different ways. The staff of the regulator could do both. Another option, proposed in legislation in the United States, allows the regulator to establish and oversee a technical committee including industry participants that would carry out the work.[29] If this approach is chosen, the project does not burden the regulator with a responsibility to engage in interface design: it can evolve flexibly with technological trends to meet the needs of the industry, all while protecting consumers from market power.

IV. Categories of Interoperability

It is helpful to think about a platform's business model, the type of network effects present in its market, and the market structure when categorizing types of interoperability.

A. Direct Network Effects

"Between-platform" interoperability eliminates proprietary direct network effects and opens the network to entry. The dominant platform's users can connect to users of other platforms as well as users on their home platform. Whether the functionality of the connection to outside users is the same as, or a subset of, the functionality on the home platform will depend on the regulatory rules.

For example, email providers like Gmail and Outlook connect to one another so that users of all email providers may send messages to each other irrespective of their provider. Similarly, wireless phone networks like Verizon and T-Mobile connect calls to another. Notice in this latter example the only requirement is that calls started on one network can be terminated on another; it does not mean that a Verizon phone will work on the T-Mobile cellular network. The implication of this incompatibility is that the handset cannot multihome across networks. Similarly, in the social network context, a post may originate

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29. *See* Augmenting Compatibility and Competition by Enabling Service Switching Act of 2021, H.R. 3849, 117th Cong. §§ 6(c)-(d) (2021) (establishing a technical committee to design standards and provide regular recommendations).

on one social network and terminate on another, but the user's account is located on just one network.[30]

B. Indirect Network Effects

Interoperability erodes the platform's proprietary indirect network effects. Instead, the network effects accrue to both business users and end consumers who can freely choose among multiple functional complements. Eliminating these network effects opens markets in three ways.

First, the functionality of the service offered to third-party complementors is not degraded. Equitable interoperability requires the platform not to self-preference vertically integrated apps or content. For example, in the Google search cases brought by both the European Commission (EC) and the U.S. Department of Justice, enforcers explain how Google provided specialized search poor interoperability with its general search engine relative to the interoperability accorded Google's own vertically integrated services.[31] Complementors such as specialized search engines can challenge the core platform directly if they are stronger or may help foster a challenger platform.

Second, multihoming by businesses, for all or part of the service, is available without restriction or disadvantage. Interoperability that permits multihoming is interoperability at the market level. This is importantly different and more powerful than the interoperability described in Section IV.B.1. It implies that the dominant platform's interface is used across the market by all platforms. One set of APIs across suppliers and across platforms can allow third-party content or services to be available on all competing platforms. For example, an API that lowers the cost to sellers of displaying its wares on many marketplaces increases entry and intensifies competition. In addition, interoperability needs to be equitable in this context so that rival sellers interact with the marketplace in the same way as the marketplace's own seller does. Entering platforms can more easily attract supply-side businesses in this environment.

Third, it ensures rival platforms access to proprietary complements. If the APIs between the platform and complements are public so that all (licensed) parties can use them, then the proprietary complementary services of the dominant platform will function the same way on other platforms. The regulator might not want to allow such popular complements to be withheld from rival

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30.   A wireless customer can also port their phone number to a rival carrier. Portability in an interoperable social network ("social graph portability") would mean taking one's profile from the dominant network to a rival network, while continuing to being able to communicate with friends on the dominant network.

31.   Mark Scott, *Google Fined Record $2.7 Billion in E.U. Antitrust Ruling*, N.Y. TIMES (June 27, 2017), https://www.nytimes.com/2017/06/27/technology/eu-google-fine.html [https://perma.cc/28DW-VR9U]; Rani Molla and Adam Clark Estes, *Google's Three Antitrust Cases, Briefly Explained*, VOX (Dec. 17, 2020), https://www.vox.com/recode/2020/12/16/22179085/google-antitrust-monopoly-state-lawsuit-ad-tech-search-facebook [https://perma.cc/M2PM-ZUYP].

platforms.[32] (An example would be if Google did not permit Google search to be installed on a new variant of the Apple operating system.) Full access to all complements makes an entering platform more attractive.

C. Contractual (Lack of) Interoperability

As we will discuss below, there are cases in digital markets where services are (or could be) technically interoperable, but a dominant platform or a rival service creates a contractual barrier to entry or use of the service. An example of such a barrier is a pre-installed default position on a platform that drives share to the default service. In the cases we discuss here, this type of contract can be a violation of equitable interoperability.

D. Data Interoperability

As does the Vestager Report, we draw the distinction between protocol interoperability, which allows a service to function at a basic level (e.g., being able to post a YouTube video on a Facebook timeline) or a sophisticated level (interconnected social networks), and data interoperability, which also allows the sharing of data. For example, it is the continuous sharing of personal banking data in a standard format through Open Banking that drives innovative use cases by fintech entrants. But interoperability can occur with and without data transfer. For example, mobile telephone termination does not require the terminating phone company to know any personal information about the caller, nor would termination of a post on social media. But in some digital markets, sharing relevant data between services could be a key element of effective interoperability.

It is outside the scope of the Article to discuss data interoperability in detail. But, as previewed below, sharing relevant data between services may allow those complementary services to offer useful functionality and may prevent the extraction of consumer and/or business user value that arises when valuable data is controlled by one or a small number of dominant platforms. Therefore, a governance scheme for data interoperability may well promote innovation and competition. Importantly, data interoperability will need to involve the permission of the user. This consent must be obtained in a way that is meaningful given the behavioral limitations of consumers. With such consent, the user gives a "permissioned token" to the third-party app. This token will give the app (e.g., a meeting scheduler) access to the user's calendar, or an expense app access to the user's credit card data. The concept is that competing apps could have a way to obtain appropriately limited access to the data they need to perform the services the consumer has requested.

These and many other interesting issues and problems surrounding platforms' accumulation of large data datasets and interoperability thereof could

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32. This issue is a common concern in the evaluation of vertical mergers in media markets.

be core considerations in the design of appropriate regulatory intervention in any given market.

E. Data Portability

Data portability is related to interoperability but is not the same concept. It refers to a consumers' ability to take (or authorize the destination service to take) their data and identifying information (e.g., a phone number) from one platform to another. Portability implicitly requires that the standard in which the data are provided is useful. In particular, the data should be able to be uploaded and used by the customer's new platform. Portability facilitates switching platforms (which requires porting your data to a new provider) and therefore intensifies competition in the market. For example, a customer leaving Amazon.com could bring their past purchase data with them to Walmart.com to improve the service and recommendations they receive from Walmart. The increase in competition due to portability will occur even if interoperability is already present. For example, being easily able to move archived email encourages a user to switch ISPs or email providers. If the porting requirement is strong enough, it may facilitate multihoming, which we know intensifies competition. Portability should also facilitate innovation because the recipient of useful data can create new products and services; this would create new competition and even new markets. Interoperability also causes these last two effects in a stronger form.

V. Interoperability as a "Supertool"

Below we discuss four platforms likely to qualify as "covered platforms" under proposed legislation in the United States[33] and as designated "Core Platform Services" (CPS's) under the EU's DMA.[34] In practice, a single corporation may operate more than one covered platform, of which we only analyze a subset below. Google, for example, may well have at least five covered platforms or CPS's subject to oversight: Android OS, Google Play, Google Search, YouTube, and its advertising technology (ad tech) services.[35] Facebook (now Meta) will likely qualify for its personal social network, number-independent communications services, and ad tech services. Apple may be designated for at least its iOS operating system and the Apple App Store. Amazon's e-commerce marketplace may qualify.[36] We introduce some ideas of how the market power exhibited by these CPS's can be reduced through the

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33. Augmenting Compatibility and Competition by Enabling Service Switching Act of 2021, H.R. 3849, 117th Cong. § 5(6) (2021).

34. Council Regulation 2022/1925, 2022 O.J. (L 265) 1, Arts. 1.2, 3.2(b).

35. Google arguably has a dominant share of proprietary data on consumer demographics, locations, and interests, but dealing with the competitive consequences of these data require special considerations that are beyond the scope of this Article.

36. Microsoft is the fifth corporation that seems likely to be covered by proposed regulation, but for reasons of space, we do not discuss it in detail. Many of the points about search, cloud, and software discussed in the context of other firms are likely to also apply to Microsoft.

implementation of appropriate interoperability rules. We stress again that we are not sure that all the ideas will work as well as we hope; there remain difficult issues to resolve relating to monetization and governance in particular. Nevertheless, we feel it is important to begin a conversation about these regulatory options.

A. *Facebook.com's Social Network*

It is uncommon for a private U.S. corporation to control a ubiquitous and important communications network from end to end in the way that Facebook controls how its billions of users communicate with one another. For example, the U.S. postal service is a government service available to all users. Similarly, the telephone began as an entirely proprietary network before AT&T was required by the government in 1913 to allow other telephone companies to connect to its network including its long-distance lines.[37] Yet, users were not free to connect equipment to AT&T's network. After several landmark decisions by courts[38] and the FCC,[39] competitors could connect their equipment to the network, but only via a costly interconnection device. In 1975, the FCC started a registration program whereby the FCC examined equipment companies and, if equipment was found to pose no risk of harm to the telephone system, permitted the sale of that equipment for connection to the system.[40] These two forms of mandatory interoperability—network and hardware interoperability—together meant that AT&T no longer controlled all the features and functions of telephone communications from end to end.

Email then became a ubiquitous form of communication, and it too employed interoperability. Email interoperability relies on several standard protocols that are neutral and universal, which makes it impossible for a single company or entity to control the system.[41] Decentralization and interoperability have produced a stable and durable system in which a message on any participating ISP can be delivered to a user on any other participating ISP.[42]

SMS (short message service) is another example of a widely used, but decentralized, communication system. Its developers pioneered SMS as a standardized protocol for exchanging brief text messages between mobile phones. This protocol became widely supported by various for-profit mobile

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37. *See* Dave Butler, *History of AT&T: Timeline and Facts*, STREET (Feb. 18, 2020, 7:06 PM EST), https://www.thestreet.com/technology/history-of-att [perma.cc/7XSF-Q87M].

38. *See, e.g.*, Hush-A-Phone Corp. v. United States, 238 F.2d 266 (1956).

39. *See, e.g.*, Use of the Carterfone Device in Message Toll Telephone Service, 13 F.C.C.2d 420 (1968).

40. *See* JONATHAN E. NUECHTERLEIN & PHILIP J. WEISER, DIGITAL CROSSROADS: TELECOMMUNICATIONS LAW AND POLICY IN THE INTERNET AGE 43 (2013).

41. *See* Karissa McKelvey, *Breaking Tech Open: Why Social Platforms Should Work More Like Email*, THE REBOOT (Feb. 1, 2021), https://archive.ph/NUfOZ [https://perma.cc/F8KG-8FXM].

42. Kate Kaye, *WTF is Interoperability?*, DIGIDAY (July 6, 2021), https://digiday.com/marketing/wtf-is-interoperability [perma.cc/4GEY-4B2L] ("If the way email worked was not interoperable, we wouldn't be able to send an email using Gmail to someone's Yahoo email account. But because email systems are interoperable, we can.").

phone manufacturers and carriers globally by 1995 and has provided the foundation for interoperability of text messaging for years.[43]

The notion of equitable interoperability we introduce below—and as applied to Facebook.com's personal social network—is focused on returning the benefits of direct network effects to end users.[44] Today, the direct network effects in Facebook's personal social networking are proprietary and controlled by the operator of the platform. The purpose of interoperability is to make these network effects operate at the market level so that entry of competitors is encouraged.

Mandatory interoperability as applied to Facebook.com would require that users of Facebook could post as usual and have content flow to their friends, some of whom might have accounts on rival social networks. Those friends in turn could post and have the content flow to friends on Facebook. The technical requirements to make this interoperability effective would include establishing the APIs and standards for passing certain formats, for example, image, text, video, and calendar. In addition, there would need to be a standardized process for establishing friendship links, perhaps with an address protocol like the internet TCP/IP. A user on Facebook.com might receive a friend request from a user of network G. They could approve the friend request, being fully aware that the friend is located on network G. Once friends on the different platforms confirmed their desire to be linked, content posted by them would flow back and forth, in the standardized format, just as it does within a proprietary network.[45]

The interoperability we propose here is importantly different from aggregation. An aggregator is software that collects the entirety of a user's activity in some sector. For example, if a user is looking to buy used Star Wars Legos, an aggregator might scour multiple auction sites to find listings and present them together for the user to compare. A real-world example of aggregators would be the meta-search travel sites. Kayak, Hipmunk, Skyscanner, and others search for flights on the airline sites themselves *and* on online travel agents like Expedia, Orbitz, and Travelocity (which were previously separate

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43. *See* Friedhelm Hillebrand, *Global Market Development*, *in* SHORT MESSAGE SERVICE (SMS): THE CREATION OF PERSONAL GLOBAL TEXT MESSAGING 125, 125-30 (Friedhelm Hillebrand ed., 2010).

44. We build on the work of Michael Kades and Fiona Scott Morton. *See* Michael Kades & Fiona Scott Morton, *Interoperability as a Competition Remedy for Digital Networks* (Sept. 2020) (unpublished manuscript), https://equitablegrowth.org/wp-content/uploads/2020/09/092320-WP-Interoperability-as-a-competition-remedy-for-digital-networks-Kades-and-Scott-Morton.pdf [perma.cc/2T2W-A5MJ].

45. The regulator presumably should allow a network that receives content from a different network to display that content with the same look and feel—font and formatting and the like—as used for content emanating from within the network. But the regulator should consider requiring that content from outside the network be labeled as such, and the label should include the origin of the content. When a Facebook user reads a post written by their friend on network G, the Facebook user should be made aware of that fact. Such a requirement is equitable in that, without it, the Facebook user might erroneously presume their friend is on Facebook. This would cause them to overvalue Facebook—whose network effects would be amplified by the misperception—and deter them from switching because of a misperception. The requirement would also facilitate "in the market" competition. By ensuring that the Facebook user knows their friends are using other networks, the label would put those other options (through the delivery of accurate information) front of mind, which would encourage switching.

corporations). Users of such aggregators see flight results from all these distributors with one search. Interoperability, by contrast, would mean that the user opens only the service they belong to and sees—in that original interface— content sent by their friends that originated on other networks.

An aggregator of social network content would need to gather information from many social networks where its users have accounts. It would effectively be searching a platform and collecting information. Without carefully designed data safeguards, this might have negative competition or privacy implications. Unrestrained interconnection might allow one network to extract all sorts of information from another, or even process data residing in another system. It is important to understand that the concept of equitable interoperability for social networks proposed here is far narrower. In our conception, interoperability is more like the old pneumatic tube that carried messages around an office building in the early twentieth century: messages pop out of the tube and the social network delivers them. The social network in turn places messages from its users into the tube when those users have friends on other sites. Interoperability decidedly would not allow network G to reach into Facebook.com and snoop around its social graph. Nor would it allow Facebook to gather information about network G's users, including those who sent content to Facebook. Likewise, users of network G would be unable to gain insight into algorithms and other proprietary processes or properties. The only thing interoperability would permit is the transmission and receipt of content sent or posted by users.

If Facebook.com were required to interoperate under either EU or U.S. law, the process would necessitate the design of APIs through which networks could exchange content. Just as a protocol is needed to exchange email, that same function must be designed for social networks. Designing a software interface is often straightforward because code is easily changed and modular, and a relevant interface may already exist within the dominant firm. The interface would define whatever is determined to be "standard functionality" (today, that might include text, images, video, and calendar) that is of most value to consumers and defines APIs that permit those elements to be exchanged by any participating network.[46] For instance, a parent on Network G wanting to know whether a school with an account on Facebook.com is closed will benefit from receiving a simple notification via text that contains that information, even if the font or illustrations are special to Facebook, non-standard, and only visible to members of Facebook.[47]

Posts would arrive in a user's feed in an unchanged way (except that they would be labeled with the network of origin) so as not to disrupt the receiving platform's business model. That is, if the receiving platform sorts and arranges messages according to the type of content, forecasted ad revenue, or time of day,

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46.   This type of interoperability corresponds to "full protocol interoperability" in the Vestager Report terminology. Vestager Report, *supra* note 1, at 85.

47.   Under this proposal, the technical committee would regularly update what constitutes standard functionality.

the platform would continue to employ that algorithm without discrimination against posts that originate elsewhere. In the case of friends on other platforms, for example, Facebook.com would deliver users' posts to their friends' home networks, and the home network would deliver the post to the destination friend.[48]

An entering platform could offer differentiation through the business model (e.g., via a subscription rather than via ad support) or content moderation (e.g., less hate speech) or privacy considerations (e.g., more or less data exploitation). Not all services would be part of the "standard functionality" and included in the API. Users would have to belong to a social network to enjoy its non-standard, differentiated features. This type of innovation would more easily attract users to a new network when network effects are not a barrier. Users, as they do with their email, could move to the entrant while continuing to send (or receive) messages and posts to (or from) their friends on Facebook.com or any other participating platform.

Differentiation would also arise. A platform run by the National Rifle Association, for example, would likely have different content moderation policies than one run by the Sierra Club, which would again differ from one run by the Walt Disney Company. Users could vote with their feet by choosing a home network that offered the speech environment and business model that best aligned with their needs.

One reason we assume that cross-posting interoperability is technically feasible is that we see it in the marketplace frequently. For example, Instagram (a Meta property) currently makes it relatively easy for users to post their Instagram content on various other apps, including apps outside the Meta family such as Twitter and Weibo.[49] Facebook recently has taken steps to create greater interoperability among its own family of products by integrating the messaging and video functions of Instagram, WhatsApp, and Messenger.[50] We also know that social networks can deny cross-posting interoperability when doing so serves their competitive interests. The story of Vine, a now-defunct video-sharing app provides an example. "Vine users initially could connect with their Facebook friends through Facebook's 'Find Contacts' API" and then upload videos to be seen by their Facebook friends.[51] But when Vine was acquired by Twitter (a perceived threat to Facebook), Facebook modified its APIs to disable

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48.   Kades & Scott Morton, *supra* note 44, at 18.

49.   *See Share from Instagram to Other Social Networks*, INSTAGRAM, https://help.instagram.com/365696916849749/?helpref=related_articles [https://perma.cc/8KE4-GUYJ] (describing how to share from Instagram to other social networks).

50.   Kaya Yurieff, *Facebook Takes a Big Step in Linking Instagram, Messenger and WhatsApp*, CNN BUSINESS (Sept. 30, 2020, 8:01 AM EDT), https://www.cnn.com/2020/09/30/tech/instagram-messenger-messaging/index.html [perma.cc/EP8J-VDQ8].

51.   Fiona M. Scott Morton & David C. Dinielli, *Roadmap for an Antitrust Case Against Facebook*, 27 STAN. J.L. BUS. & FIN. 267, 303 (2022).

this functionality, substantially devaluing Vine and frustrating the purpose of Twitter's acquisition.[52] Ultimately, Twitter shut down Vine.[53]

If Facebook were mandated to interoperate, other social networks would be free to choose whether to participate or not. A social network offering a friends and family service similar to that offered by Facebook might want to interoperate so that it could more easily attract users. Another type of social media (e.g., TikTok) might not gain from interoperating with Facebook, and any choice to interoperate on its part would be voluntary. Indeed, the fact that a platform like Twitter has grown and prospered without being able to interoperate with Facebook suggests that it might be better off without interoperating if given the choice. But an entering social network for children that was run by Disney, for example, or a small town that wants to run its own social network, might well want to interoperate.

These nascent entrants and any existing competitors should have input into the design of the interface to make sure it covers critical functionality and promotes entry. For this reason, any successful regulation will likely include a role for industry input through some kind of technical committee or process. The regulator could task a committee including entrants and neutral experts to design the APIs in conjunction with the covered platform. This setup, however, still requires the regulator to approve the APIs so that the interface is not captured by the dominant firm. The regulator would approve APIs or changes to them based on their impact on competition and whether they promote contestability and fairness.

It is important to stress that self-regulation will not work in this setting. It may be tempting to allow the dominant firm to design the APIs and simply publish them for everyone else to use. But if the dominant firm is placed in charge, it has the incentive and ability to alter the interface every time a threatening competitor appears likely to obtain any significant market share.[54] In that case, content flowing to or from competitors will not transmit properly,

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52.   *Id.*

53.   *Id.*

54.   The dominant firm also could give its internal team advance notice of changes or make the interface difficult to use by others, and so forth. These concerns are similar but not identical to concerns relating to "standards wars," in which two or more incompatible technologies enable roughly similar product functions, and the companies that control those technologies vie to make their own technology the last one standing at the end of the war. *See generally* CARL SHAPIRO & HAL R. VARIAN, INFORMATION RULES: A STRATEGIC GUIDE TO THE NETWORK ECONOMY 261-84 (1999) (describing the dynamics of "standards wars"), Standards wars are expensive and inefficient. *See id.* at 276-84. They also can delay adoption of new technologies. *See id.* at 264 ("[R]ival, incompatible approaches to a new technology can indeed kill or at least greatly retard the growth of that technology."). In standards wars, companies exert their own power, hoping the technology they control will become the universal standard in the relevant market. The prospect of dominant platforms' having control over APIs is not that the dominant platform will call upon its vast financial, cultural, and advertising power in launching a campaign a small competitor cannot win. The concern is that the dominant platform will engage in a relatively inexpensive exclusionary strategy. In our world of mandated interoperability, the dominant firm might design the APIs or modify them to slow data transfers to or from particular rivals, or to transmit posts originating on rival platforms using layouts that are unappealing, colors that are unappealing, or even fonts that undermine the look and feel or other branding choices the rival platforms have made.

making consumers—who value reliable communication—reluctant to leave the dominant firm.[55] To guard against this outcome, the regulator must have ultimate control. If the regulator empowers a technical committee, that allows the regulator to avoid controlling the pace of technological change or making design choices. The regulator instead can protect the interface from capture by the dominant firm, from bias against any set of entrants, and from changes that block or restrict entry.

The "equitable" part of equitable interoperability is a necessary component of the regulation. When a platform engages in content moderation, chooses the prominence of content, and limits access to its users, it would have to do so regardless of the home platform or origin of the content. For example, no compliant platform could discriminate against content simply *because* it originated on a rival platform. It may also be necessary to prohibit the monetization of users from other platforms, which might take the form of analyzing incoming messages from users' friends and gathering information to later monetize them, sell ads, or combine with other data about those friends.[56] Such activity might be prohibited in order to give the home platform the revenue from its own users and to protect those users' privacy. If so, social networks would see the content received by their own users just as they do now, and they would be able to monetize those users according to their terms of service, subject to privacy-based or other regulated data usage restrictions.

The FTC could impose mandatory interoperability on Facebook.com as a remedy in its current antitrust case against it in addition to divestiture of WhatsApp and Instagram.[57] Alternatively, the United States could enact legislation mandating interoperability for the large platforms (which would include Facebook.com); this is the approach taken in the DMA with respect to messaging apps.[58] Notice, though, that creating effective interoperability between social networks may require social networks that avail themselves of the opportunity to interface with Facebook.com to *themselves* be interoperable with one another. Without this feature there could be many small entrants allowing content exchange with Facebook.com but not among themselves, thereby limiting their own growth and lowering the quality of the combined network.

The importance of privacy to users of social networks is a reason that platforms electing to interoperate should be required to obtain a license that expressly prescribes requirements for the transmission, use, and display of content shared through the regulated APIs, and that further proscribes other uses

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55. The technical committee must establish a process whereby it announces and publishes new interfaces early enough and at the same time to all market participants so that those participants can adopt on time.

56. Consideration of different platforms' monetization strategies and their implications for the design of equitable interoperability regulations for specific applications (including Facebook's social network) are challenging and would require careful further economic analysis.

57. For details on the design of a remedy, *see* Kades & Scott Morton, *supra* note 44, at 38-42 (offering and discussing a draft remedy).

58. *See generally* Council Regulation 2022/1925, 2022 O.J. (L 265) 1, art. 6.

of the content. The regulator and technical committee need not demand perfect privacy; rather, standards should be designed to ensure privacy is not degraded relative to the status quo. Applicants for such a license should demonstrate the ability to meet minimum safety, security, national security, and data protection standards. The license to use the interface also could come with an obligation to follow non-discriminatory reciprocity with all other license holders. The cost to Facebook or any other social network of delivering the posts of its users—a small amount of electricity—is very similar regardless of whether their friends are on or off the platform, so interconnection fees are unlikely to be needed unless a business model develops that has significant asymmetries.[59]

There are several difficult issues that arise when analyzing the variety of functions in a social network and how they could be made interoperable. We do not have complete solutions, nor do we address all the issues, but we raise a few of them here to encourage discussion. For example, the creation of groups is an important aspect of social networks that should be part of the interoperability regime. A group administrator forms a group and invites members. Under interoperability, those members may have different home networks. A member whose home network is not the same as the group's administrator should be able to participate in sharing content as described above. That person's posts would flow to the administrator's network and be distributed as usual. Content moderation, again, should follow the rules of the administrator's network in a nondiscriminatory fashion.

Different networks may monetize differently, which may cause their preferred content moderation to vary. For example, if a user creates a post with external content, does clicking on that external content lead the reader to leave the social network? A network that relies on advertising for revenue will not want the reader to leave and may downgrade that post accordingly. A network that charges a subscription may not be harmed if the user leaves to read content elsewhere and does not downgrade the post. The technical committee or regulator may wish to create conduct rules concerning the format of external content that can be included—and how it is treated by the receiving network— to ensure equitable interoperability. It may be that the ability to leave the social network to consume content on the original (creator) site would make the internet more open and deliver more revenue to those sites.

Although interoperability can eliminate proprietary direct network effects, there remain indirect network effects even in a social network. For example, the more other users on the platform who are similar, the better the quality of their feeds will be, assuming the network learns from the behavior of other users and applies those results. If these forces are large, a small network may not be able to match the quality of a large one. However, a small network may be able to use its differentiation to overcome any disadvantage. A Disney network, for

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59. This is very different from the interconnection of the wired telephone system that required structures and equipment as well as maintenance, all of which came with costs that had to be borne by one party or the other.

example, could use Disney content; the network of a small town would have more local content to offer its users. Nonetheless, one could think about a second stage of regulation where a dominant platform is required to license useful metadata of this type to entrants.

Lastly, the regulator and technical committee will have to determine the specific privacy regulations required by the interface it establishes. It is critical that the regulator not reject interoperability because privacy cannot be made perfect, but rather design interoperability so that privacy is not degraded relative to the setting without interoperability.

B. Google Android and Apps

Equitable interoperability doesn't only require that products work with each other, but also that they do so in a way that is qualitatively the same as, or broadly equivalent to, the way they work with other products in terms of ease, cost, utility, speed, and the like. This condition is not met if interfaces are designed to preference certain products and services over others, for example when a platform makes it easier, or the default, to interoperate with its own products rather than the products produced by others. If a dominant firm designed an interface to its operating system so that its own search function was faster than that of its rivals, for example, this would likely be discriminatory.[60]

The Android OS, controlled by Google and used in most mobile phones other than those made by Apple, provides an example of a system or feature that can be interoperable but not equitably so. Android is open source, meaning that its code is public and can be freely used and modified.[61] To install certain Google apps such as Google Maps, Google Search, and the Chrome browser, however, manufacturers must license what sometimes has been termed the "official Android."[62] In recent years, Google has begun moving certain functionalities that traditionally resided in the OS out of "official Android" and into key applications such as maps and search apps and the Chrome browser that must be licensed as a bundle with "official Android."[63] As a result, if a manufacturer builds a phone incorporating the opensource OS rather than "official Android," the apps on that phone may experience performance glitches or lack certain functionalities they would have if running on the "official Android," which always will be paired with the Google apps that provide those functionalities. This practice also means

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60. Similar allegations have been levied against Google in relation to its Chrome browser. Daniel Aleksandersen, *Google's Unfair Performance Advantage in Chrome*, CTRL.BLOG (Jan. 2, 2022), https://www.ctrl.blog/entry/chrome-google-dse-preconnect.html [https://perma.cc/M3L8-CVFY].

61. *Android Open Source Project*, ANDROID (2023), https://source.android.com [https://perma.cc/T2YN-PX38].

62. Charles Arthur & Samuel Gibbs, *The Hidden Costs of Building an Android Device*, THE GUARDIAN (Jan. 23, 2014), https://www.theguardian.com/technology/2014/jan/23/how-google-controls-androids-open-source [https://perma.cc/2CGM-AYSD] ("The Android mobile operating system is free for consumers and for manufacturers to install, but manufacturers need a licence to install Gmail, Google Maps and the Google Play store.").

63. *Id.*

that the Android OS is not interoperable in an equitable way because it works better on phones with certain Google apps installed than it does on phones without those apps.[64]

Google's contracts respecting the use of Android have been found to violate the competition law of the European Union.[65] Of central importance was the bundling of the otherwise open-source Android operating system with proprietary apps such as Google's Play store and search engine, among others, which must be preinstalled in order to license the "official Android" OS. Google's bundles impede entry by competing stores, search, and others such as map applications because—despite some technical interoperability of the operating system—rival apps cannot get on to the operating system under equal terms due to contractual barriers that give various forms of preferential treatment to the Google apps as compared to rival apps.[66]

If an original equipment manufacturer (OEM) is required to preinstall Google search as the default in order to license Android on the handset, then a competing search engine cannot equitably interoperate with that OS. The competing search engine requires the user to take the handset home, download, install, and choose a competing app as the default for that search engine to operate as the default on their handset. Because users typically do not change defaults, the competing app cannot effectively interoperate with the operating system. We call this a contractual lack of interoperability: even if there is no technical barrier preventing Bing from being used by consumers with Android handsets, Google's contract prevents users from having effective choice and further prevents Bing from having a fair chance to compete.

Adherence to equitable interoperability by the Android OS and store would require the elimination of those contracts so that rival apps have the technical means to interoperate without facing discrimination or inequities in accessing consumers. Such a policy would decrease barriers to entry for rival apps. If equitable interoperability were required only for "covered platforms," as proposed in the United States,[67] or for "Core Platform Services," as in the EU,[68] a small entering search engine would not be required to engage in equitable interoperability. The regulation would therefore permit such an entrant to contract with a device maker to be preinstalled—perhaps exclusively—on some

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64.   *See* Heidhues et al., *supra* note 11, at 941.

65.   European Commission Press Release IP/18/4581, Antitrust: Commission Fines Google €4.34B For Illegal Practices Regarding Android Mobile Devices to Strengthen Dominance of Google's Search Engine (July 18, 2018) ("Since 2011, Google has imposed illegal restrictions on Android device manufacturers and mobile network operators to cement its dominant position in general internet search.").

66.   *See* Heidhues et al., *supra* note 11, at 933-36 (describing how contractual barriers require licensees to install a full suite of Google apps, give them prominence on the home screen, and make Google Search the default search engine at all search access points).

67.   Augmenting Compatibility and Competition by Enabling Service Switching Act of 2021, H.R. 3849, 117th Cong. §§ 3(a), 4(a) (extending portability and interoperability requirements to "covered platforms").

68.   Council Regulation 2022/1925, 2022 O.J. (L 265) 1, art. 1.2 ("This Regulation shall apply to core platform services.").

share of its handsets.[69] Currently, however, Google's own contracts with handset makers foreclose entry by this method,[70] as the manufacturer would lose access to Android. Elimination of the full suite of discriminatory Google contracts is necessary to achieve equitable interoperability in this case.

The search interoperability problem is different than many other interoperability problems because the barriers are both contractual and technical. An equitable interoperability mandate would emphasize the "equitable"—or non-discriminatory—part of the rule, in addition to technical solutions, to generate competition in this market.[71] If Google complied with an equitable interoperability requirement, handset makers could sell Android handsets with any kind of competing apps on them, and all handsets would be fully functional. This would significantly lower barriers to entry in search, mapping, and other popular apps.[72]

C. Google Ad Tech

Google plays an outsized role in the complex process by which "advertisers" like FedEx or New York's Metropolitan Museum of Art place

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69. Because even the small entrant's exclusive contract creates a barrier to any other search engine for the relevant consumers, it is helpful to explain why the small entrant's contract is pro-competitive. Its small market share means that the exclusive contract will generate more customers for the entrant, which in turn raises the quality of the small search engine, allowing it to compete more strongly in the future. Given the existence of a dominant firm, that sort of competition is very valuable for consumers. That benefit should be compared to potential harm in the form of foreclosed competition due to the exclusive contract. Because of its small size, the exclusive contract creates a barrier for relatively few consumers, allowing rivals plenty of market share in which to continue to compete.

70. Google recently has relocated some of the provisions requiring the installation of Google Search at all search access points into what it terms Revenue Share Agreements. As we explain in another Article, those new agreements appear to give manufacturers a choice as to which search engage to make the exclusive default. But in fact, the new contracts give a financial incentive to continue to make Google Search the default, and the manufacturers in any event remain bound by a different contractual provision to preinstall various Google apps, all of which incorporate Google Search as the default. *See* Heidhues et al., *supra* note 11, at 929-33.

71. This is not to say that the technical challenges to ensuring equitable interoperability are insignificant. Among other things, a technical committee would need to determine which elements of the Android OS are sufficiently central to ensuring interoperability with third-party apps that they should remain features of the open-source OS rather than being migrated into Google's proprietary apps.

72. In our companion Article on the search market, we explain how Google has located key functionalities of Android not just in the operating system but also in some apps such as Google Maps and Chrome. *See* Heidhues et al., *supra* note 11. Equitable interoperability would require that Google migrate those functionalities (as determined by a technical committee) back into the Android OS so that an entering map, search engine, or browser would be fully functional (interoperable) with the OS to the same degree as are the Google apps. The DMA includes a provision that arguably requires this. Article 6.4 requires gatekeepers to allow third-party apps to run on their operating systems by mandating that they "allow and technically enable the installation and effective use of third-party software applications or software application stores using, or interoperating with, its operating system and allow those software applications or software application stores to be accessed by means other than the relevant core platform services of that gatekeeper." Council Regulation 2022/1925, 2022 O.J. (L 265) 1, art. 6.4. The requirement that gatekeepers permit "effective use"—as opposed to degraded or cumbersome or ineffective use—is consistent with our recommendation that the interoperability here be "equitable." If an app can interoperate with an OS, but only in a way that is ineffective considering the purpose and design of the app, then that interoperability cannot be said to permit "effective use" of the OS, nor would it be considered "equitable" under our definition.
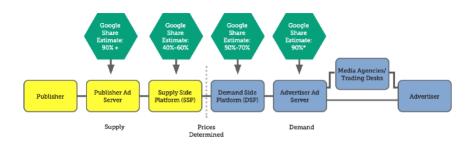
digital advertisements on web pages created by "publishers" like Golf Magazine (golf.com) or the East Anglian Daily Times (eadt.co.uk).

We focus here on advertising placed on the "open web," in contrast to advertising that is placed within a platform operating as a "walled garden." To illustrate the difference, imagine a reader who visits their own Facebook page and sees advertisements in their feed. Those ads show up because advertisers pay Facebook.com to place ads that are seen by people while they are using Facebook.com. That is a "walled garden." By contrast, imagine a reader who navigates to Golf.com, opens the site, and sees an ad for putters on the home page. The ad likely appeared on the reader's screen because Golf Magazine offered for auction that space at that particular time, and the putter manufacturer won the auction. Digital advertising placed through this method is deemed advertising on the "open web," and the companies that together effectuate the offer, bid, and auction comprise what is termed the "ad tech stack."

The various functions of the ad tech stack are depicted in the following schematic, which shows publishers on the left and advertisers on the right, along with the firms that represent and assist each side, respectively. Auction winners and prices are determined on an exchange that is located between the buyer and seller. Inputs from sellers offering advertising space come from the left side of the graphic, while information and bids from buyers who wish to place ads come into the exchange from the right side.

Figure 1. Digital Display Advertising: "the Ad Tech Stack"[73]

Detailed descriptions of each of the functions shown in the figure above are beyond the scope of this Article, but two observations are important. First, as shown by the market share figures above the various functions, Google, through related companies, has a high share in each function in the stack. Second, Google's presence across the entirety of the stack is highly unusual in an auction market.

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73.   The schematic is reproduced from Scott Morton & Dinielli, *supra* note 28, at 11.

As indicated by various authors,[74] a 2023 complaint by the Department of Justice,[75] and an investigation by the European Commission,[76] Google successfully monopolized the ad tech stack by acquiring businesses and making those businesses only interoperate, or interoperate *well*, with other Google businesses. As these sources allege, Google manipulated the demand-side platform (DSP) so that the exchange more quickly received bids from Google's own DSP than from those of rivals. The Google exchange charged an additional fee on bids from *non*-Google DSPs, but not from Google businesses. The Google video property, YouTube, only interoperates with the Google advertiser tool and not with rival tools that want to buy ads, as it had previously. The list goes on.

Some of these examples are what Susan Athey and Fiona Scott Morton call "platform annexation."[77] Their work describes a cluster of strategies that involve a platform acquiring a useful tool, and then degrading interoperability between the tool and rival platforms.[78] When a tool is popular and switching from it has some costs, this strategy can move a large bloc of users to the acquiring platform and lessen or eliminate multihoming.[79] In Google's case, such discrimination is argued to have either driven competing firms out of business or made them weaker and smaller.[80]

If equitable interoperability were required of all Google's ad tech tools and functionality, including the publisher tool, the exchange, and YouTube, competitors would be able to compete for customer demand on a level playing field. Publishers would be able to use multiple exchanges to ensure they are getting top dollar for their inventories of ad space, advertisers would be more likely to make the most valuable ad placements at the lowest possible price, and ad intermediaries of all kinds could compete to deliver these results to publishers and advertisers on an equal footing with Google's ad tools. This process would lower the margin earned by Google's platform, benefiting both advertisers and publishers.

Just as the FCC's registration program enabled entering equipment makers to connect to AT&T's wired network if they met certain standards, that same function must be carried out in the case of rival advertiser tools connecting to

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74.   *See id.* at 1-2, 18, 21-23; Dina Srinivasan, *Why Google Dominates Advertising Markets*, 24 STANFORD TECH. L. REV. 55, 88-132 (2020).

75.   *See* Press Release, U.S. Dep't of Just., Justice Department Sues Google for Monopolizing Digital Advertising Technologies (Jan. 24, 2023), https://www.justice.gov/opa/pr/justice-department-sues-google-monopolizing-digital-advertising-technologies [https://perma.cc/WA8M-SU88].

76.   European Commission Press Release IP/21/3143, Antitrust: Commission Opens Investigation into Possible Anticompetitive Conduct by Google in the Online Advertising Technology Sector (June 22, 2021), https://ec.europa.eu/commission/presscorner/detail/en/ip_21_3143 [perma.cc/F6FG-YR2W].

77.   *See* Susan Athey & Fiona Scott Morton, *Platform Annexation*, 84 ANTITRUST L.J. 677, (2022)

78.   *Id.* at 685-89, 691.

79.   *Id.* at 688-89.

80.   *E.g.*, *Understanding the Digital Advertising Ecosystem and the Impact of Data Privacy and Competition Policy: Hearing Before the S. Comm. on the Judiciary*, 116th Cong. 5-6 (2019) (statement of Brian O'Kelley, Founder and Former CEO of AppNexus, Inc.).

Google's exchange. Again, this can be solved by a regulator creating an interface for advertiser tools and exchanges to use, or the regulator constituting a technical committee of experts, entrants, and rivals to establish open APIs to achieve this functionality.

There is, however, a fundamental conflict of interest problem in the ad tech stack that is unrelated to interoperability, as is made obvious by the schematic above. Google works as the agent of the publisher, the agent of the advertiser, and the operator of the exchange that determines market-clearing prices. Google keeps the difference between what the advertiser pays and what the publisher receives, it has a strong incentive to raise prices, lower publisher payments, and make the price-discovery process costly. The take rate is therefore high. One solution to this exercise of market power is divestitures.

If divestitures were required as a remedy or occurred because a regulator determined there is a conflict of interest when a firm acts as the agent on both sides of a transaction,[81] then many parties would necessarily be involved in selling an ad. Interoperability across corporate boundaries would simply have to occur, or an ad could not be sold and placed. The industry would have a strong incentive to quickly work out APIs at the different interfaces to allow transactions to take place. Mandatory interoperability without discrimination would also prevent Google, or any other company with the same market share, from engaging in acquisitions that when combined with degradation of interoperability, would recreate its market power.[82]

D. The Apple Operating System

Many consumers single home on a mobile device, meaning they carry only one mobile phone. About half of users in the United States have iOS devices, though that percentage is concentrated in higher income brackets.[83] Because Apple creates both the hardware and the operating system, it can share more functionalities with its own internal developers than with external developers. This has led to complaints by third-party developers such as Tile that Apple's integration of its AirTags with iPhone's FindMy app discriminates against Tile's

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81.   *Cf.* Letter from Elizabeth Warren, Sen., to the Hon. Lina Khan, Chair, Fed. Trade Comm'n 3 (June 29, 2021), https://www.warren.senate.gov/imo/media/doc/Letter%20to%20FTC%20re% 20Amazon-MGM%20Deal.pdf [perma.cc/2RX3-Z5HM] (noting that Amazon's participation in various retail and retail-related functions "creates conflicts of interest throughout its online marketplace ecosystem that may provide it with the incentive and ability to harm competitors in unexpected ways that a narrowly-focused antitrust analysis may not anticipate or reveal").

82.   Athey & Scott Morton, *supra* note 77, at 685-89, 691.

83.   *See* Ben Renner, *Survey: iPhone Owners Happier, Have More Money, Friends Than Android Users*, STUDYFINDS (Nov. 5, 2018), https://www.studyfinds.org/survey-iphone-owners-happier-more-money-friends-android [perma.cc/9ZEY-3HSF]; Federica Laricchia, *Number of iPhone Users in the United States from 2012 to 2022*, STATISTA (Oct. 18, 2022), https://www.statista.com/statistics/232790/forecast-of-apple-users-in-the-us [https://perma.cc/P3LT-ZGLC]

product.[84] Tile's product is a Bluetooth dongle that attaches to an item to help users discover that item's location.[85] When many users install Tile's app, they create a "finding network" of devices to help other Tile users locate missing items. Recently, Apple began pre-installing an app on its devices called "Find My," which promotes its competing AirTag product.[86] Because *all* iPhones have FindMy on them, FindMy has a larger tracking network than Tile enjoys, leading to a competitive disadvantage for Tile.[87] The near-field communications (NFC) chip that enables secure mobile payments from Apple's iPhone offers another example of asymmetric access to hardware. Apple does not grant third-party developers access to the iPhone's NFC chip, thereby ensuring that Apple Pay remains the only mobile payment application available to nearly one billion iPhone users worldwide.[88] This denial of interoperability is alleged to have stifled the growth of complementary or supplementary ecosystems of mobile payment tools for Apple devices.[89] And in 2019, Germany passed a law demanding that Apple grant NFC chip access to other mobile payment service providers in order to end Apple's anticompetitive practice.[90]

Equitable interoperability would mandate that whatever interface was shared internally for use by developers at the dominant platform be shared with external developers on equal terms. Equivalent access to the OS and hardware would place internal and third-party developers on a level playing field and promote vigorous competition in the market.

E. The Apple App Store

The Apple App Store is another setting where rivals do not have equitable interoperability with Apple's iOS. The store currently works as follows: first, a developer submits an app to Apple for review, which prompts Apple to determine whether the app operates as it should, and whether it complies with conditions like content restrictions and privacy standards. Second, after Apple approves it,

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84. *See* Sarah Perez, *Tile Bashes Apple's New AirTag as Unfair Competition*, TECHCRUNCH (Apr. 4, 2021, 2:51 PM EDT), https://techcrunch.com/2021/04/20/tile-bashes-apples-new-airtag-as-unfair-competition [perma.cc/743Z-JFM4].

85. *Id.*

86. *See id.* ("Apple is . . . leveraging its larger iPhone install base to help find missing items.").

87. *See id.*

88. *EU Considers Forcing Apple to Open iPhone's NFC Chip to Third Parties*, MACDAILYNEWS (Sept. 18, 2020, 12:21 PM), https://macdailynews.com/2020/09/18/eu-considers-forcing-apple-to-open-iphones-nfc-chip-to-third-parties [perma.cc/3R2J-KZUM]; Stephen Nellis, *Apple sees revenue growth accelerating after setting record for iPhone sales, China strength*, REUTERS (Jan. 27, 2021), https://www.reuters.com/article/us-apple-results/apple-tops-wall-street-expectations-on-record-iphone-revenue-china-sales-surge-idUSKBN29W2TD?il=0 [https://perma.cc/R772-AGU6] ("Apple now has an installed base of more than 1 billion iPhones.").

89. Karen Webster, *Is it Time for Apple to Allow Others Access to the iPhone NFC Chip?*, PYMNTS (Dec. 21, 2020), https://www.pymnts.com/news/payments-innovation/2020/time-for-apple-pay-to-let-others-access-iphone-nfc-chip [perma.cc/G6KG-79A8].

90. Ben Lovejoy, *Germany Forces Apple to Let Other Mobile Wallet Services Use iPhone's NFC Chip*, 9TO5MAC (Nov. 15, 2019, 5:22 AM PT), https://9to5mac.com/2019/11/15/use-nfc-chip [perma.cc/AJ64-GEHV].

the developer may place their app in the Apple App Store. The developer will not pay Apple for distribution if it is a non-profit, or if the app delivers a good or service that is consumed offline;[91] the developer will pay Apple only a reduced fee it is sufficiently small.[92] Familiar "offline" apps include Chase Bank, Delta Airlines, and Tesla. These businesses pay nothing for their use of the store. If an app delivers a good or service consumed on the handset such as music, video, eBooks, or games, Apple charges developers 30% of the revenue generated by selling the app, subscription, and any "in-app purchases."[93] In-app purchases are sales within an app such as a book, a movie, a game, a costume in a game, higher status in a dating app, and so forth. Apple does not take a share of advertising in the apps it distributes—with at least one well-known exception, Google Search.[94]

Spotify sells its app outside of iOS, where it offers various kinds of subscriptions, family plans, and collects revenue.[95] A subscriber to Spotify can download the free app in the Apple App store and log in using their Spotify credentials to access the content purchased outside of iOS. This is known as a "reader app."[96] Other popular reader apps include Netflix and Kindle. The reader app allows the user to purchase content without the 30% tax and yet consume it on their Apple device. But this strategy is only feasible for apps that are already popular enough that users are willing to navigate to a website outside of iOS. New apps or apps that offer goods or services that can be purchased on the spur of the moment (a costume in a game) rather than planned for (a Netflix subscription) may not find the reader app exception works for them. This was particularly true when Apple did not permit developers to direct users outside iOS to buy content, but users had to learn where to buy content.

Compounding the problem, Apple itself sells services that compete with rival apps in the store that pay the 30% fee. For example, Apple offers games

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91. *See* App Store Review Guidelines, APPLE, at 3.1.3(e) (2023), https://developer.apple.com/app-store/review/guidelines/#goods-and-services-outside-of-the-app [https://perma.cc/FB32-L6CG] ("Physical Goods and Services Outside of the App: If your app enables people to purchase physical goods or services that will be consumed outside of the app, you must use purchase methods other than in-app purchase to collect those payments, such as Apple Pay or traditional credit card entry.")

92. *See* Apple Pay for Donations, Apple (2023), https://developer.apple.com/apple-pay/nonprofits [https://perma.cc/E9TF-8UWR] (noting that nonprofit organizations are exempt from paying fees or commissions).

93. *Paid Applications Agreement (Schedules 2 and 3 of the Apple Developer Program License Agreement)*, APPLE, at 4, https://developer.apple.com/support/downloads/terms/schedules/Schedule-2-and-3-20220225-English.pdf [https://perma.cc/PGF9-YLVK]

94. Thomas Claburn, *What Brit Watchdog Redacted: Google Gives Apple Cut of Chrome iOS Search Revenue*, REGISTER (Feb. 17, 2023), https://www.theregister.com/2023/02/17/google_apple_chrome_ios_revenue [https://perma.cc/CC24-XH6E].

95. *See Sign Up for Free to Start Listening*, SPOTIFY, https://www.spotify.com/us/signup/?sp_t_counter=1 [perma.cc/CGB2-8T8H] (enabling users to create an account online).

96. *Distributing "Reader" Apps With a Link to Your Website*, APPLE (2023), https://developer.apple.com/support/reader-apps [https://perma.cc/2WEP-TQGJ].

that compete with many gaming companies.[97] Apple Music competes with Spotify and Tidal. Competition among and between apps on a single platform obviously benefits consumers, but Spotify complains that Apple inhibits fair competition among apps on its own app store, at least when Apple distributes its own apps. According to Spotify, Apple gives its own music service an unfair advantage because it does not pay a 30% fee to itself and therefore enjoys lower costs, thereby undermining the fair competition among apps that benefits consumers.[98]

There is no competition among stores on the Apple platform that might offer developers either lower fees or better-quality service. Developers would like the choice of distributing to consumers through rival stores that might engage in price competition with each other, driving down fees and creating innovation in services and quality. A carefully executed interoperability rule could stimulate the creation of a competitive marketplace of stores that distribute apps.[99] A regulator (or its technical committee) could design an interface for app stores and publish the approved APIs that qualifying rival stores must use. The side of the interface used by the store would allow needed store functionality; Apple would ensure its operating system hooked to the APIs in the interface.

The regulator would issue licenses to third-party stores, ensure the interface promotes entry, and guarantee the interface remains equitable. Again, because of the importance of security and privacy on a personal handset, the regulator ought to require stores to obtain a license. A licensed store could then distribute any Apple-approved app. Likely, the regulator would require that Apple devices come with a meta-store app pre-installed where consumers could find and download any licensed store. To ensure the continued functionality and security of apps offered in iOS stores, Apple may sensibly continue approving individual apps for use on iOS, regardless of the store through which they are distributed. Licensed stores would only be permitted to distribute approved apps, which could protect consumers from malware. The individual app screening process, if

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97. *See*, *e.g.*, *Texas Hold'em*, APPLE (2023), https://apps.apple.com/us/app/texas-holdem/id284602850 [https://perma.cc/CZ6C-X8B8] (previewing the Apple App Store listing for Texas Hold'em and further identifying the seller as Apple itself).

98. Spotify filed a complaint to the EC challenging the legality of the 30% tax and the inability to distribute to Apple device users to except through the Apple store. The complaint itself was confidential, but Spotify created a web page meant to explain the complaint to the public entitled "Time to Play Fair." *Time to Play Fair*, SPOTIFY, https://timetoplayfair.com [perma.cc/4AUC-Y72N]. The page links to an animated cartoon that explains how Spotify has no choice but to use the Apple App Store and accede to the tax for in-app purchases, including the fee to upgrade to premium service. *See id.* Epic Games raised similar complaints in its lawsuit in the United States against Apple. *See* Epic Games, Inc. v. Apple Inc., 559 F. Supp. 3d 898, 921 (N.D. Cal. 2021) ("Epic Games claimed that Apple is an antitrust monopolist over (i) Apple's own system of distributing apps on Apple's own devices in the App Store and (ii) Apple's own system of collecting payments and commissions of purchases made on Apple's own devices in the App Store.").

99. The DMA explicitly requires that operating systems such as Apple's iOS be designed to interoperate effectively with third-party app stores. Article 6.4 provides that a gatekeeper shall "allow and technically enable the installation and effective use of third-party software applications or software application stores using, or interoperating with, its operating system and allow those software applications or software application stores to be accessed by means other than the relevant core platform services of that gatekeeper." Council Regulation 2022/1925, 2022 O.J. (L 265) 1, art. 6.4.

administered by Apple, would require regulatory oversight to ensure continued nondiscrimination and a fair, cost-based fee.

Users purchasing an Apple device would then be able to install rival, licensed stores which might contain differently curated or cheaper apps. Rival stores might do more or less review of app content, offer better navigation systems to find apps, only offer free apps or apps with A+ privacy ratings, take payments in different ways, or have selections curated for certain interests or languages. Indeed, Apple itself might begin to offer more than one store to appeal to consumers with particular tastes. For example, a narrow Apple store might curate to only have the most popular apps, or a children's Apple store might be very strict about junk and pornography.

The store license plays an important role in this interoperability regime. The license allows a regulator to ensure that a store meets privacy, safety, and national security standards. Regulators will likely want input from operating systems concerning the standards for privacy and security that the regulator should require of stores. An important issue for the regulator is determining how to protect consumers from app stores that have the ability to share personal information of consumers with apps in the store. The regulator might condition a license on the store's adherence to a default level of sharing of personal information that is very conservative. The regulator could also require the use of an authorized choice architecture if the store wished the user to agree to share more personal data.

With sufficient competition among app stores, Apple could set the fees for app developers and users in its own store however it wished, subject to existing law, by downloads, in-app purchases, corporate revenues, or anything else. Other stores could do the same. Developers who did not like the iOS App Store policies and fees could distribute through rival stores, which would compete for their business.

As with all the cases of interoperability we consider in this Article, we describe a regulation where there is no fee charged for the interface that gives access to a covered platform like iOS. This issue should be studied in more detail to determine the welfare consequences of different options. We note that, in our setting, the reason for the interoperability is because the market power of the covered platform is high, which means any fees must be regulated. Further, incentives to be studied include the response to interoperability by the platform. This response is likely to vary by the business model of the platform. A maker of a vertically integrated handset may have an incentive to raise its price if it no longer earns fees based on usage. A platform that monetizes through advertising will have different incentives.[100]

Under the current market structure, apps have no alternative route to serve Apple users. With equitable interoperability of the iOS store interface, third-party stores would enter, develop brand recognition, and cultivate large user

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100.   *See* Federico Etro, *Device-Funded vs Ad-Funded Platforms*, 75 INT'L J. INDUS. ORG. 1, 7 (2021).

bases of their own. We envision marketplace-wide interoperability so that a store needs to work with only one interface and that interface is used by all participating operating systems. However, the apps in such stores will be specific to the OS on which they run. Over time, the existence of multiplatform stores may encourage entry of new operating systems because consumers' activity and data could stay in the store as they switch to new devices that might run on new operating systems. A consumer could switch to an entrant OS by buying the new device, installing the store, and logging in to their existing store account. The store could become a kind of interoperable 'middleware' allowing easy switching across operating systems.

F. The Android App Store

The interoperability issues with the Android store are conceptually similar to those discussed above with respect to iOS. The differences lie in business models and in the institutional details of store policies. Android is licensed by independent device makers,[101] so it is not as vertically integrated into hardware as iOS is. However, apps also go through an official Google approval process, and Google requires that the Google Play Store be preinstalled in a prominent location on authorized Android handsets. As Apple does, Google charges app developers 30% of sales in the store, whether for sales of the app or for in-app purchases.[102]

Google permits other app stores to be installed on a Google handset.[103] For example, Samsung has an app store on its Android handset—the "Galaxy Store."[104] As far as we can learn, Samsung charges the same 30% commission rate for app distribution, but this is a list price and negotiated discounts are offered.[105] The Galaxy Store's share of Android app downloads allegedly "trail[s] far behind" that of the Play Store.[106] This example, however, demonstrates the technical feasibility of designing an interface that supports multiple stores, each containing authorized apps.

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101. *See supra* notes 61-64 and accompanying text.
102. *Service Fees*, GOOGLE, https://support.google.com/googleplay/android-developer/answer/112622 [https://perma.cc/W79K-8M5V].
103. Alternative Distribution Options, Google Developers), https://developer.android.com/distribute/marketing-tools/alternative-distribution [https://perma.cc/2XLQ-FCMZ].
104. *Galaxy Store*, SAMSUNG, at 5 https://www.samsung.com/us/apps/galaxy-store [perma.cc/45RP-X5AL]. Note that this study was funded by Apple.
105. Jonathan Borck, Juliette Caminade & Markus von Wartburg, *Apple's App Store and Other Digital Marketplaces: A Comparison of Commission Rates*, ANALYSIS GRP. 5 (2020), https://www.analysisgroup.com/globalassets/insights/publishing/apples_app_store_and_other_digital_m arketplaces_a_comparison_of_commission_rates.pdf [perma.cc/8V9C-7UJB].
106. Complaint at 20, Epic Games, Inc. v. Google LLC, No. 320-cv-05671 (N.D. Cal. Aug. 13, 2020).

G. Amazon E-Commerce Marketplace

The network effects in e-commerce marketplaces are indirect: consumers want to go where there are more sellers, and sellers want to go where there are more buyers. Entering marketplaces thus face at least one difficulty in getting established—they need sellers listing goods in order to attract consumers. A seller will be reluctant to pay the fixed cost to list on a nascent marketplace because the returns could be low when there are very few consumers. However, the seller may use specialized software that allows it to load its store content—goods, prices, inventory, or images—just one time, and then link that software to an e-commerce site. For example, Shopify is a well-known tool of this type that interoperates with e-commerce sites like Amazon and Walmart.[107] This tool drastically lowers the fixed cost of listing on a new platform and allows the seller to run the sites almost as if they were one. The seller can add new products just once, and the products appear on all sites. This system allows the seller to keep track of listings, inventory, and offers in one place, while displaying products across many different marketplaces.

Thus, in the current system, different e-commerce sites interoperate with popular software tools for hosting e-commerce sites. Sellers' switching costs of moving sales from one platform to another are negligible, promoting multihoming by brands and stores. Such interoperability promotes competition between e-commerce sites. The interoperability that has arisen here works at the market level, with multiple tools interconnecting with multiple e-commerce sites.

Could a regulator improve interoperability in e-commerce? A regulator could certainly codify and publish industry APIs to ensure that they are not withdrawn or changed in an anti-competitive way. Further, a regulator could enforce the equitable aspect of interoperability. Larger platforms and tools will tend to want changes that advantage their own business, and these changes might reduce the functionality of smaller rivals. Further, the regulator could protect interoperability from degradation going forward. A dominant e-commerce site could engage in platform annexation by ending interoperability in an adjacent market for tools like Shopify. An interoperability regulation would permit the regulator to investigate if a dominant platform shut down interoperability or made it technically or financially costly for sellers or end users to multihome with competing retail sites.

Fulfillment functions occupy the other side of e-commerce platforms. Interoperability in fulfillment requires keeping track of a physical object. Physical objects, unlike data, cannot be moved and shared practically without

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107.   *See Sales Channels*, SHOPIFY, https://help.shopify.com/en/manual/online-sales-channels [perma.cc/8DTF-CEDD] ("You can use Shopify to sell your products on different online sales channels. Sales channels represent the different platforms where you sell your products.").

cost, and the location of warehouses and delivery trucks matter.[108] A seller might wish to fulfill its orders from multiple marketplaces through one warehouse to minimize inventory costs and take advantage of scale. This is straightforward if the seller is large enough to have economies of scale itself. Many sellers are too small to own their own warehouse and so need to purchase this service. Fulfillment services like DHL or FedEx have "open APIs" by definition because these freestanding delivery services wish to serve sellers from every platform. The Amazon fulfillment service, by contrast, need not have open APIs if it only delivers goods sold by its corporate sister.

Amazon, however, sells fulfillment services for sales on rival platforms through a service called Multi-Channel Fulfillment. Multihoming merchants who use rival e-commerce platforms to list and sell goods can purchase fulfillment services for those sales from Amazon using inventory that is located in an Amazon warehouse.[109] The seller instructs Amazon to deliver specific goods of the seller to the relevant consumer. Notice that interoperability runs the other way as well: a seller can use a rival fulfillment service—its own, or a third party—to deliver sales made on Amazon's marketplace.

Again, does this leave any role for a regulator? We could first ask whether this service fully satisfies the criteria of equitable interoperability.[110] A regulator enforcing equitable interoperability is positioned to protect competition by preventing leveraging from one side of the interface to the other. For example, the Amazon marketplace might be able to use its marketplace search results to advantage its fulfillment service by more prominently featuring the products of sellers that use Amazon fulfillment. In that setting, fulfillment interoperability is not equitable because some choices are advantaged over others. The regulator could require that the marketplace not discriminate in its rankings, search results, or in any other method used to steer consumers against sellers who use third-party fulfillment. Likewise, the regulator could require the platform not to discriminate against any seller that chooses to list on rival marketplaces, set different prices, or offer different selections on rival marketplaces. The regulator could also ensure the platform doesn't use its fulfillment services to gather data about other sellers and their products that it then could turn around and use to compete against or undercut those sellers with its own products.

Today it appears that Amazon's e-commerce platform is interoperable on both sides, at least in a limited way: a merchant can use tools like Shopify to multihome across stores, keeping a uniform storefront in all of them. And if a merchant buys multi-channel fulfillment from Amazon, it can use that

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108. The physical element here is reminiscent of the problem of interconnecting with a regulated AT&T when wires and equipment needed to be connected at specific locations that required structures and maintenance—all of those being costly.

109. Gabriel Bang, *7 Benefits that Amazon Multi-Channel Fulfillment provides for Amazon sellers*, AMAZON SUPPLY CHAIN (Feb. 28, 2023), https://supplychain.amazon.com/blog/7-benefits-that-mcf-provides-for-amazon-sellers [https://perma.cc/L8AA-A3CM]

110. Amazon now offers unbranded packaging by default. *See Multi-Channel Fulfillment: FAQ*, AMAZON, https://supplychain.amazon.com/support#unbranded [perma.cc/J57J-2YMV] ("Multi-Channel Fulfillment is now automatically shipping in unbranded packaging at no additional cost.").

functionality to multihome its storefront across smaller e-commerce stores that might have poor fulfillment services.

A further area of regulatory interest is the use of seller data by Amazon and the extent to which it shares that data with other parties. This topic is beyond the scope of the current Article but thinking about how interoperability might apply to types of data is an important area for future research.

H. Looking Ahead: Google's Dominance Over the Internet of Things

The complaint against Google search from state attorneys general, led by Colorado, describes the concern that Google will gain an early monopoly over the Internet of Things (IoT).[111] Because Google's Android operating system is the only popular mobile operating system which can be licensed, many makers of smart devices from refrigerators to cars to televisions are installing various Android OS's in their devices.[112] Market power in device OS's allows Google to set licensing conditions that position Google to maintain its monopoly and extract rents from these industries in future. The autonomous vehicles of the future may be built at a General Motors factory, but their profits may be primarily taken by Google.

Interoperability may prove a very helpful policy for the IoT. Cars that connect to road sensors and traffic lights, pipe sensors that connect to home thermostats, lights that connect to smart phones, and so forth, have the potential to be useful to consumers. But network effects are likely to be strong due to the value of interconnection. Therefore, the market may tip in favor of Google, and limit competition in the future.

Equitable interoperability within the IoT could decouple the dominant operating system—Android—from the physical smart devices it runs on, allowing consumers to choose a physical device maker independently from the OS. In addition, open APIs and equitable interoperability with Android OS's could allow rival makers of devices access to consumers who participate in an Android network. Those device makers might choose to operate with rival OS entrants that have better ways to control cars, develop home monitoring systems, run advertising on televisions, and so forth.

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111.   *See* Complaint at 5-7, Colorado v. Google LLC, No. 1:20-cv-03715-APM (D.D.C. Dec. 17, 2020).

112.   Android TV is a leader in the market for smart television operating systems. *See Android TV Market Size to Reach US$ 231 Billion by 2026*, GLOBE NEWSWIRE (Jan. 14, 2020), https://www.globenewswire.com/news-release/2020/01/14/1970493/0/en/Android-TV-Market-Size-to-Reach-US-231-Billion-by-2026.html [perma.cc/VVJ7-VGYX]. Porsche has added support for Android Auto to its vehicles' computers. Caleb Miller, *Porsche Reveals New Infotainment System, Adds Android Auto*, CAR & DRIVER (June 18, 2021), https://www.caranddriver.com/news/a36756380/porsche-newinfotainment-system-android-auto [perma.cc/Z6RD-2K3F]. Samsung has released a smart refrigerator that runs Android. *Samsung's T9000 Smart Refrigerator Runs on Android, Includes Apps Like Evernote and Epicurious*, GADGETS 360 (Jan. 22, 2013), https://gadgets.ndtv.com/others/news/samsungs-t9000-smart-refrigerator-runs-on-android-includes-apps-like-evernote-andepicurious-320610 [perma.cc/8HJ4-TDXQ].

A recent report from the EC evaluates not just the Android IoT landscape, but other platforms like Alexa and Siri that operate consumer and home devices.[113] The report concludes that competition is lacking in the space in part because third-party device makers are blocked from interoperating with proprietary OS's and with proprietary voice assistants, which the report describes as two separate choke points that could be made interoperable.[114] Even in situations in which the third-party device makers are not literally blocked from interacting with the OS's and voice assistants, they can experience only partial interoperability which means they provide less functionality than similar complementary devices manufactured and sold by the company that operates that IoT ecosystem (Google, Apple, or Amazon). When the third-party device makers are weakened by lack of full interoperability, they are unable to provide robust competition in the market for complements to the dominant platform, which benefits the dominant platform and harms consumers of connected devices.

For example, everyone who currently purchases an Amazon Echo device is obligated to use Amazon's Alexa voice assistant. If Amazon were required to make its voice assistant and its operating system interoperable, makers of smart speakers could offer consumers a speaker with a choice of Alexa, Siri, or "hey Google," as the voice assistant (or none of these) installed and the speaker would not need to run on any particular OS. This would increase user choice and create competition across two markets—physical smart speakers, and voice assistants—where currently there is only a single market. In this way a user could choose to buy a speaker from any maker and pair it with their current smart home service. This is another example of a fast-moving new industry that could be protected from monopolization by careful interoperability regulation.

There are other areas that we have not addressed, or that will arise in the future, where mandatory interoperability could increase competition. For example, this Article does not address competition in cloud services.

VI. Interoperability in the DMA and in the Proposed U.S. Law

The DMA establishes conditions that could lead to equitable interoperability of the kind we describe. These regulations require core platform services (CPS) to allow consumers choice of defaults, technically enable apps and third-party app stores, and offer equivalent interoperability for third party hardware and software, among others."[115] The DMA mandates contractual or technical interoperability in a number of its rules which may then drive increased contestability in several of the settings that we have discussed above. We briefly

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113. *See* European Commission Press Release IP/21/2884, Antitrust: Commission Publishes Initial Findings of Consumer Internet of Things Sector Inquiry (June 9, 2021), https://ec.europa.eu/commission/presscorner/detail/en/ip_21_2884 [perma.cc/YYB7-A5XS] (discussing, among other things, the market for voice assistants).

114. *Id.*

115. Council Regulation 2022/1925, 2022 O.J. (L 265) 1, art. 6(1)(f).

describe some of the similarities and differences between our proposed approach to interoperability and the approach adopted by the DMA.

The DMA generally takes a context-specific approach to interoperability. For example, Article 7 mandates interoperability in a market with direct network effects, number-independent interpersonal communications services (i.e., WhatsApp, iMessage and the like).[116] These services must make basic functionalities interoperable at no charge while preserving the level of security. Article 6(7) requires very general technical interoperability for core platform services.[117] Article 6(3) requires a CPS operating system to allow users to choose default services, thus potentially removing an inequitable element of the interoperability between the OS's service and rival services.[118]

In contrast, this Article suggests that a gatekeeper operating system provide the same functionality to third party software that it provides to its own integrated version of the service. Such a provision means that a rival can offer all the functionality that the platform's own service offers to customers. Eliminating the situation where competitors obtain degraded technical interoperability may improve competition in apps like digital wallets, for example.

The DMA also mandates interoperability in some specific settings. For example, Article 6(4) requires a CPS mobile OS to permit competing app stores to interoperate.[119] This is the case where the rule ends a contractual as well as technical prohibition on interoperability and allows competition among app stores. Such competition is particularly critical to establish contestability on platforms where users single home.

Articles 6(9) and 6(10) are slightly different. These require that the CPS supply real-time data to business users and allow end users to effectively port their data to a rival service;[120] we discuss the importance of data portability to contestability in Section IV.E. Free real-time data portability helps rivals to compete on equal footing with integrated platform services. While the rival cannot connect directly to the platform as it could in a standard interoperability situation, by receiving a customer's real-time data feed, it can lower the cost to a customer of multi-homing. The interoperability created by the APIs that allow the data to flow permit the third party to offer services almost as if it were interoperating. One might think of this as vertical rather than horizontal interoperability, and it is therefore an important variant on our theme.

Finally, we note that interoperability has featured in legislation being considered in other jurisdictions. In the United States, the Augmenting Compatibility and Competition by Enabling Service Switching Act (ACCESS Act) (introduced in the House in 2021 and in the Senate in 2022)[121] would establish a committee at the FTC comprised of company representatives, neutral

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116.   Council Regulation 2022/1925, 2022 O.J. (L 265) 1, art. 7.
117.   *Id.* art. 6.7
118.   *Id.* art. 6.3.
119.   *Id.* art. 6.4
120.   *Id.* art. 6.9; art. 6.10
121.   H.R. 3849, 117th Congress (2021)

specialists, and potential entrants to design an interface with the desired functionalities. The FTC would approve the interface if it promotes entry, is nondiscriminatory, and does not preserve the market power of the covered platform. Separately, the American Innovation and Choice Online Act (AICOA), in prohibiting various forms of "self preferencing," would provide additional assurance that that interoperability is equitable through a prohibition against self-preferencing.[122] The legislation establishing the Digital Markets Unit at Great Britain's Competition & Markets Authority empowers the agency to create a bespoke code of conduct for each platform being regulated. Interoperability is one of tools the CMA could use in its effort to limit the effects of market power. These pieces of legislation, if enacted as introduced, would be positive steps toward pro-competitive uses of equitable interoperability.

VII. Enforcement

The key element to enforcement in the proposed U.S. framework is the balance between a technical committee comprised of industry representatives and the role of the regulator.[123] Industry representatives and the dominant firm are well placed to design the interface because of their technological expertise and knowledge of market trends. And one of the tool's best features is that the government can stand in the background during the design phase.[124] One might think that such a committee could run itself, rather as a standard-setting organizations (SSO) does, with no oversight. The economic incentives of the dominant firm, however, indicate otherwise. Because the dominant firm has a strong incentive to guide the standard to protect its monopoly and give itself an advantage in the marketplace, the regulator must have ultimate control.

Without the power to reject changes to the interface, the platform would be able to change it at will: as competing entrants begin to gain traction with consumers, they will find that the API changes in a way that just happens to degrade their functionality so that they are unable to attract users away from the dominant firm. It is critical that the regulator be empowered to delay the adoption of a proposed new interface if it suspects that it will not serve the public interest by promoting entry and competition. If, after investigation, the regulator finds that the interface entrenches the market power of the dominant firm and does not promote contestability, then the regulator should reject it and ask the committee to create a procompetitive interface.

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122. S. 2992, 117th Congress (2022) § 3(a)(2) (prohibiting platforms from limiting the ability of business users that offer goods or services that compete with those offered by the platform to access the same platform services and features as those made accessible to the platforms' own products and services).

123. *See* Augmenting Compatibility and Competition by Enabling Service Switching Act of 2021, H.R. 3849, 117th Cong.§§ 6(c)-(d) (2021) (requiring the commission to constitute a technical committee that meets regularly to provide expert recommendations, but limiting the committee to an advisory role).

124. *See* Augmenting Compatibility and Competition by Enabling Service Switching Act of 2021, H.R. 3849, 117th Cong. § 6(c)(2) (delegating standard development to the technical committee while vesting the power to approve or reject standards with the commission).

We advise that any regulator be empowered to require a divestiture of the part of the platform that will restore competition if a platform repeatedly fails to comply with interoperability mandates. For example, the EC has been attempting to apply remedies to Google Search for a decade, yet the market structure is unchanged and Google's market power has grown. The divestiture of the Google Android mobile operating system into an independent, regulated entity would remove any incentive for Android to discriminate among technically interoperable apps and allow for entry into currently monopolized markets like general search.[125]

VIII. Risks

A regulator could be slow. In a fast-moving sector, it will be important to update the interface to keep pace with technological change. Because the regulator must have the power to block new interface designs if they are found to be anticompetitive, it necessarily runs the risk of slowing the pace of innovation. A prudent law would establish a presumption that the recommendations of the technical committee will be automatically adopted by the regulator within some number of days unless the regulator actively rejects the new interface. The law also could allow the regulator to mandate timetables for the development and imposition of standards. This would require the regulator and technical committee to stay on schedule, while retaining the regulator's ability to protect consumers by rejecting changes that do not serve the public.

The regulated interface may limit differentiation among competitors. If the interface makes certain technologies or business models costly or impossible, then these will not arise naturally in the market. We recommend that the regulator or the technical committee consult regularly with market participants and allow the regulated interface to evolve in response to market needs. We note that under current proposals like the DMA and ACCESS Act, very few platform operators will be subject to possible mandatory interoperability.[126] Other, non-covered, digital platforms and businesses would be free to use the resulting interfaces, or not, as they prefer, so their innovation can take any direction.

Interoperability might harm consumers if it requires excessive data sharing. A frequently mentioned example is the way Facebook collects data by interoperating with many third-party websites through "likes" and logins.[127] If the system is designed to work on behalf of consumers, however, then the interface can be used to protect them. Legislation combined with privacy

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125.   *See* Heidhues et al., *supra* note 11, at 939-45.

126.   *See supra* notes 35-36 (citing to scope-limiting provisions).

127.   Bennett Cyphers & Danny O'Brien, *Facing Facebook: Data Portability and Interoperability Are Anti-Monopoly Medicine*, ELECTRONIC FRONTIER FOUND. (July 24, 2018), https://www.eff.org/deeplinks/2018/07/facing-facebook-data-portability-and-interoperability-are-anti-monopoly-medicine [https://perma.cc/X4T9-YJ82] ("The company tracks whenever you use one of the hundreds of thousands of websites and apps that use Facebook technology, and it uses those data to target ads.").

protection such as a well enforced General Data Protection Regulation (GDPR) may be able to prevent poor outcomes.[128]

The equitable part of equitable interoperability may be difficult to enforce because the choices that lead to discrimination are buried deep within the firm or are hidden in an algorithm that few people understand. For example, determining if a social network is filtering content and posts in a neutral way may be hard to determine. A law or regulation might benefit from containing a whistleblower provision so that employees inside the firm are compensated when they report violations of the regulations. Ensuring that third parties are free to raise issues with public authorities, as is currently mandated within the U.S. and EU proposals, is also critical.

To maintain benefits to consumers, it is important not to design such committees to function the way SSOs do. SSOs are prone to domination by firms with market power that seek to use the SSO to maintain their market power. In particular, firms can exploit their participation in an SSO to direct the development of standards in a way that promotes their own market positions. Leading firms participating in the Third Generation Partnership Project (3GPP), for example, influenced the 3GPP to include their own patents in standards governed by the 3GPP.[129] Likewise, the World Wide Web Consortium (W3C) is dominated by Google because of Google's size and market power.[130] Consequently, the W3C advantages Google relative to its competitors.[131] These cautionary examples motivate the need for regulatory oversight in the

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128. The General Data Protection Regulation (GDPR), a 2016 EU regulation enforced from 2018 onward, sets guidelines on companies' collection and use of consumers' personal data. *See* Regulation 2016/679 2016 O.J. (L 119) 1.

129. *See* Aija Elina Leiponen, *Competing Through Cooperation: The Organization of Standard Setting in Wireless Telecommunications*, 54 MGMT. SCI. 1904, 1906-11 (2008) (finding certain firms' entry into the 3GPP consortium increased the extent to which the consortium used these firms' technologies, suggesting that firms can use their membership in a SSO to promote their own market position); *see also* Aija Leiponen, *Clubs and Standards: The Role of Industry Consortia in Standardization of Wireless Telecommunications* (ELTA Discussion Paper No. 997, 2005), https://www.etla.fi/wp-content/uploads/2012/09/dp997.pdf [perma.cc/9P4G-ZJF4] (finding that firms that were well connected outside the 3GPP tended to have greater influence within the 3GPP and that large firms with market power tend to dominate the process of standard development); Rudi Bekkers, René Bongard & Alessandro Nuvolari, *An Empirical Study on the Determinants of Essential Patent Claims in Compatibility Standards*, 40 RSCH. POL'Y 1001, 1010-13 (2011) (finding that involvement in the 3GPP's W-CDMA standardization process increased the probability that the process deemed a firm's patented technology to be essential to the standard and that "participants . . . systematically influence the content of the standard in the direction of their own patented technologies").

130. Thomas Claburn, *Aggrieved Ad Tech Types Decry Google Dominance in W3C tandards – Who Writes the Rules and for Whom?*, THE REGISTER (July 17, 2020), https://www.theregister.com/2020/07/17/aggrieved_ad_tech_types_decry [perma.cc/8WLJ-YWDS] ("Google contributes over three times as many individuals as the next largest contributor (Microsoft) to the W3C.").

131. *Id.*; *see also* MAJORITY STAFF OF THE SUBCOMM. ON ANTITRUST, COM. & ADMIN. L. OF THE H. COMM. ON THE JUDICIARY, 116TH CONG., INVESTIGATION OF COMPETITION IN DIGITAL MARKETS: MAJORITY STAFF REPORT AND RECOMMENDATIONS 229 (2020) ("Though standards bodies like the W3C give the impression of being a place where browser vendors collaborate to improve the web platform, in reality Google's monopoly position and aggressive rate of shipping non-standard features frequently reduce standards bodies to codifying web features and decisions Google has already made.").

background to prevent the benefits of interoperability being neutralized by the firm being regulated.

The regulator could be captured by industry. Although capture by the dominant firm should be difficult in an environment where the law explicitly calls for the interface to promote competition and erode the market power of the dominant firm, a regulator could become captured by a consortium of industry interests and approve interfaces that fail to generate as much competition as they could. To preempt the risk of capture, the technical committee's work should be transparent, and the committee should include multiple members from consumer groups and neutral public policy experts.

Interoperability is a behavioral remedy. It may be that today's digital platforms are so powerful they will be able to circumvent this regulation, just as Google has been able to evade EC remedies in the general search market, for example.[132] Because the profits at stake are so large, it may be impossible for the regulator to apply a heavy-enough fine, in a timely manner, to incentivize compliance. Having the ability to approve or halt changes to the interface is critical if the regulator is to protect entrants.

IX. Conclusion

Although much research remains to be done, we believe that a significant number of important competition problems generated by monopoly platforms may be ameliorated with the "supertool" of equitable interoperability. When carefully implemented, equitable interoperability breaks down entry barriers which creates entrants, which in turn creates competition and consumer choice. Interoperability transforms what might have been competition *for* the market into competition *in* the market, which is a more efficient and effective form of competition. As we have shown above, interoperability can be applied to many digital settings, from e-commerce to operating systems to social networks. An interoperability statute gives regulators a useful tool that may be able to control many cases of platform market power.

We recommend that the regulator should have the ability to apply interoperability and:

(1) Identify settings where equitable interoperability is needed;
(2) If desired, constitute a technical committee that includes consumer representatives, rivals, potential entrants and neutral experts for each Core Platform Service or covered platform;
(3) Charge the committee with creating (or develop an internal process that creates) an interface with APIs that promote competition in the market;

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132. *See* Kelvin Chan, *After Years of Grappling with Google, Europe Has Tips for US*, ASSOCIATED PRESS (Oct. 21, 2020), https://apnews.com/article/google-antitrust-lawsuit-europe-tips-9b100e96d23849b742d27c457157b6bc [perma.cc/U24M-YAY9] ("By the time the investigation wrapped up, Google had already made some changes so regulators didn't require a specific remedy to restore competition.").

> committee processes should include guidelines on how to update the interface as needed;
>
> (4) Issue licenses to parties that wish to interoperate, requiring reciprocity and other security and privacy standards as needed;
>
> (5) Briefly halt changes to the standard to investigate if they are anticompetitive, and fully block them if the regulator finds they do not serve the public interest;
>
> (6) Enforce all of the above through revocation of licenses or fines of sufficient size to incentivize compliance; and
>
> (7) Require divestitures in response to repeated non-compliance.

The "equitable" portion of equitable interoperability is critical to include and enforce. The dominant platform has a financial incentive to bias the system in its favor. If the platform can also influence the design of the interface such that its attributes favor the dominant firm's own technology, customer base, or other businesses, then entrants will not be competing on a level playing field. Therefore, strong oversight by the regulator is needed as well as meaningful participation by rivals and potential rivals and those representing their interests. Self-regulation will be insufficient to create and maintain contestability.

A frequent critique of regulation is that it inhibits innovation. In fact, there are many examples of settings in which standardized interfaces promote innovation by the businesses—and whole ecosystems—operating on a side of the standardized interface. Through a stable link to the platform, these businesses can attract customers when they invent attractive products. This profit motive is a strong financial incentive for firms to engage in innovation.

An attractive feature of interoperability is that the regulator may choose to task a technical committee with designing the interface, so the regulator need not be involved in product design in a fast-moving sector. We stress, however, that the regulator must have the authority to ensure interoperability produces vigorous competition. In this context, equitable interoperability can become a form of oversight of industry-designed interfaces. We have referred to "equitable interoperability" throughout as regulation, but it could just as easily be thought of as a governance scheme.