

CLEARING UP MISCONCEPTIONS ABOUT GOOGLE'S AD TECH BUSINESS

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I. INTRODUCTION

The technologies that advertisers, website owners and app developers use to buy and sell advertising space online (“ad tech”) have attracted regulatory interest around the world.

Interest in this area is understandable. Ad tech tools help website owners and app developers (collectively, “publishers”) optimize their ad sales and thereby fund free original content. Advertisers similarly rely on such tools to optimize return on their digital ad spend.

However, it appears that scrutiny of ad tech is in part driven by fundamental misunderstandings about Google’s products and practices in that space.

In this paper, we explain how ad tech products operate in general, how Google’s ad tech products have evolved and work today and how ad tech fits into Google’s overall business model. We then address several mistaken propositions and theories advanced by two Google critics, Damien Geradin and Dimitrios Katsifis (G&K),² which seem to have colored some of the regulatory interest in Google’s ad tech business. This paper is not a comprehensive economic and legal assessment of G&K’s antitrust theories. There are fundamental legal and economics deficiencies in their theories that are not addressed in this paper. Instead, while we follow a legal and economic antitrust framework, we focus primarily on how and why the facts, as we understand them, do not support G&K’s theories.³

G&K center their claims on Google’s popular Ad Manager product. This ad tech product helps publishers manage the sale and placement of ads on their websites and apps, and as part of that service, connects them with ad buyers through various mechanisms,⁴ including ad auctions. G&K claim that Google has designed Ad Manager to stifle competition by favoring its own ad

² As is disclosed on their law firm’s website and in a public submission to the ACCC by News Corp., Damien Geradin and Dimitrios Katsifis represent News Corp. See, e.g., *Damien Geradin*, Geradin Partners, <https://www.geradinpartners.com/team/damien-geradin/>; see also *Submission to the Australian Competition and Consumer Commission: Response to the Digital Platforms Inquiry Preliminary Report*, News Corp Australia (Mar. 1, 2019) at 6 n. 11, <https://www.accc.gov.au/system/files/News%20Corp%20Australia%20%28March%202019%29.pdf>.

³ Damien Geradin and Dimitrios Katsifis, *An EU Competition Law Analysis of Online Display Advertising in the Programmatic Age* (Dec. 12, 2018), <https://www.ssrn.com/abstract=3299931> [hereinafter *An EU Competition Law Analysis*]; Damien Geradin and Dimitrios Katsifis, *Google’s (Forgotten) Monopoly – Ad Technology Services on the Open Web* (May 21, 2019), <https://www.ssrn.com/abstract=3391913> [hereinafter *Google’s (Forgotten) Monopoly*]; Damien Geradin, *Online Platforms and Digital Advertising Market Study Observations on the Statement of Scope* (Sept. 11, 2019), https://assets.publishing.service.gov.uk/media/5d7274da40f0b6092f56c0de/Damien_Geradin_response.pdf; Damien Geradin and Dimitrios Katsifis, “*Trust Me, I’m Fair*”: *Analysing Google’s Latest Practices in Ad Tech From the Perspective of EU Competition Law* (Oct. 7, 2019), <https://www.ssrn.com/abstract=3465780> [hereinafter *Trust Me, I’m Fair*]; Damien Geradin and Dimitrios Katsifis, *Online Platforms and Digital Advertising market study: Observations on CMA’s Interim Report* (Feb. 13, 2020), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3537864.

⁴ As explained below in Section II.B, “ad buyers” are intermediaries like ad agencies, ad networks or demand side platforms that bid in ad auctions.

auctions over those offered by competitors, and has been able to extract monopolistic rents. As we explain in this paper, their theories are unfounded. The paper is structured as follows:

In Section II, we describe ad tech concepts and terminology relevant to G&K's theories, including Google's products. We also explain how the particular ad tech concepts on which G&K are focused—open ad auctions operated by ad tech intermediaries—fit into the greater online advertising marketplace and represent a relatively small sales channel in that marketplace. Most advertiser spend on online display advertising does not involve such intermediated open ad auctions.

In Section III, we examine how Google's business model as a search engine and vertically integrated ad tech provider affects its incentives, and the implications of that for G&K's theories. Google makes the large majority of its ad revenue from Google Search, and search engines are more useful if there continues to be a wealth of free, original online content for which to search. That suggests that Google should have strong economic reasons to facilitate a competitive ad tech sector, because competitive and innovative ad tech supports publishers' ability to fund free and original content. Trying to stifle competition in ad tech, on the other hand, would undercut publishers' ability to fund free and original content and thus ultimately hurt Google's search business. As a search engine and vertically integrated ad tech provider, Google also has incentives to balance the interests of all ecosystem participants—users, publishers, and advertisers—and promote the long-term viability of the open Internet. That includes incentives to solve market externalities or “tragedy of the commons” problems, such as when publishers adopt ad practices in search of incremental revenue for themselves, only to drive users to adopt ad blockers, which harms publishers and advertisers. G&K's theories focus exclusively on the interests of publishers. As a result, they mistake conduct by Google that attempts to balance the interests of all ecosystem participants as anticompetitive.

In Section IV, we discuss how real-time bidding and Google's Ad Manager product have evolved since Google's acquisition of DoubleClick, placing these changes in the context of market developments that took place over this time, such as the emergence of header bidding and the impact that had on ad auctions. While a comprehensive description of every aspect of Google Ad Manager's workings and its development is beyond the scope of this paper, we aim to provide the key facts and context necessary for evaluating G&K's theories. We find that Google's Ad Manager product has a track record of enhancing rather than inhibiting competition, and that its evolution reflects Google's responses to rapid technological and competitive changes, as well as attempts to balance the interests of users, publishers and advertisers.

In Section V, we address each of G&K's antitrust theories of harm, starting with their claim that Google designed its Ad Manager product to favor its own ad auction by letting it see bids generated by rival auctions and then outbid them. We explain that this is actually not how Ad Manager was designed, nor how it works today, and how its design and changes to its design have promoted competition. We also address G&K's theories that Google shares insufficient data with publishers and rivals, explaining among other things that Google actually has

expanded the data it shares to enhance auction transparency while balancing that with user privacy constraints. We furthermore address G&K's theories that Google should have developed certain product features earlier, or should participate in rival auctions, observing that the public record makes clear that there were procompetitive reasons for Google's product decisions, such as reducing web page load latency or auction inefficiencies that can have adverse effects on the ecosystem.

We then consider G&K's claim that competition in ad tech has been adversely affected by Google's conduct. We find that empirical evidence in fact shows that ad tech has experienced the hallmarks of a fiercely competitive marketplace, including rapidly growing output, declining prices and relentless innovation and dynamism.

Finally, we address G&K's theory that Google may be extracting "monopolistic rents in ad intermediation" by taking undisclosed margins. We explain that this theory is flawed, among other reasons, because it is inconsistent with the empirical evidence that Google operates in a highly competitive market, such that it could not extract monopolistic rents, and because Google's overall ad tech earnings (disclosed in its public filings) in fact are in line with those of other market participants. We also explain that the theory fails to account for the procompetitive value that Google creates by reducing risk for advertisers and publishers and thereby promoting market liquidity.

In Section VI, we make some concluding remarks.

II. WHAT IS "AD TECH"?

G&K raise questions about particular software technologies used by web publishers, app developers and advertisers to help them sell and buy advertising space on websites and in mobile applications. These technologies are complex and constantly evolve. We describe below what these technologies do and how they fit into the greater online advertising marketplace.

A. Ad Tech's Role In Online Advertising

While browsing the web and using apps, users often are shown ads that fund the free or low-cost online content or services they are consuming. For example, that happens when you: scroll through your feed on Facebook or LinkedIn; catch up on your friends' Snapchat and Instagram stories; swipe on dating profiles on Badoo; stream music on Pandora or a free Spotify account; chat with friends on Viber; watch a show on Hulu, a funny cat video on YouTube, or a new dance on TikTok; consume news on Twitter or the New York Times website or app; read posts on Reddit; play Candy Crush on your phone; watch or read about sports on ESPN.com; or seek home decor inspiration on Pinterest. These and many other companies monetize their online operations in whole or in part by selling "virtual real estate" on their websites and apps to businesses who want to advertise their goods and services to users.

Each of these and other companies typically use software designed to facilitate the sale, purchase and display of ad space on websites and mobile apps. Businesses seeking to buy online ad space, typically advertisers and ad agencies, use such software to reach their desired target audience on the Internet and to optimize returns on their online ad spend. Web and app developers (often referred to as “publishers”) use such software to maximize revenue from the sale of ad space on their online properties. Collectively, that software is generally what is referred to as “ad tech.” Publishers, advertisers, and ad agencies can develop ad tech internally or source it from third-party vendors, which G&K refer to as “ad tech intermediaries.”

G&K’s theories focus on a specific issue within ad tech: competition among ad tech intermediaries to run open ad auctions in which advertisers (or vendors representing them) can bid in real-time to buy online ad space from publishers. In these intermediated open auctions, a publisher puts up for bid the opportunity for an advertiser to show an ad to a particular user at the very moment that user is browsing on that publisher’s website or using an app (often referred to as an “ad impression”).⁵ Usually, many different bidders participate in such auctions. These auctions take place in the background, in real-time, while a user waits for a website or app to load. Appendix 1 provides a simplified visualization.

Intermediated open auctions are one of several ways that advertisers and publishers transact. It represents a relatively small slice of all online display ad sales (and an even smaller slice of all online ad sales). While most online display ad sales involve the use of ad tech, the large majority of ad dollars spent on online display ad space is based on transactions between advertisers (or ad agencies) and publishers that do not involve intermediated open auctions.⁶ For example, many large publishers generate most of their ad sales directly through contracts with advertisers or agencies negotiated by their sales teams or directly through their own software platforms. Even publishers that rely on third-party ad tech providers increasingly do so to transact directly with advertisers or agencies rather than through intermediated open auctions. Direct transactions thus make up the large majority of online display ad sales. That is true for many popular user platforms and retailers like Amazon, Best Buy, CVS, eBay, Etsy, Facebook, Google, Kroger, LinkedIn, Pinterest, Reddit, Snapchat, Target, TikTok, Tripadvisor, Twitter, Walmart and Yelp, which sell much of their ad inventory through their own platforms (often through advertiser-friendly “self-serve” or “self-service” platforms).⁷ It is also true for

⁵ “Open” auctions refer to auctions that are typically open to many different advertisers. Publishers can also hold invite-only private auctions in which the publisher allows only a small, pre-defined universe of advertisers or buyers to participate. These are tightly controlled by advertisers and publishers and typically called private marketplace programmatic auctions.

⁶ eMarketer forecasts that in 2020, programmatic digital display ad spend will be 85% of total US digital display ad spend. See Lauren Fisher, *US Programmatic Digital Display Ad Spending*, eMarketer (Nov. 21, 2019), <https://www.emarketer.com/content/us-programmatic-digital-display-ad-spending>. eMarketer also forecasts that open auction will account for 17% of total US programmatic digital display ad spend in 2020. See Lauren Fisher, *Private Marketplace Ad Spending to Surpass Open Exchange in 2020*, eMarketer (Jan. 21, 2020), <https://www.emarketer.com/content/private-marketplace-ad-spending-to-surpass-open-exchange-in-2020>. Based on these forecasts, about 15% of total US display ad spend will involve open intermediated auctions in 2020.

⁷ See also, Appendix 2, Section 8.

publishers of other popular online destinations like Meredith,⁸ NBC,⁹ Rogers Media,¹⁰ as well as many major news publishers, such as the Financial Times¹¹ or New York Times.¹² While there surely are publishers and advertisers that sell and buy to a greater extent on intermediated open auctions, for many it does not represent a significant part of their ad sales or spend, or accounts for a decreasing share of their sales, such as News UK and The Guardian.¹³

This means that G&K's antitrust theories about Google's intermediated open auction products concern a relatively small sales channel in online advertising. In fact, as we understand it, Google typically does not act as an intermediary at all (much less as an open auction intermediary) for advertisements displayed on popular destinations like Amazon, Facebook, LinkedIn, Pinterest, Snapchat, Twitter, TikTok etc., where advertisers and agencies often spend much of their ad budget. Facebook alone reportedly accounts for about half of all display advertising revenues.¹⁴ What is more, it has become easy and common to shift between direct transactions and intermediated open auctions based on what generates the best returns, especially with direct sales increasingly done through publishers' self-service platforms or other programmatic channels.¹⁵ Theories that Google is able to operate its intermediated open auctions in a way that constrains output of online display ad sales, must be evaluated with this broader context in mind.

B. Ad Tech Concepts And Terminology

With that background, the balance of this paper will focus on the narrow ad tech issues raised by G&K. Below we explain some of the key related concepts, products and technologies.

⁸ See BeetTV, *Programmatic Ad Rates Will Be Higher Than Direct: Meredith's Schenck*, YouTube (Mar. 20, 2018) at 00:01-00:15, <https://www.youtube.com/watch?v=yIVoQ01S3zY>. Meredith operates a number of brands including AllRecipes, Entertainment, People and many more. See *Our Brands*, Meredith, <https://www.meredith.com/national-media/brands>.

⁹ NBC's new streaming service, Peacock, for example, will exclusively sell ads directly at launch. See *The Big Story: Call Of The Peacock*, AdExchanger (Jan. 22, 2020) at 31:05-31:26, <https://www.adexchanger.com/podcast/the-big-story/the-big-story-call-of-the-peacock/>.

¹⁰ Google Ad Manager, *Rogers Media Uses Programmatic Guaranteed to Streamline Premium Deals*, YouTube (Mar. 12, 2019) at 00:51-00:59, https://www.youtube.com/watch?v=Af1rWC7_wGQ.

¹¹ *The GDPR Is Leading Some Publishers to Shut Off Open Exchanges*, eMarketer (June 11, 2018), <https://www.emarketer.com/content/the-gdpr-is-leading-some-publishers-to-shutoff-open-exchanges-3>.

¹² See Tim Peterson, *The New York Times Has Folded its Programmatic Sales Team Into its Larger Ad Sales Org*, DigiDay (Mar. 7, 2018), <https://digiday.com/media/new-york-times-folded-programmatic-sales-team-larger-ad-sales-org/>.

¹³ Jessica Davies, *Top UK Publishers Say They'll Move to Reduce Ads Bought Through Open Ad Exchanges*, Digiday (Jan. 18, 2019), <https://digiday.com/uk/uk-publishers-reduce-ads-bought-open-ad-exchanges/>.

¹⁴ Donna Fuscaldo, *Facebook and Google to See Advertising Slow Due to Coronavirus*, Motley Fool (Mar. 25, 2020), <https://www.fool.com/investing/2020/03/25/facebook-and-google-to-see-advertising-slow-due-to.aspx>.

¹⁵ See, for example, Section IV for a discussion of how Google's Enhanced Dynamic Allocation in Ad Manager and unified auctions more generally create the ability to shift between direct and intermediated based on which offers the most competitive return. Advertisers achieve this through marketing mix and supply path optimization tools and techniques.

In ad tech, the publisher-side of the marketplace is often referred to as the “supply-side” or “sell-side,” while the advertiser-side of the marketplace is often referred to as “demand-side” or “buy-side.” As discussed in the next Section, historically, there have been several types of ad tech products. Over time, as the industry evolved, the distinctions between, and functionalities of, these products have blurred. Certain products that were historically distinct today overlap substantially in the functionality they provide, and advertisers and publishers use various different types of product as substitutes in whole or in part when buying and selling ad inventory.

Buy-side tools: Advertisers use several tools to buy and place ads online. These include advertiser-side ad servers. Advertiser-side ad servers decide which creatives to send to each web publisher, track ad performance across sites and publishers, and consolidate reporting. Advertisers also use buying platforms or ad networks to bid on and buy ad space online. Some of these platforms are called “demand-side platforms” or “DSPs.” In what follows there is no need to distinguish between ad networks, DSPs and other buying platforms. All are software platforms that help advertisers and ad agencies bid on and buy ad space and optimize their ad campaigns, often across different sources of online ad inventory (i.e. across different websites or apps). And many buy-side tools (including the self-serve platforms offered by certain publishers mentioned above) now include both ad serving and ad buying capabilities, such that the lines between advertiser-side ad servers and buying platforms is blurring as well. Advertisers regularly retain ad agencies to do their ad serving and buying for them, and many ad agencies have trading desks with internal ad serving and buying platforms, though they often also use third-party platforms.

In discussing open auctions in this paper, we often use the term “ad buyers.” That is a commonly used term in the industry. It typically refers to the buy-side tools and vendors like DSPs, ad networks and ad agency trading desks. That is how we will use the term “ad buyer” in this paper. Ad buyers bid on ad impressions for advertisers in open auctions, such as auctions held on ad exchanges or supply-side platforms (SSPs) (discussed below). Note that ad buyers often first run an internal auction-like process among advertisers on their own platform,¹⁶ and then bid for the winning advertiser in an open auction.

Google’s buy-side tools are Google Ads (previously called AdWords), Display & Video 360 (DV360) (previously called DoubleClick Bid Manager (DBM)) and Campaign Manager (previously called DoubleClick Campaign Manager (DCM) and, before that, DoubleClick for Advertisers (DFA)). Google Ads and DV360 enable advertisers and agencies to buy ad inventory both on Google’s own properties and on third-party publisher properties. Google Ads and DV360 also both buy on Google’s Ad Manager ad exchange and on third-party ad exchanges. Campaign Manager provides advertisers ad serving and reporting capabilities.

There are many other providers of buy-side tools. Some are so-called “pure-play” ad tech intermediaries. They only offer tools to enable advertisers to serve or buy ad inventory on third-party publisher properties, but do not sell their own ad inventory. Examples include: Adform,

¹⁶ See Jordan Linville, *How A DSP Can Increase Win-Rates Through Multi-Bid*, PubMatic (Oct. 31, 2017), <https://pubmatic.com/blog/dsp-can-increase-win-rates-multi-bid/>.

Adobe, Amobee, Criteo, Extreme Reach, Flashtalking, Innovid, MediaMath, The Trade Desk, Weborama and many more.¹⁷ Of those examples, Adform, Extreme Reach, Flashtalking, Innovid and Weborama offer ad serving capabilities. Then there are ad tech intermediaries who are also publishers. Their buy-side tools typically enable advertisers to buy ad inventory on their own properties and on properties owned by third-party publishers. In addition to Google, examples include Amazon, AT&T's Xandr, Facebook, Microsoft, Twitter and Verizon Media. Google's and Amazon's buy-side tools include ad servers and buying platforms. Finally, there are buy-side tools offered by web publishers that are designed to enable advertisers to buy ad inventory on their own properties (so-called self-serve platforms).¹⁸

Sell-side tools: Publishers may use several tools to sell their ad inventory to advertisers. These include publisher-side ad servers or ad networks to help serve the right ad in the right ad unit on the publisher's online properties at the right time. They may also use such tools to manage and forecast ad sales and returns across different sales channels and buyers, enable ad targeting and support billing. In addition to ad servers and ad networks, publishers may also use ad exchanges or SSPs. While these sell-side tools were first developed as distinct products more than ten years ago, in today's world, the differences between them are diminishing. The terms ad exchange and SSP, for example, are often used interchangeably in the industry, and we will do the same in this paper. Even the distinction between publisher-side ad servers and SSPs has been blurring in recent years, with it becoming common in the industry to offer ad serving and SSP functionalities on a single platform.¹⁹ Today, sell-side tools typically enable publishers to sell through real-time bidding auctions in which ad buyers can bid on a particular ad impression on a publisher's website or app, including the open ad auctions discussed above. These tools therefore also interface with ad buyers to facilitate such competitive bidding.

Google's sell-side display tools include Google Ad Manager ("GAM" or "Ad Manager"), AdSense for Content, and AdMob (for apps). Google's Ad Manager platform includes ad server functionality and optional real-time auction capabilities, including an ad exchange. Each can be used separately and in conjunction with third-party products.²⁰ The ad server in Ad Manager was previously called DoubleClick for Publishers ("DFP"). The ad exchange in Ad Manager was previously called "DoubleClick Ad Exchange" or "AdX." For ease of reference, in the context of discussing G&K's allegations, we still use the old DFP and AdX names in this paper. In addition to Google Ads and DV360, there are many third-party ad buyers bidding on AdX (which are

¹⁷ See Appendix 2, Sections 1-3.

¹⁸ Examples were provided above. See also, Appendix 2, Section 8.

¹⁹ For example, Smart advertises its SSP as being "natively integrated into the ad server" and requires "no switching between platforms." *Unified Auction. Transparency & Control. 100% Value Path Optimization.*, Smart, <https://smartadserver.com/publishers/#section-01>; Comcast's FreeWheel likewise reportedly "integrated [its] SSP into its ad server to make transacting easier for publishers." See Rae Paoletta, *FreeWheel Launches Ad Product Suite, Boosts Competition with Roku*, AdExchanger (Oct. 15, 2018), <https://www.adexchanger.com/digital-tv/freewheel-launches-ad-product-suite-boosts-competition-with-roku/>. AT&T's Xandr markets its "Xandr Monetize" platform as having both SSP and ad serving capabilities. *Xandr Monetize*, Xandr, <https://www.xandr.com/platform/monetize/>.

²⁰ Google help center makes clear that you can choose whether to use Google's exchange even if you use Ad Manager to serve ads. *Create and Manage Yield Groups*, Google, <https://support.google.com/admanager/answer/7390828?hl=en>.

collectively called Authorized Buyers). More detail about how Google's Ad Manager product works today and worked in the past are described in Sections IV below.

There are many other providers of sell-side tools. Some are ad tech intermediaries focused on sell-side tools. Examples include AdColony, Chartboost, Comcast's FreeWheel, Fyber, Index Exchange, InMobi, ironSource, OpenX, Outbrain, PubMatic, Rubicon Project, Taboola, Teads, Unity and Vungle.²¹ Others offer both buy and sell-side tools. Beyond Google, examples include Amazon, AT&T's Xandr, Twitter's MoPub and Verizon Media.²²

Examples of providers offering publisher-side ad servers (or mobile app equivalents, called mediation platforms), in addition to Google, include Adform, AT&T's Xandr, Comcast's FreeWheel, PubMatic, Smart, SpotX, ironSource, Twitter's MoPub and others.²³ Each of them offer both ad serving and real-time auction capabilities as part of their sell-side offering. Few offer publisher-side ad serving capabilities without auction functionality. In-house ad serving systems are also commonplace, especially among larger publishers. Small publishers, on the other hand, typically rely on a third-party ad server or simply use ad networks (without a separate ad server) to serve ads on their sites, although there are providers like Adzerk that help small publishers build in-house ad servers as well. Ad networks and other sell-side tools can also be used without an ad server by placing an ad tag on the webpage that directly connects to the ad network or other sell-side tool. For mobile apps, that can be achieved with a software development kit integration between the app and ad network.²⁴

In recent years, another sell-side tool called "header bidding" has emerged, which enabled publishers to have multiple ad exchanges and ad networks to submit real-time bids for an ad impression in a single auction. The tool and its origins are described in further detail below. Prebid.org, an open-source organization, was among the first to offer a header bidding solution and it is still widely used. But its so-called "client-side" header bidding solution came with a number of challenges, which has prompted several providers to offer so-called "server-side" header bidding or similar solutions. Today, many providers of sell-side tools also offer a header bidding solution or an equivalent as part of their sell-side tools, including Amazon, AT&T's Xandr, Index Exchange, OpenX and PubMatic, among several others.²⁵ There are also equivalents of header bidding auctions for mobile app advertising. Examples of ad tech intermediaries offering those include AppLovin, Fyber, PubMatic, ironSource, Twitter's MoPub and several more.²⁶

Google developed and launched an alternative to header bidding auctions, called Open Bidding (previously called Exchange Bidding). Through Open Bidding, multiple third-party ad exchanges can bid on impressions sold via Ad Manager. Open Bidding is an optional feature of

²¹ See Appendix 2, Sections 4-7.

²² See Appendix 2, Sections 4-6.

²³ See Appendix 2, Sections 6-7.

²⁴ See, e.g., *Mobile SDK Advertising: Increase mobile app revenue with the ironSource ad SDK*, ironSource, <https://www.ironsrc.com/mobile-advertising-sdk/>.

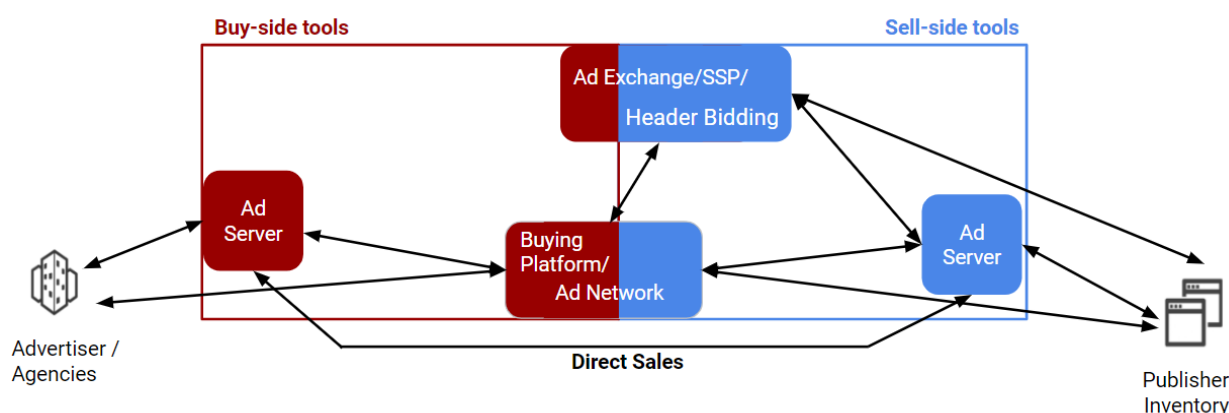
²⁵ See Appendix 2, Sections 5, 7.

²⁶ *Id.*

Google's Ad Manager platform. Publishers can also funnel bids from header bidding auctions into Ad Manager to compete against bids submitted in the auction that occurs inside Ad Manager. Sections IV.E-G below describes how this and Open Bidding work.

Figure 1 below is a simplified depiction of how some of these ad tech products fit together. It inevitably leaves out a lot of nuance, and ad tech constantly evolves, so it may soon look quite different to how it is depicted below. For example, while it is shown separately, as noted above, publisher ad server platforms today typically also include an ad exchange. As shown with the arrows, there are several alternative channels through which an ad impression can be sold and purchased. Many advertisers and publishers use multiple channels and ad tech products in conjunction with each other.

Figure 1



III. GOOGLE'S BUSINESS MODEL AND INCENTIVES IN AD TECH

Before turning to a deeper dive into Google's ad tech products at the heart of G&K's theories, we take a step back to look at Google's overall business model and how it is likely to affect its objectives and incentives in ad tech. That provides important context for evaluating Google's ad tech product designs and practices, including the ones G&K focus on. After all, in antitrust analysis, in addition to evaluating empirical evidence, it is important to evaluate whether a firm is likely to engage in anticompetitive conduct in the first place.

First, consider that Google's largest business is still by far Google Search. Based on Google's public filings, Search generated 63% of Google's overall revenues and 73% of its advertising revenues in 2018.²⁷ As such, Google should have a strong business interest in supporting a

²⁷ Calculated as "Google Search & other revenue" divided by "Total revenues" and "Google Search & other revenue" divided by "Google advertising revenue"; (\$85.296b/\$136.362b) and (\$85.296b/\$116.461b). See *Alphabet Inc., Annual Report (Form 10-K)*, U.S. Securities and Exchange Commission (Feb. 3, 2020) at 29, <https://www.sec.gov/Archives/edgar/data/1652044/000165204420000008/goog10-k2019.htm>.

vibrant open, ad-supported Internet.²⁸ After all, people use Google Search to find useful information online that is responsive to their queries; Google's search engine would be less useful if there were a dearth of free and original content on websites for which users can search.

Google's presence, investments and innovations in ad tech make sense in that context, even if ad tech in itself accounts for a relatively small proportion of Google's net ad revenue (by our calculations about 7% in 2018).²⁹ A competitive and open ad tech marketplace helps publishers optimize yield from ad sales. It also helps advertisers increase their returns from online advertising and thus promotes growth in online ad spend, which in turn helps web publishers grow their ad sales. All of that helps web publishers fund the creation of free and original online content, which is good for the open Internet and thus search engines. Given the importance of a vibrant open and ad-supported Internet to Google's search business and the comparatively limited revenue Google derives from its ad tech business, any suggestion that Google is taking actions to constrain output, inflate prices or stifle innovation in ad tech warrant evaluation with a skeptical eye.

Illustrative, in this respect, is that Google's ad tech products let advertisers and publishers use Google's and competing ad tech products together in several ways. For example, Google's DV360 platform enables bidding on more than 80 non-Google exchanges,³⁰ and Google's Ad Manager ad server can be used by publishers to call any third-party vendor that provides an appropriate ad tag.³¹ Similarly, Google's Ad Manager ad exchange can collect bids from countless ad buyers, including many third-party DSPs and ad networks.³² These ad buyers typically also bid on any number of other ad exchanges. Google's Ad Manager also enables

²⁸ See, e.g., Sundar Pichai, *Google's Sundar Pichai: Privacy Should Not Be a Luxury Good*, New York Times (May 7, 2019), <https://www.nytimes.com/2019/05/07/opinion/google-sundar-pichai-privacy.html> (“[Advertising revenue] sustains a broad community of content creators, which in turn helps keep content on the web free for everyone.”); USENIX Enigma Conference, *USENIX Enigma 2020 - Browser Privacy: Opportunities and Tradeoffs (Panel)*, YouTube (Mar. 10, 2020) at 20:59-21:03, https://www.youtube.com/watch?time_continue=3&v=xakXPfyFUI&feature=emb_logo (Comments by Justin Schuh, Engineering Director Chrome Trust & Safety: “We really want to, essentially, make the whole web better.”); Wendy Tanaka, *Google's Chrome Details*, Forbes (Sept. 2, 2008), https://www.forbes.com/2008/09/02/google-browser-chrome-tech-enter-cx_wt_0902chromeworks.html#b5325cf6b7f8 (“If the Web gets better, more users use the Web, and Google benefits. We care about this a lot.”).

²⁹ Calculated as “Google Network Members’ properties revenue” (at 27) minus associated traffic acquisition costs (at 32), which is then divided by “Google advertising revenues” (at 27) minus associated traffic acquisition costs (at 32); (\$19.982b-\$14.154b)/(\$116.318b - \$14.154b - \$12.572b). *Alphabet Inc., Annual Report (Form 10-K)*, U.S. Securities and Exchange Commission (Feb. 4, 2019), <https://www.sec.gov/Archives/edgar/data/1652044/000165204419000004/goog10-kq42018.htm>.

³⁰ See *Supported Display Exchanges*, Google, https://support.google.com/displayvideo/table/3267029?hl=en&ref_topic=3224955.

³¹ See *Line Item Types and Priorities*, Google, <https://support.google.com/admanager/answer/177279?hl=en> (“Any third-party ad network or exchange that provides an appropriate ad tag can be represented by a non-guaranteed line item that competes based on a price that you enter into Ad Manager—for example, this is how header bidding can be configured.”).

³² See *Ad Manager Certified External Vendors*, Google, <https://developers.google.com/third-party-ads/adx-vendors>.

publishers to solicit real-time bids through some 20 different third-party ad exchanges in addition to Google's own ad exchange.³³ Google even enables publishers using its Ad Manager platform to only solicit bids through third-party ad exchanges and not through Google's ad exchange.³⁴ This fostering of interoperability and head-to-head competition with Google's ad tech products is hard to square with a theory that Google is looking to destroy or weaken competition in ad tech.

Second, the combination of Google's search business and its vertical ad tech integration should give it incentives to balance the interests of all ecosystem participants (users, advertisers and publishers) and solve for externalities that threaten the long-term viability of the ecosystem.³⁵ Google's actions and positions over the years show as much.³⁶

As an example, one of the reasons some users turn on ad blockers is because some ad-filled pages take longer to load and also run down phone batteries. A single publisher may not worry about its impact on aggregate ad blocker uptake. However, if all publishers fill their pages with ads or use annoying ad formats, more users turn on ad blockers and this harms advertisers, and ultimately harms other publishers (an example of the so-called "tragedy of the commons").³⁷ As a result, Google likely cares more about an issue like long page load times than any individual publisher does because of its impact on the ecosystem as a whole, on users, advertisers and publishers. One would expect it to affect Google to a much greater extent than individual publishers or advertisers, or individual ad tech providers that do not have a user-focused business or are focused on one side of the ad tech chain. As discussed below, a similar calculus may well also be true with respect to the adoption of header bidding, which likewise carries latency and other broader risks to the ecosystem.

³³ See *Introduction to Open Bidding*, Google, <https://support.google.com/admanager/answer/7128453?hl=en>.

³⁴ *Create and Manage Yield Groups*, Google, <https://support.google.com/admanager/answer/7390828?hl=en> ("[Y]ou can choose to block Ad Exchange (or individual Ad Exchange buyers, including Display & Video 360 and the Google Display Network) from a yield group using Inventory Protections.").

³⁵ Google's presence across the buy and sell-side of ad tech also give it incentives to promote efficiency traditionally associated with vertical integration, such as incentives to reduce double marginalization, latency between products, etc.

³⁶ Scott Spencer, *Protecting the Mobile App Ecosystem*, (Feb. 20, 2020), <https://www.blog.google/products/admob/protecting-mobile-app-ecosystem/> ("For over 20 years, Google has been heavily investing in creating a healthier ads ecosystem that generates value fairly, for everyone involved."). See also, Scott Spencer, *Enabling a Safe Digital Advertising Ecosystem*, Google (Mar. 14, 2019), <https://www.blog.google/products/ads/enabling-safe-digital-advertising-ecosystem/>; Andres Ferrate, *Additional Safeguards to Protect the Quality of Our Ad Network*, (Aug. 21, 2019), <https://www.blog.google/products/adsense/additional-safeguards-protect-quality-our-ad-network/> ("Supporting a healthy ads ecosystem that works for publishers, advertisers, and users continues to be a top priority in our effort to sustain a free and open web.").

³⁷ Around 30% of all internet users now use ad blockers. Additionally, one survey regarding users' motivations for using an ad blocker found that 33% of respondents desired faster page load times and 23% of respondents desired to slow the battery drain on their devices. See Daniyal Malik, *Global Ad-Blocking Behaviors In 2019 - Stats & Consumer Trends*, Digital Information World (Apr. 1, 2019), <https://www.digitalinformationworld.com/2019/04/global-ad-blocking-behaviors-infographic.html>.

Google's investments in technologies to fight ad fraud and other "invalid activity"³⁸ also illustrate Google's incentives to act in the long-term interests of the ecosystem, even if it may not be in the short-term interests of some ecosystem participants. For example, measures to combat common ad fraud practices like "click fraud" could seem to reduce ad revenue, since it would reduce fraudulent clicks for which one could otherwise charge. But ad fraud is a threat to the trust in and long-term health of ad tech and the open Internet, and thus to Google's search and ad tech businesses.³⁹

It is important to take all of this into consideration when evaluating the product designs and practices G&K raise in their theories, and to vet carefully whether they reflect attempts to stifle competition or rather are efforts to balance interests of various industry stakeholders in the interest of the long-term health of the ecosystem. G&K's theories seem to be largely, if not exclusively, focused on the short-term interests of certain types of publishers. As a result, they mistakenly characterize anything they perceive as adversely affecting publishers in the short-term as anticompetitive.

IV. THE EVOLUTION OF REAL-TIME BIDDING AND GOOGLE AD MANAGER

G&K's theories about Google's Ad Manager product trace back to an innovation that DoubleClick introduced in 2007, prior to DoubleClick's 2008 acquisition by Google. An evaluation of their theories thus requires a look back to the 2000s and how real-time bidding and Ad Manager have evolved since then. As this shows, Google constantly innovated Ad Manager to keep up with rapid technological and competitive change, as well as to continuously balance the interests of users, advertisers and publishers. Due to its scope, this paper covers but a few of many innovations and changes that Google has made to Ad Manager.

A. The Waterfall Process In Ad Servers

In the early 2000s, web publishers mostly sold their ad space through direct contracts and ad networks. Their directly negotiated "guaranteed" sales contracts with advertisers or agencies (typically with a negotiated fixed price, volume and timeframe) would be prioritized before

³⁸ In 2018, Google launched 330 detection classifiers to help us better detect "badness" at the page level, took down 2.3 billion "bad ads," terminated 1 million bad advertiser accounts, terminated 734,000 publishers and app developers from our ad network, removed ads completely from nearly 1.5 million apps and took ads off nearly 28 million pages that violated Google's publishers; further, it worked with White Ops and the FBI to "take down one of the largest and most complex international ad fraud operations [Google had] ever seen." Scott Spencer, *Enabling a Safe Digital Advertising Ecosystem*, Google (Mar. 14, 2019), <https://www.blog.google/products/ads/enabling-safe-digital-advertising-ecosystem/>.

³⁹ Jeff Stone, *How Scammers Made Ad Fraud a Billion-Dollar Criminal Industry*, CyberScoop (May 10, 2019), <https://www.cyberscoop.com/how-scammers-made-ad-fraud-a-billion-dollar-criminal-industry/> ("Unchecked internet fraud isn't just a problem for advertisers and publishers, it also represents an 'existential' threat to Google . . . A large portion of the company's business relies on advertising revenue and, if clients cease to trust the advertising ecosystem, that spells trouble for Google's short and long term plans, Bjorke said. 'It's very simple,' he said. 'The future growth of Google and other companies hinges on the fact that online advertising is trusted, and that there will be a return on investment on ad budgets It's very important for us [because] people could stop investing in advertisements.'").

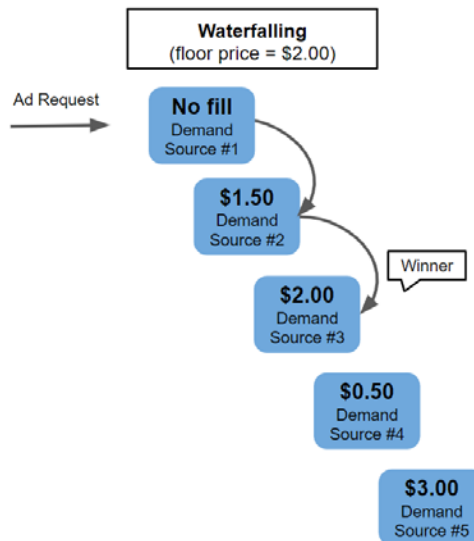
publishers sold inventory using other tools. For less valuable ad units that did not justify the transaction costs of such direct selling—called “remnant” inventory—publishers would turn to ad networks that would aggregate that inventory from many publishers and then sell it to advertisers.

At that time, publishers with such direct and remnant sales channels would set up a so-called “waterfall” process in their ad server to maximize yield from their ad sales. In that process, the ad server would first seek to fill an impression with an ad from an eligible guaranteed sales contract, to ensure the publisher fulfilled its contractual obligations. The publisher would set up “guaranteed line items” for that purpose in its ad server. If there was no such eligible guaranteed line item, then the server would attempt to sell that (by definition) remnant inventory by sequentially calling a series of ad networks in an order determined by the publisher. For this purpose, the publisher would set up “remnant” or “non-guaranteed” line items in the ad server. If the first ad network would not buy remnant inventory at or above the floor price set by the publisher for a particular ad unit or impression, the ad server would call the second network etc., until the impression was filled or could not be filled.

In this waterfall process, a publisher typically would determine the order in which to call ad networks based on data about their historical average performance (e.g. dividing the total revenue from an ad network by the number of impressions sold to the ad network), based on negotiated fixed-price deals, or any other method the publisher saw fit. Publishers would periodically re-evaluate the historical performance of ad networks and adjust their sequence in the waterfall accordingly (which was a time-consuming process). For example, if it turned out that a particular ad network over time was paying less than the publisher had estimated, publishers would likely put them lower in the waterfall and move better-paying ad networks up.

This waterfall process had inefficiencies and potentially left a significant amount of money on the table for publishers. In particular, it was possible that an ad network would be called first and “win” in the waterfall process based on its historical performance, while another ad network further down in the waterfall actually was able to pay a higher price for the particular ad impression. This is depicted below. Notice how “Demand Source #3” (i.e. ad network prioritized in position #3) won despite the fact that “Demand Source #5,” further down the waterfall, could have generated the most money for the publisher. When ad exchanges emerged, they would likewise be slotted into this waterfall process.

Figure 2



B. DoubleClick Introduces Dynamic Allocation

In 2007, before its acquisition by Google closed,⁴⁰ DoubleClick launched a new feature in DFP called Dynamic Allocation. Using DoubleClick’s newly-launched ad exchange,⁴¹ Dynamic Allocation solved for the above-described inefficiency in the waterfall process by enabling publishers to solicit real-time bids for ad impressions not fulfilled by guaranteed line items. As DoubleClick’s website explained it at the time: “DoubleClick’s proprietary Dynamic Allocation system sells inventory through the channel that pays the highest price, in real-time.”⁴² It worked as follows:⁴³

- DFP would first determine whether there was a guaranteed line item eligible to fulfill an ad impression. If there was, no remnant line item would be called and Dynamic Allocation would not kick in.

⁴⁰ Press Release, *Google Closes Acquisition of DoubleClick*, Google (Mar. 11, 2008), http://googlepress.blogspot.com/2008/03/google-closes-acquisition-of_11.html.

⁴¹ Louise Story, *DoubleClick to Set Up an Exchange for Buying and Selling Digital Ads*, New York Times (Apr. 4, 2007), <https://www.nytimes.com/2007/04/04/business/media/04adco.html>.

⁴² *DoubleClick Advertising Exchange*, DoubleClick (via WebArchive.org) (Oct. 1, 2007), <https://web.archive.org/web/20071001100309/http://www.doubleclick.com/products/advertisingexchange/index.aspx>.

⁴³ This process is generally described on Google’s support pages, with the exception that it reflects changes as a result of the rollout of “Enhanced Dynamic Allocation.” *Dynamic Allocation*, Google, <https://support.google.com/admanager/answer/3721872?hl=en>; see also *Online Platforms and Digital Advertising Market Study Interim Report: Appendix H: Intermediation in Digital Advertising*, Competition and Markets Authority (Dec. 18, 2019) ¶ 15, https://assets.publishing.service.gov.uk/media/5dfa172240f0b6217b108351/Appendix_H2.pdf [hereinafter *CMA Appendix H*]. See generally, *Profiting from Non-Guaranteed Advertising: The Value of Dynamic Allocation & Auction Pricing for Online Publishers*, DoubleClick (by Google) at 3, http://static.googleusercontent.com/media/www.google.com/en/us/adexchange/DC_Ad_Exchange_WP_100713.pdf.

- If not, Dynamic Allocation enabled publishers to establish a “floor price” for AdX buyers to beat.
- The “floor price” was at least the highest net value CPM⁴⁴ set by the publisher for its remnant line items. Publishers typically set the net value CPM for their booked static remnant line items based on their estimates of what CPM the line item would likely generate (taking into account its historical performance) or based on a fixed-price the publisher had negotiated with a particular remnant demand partner.
- This “floor price” was then shared with all AdX buyers, after which AdX buyers would submit their real-time bids.
- If it cleared the floor price, the highest AdX bidder would win and pay the price bid by the second-highest bidder or the floor price, if higher. That is, AdX was a second-price auction. If AdX buyers did not bid above the floor price (on a net basis, i.e. after consideration of AdX’s revenue share), the static remnant line item with the highest fixed or estimated price would win the impression.

Dynamic Allocation thus enabled publishers to determine in real-time whether there were ad buyers willing to pay a price for a particular ad impression greater than what the publisher estimated its remnant demand partners would generate or than the fixed-price negotiated with remnant demand partners.⁴⁵

From the outset, DoubleClick ran AdX as a second-price auction for ad buyers. Second-price auctions have attractive properties from an economic efficiency perspective, with buyers better incentivized to bid their true value because they know that they only need to pay the price bid by the second-highest bidder if they win. This simplifies bidding strategies for buyers; they do not need a complex model of the competitive landscape when determining their bids. It also allows for sustainable revenue generation for publishers. Like DoubleClick, Google and many others therefore used second-price auctions to sell ad inventory. Indeed, it is still today Google’s mechanism of choice for sale of its own ad inventory on Google.com.

C. Google Enhances Dynamic Allocation

In 2014, Google introduced a further innovation, known as Enhanced Dynamic Allocation (EDA). EDA enabled publishers to have AdX buyers and other remnant demand sources compete not only with each other but also with guaranteed deals, while ensuring that this would not interfere

⁴⁴ Cost-per-mille (i.e. cost-per-thousand impressions), this is a common method of measuring ad prices.

⁴⁵ According to a 2010 study from Google, Dynamic Allocation resulted in an average CPM lift of 136% compared with fixed, upfront, pre-negotiated sales of non-guaranteed inventory. *Profiting from Non-Guaranteed Advertising: The Value of Dynamic Allocation & Auction Pricing for Online Publishers*, DoubleClick (by Google), http://static.googleusercontent.com/media/www.google.com/en/us/adexchange/DC_Ad_Exchange_WP_1_00713.pdf.

with the publisher's compliance with its volume commitments under guaranteed deals.⁴⁶ This allowed the indirect (remnant) channel to win the impression if the revenue to be derived from that buyer was higher than the opportunity cost of not serving under the guaranteed deal.⁴⁷ EDA increased competition between the publishers' guaranteed deals, AdX buyers and other remnant demand sources, including those informed by header bidding (when that emerged), generating more revenue for publishers. Competing ad networks and exchanges (used by publishers in remnant line items) also gained from the launch of EDA as they now had an opportunity to compete against guaranteed deals. The highest available offer from remnant line items and AdX would win the impression, as long as that offer was higher than the opportunity cost of not serving a guaranteed impression.⁴⁸

D. The Emergence Of RTB Protocols And Header Bidding

Several years after DoubleClick created Dynamic Allocation, the industry began developing industry-wide protocols for real-time bidding. The OpenRTB Consortium was formed for that purpose around 2011.⁴⁹ Industry adoption of the protocols they developed occurred around 2012, when the protocols became the IAB standard.⁵⁰ Based on those protocols, industry participants began developing auction solutions that enabled real-time bidding among multiple ad exchanges.

This ultimately led to the emergence of header bidding. Header bidding is a Javascript tool designed to run an auction among different ad exchanges and ad networks to sell a publisher's ad impression. It is thus an "auction of auctions" tool, since it runs an auction among tools that

⁴⁶ See *CMA Appendix H* ¶ 15 ("In 2014, Google introduced Enhanced Dynamic Allocation, which extended the principle of dynamic allocation to 'guaranteed line items', i.e. direct deals. Direct deals were no longer always prioritised over other bids, but AdX bids (and other SSPs' estimated bids) could win the impression if they were sufficiently high and if this did not cause under-delivery of the direct deal.").

⁴⁷ Prior to EDA, guaranteed deals had priority for all impressions matching their criteria, resulting in an inefficient outcome in cases when: (i) a remnant source would pay a publisher more for the impression, and (ii) there were still plenty of opportunities forthcoming for the guaranteed deal's commitments to be met. EDA solved this inefficiency by optimizing publisher revenue without causing under-delivery of the guaranteed line item. To do this, Ad Manager creates a temporary CPM for the best guaranteed line item. This value can be thought of as an "opportunity cost" of not serving the guaranteed line item and protects against under delivery. In general, the more "behind schedule" the line item is, the higher the temporary CPM that is passed to AdX. This process allows AdX buyers, Open Bidders, and eligible remnant line items to compete with the best guaranteed line item and thereby "maximizes efficiency and increases publisher yield/advertiser value compared to a static allocation/'waterfall' system." See *generally Id.*; *Dynamic Allocation*, Google, <https://support.google.com/admanager/answer/3721872?hl=en>.

⁴⁸ Thus, to the extent that G&K's claim that EDA allowed AdX to "jump even ahead of direct deals in the waterfall" or gave it some special advantage over other remnant line items, that is not correct given that other remnant line items could also win out over guaranteed line items under EDA. See *Trust Me, I'm Fair* at 9.

⁴⁹ Ben Trender, *OpenRTB Consortium*, AdMonsters (Dec. 22, 2010), <https://www.admonsters.com/openrtb-consortium/>.

⁵⁰ *Real Time Bidding (RTB) Project: OpenRTB API Specification Version 2.5*, IAB (Dec. 2016) at 2, <https://www.iab.com/wp-content/uploads/2016/03/OpenRTB-API-Specification-Version-2-5-FINAL.pdf> ("Due to very widespread adoption by the industry, OpenRTB was adopted as an IAB standard in January 2012 with the release of version 2.1.").

themselves run auctions (ad exchanges and SSPs). Initially, and in many cases still today, header bidding auctions have run inside a user's browser, in the header of a publisher's website. It is therefore called "client-side" header bidding, and works as follows: from the browser, a so-called header bidding wrapper calls participating ad exchanges, which then return their bids in response; the wrapper then selects the winning bid and sends that bid into the publisher's ad server if a publisher has set up the ad server to do so; if a publisher preferred it, the wrapper could also send the winning bid directly to the publisher without going through its ad server. There are also several server-based header bidding auction solutions. In that scenario, the auction occurs on a server instead of in the user's browser, which reduces certain problems associated with client-side header bidding, such as increased page load latency. All header bidding auctions occur *before* a publisher's ad server is called or even is "aware" that there is an impression to be served.

While some header bidding-like concepts may have emerged earlier, the ones that ultimately became more widely used did not emerge in earnest until 2015, when a team from AppNexus (now AT&T's Xandr) released its prototype open-source client-side header solution, Prebid.js.⁵¹ By 2016, header bidding was still in its "early stages,"⁵² and it was not until late 2017 that Prebid.org was founded and Prebid.js 1.0 was launched.⁵³

Client-side header bidding like Prebid's product came with significant shortcomings affecting publishers, advertisers and users. For example, it is widely recognized that client-side header bidding implementations are associated with: (i) page load latency;⁵⁴ (ii) discrepancies in performance metrics used to determine advertiser invoices;⁵⁵ (iii) compromised user trust, security and privacy;⁵⁶ and (iv) high engineering and setup costs.⁵⁷

Moreover, header bidding introduced an auction of auctions, which created potential inefficiencies by developing multiple paths to the same ad impression. In particular, auctions of auctions increase the risk that bid prices are inflated because advertisers may unknowingly compete against themselves for the same ad impression by participating in different exchanges

⁵¹ *Happy Birthday, Prebid.js!*, Prebid (Aug. 31, 2016), <http://prebid.org/blog/happy-birthday-prebid-js>.

⁵² *Id.*

⁵³ *Announcing Prebid.js 1.0*, Prebid (Sept. 25, 2017), <http://prebid.org/blog/announcing-prebid-1-0>; *About Prebid.org*, Prebid <http://prebid.org/overview/what-is-prebid-org.html>.

⁵⁴ Jessica Davies, *Beware of Page Latency: The Side Effects to Header Bidding*, Digiday (Sept. 20, 2016), <https://digiday.com/uk/beware-page-latency-side-effects-header-bidding/>.

⁵⁵ James Curran, *For Publishers, Header Bidding Discrepancies Can Outweigh Revenue Lift*, AdExchanger (July 8, 2016), <https://adexchanger.com/the-sell-sider/publishers-header-bidding-discrepancies-can-outweigh-revenue-lift/>.

⁵⁶ See Ross Benes, *Unraveling Header Bidding's Problems With User Data*, DigiDay (Mar. 20, 2017), <https://digiday.com/media/header-bidding-security/>; Courtney Touchstone, *What Publishers Need to Know about Data Leakage*, SpotX (Aug. 9, 2018), <https://www.spotx.tv/resources/blog/product-pulse/what-publishers-need-to-know-about-data-leakage/>.

⁵⁷ *Header Bidding Essentials*, Roxot, <https://roxot.com/header-bidding-essentials> ("Header bidding is a technical solution and complex to implement correctly."). Note that Roxot, the source for the quote above, offers a "header bidding solution."

competing in the same header bidding auction.⁵⁸ That is especially so because many publishers and advertisers multi-home across different exchanges and DSPs, which means that a lot of the same ad impressions and ad demand are going to be present on multiple exchanges. Ad buyers nevertheless bid on ad exchanges that participate in header bidding presumably because of a risk that they otherwise might miss out on incremental ad inventory, as there often is no easy way to tell if you are bidding on the same ad impression across multiple exchanges or header bidding auctions.

While such increased self-competition could in the short-term drive up the price for publishers, it could ultimately have an adverse impact on the overall ecosystem by hurting advertisers' trust in ad auctions. In a similar vein, The Trade Desk recently observed that, with respect to ad exchanges that participate in multiple header bidding (or similar) auctions, "see[ing] every ad opportunity once per exchange . . . will help create a fair and transparent marketplace for advertisers and publishers, which is a key to the trust and integrity necessary to ensure a growing, thriving market."⁵⁹ In line with this, The Trade Desk reportedly asked its partner exchanges to "stop sending duplicate bid requests for the same ad impression."⁶⁰

E. Google Develops And Launches Open Bidding

Google did not launch or have AdX participate in header bidding auctions when they emerged. That is not surprising given header bidding's potential for adverse effects on users, advertisers and the ecosystem, and the fact that Google already had an efficient auction mechanism with Dynamic Allocation and AdX, in which many different Google-owned and third-party ad buyers competed.

However, as popularity of header bidding grew among publishers, and the industry moved in that direction, Google developed and launched an alternative that solved for some of the drawbacks of header bidding, including latency. In April 2016, Google announced that it was testing its Exchange Bidding feature for Ad Manager.⁶¹ With Exchange Bidding, Google

⁵⁸ Others have described this phenomenon in regards to when an advertiser uses multiple DSPs and those DSPs bid on the same inventory being offered by a single exchange. That problem is only confounded and made more difficult to detect when multiple exchanges are in turn competing for the same inventory via header bidding. According to a study from Criteo, moving from one to two tools targeting the same inventory reduced advertiser ROI by 22%. See, e.g., *Why You Should Only Use One Retargeter*, Criteo, <https://www.criteo.com/insights/one-retargeter-vs-two/> ("Because most retargeting ads are sold via an RTB exchange, both retargeters are going to bid (on your behalf) for that user. We call this **bid collision**. It's as bad as it sounds: by using your budget to bid against yourself, you are simply going to pay more for the same ad impression."); Brian O'Kelley, *DSP User: In What Situations Am I Bidding Against Myself?*, Quora, <https://www.quora.com/DSP-User-In-what-situations-am-I-bidding-against-myself>.

⁵⁹ Sarah Sluis, *The Trade Desk Suppresses Bid Duplication Amid COVID-19 Traffic Surge*, AdExchanger (Apr. 21, 2020), <https://www.adexchanger.com/platforms/the-trade-desk-suppresses-bid-duplication-amid-covid-19-traffic-surge/>.

⁶⁰ *Id.*

⁶¹ Jonathan Bellack, *Improving Yield, Speed and Control with DoubleClick for Publishers First Look and Exchange Bidding*, Google (Apr. 13, 2016), <https://www.blog.google/products/admanager/improving-yield-speed-and-control-with-dfp-first-look-and-exchange-bidding/>.

enabled publishers to create real-time competition among AdX and other ad exchanges within Ad Manager, as well as with any static guaranteed and remnant line items in Ad Manager (including remnant line items representing winning header bidding bids). Google more recently renamed Exchange Bidding to Open Bidding.

Open Bidding does not generate significant latency, and provides clear and aggregated reporting all in one place, a significant simplification for publishers.⁶² Google's Open Bidding reportedly is easy to set up and does not generally require custom engineering work.⁶³ Open Bidding also comes with greater measures to protect user privacy.⁶⁴ Just like other providers do for similar solutions (e.g. Amazon, AT&T's Xandr etc.), Google charges for this service.

F. Google Transitions Ad Manager To A Unified First-Price Auction

While Open Bidding enabled publishers to have bids from AdX buyers and third-party exchanges compete, without some of the problems of header bidding, it also created complexity in Ad Manager. Publishers' use of header bidding in conjunction with Ad Manager exacerbated that.

The complexity stemmed in part from the advertiser self-competition mentioned previously and the fact that many of the exchanges participating in Open Bidding and header bidding had recently transitioned from second-price to first-price auctions (where the winning bidder pays their own bid), while AdX was still a second-price auction (where the winning bidder pays the second-highest bid). As recognized by other market participants,⁶⁵ a second-price auction is an efficient mechanism for selling ad space, but challenges arise when a second-price auction has to compete with first-price auctions, as started occurring with header bidding and Open Bidding. This meant that ad buyers that bid across those exchanges had to calibrate their bid strategies for different auction mechanisms—second-price strategies on AdX, first-price strategies on others—while they could be bidding on the same impression on each exchange.

⁶² *Introduction to Open Bidding*, Google, <https://support.google.com/admanager/answer/7128453?hl=en> (“Open Bidding in Ad Manager also provides simplified trafficking, reporting, and billing,” and “[o]pen Bidding in Ad Manager also reduces the latency historically associated with header bidding.”).

⁶³ *How to Start Earning with Exchange Bidding*, Sovrn (Feb. 20, 2019), <https://www.sovrn.com/blog/start-earning-exchange-bidding/> (“Exchange Bidding is a powerful part of a holistic site monetization strategy, and it's simple to get started.”).

⁶⁴ See, e.g., Jason Bigler, *Rolling Out First Price Auctions to Google Ad Manager Partners*, Google (Sept. 5, 2019), <https://www.blog.google/products/admanager/rolling-out-first-price-auctions-google-ad-manager-partners/>.

⁶⁵ See, e.g., Martin Hill, *Evolution to First Price Auctions, Rubicon Project* (Sept. 5, 2019), <https://rubiconproject.com/insights/thought-leadership/evolution-to-first-price-auctions/> (“[I]t's probably well documented that the second price auction is the right type of auction to kind of maximize, I guess, revenue . . . [and] this kind of multi-auction ecosystem means that to have demand represented fairly in that final auction, we kind of needed to move towards the first price, so that the active bid price for each individual bidder is correctly reflected in where the final decision is being made.”); Brian Wallach, *First-Price Auctions Aren't the Best Solution for Publishers or Brands*, FreeWheel, <https://www.freewheel.com/first-price-auctions-arent-the-best-solution-for-publishers-or-brands/>.

It could also give rise to inefficient auction outcomes. An ad buyer, representing an advertiser with the highest valuation for an impression, could lose out to an ad buyer with a lower valuation for the impression. For example, an ad buyer on AdX (say Buyer A) might bid \$5 and face competition from another ad buyer on AdX, who was bidding \$2. Between them, the AdX auction would clear at a price of \$2, the second-highest bid in this auction. Buyer A would then compete with this \$2 price in Ad Manager against the bids from ad buyers on first-price auction exchanges that participated in Exchange Bidding. Imagine that the ad buyer with the highest bid across those exchanges (let's call it Buyer C) bid \$3. Buyer A (\$2) would then lose in the Ad Manager auction to Buyer C (\$3), even though Buyer A originally actually bid \$5 on AdX, due to the interaction between first and second-price auctions. To the extent the higher bid by Buyer A reflected a higher advertiser valuation of the impression than Buyer C, this results in an inefficient allocation of the impression. It also created uncertainty for ad buyers on AdX as to how they should determine their bidding strategy.

Finally, complexity also arose because publishers in Google Ad Manager could set different price floors for different ad buyers, and used that to impose higher price floors on certain ad buyers than on others, depending, among other things, on what ad exchange they bid on. With the launch of Exchange Bidding, this gave rise to a situation in which an ad buyer could submit two bids for the same impression, one into AdX and one into an ad exchange participating in Exchange Bidding, and find that its lower bid wins.

Accordingly, to reduce this complexity and potential for auction inefficiency, Google announced in March 2019 that it would be moving from a multi-stage second-price auction to a unified first-price auction.⁶⁶

G. Google Ad Manager's Unified First-Price Auction

Since the transition to a unified first-price auction, Ad Manager offers publishers the following ways to sell the ad inventory on their online properties.

First, as has long been the case, Ad Manager continues to enable publishers to create guaranteed line items,⁶⁷ for contractual commitments by the publisher to sell a certain number of ad impressions to a certain buyer, and remnant or non-guaranteed line items, typically for sales through individual ad networks or ad exchanges. Since it emerged, publishers also use non-guaranteed line items to represent bids from header bidding auctions, which take place outside Ad Manager.⁶⁸

⁶⁶ Sam Cox, *Simplifying Programmatic: First Price Auctions for Google Ad Manager*, Google (Mar. 6, 2019), <https://www.blog.google/products/admanager/simplifying-programmatic-first-price-auctions-google-ad-manager/>.

⁶⁷ Guaranteed line items are those for which a publisher is "contractually obligated to deliver a requested number of impressions." In contrast, non-guaranteed line items are used to fill "leftover" or remnant impressions. *Glossary*, Google, <https://support.google.com/admanager/table/7636513?hl=en>.

⁶⁸ *Line Item Types and Priorities*, Google, <https://support.google.com/admanager/answer/177279?hl=en> ("Network, Bulk and Price Priority line items are for demand that is non-guaranteed. Any third-party ad network or exchange that provides an appropriate ad tag can be represented by a non-guaranteed line

Second, in addition to creating line items, Ad Manager enables publishers to solicit real-time bids through a variety of ad exchanges, including not just AdX but also more than 20 other ad exchanges participating in Open Bidding (formerly called “Exchange Bidding”). These third-party ad exchanges can submit real-time bids into Ad Manager like bids that come into Ad Manager from ad buyers on AdX, such as Google Ads, DV360 or other Authorized Buyers (e.g. third-party DSPs, ad networks, ad agencies etc.).⁶⁹

Ad Manager runs a unified first-price auction in which each of these sales channels are incorporated, subject to a publisher’s preferences. As a Google blog post explained, it is:

[A] single auction that compares the prices from a publisher’s guaranteed campaigns with all of a publisher’s non-guaranteed advertising sources—including real-time bidding partners (such as Authorized Buyers and Exchange Bidding partners) and non-guaranteed line items (including those that publishers use in their header bidding implementations).⁷⁰

A given impression is typically sold to the buyer offering the highest net price among all of these sales channels. As an Ad Manager help center page explains, “[t]he best Ad Manager line item rate, expected Mediation yields and exchange bids are compared at the same time and the top bid wins the auction,” meaning “[t]he highest net bid (which takes into account Ad Manager’s revenue share) wins.”⁷¹

As part of its launch of a unified first-price auction in Ad Manager, Google took steps that provide publishers and ad buyers “additional auction transparency.”⁷² As explained in blog posts, Google provides ad buyers on AdX and ad exchanges and networks participating in Open Bidding “additional information post-auction to help inform [their] bidding strategies.”⁷³ In particular, ad buyers “receive the minimum bid price to win after the auction closes,” which helps them “understand when to bid higher to win valuable inventory” in future auctions.⁷⁴

For publishers, Google started “a new beta that provides data from all the bids submitted to your auctions.”⁷⁵ Google explained that “[w]ith this Bid Data Transfer file, you’ll be able to create a

item that competes based on a price that you enter into Ad Manager—for example, this is how header bidding can be configured.”)

⁶⁹ See *Introduction to Open Bidding*, Google,

<https://support.google.com/admanager/answer/7128453?hl=en>.

⁷⁰ Jason Bigler, *An Update on First Price Auctions for Google Ad Manager*, Google (May 10, 2019),

<https://www.blog.google/products/admanager/update-first-price-auctions-google-ad-manager/>.

⁷¹ *Learn the Basics: How Open Bidding Works*, Google,

<https://support.google.com/admanager/answer/7128958?hl=en>.

⁷² Jason Bigler, *Rolling Out First Price Auctions to Google Ad Manager Partners*, Google (Sept. 5, 2019),

<https://www.blog.google/products/admanager/rolling-out-first-price-auctions-google-ad-manager-partners/>.

⁷³ *Id.*

⁷⁴ *Id.*

⁷⁵ *Id.*

full bid landscape that shows the range and number of bids you received, across dimensions like ad unit and buyer. This information will help you evaluate the value of your inventory and better understand the bidding behavior of buyers.”⁷⁶ As indicated in Google’s Ad Manager help center pages, the Bid Data Transfer (BDT) beta file offers publishers “details about every Open Bidding and Authorized Buyers bid for your inventory, whether the bid won the auction or not.”⁷⁷

With the transition to a unified first-price auction in Ad Manager, Google also adopted new unified pricing rules (UPRs), explaining the objectives of those rules as follows:

Our new unified pricing rules will help publishers more easily manage floor prices across all non-guaranteed partners. For example, instead of setting up the same floor prices in multiple places—in the auction in Ad Manager, and with their Exchange Bidding and other non-guaranteed advertising sources—which can take a lot of time and can lead to errors, a publisher can set up a single unified pricing rule to control pricing from one place. To maintain a fair and transparent auction, these rules will be applied to all partners equally, and cannot be set for individual buying platforms.⁷⁸

V. GOOGLE’S AD TECH PRODUCTS AND PRACTICES HAVE PROMOTED NOT HARMED COMPETITION

A. Dynamic Allocation Increased Efficiency And Competition

In their papers, G&K argue that Google has engaged in “anticompetitive leveraging” by using its ad server in Ad Manager (previously DFP) to foreclose what they call the “market for ad intermediation.”⁷⁹ They argue that this purportedly anticompetitive practice resulted from Google’s acquisition of DoubleClick in 2008.⁸⁰ In particular, G&K claim that Google developed the Dynamic Allocation feature in Ad Manager to “favor its own intermediation service [AdX] over its rivals” by giving AdX a “so-called ‘last look’ advantage over every impression, i.e., the possibility to outbid at will its rivals *after* they had submitted their bids.”⁸¹ According to G&K, “the existence of Dynamic Allocation results in AdX having the ‘last look’ over header bidding, in that it may take the winning header bidding bid and outbid it by paying just one penny more.”⁸²

Their theory is mistaken in a number of respects.

⁷⁶ *Id.*

⁷⁷ *Bids Data in Ad Manager Data Transfer (Beta)*, Google, <https://support.google.com/admanager/answer/7357436?hl=en>.

⁷⁸ Jason Bigler, *An Update on First Price Auctions for Google Ad Manager*, Google (May 10, 2019), <https://www.blog.google/products/admanager/update-first-price-auctions-google-ad-manager/>.

⁷⁹ *Google’s (Forgotten) Monopoly* at 10-11.

⁸⁰ *Id.* at 9-11.

⁸¹ *Id.* at 10-11 (emphasis omitted).

⁸² *Trust Me, I’m Fair* at 9.

First, DoubleClick's Dynamic Allocation and Google's later enhancement of it were procompetitive innovations, not anticompetitive product designs. As the UK's Competition and Markets Authority (CMA) has observed, Dynamic Allocation solved for an inefficiency in the then-existing waterfall process in the ad server by which publishers sought to grow ad sales.⁸³ In particular, as described above, Dynamic Allocation expanded DFP publishers' options to foster competition for and grow sales of their ad inventory. It did so, initially, by introducing the ability to solicit real-time auction bids from ad buyers on AdX to see if any of those buyers were willing to pay a higher price for an ad impression than what the publisher estimated it could fetch from its other remnant demand sources (e.g. ad networks) for that impression. The publisher's highest estimate of that would then be the floor price communicated to ad buyers on AdX. As discussed, Google later also enabled the opportunity cost of not serving a guaranteed line item to factor into the floor price (an innovation that further optimized ad sales), thereby for the first time creating competition between guaranteed and non-guaranteed demand sources.⁸⁴

It is common practice in auctions to communicate to buyers what the seller's floor price is. It is also common for the floor price in an auction to be based on the seller's estimate of the price it could get without running an auction, as Dynamic Allocation did. Indeed, while not the only way to run an auction, these are well-accepted methods to run an auction to maximize sales by informing buyers what they need to bid at a minimum to have a chance to buy the auctioned goods.⁸⁵ It was thus an approach that benefited both publishers and ad buyers. It was also beneficial because the real time bids from AdX buyers represented a committed price and purchase for publishers, while publishers had no guarantee that another remnant demand partner would actually purchase the impression at the price that the publisher estimated.

Second, what all of this also shows is that G&K's theories are based on factually incorrect premises as to how Dynamic Allocation worked when it was launched. Contrary to what G&K assert, when Dynamic Allocation was launched, the floor price for AdX was booked by the

⁸³ *CMA Appendix H ¶¶ 13-15* ("As a way to partially address this inefficiency [sub-optimal yield generated by the waterfall], the ad server DoubleClick for Publishers (DFP), which was acquired by Google in 2008, introduced Dynamic Allocation.")

⁸⁴ As evidence of the procompetitive nature of this change, Comcast's NBCUniversal recently adopted a similar technique in the television space; on April 14th, 2020 it was reported that, through an integration with Comcast's FreeWheel and The Trade Desk, Comcast's NBCU will "operate[] an auction where programmatic demand is considered alongside direct-sold campaigns." James Hercher, *FreeWheel Launches Unified Direct-Sold/Programmatic Product With NBCU And The Trade Desk*, AdExchanger (Apr. 14, 2020), <https://www.adexchanger.com/digital-tv/freewheel-launches-unified-direct-sold-programmatic-product-with-nbcu-and-the-trade-desk/>.

⁸⁵ In a textbook second-price auction, the floor may not influence bids. There are two reasons why the textbook case does not hold in the present case. First, the floor being conveyed to bidders reveals information about the value of the impression. For this reason, for some bidders seeing the floor may cause them to increase their true valuation. Second, certain bidders are bidding into multiple auctions subject to an overall budget constraint. In this set-up it may be that bidders will shade bids in an attempt to maximize their surplus (the difference between a bidder's valuation and the price he/she pays). A bidder may be better off losing an auction if the floor is only slightly below the true valuation, therefore saving her budget and allowing her to win more impressions in the future when the floors are much further away from the true valuations. See, e.g., Gagan Pratap Ghosh and Heng Liu, *Sequential Second Price Auctions With Budget Constrained Bidders* (May 1, 2016), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2756007.

publisher, typically based on estimates of what price a publisher could get for an impression absent the auction, not on the bids of competing ad networks or ad exchanges for that impression.⁸⁶ In addition, contrary to G&K's assertions, it was the ad buyers competing in the AdX auction (not just AdX) that received price floor information. And, there were and are many ad buyers bidding on AdX, including Google's ad buyers, Google Ads and DV360, but also many competing ad buyers (i.e. third-party DSPs, ad networks or agency trading desks). So it would be risky for any such ad buyer to bid just "a penny above the floor," as G&K theorize, because it could well then lose to another ad buyer bidding more.

Third, and importantly, Dynamic Allocation was launched by DoubleClick in 2007,⁸⁷ before Google acquired DoubleClick and *almost a decade before* header bidding emerged. So any claims that Dynamic Allocation was the result of Google's acquisition of DoubleClick or that it was designed to hinder header bidding are chronologically backwards. To the extent Dynamic Allocation led to opportunities for AdX buyers to outbid header bidding auction bids, that only happened nearly ten years *after* the invention of Dynamic Allocation. It resulted from the emergence of header bidding and how publishers used header bidding in conjunction with Google's Ad Manager, not any anticompetitive design of Dynamic Allocation almost a decade earlier. As the CMA observed in its Interim Report, what G&K call a so-called last look, "was not intentionally designed to give AdX an advantage when competing against header bidding; it was simply the result of the header bidding auction taking place before the AdX auction was able to run."⁸⁸ Of course, as discussed below, since Google's transition of Ad Manager to a unified first-price auction, the price floor that AdX buyers receive no longer reflects header bidding bids or any other bids (estimated or actual) of competing ad networks or ad exchanges.

Finally, there is no evidence that we can see that Dynamic Allocation has had any exclusionary effects on competitors (much less harm to competition as a whole). As discussed below, header bidding has seen widespread adoption and the ad tech marketplace has remained highly competitive throughout. Consistent with that, the Canadian Competition Bureau, after conducting an investigation into the impact of Dynamic Allocation, concluded in 2016 that "there has been no exclusionary effect on competing ad exchanges as a result of E[nhanced] D[ynamic] A[llocation]."⁸⁹

⁸⁶ *Profiting from Non-Guaranteed Advertising: The Value of Dynamic Allocation & Auction Pricing for Online Publishers*, DoubleClick (by Google), http://static.googleusercontent.com/media/www.google.com/en/us/adexchange/DC_Ad_Exchange_WP_100713.pdf.

⁸⁷ WebArchive.org contains snapshots of the DoubleClick website mentioning "Dynamic Allocation" as early as October 1, 2007. See *DoubleClick Advertising Exchange*, DoubleClick (via WebArchive.org) (Oct. 1, 2007), <https://web.archive.org/web/20071001100309/http://www.doubleclick.com/products/advertisingexchange/index.aspx>.

⁸⁸ *CMA Appendix H* ¶ 19.

⁸⁹ *Competition Bureau Statement Regarding Its Investigation Into Alleged Anti-Competitive Conduct by Google*, Government of Canada Competition Bureau (Apr. 19, 2016), <https://www.competitionbureau.gc.ca/eic/site/cb-bc.nsf/eng/04066.html>.

B. Open Bidding Created an Alternative To and Solved Drawbacks Of Header Bidding

G&K also seem to suggest that Google should have enabled rival ad exchanges to submit real-time bids into Ad Manager before header bidding emerged,⁹⁰ and that Google should have AdX or Google Ads participate in header bidding auctions instead of, or in addition to, launching its Open Bidding (formerly Exchange Bidding) product.⁹¹ These theories are not just questionable as a matter of antitrust law and policy, but also as a matter of fact and economics.

Until about 2012, when the IAB adopted the OpenRTB protocols, there were no well-established industry standards for real-time bidding integrations. Header bidding solutions started emerging after that in 2015. Given Google's business needs to balance user, advertiser and publisher interests, it is not surprising that it was not first to introduce "auction of auctions" solutions like header bidding. As explained above, there are inherent inefficiencies and drawbacks to such solutions. In addition to the potential for latency and other adverse impacts on users, there is opportunity for advertisers to unknowingly bid against themselves for the same ad impression through multiple different exchanges when those exchanges compete with each other in auctions. Such unintended "self-competition" by advertisers may be appealing to individual publishers in the short-term, since it could increase the CPM price they receive for an ad impression. However, it could over time adversely affect advertisers' trust in ad auctions, such that they bid less on ad exchanges as a result. That could be an overall negative for the ecosystem, including publishers, in the long-term. As a search engine for users and a vertically integrated ad tech provider serving both publishers and advertisers, one would expect Google to be cautious about adopting technologies that may have such adverse effects on the ecosystem.

That said, when the industry trended in the direction of such auction of auctions solutions with publisher adoption of header bidding, Google began developing an alternative, and announced beta testing of its Exchange Bidding feature in 2016. It has enabled publishers to invite 20 different exchange partners to submit real-time bids into Ad Manager, and solved for various shortcomings of header bidding that have adverse user and ecosystem impact.⁹² As discussed above and below, in transitioning Ad Manager to a unified first-price auction, Google also took steps to try to mitigate some of the risks of adverse effects from potential advertiser self-competition.

Given the widely reported drawbacks of header bidding for users and other constituencies, Google had valid reasons to launch its own, improved alternative, instead of having AdX or Google Ads participate in client-side header bidding. That is presumably why others, especially those that also have strong reasons to consider user experience such as Amazon, likewise have developed their own alternative server-side solution,⁹³ instead of participating in the client-

⁹⁰ *Trust Me, I'm, Fair* at 8.

⁹¹ *See Id.* at 9-10 n. 34.

⁹² *Introduction to Open Bidding*, Google, <https://support.google.com/admanager/answer/7128453?hl=en>.

⁹³ *See Transparent Ad Marketplace*, Amazon, <https://aps.amazon.com/aps/transparent-ad-marketplace/>.

side header bidding auction solution offered by Prebid.org.⁹⁴ More fundamentally, it is unquestionably procompetitive to create more options for publishers, especially when they solve for drawbacks of existing products.⁹⁵

Meanwhile, Google's Ad Manager at all times has enabled publishers to use non-guaranteed line items to bring header bidding auction bids into Ad Manager, and as such has not taken actions to foreclose it.

C. Google's Transition To A Unified First-Price Auction Removed Complexity And Enhanced Auction Efficiency

1. Ad Manager Price Floors Do Not Reflect Header Bidding Bids

G&K speculate that AdX buyers or Open Bidding buyers continue to have opportunities to look at and then beat the bids coming into Ad Manager from header bidding auctions since Ad Manager transitioned to a unified first-price auction.⁹⁶ Their speculation is contrary to the public record.

In a blog post, Google explained that in its unified first-price auction "all real-time bidding partners integrated with Ad Manager . . . will be notified of the auction at the same time," and "all non-guaranteed advertising sources [will be provided] the same opportunity to win an auction."⁹⁷ A Google help center page for Ad Manager similarly indicates that "[a]ll participants in the unified auction, including Ad Exchange and third-party exchanges, compete equally for each impression on a net basis."⁹⁸

Google's blog post furthermore indicates that "no price from any of a publisher's non-guaranteed advertising sources, including non-guaranteed line item prices, will be shared with another buyer before they bid in the auction," and explain that "non-guaranteed line item prices" include prices of non-guaranteed line items "that publishers use in their header bidding implementations."⁹⁹ Its blog post similarly explains that, "[a]n advertising buyer's bid will not . . .

⁹⁴ See *Prebid.Org Members*, Prebid.org, <https://prebid.org/partners/partners.html> (listing various members in Prebid.org but not including Amazon).

⁹⁵ For example, Vice Media (a prominent publisher) saw a 17% increase in revenue and 41% higher CPMs for Exchange Bidding inventory once it adopted Exchange Bidding, and claimed that Exchange Bidding "allowed us to vastly expand the volume of inventory that we could monetize programmatically" and that it was "much easier than . . . adding code to the page for header bidding." Alex Payne, *Case Study VICE Media Boosts Revenue Across 500+ Websites With Exchange Bidding*, Google, <https://admanager.google.com/home/resources/vice-media-boosts-revenue-across-500-websites-exchange-bidding/>.

⁹⁶ See *Trust Me, I'm Fair* at 26-30.

⁹⁷ Jason Bigler, *An Update on First Price Auctions for Google Ad Manager*, Google (May 10, 2019), <https://www.blog.google/products/admanager/update-first-price-auctions-google-ad-manager/>.

⁹⁸ *Learn the Basics: How Open Bidding Works*, Google, <https://support.google.com/admanager/answer/7128958?hl=en>.

⁹⁹ Jason Bigler, *An Update on First Price Auctions for Google Ad Manager*, Google (May 10, 2019), <https://www.blog.google/products/admanager/update-first-price-auctions-google-ad-manager/>.

be able to set the price for another buyer.”¹⁰⁰ As is plain from this blog post, non-guaranteed advertising sources include both non-guaranteed line items (including those used to source header bidding auction bids) and other non-guaranteed advertising sources, namely the third-party ad exchanges and ad networks participating in Google’s Open Bidding and ad buyers competing on AdX.

This is an unambiguous indication that no bidder in the unified first-price auction in Ad Manager—including AdX buyers—has access to any other bidders’ information before submitting their bids, nor to bids from header bidding auctions.

All of this is also confirmed in help center pages for Ad Manager, which explain that the floor price communicated to ad buyers in a given Ad Manager auction is not set with reference to a competitor’s bid.¹⁰¹ Instead, the floor price is “at least the maximum of the temporary CPM calculated by Ad Manager for the best eligible guaranteed line item or the floor price configured by the publisher (as may be adjusted, at the publisher’s option, by various Ad Manager optimizations).”¹⁰² The help center pages indicate that this is the case regardless of whether an ad buyer participates in the Ad Manager auction through AdX or through a third-party exchange (as part of Open Bidding).¹⁰³

G&K hypothesize that Google “might allow its own exchange to bid a millisecond later than its rivals.”¹⁰⁴ But they offer no support for that speculation either. We also do not see why it would matter. Even if AdX could bid a millisecond after other bidders, that would neither affect the bids from AdX nor the outcome of the auction, since no bidder knows its competitors’ bids. That is, in an auction with sealed bids, bid sequencing is of no import.

Similarly, G&K suggest that Ad Manager “might simply pass less information to rival exchanges about the user or the impression or make it harder for them to identify the user.” They concede, however, that this is pure speculation as well.¹⁰⁵ While we do not know what G&K mean with these speculations, it is of course true that sharing certain user information with third-parties could well have privacy and regulatory implications. That is something that G&K do not seem to account for given their focus on the financial interests of certain large publishers.

¹⁰⁰ Sam Cox, *Simplifying Programmatic: First Price Auctions for Google Ad Manager*, Google (Mar. 6, 2019), <https://www.blog.google/products/admanager/simplifying-programmatic-first-price-auctions-google-ad-manager/>.

¹⁰¹ *How Open Bidding Works*, Google, <https://support.google.com/admanager/answer/7128958> (“The reserve price is not set by either the value CPMs of remnant line items that are competing for the impression or any bids received from any Ad Exchange buyers or Open Bidders for the impression. No auction participant receives any information about any other party’s bids prior to completion of the auction.”).

¹⁰² *Id.*

¹⁰³ *Id.* (“Ad Manager sends the reserve price for the unified auction to all eligible Ad Exchange buyers and Open Bidding participants (including third-party exchanges or networks).”).

¹⁰⁴ *Trust Me, I’m Fair* at 26.

¹⁰⁵ *Id.* at 26-27.

Finally, G&K’s speculation that there might still be a “last look” when publishers do not turn Open Bidding on and solely rely on AdX for real-time bidding¹⁰⁶ likewise lacks foundation. As Google’s blog posts make clear, and as the CMA has observed, it no longer exists.¹⁰⁷

2. Ad Buyers Receive Additional “Minimum Bid to Win” Information

With its transition to a unified first-price auction, Google enhanced auction transparency and efficiency, among other ways, by providing bidders in the Ad Manager auction additional “minimum bid to win” information after an auction closes. For losing bidders this represents the bid that won the auction, and as such informs the loser how much higher it would have needed to bid to win. For the winning bidder this represents the lowest it could have bid and still won.

G&K complain that Google favors Ad Manager buyers over header bidding participants by providing the former but not the latter with “minimum bid to win” information.¹⁰⁸ Their theory of harm is not clear, but it appears to be that Google is seeking to disadvantage header bidders by not sharing this information and thus lessen the competitive constraint that header bidding puts on Google Ad Manager. Another theory appears to be that “minimum bid to win” information may lead to a softening of competition amongst auction participants, leading to lower monetization for publishers. These theories are unfounded for the following reasons.

First, the complaint that Google does not provide minimum bid to win information to header bidding participants results from the design of header bidding, not Google’s policies. Header bidding auctions take place outside of Ad Manager, before the ad server is called. Google does not have any ability to provide “minimum bid to win” information to header bidding participants because it does not know the identity of the participants.

Second, all real-time bidders in Ad Manager’s unified first-price auction are eligible to receive this information, including not just Google’s own ad buyers (Google Ads and DV360), but also all competing ad buyers on AdX (e.g. The Trade Desk, MediaMath, Amazon etc.), and all of the more than 20 competing third-party ad exchanges participating in Open Bidding.¹⁰⁹ Thus, whichever of those tools buyers bid through—Google or its competitors—they receive the same “minimum bid to win” information from Google.

¹⁰⁶ See *Id.* at 30.

¹⁰⁷ See Jason Bigler, *An Update on First Price Auctions for Google Ad Manager*, Google (May 10, 2019), <https://www.blog.google/products/admanager/update-first-price-auctions-google-ad-manager/> (“Going forward, no price from any of a publisher’s non-guaranteed advertising sources, including non-guaranteed line item prices, will be shared with another buyer before they bid in the auction.”); *CMA Appendix H* ¶ 29 (“Google’s exchange will no longer be informed of the winning bid from header bidding before submitting a bid and the results from header bidding will have no influence on the bids submitted by Google’s DSPs (DV360 and Google Ads), other DSPs bidding into Google’s exchange, or other SSPs bidding into Open Bidding.”).

¹⁰⁸ *Trust Me, I’m Fair* at 32.

¹⁰⁹ *Authorized Buyer’s Help: Training Guide Auction Model*, Google, <https://support.google.com/authorizedbuyers/answer/6077702?hl=en>.

Third, as is clear from Google help pages, the “minimum bid to win” information is provided to Open Bidding buyers and AdX buyers *after* the auction closes.¹¹⁰ Therefore, it cannot provide these bidders with an advantage over other bidders during the auction, much less the ability to use the information to lower their bids in the auction. It accordingly is unclear on what basis G&K claim that bidders could “potentially buy the same inventory at a cheaper price” using the “minimum bid to win” information.¹¹¹ It provides ad buyers feedback on closed auctions so that they can adjust their bid strategies in the future. That is hardly a mechanism that would enable coordination among buyers to reduce their bids below short run profit maximizing levels, as G&K seem to suggest. After all, past bid information does not provide certainty for future auctions. For every new auction for a new ad impression, ad buyers always face the uncertainty of losing or winning and have to put in what they deem competitive bids on that basis, without knowing what another buyer is going to bid. Indeed, it is unclear why Google would have an incentive to implement a mechanism that caused a reduction in spend through Ad Manager. Rather, Google’s sharing of “minimum bid to win” information with ad buyers will tend to make auctions more competitive over time. That is so both because ad buyers will be better informed to bid to win in the future and because that, in turn, will attract more buyers and spend to the auction. This creates more efficient auctions and more sales to the benefit of advertisers and publishers and the ecosystem as a whole.

3. Publishers Receive More Comprehensive Bid Data

Google also provided publishers using Ad Manager additional auction transparency by launching a new beta product—the BDT file—that enables publishers to create a full bid landscape across different dimensions, including won and lost bids. Google is able to provide publishers this kind of detail by “requir[ing] all Ad Manager partners to share . . . bid data.”¹¹² They did not all do so before, so Google’s BDT file provided publishers a more comprehensive picture of the bid landscape than previously available.

G&K suggest that with this new product Google purposely is disadvantaging header bidding participants by preventing publishers from combining its recently launched BDT, with other Google Ad Manager Data Transfer files.¹¹³ They argue that this prevents publishers from fully analyzing the efficacy of header bidding,¹¹⁴ apparently to suggest that it undermines header bidding’s competitiveness with Ad Manager. That claim is misplaced.

As an initial matter, we observe that the best way to compare the performance of ad exchanges to each other and to AdX is to run a randomized controlled experiment (or “A/B” test). This is superior to comparing bids because it controls for all confounding factors (such as page latency, impression discrepancies, or user experience impacts). Publishers wishing to compare ad

¹¹⁰ *See Id.*

¹¹¹ *Trust Me, I’m Fair* at 33.

¹¹² Jason Bigler, *An Update on First Price Auctions for Google Ad Manager*, Google (May 10, 2019), <https://www.blog.google/products/admanager/update-first-price-auctions-google-ad-manager/>.

¹¹³ *Trust Me, I’m Fair* at 35.

¹¹⁴ *See Id.* at 33.

exchange performance may do A/B testing at the time they are thinking of adding a new ad exchange, or removing one. Rather than making the change on 100% of their traffic, they could make the change on a random subset of users or ad requests.¹¹⁵ Google’s help center pages for Ad Manager indicate that it supports such publisher experimentation, by making it easy for publishers to compare slices of traffic and obtain accurate experimental results.¹¹⁶ As a result, there is no basis for the claim that publishers are unable to analyze the efficacy of header bidding, let alone that Google has attempted to stop them from doing so.

Moreover, with its BDT file, Google is providing publishers more comprehensive bid information with its BDT file than previously available—covering won and lost bids—and enables them to slice and dice that data. The only limitation is on joining this with other data. One of its blog posts indicates that Google limits joining the BDT file with other Ad Manager data files for a good reason: “to prevent bid data from being tied to individual users.”¹¹⁷ This is a matter of user privacy considerations, rather than an attempt to harm competition. That is not surprising or “puzzl[ing],” as G&K suggest, since the BDT file provides information for both won and lost bids. Joining such comprehensive bid files with user data from other Ad Manager Transfer files would enable publishers to see multiple advertiser attempts to target a specific user, including all failed attempts (lost bids), which in turn could allow creation of significantly more detailed user-specific profiles. For instance, a publisher may observe a bicycle manufacturer win an impression when a user visits a website and infer that the user is interested in bicycles; this is inevitable because the bicycle ad appears on the publisher’s website. But let’s imagine a hypothetical where the publisher could also see all losing bids for that specific impression. It could then observe that a student loan servicer, a New York City vegan restaurant, a skin care product manufacturer and a crib manufacturer all bid highly for the same impression, giving the publisher the ability to infer, in one instant, and use for its own targeting purposes, a far more complete picture of the associated user’s interests and needs.

The limitation on joining BDT files with user data is consistent with Google’s broader efforts to enhance user privacy protections by reducing data leakage to third-parties that could facilitate the compilation of detailed user profiles. Google does so across the buy and sell-side of its ad tech business. For example, recently, Google announced that, after discussion with data protection authorities in Europe, it would stop including contextual content categories in bid requests for ad buyers on AdX to “help avoid the risk that any participant in our auctions is able to associate individual ad identifiers with Google’s contextual content categories.”¹¹⁸

¹¹⁵ For example, a publisher could run an experiment to compare: (a) AdX and existing header bidding partners; (b) AdX, existing header bidding partners, and a new partner it is considering adding; and (c) AdX only. It can then see on a particular webpage, device type, country, or combination of those and many other dimensions, for each of settings (a), (b) and (c) how much revenue and how many impressions it got from AdX and each header bidding participant that was enabled in the corresponding experiment setting (as well as examine various other metrics).

¹¹⁶ See, e.g., *Run Experiments*, Google, <https://support.google.com/admanager/answer/6333031?hl=en>.

¹¹⁷ Jason Bigler, *Rolling Out First Price Auctions to Google Ad Manager Partners*, Google (Sept. 5, 2019), <https://www.blog.google/products/admanager/rolling-out-first-price-auctions-google-ad-manager-partners/>.

¹¹⁸ Chetna Bindra, *Additional Steps to Safeguard User Privacy*, Google (Nov. 14, 2019), <https://www.blog.google/products/admanager/additional-steps-safeguard-user-privacy/>.

Subject to its user privacy constraints, however, Google's BDT file beta product helps publishers foster greater competition for their impressions (including between Google and other ad tech providers). As discussed, it is not surprising for a company like Google to seek to balance publisher interests in greater bid transparency with user interests in greater privacy. That kind of balancing is important to the long-term viability of the overall ecosystem,¹¹⁹ which is what one would expect a search engine and vertically integrated ad tech player like Google to do.

4. The New Uniform Pricing Rules Balance Advertiser And Publisher Interests

G&K argue that Google's new UPRs for the Ad Manager auction disadvantage publishers and competitors because they do not enable publishers to impose buyer-specific price floors in that auction.¹²⁰ They claim that this "effectively deprives [publishers] of their ability to monetize their inventory as they see fit" and that it allows Google Ads to submit lower bids than it otherwise would.¹²¹ In particular, they claim that publishers are less likely to impose higher floors when they have to impose them on all ad buyers (as opposed to just Google Ads) because other ad buyers may not be able to meet higher price floors, such that publishers will lower them for all, including for Google Ads.

These arguments not only fail to state a coherent antitrust theory, but also ignore that an ad auction operator must balance the interests of publishers and advertisers to attract both and remain viable.

It is important to appreciate what G&K are actually arguing here. Google enables publishers to impose price floors on ad buyers participating in its Ad Manager auction; it just does not enable publishers to discriminate against a particular ad buyer¹²² by imposing a higher price floor on that ad buyer than on other ad buyers in the auction. This is what G&K take issue with. In particular, their complaint is that Google does not enable publishers to disadvantage Google Ads (and the advertisers it represents) as a buyer in the Ad Manager auction by imposing a higher price floor on it than on third-party ad buying platforms participating in the auction.¹²³ That does not support a theory of antitrust harm. There is no foreclosure of competition from

¹¹⁹ See Alex Shellhammer, *2019 Google Ad Manager Recap*, Google (Dec. 18, 2019), <https://www.blog.google/products/admanager/2019-google-ad-manager-recap/> ("Encouraged a safe and healthy ads ecosystem . . . we took steps to ensure that our platform and policies are meeting users, publishers, and advertisers evolving expectations.").

¹²⁰ E.g., to impose a pricing floor for bids submitted through PubMatic that is different than, for example, the pricing floor for bids through Rubicon Project. However, publishers remain free to impose advertiser-specific pricing floors.

¹²¹ *Trust Me, I'm Fair* at 23-24, 37.

¹²² For the avoidance of doubt (and as previously discussed), by "ad buyer" we are referring to buy-side tools and vendors like DSPs, ad networks and ad agency trading desks, not advertisers. Publishers remain free to set different price floors for different advertisers.

¹²³ *Id.* at 37.

the UPRs; to the contrary, they promote non-discrimination, so all auction buyers compete based on the same price floor.¹²⁴

G&K complain that publishers used to have the ability to impose discriminatory price floors on Google Ads, and now cannot. But it made sense for Google to want to ensure that all ad buyers in its unified first-price auction are subjected to the same pricing rules. Discriminatory price floors can exacerbate the adverse effects to the ecosystem from advertiser self-competition problems. As discussed, with the growing publisher use of auction of auctions solutions like header bidding, a single ad impression will be auctioned through multiple different exchanges at the same time. But it is difficult for advertisers and their ad buyers (e.g. DSPs or ad networks) to determine whether they are bidding on different or the same impression in different ad exchanges. That means there is increasing risk that advertisers bidding for an impression unknowingly bid against themselves. Discriminatory price floors could be used by publishers to take advantage of advertiser self-competition to drive up bids with little downside risk to the publisher. A publisher could impose a higher price floor for the same impression in exchange X than in exchange Y, knowing that the same DSP or ad network bids on both, to try to get the higher bid from that DSP. If it fails, it will likely still get the lower price from that same DSP in the other exchange. This kind of gaming of the auction could further undermine advertiser trust in the auctions and cause advertisers either to participate less or bid lower than they otherwise would to try to counteract practices that take advantage of self-competition. That would ultimately lead to suboptimal output.

Google's new UPRs thus prevent practices that increase auction complexity and threaten to harm auction integrity. Google's blog post on this topic indicates that was an important consideration in its transition to a unified first-price auction with new pricing rules. Google explained, for example, that this transition was part of an attempt to simplify a "complex marketplace where a single ad can pass through a mix of auctions, *with different rules*, before a winning bid price is selected and an ad is served. [That] made it difficult for advertisers and agencies to properly value programmatic inventory and it has driven our publishers and app developers to implement increasingly complicated ad monetization strategies, reducing transparency across the industry."¹²⁵

Finally, it is worth noting that a discriminatory floor can give rise to an allocative inefficiency—a buyer with a higher valuation (and bid) could lose out to a buyer with a lower valuation (and bid) because it faces a higher floor. This is inefficient in the sense that there is hypothetical gain from trade that is not exhausted: the low-value winner would be happy to trade the won

¹²⁴ This is not a hypothetical concern. The CMA observed that the change was "motivated by the fact that publishers tended to set higher floor prices for AdX compared to other SSPs. Introducing a uniform reserve price would therefore improve AdX competitiveness by giving it an 'equal footing' with third-party SSPs." *CMA Appendix H* ¶ 30. Note that publishers are still able to preclude Google's ad exchange buyers (including Google Ads) from participating in the auction altogether, while allowing third-party exchanges to continue to participate.

¹²⁵ Sam Cox, *Simplifying Programmatic: First Price Auctions for Google Ad Manager*, Google (Mar. 6, 2019), <https://www.blog.google/products/admanager/simplifying-programmatic-first-price-auctions-google-ad-manager/> (emphasis added).

impression with the high-value loser at a price between their respective valuations (if such a trade were feasible).¹²⁶ G&K ignore this allocative inefficiency in their assessment.

D. No Indications That Header Bidding Has Been Foreclosed

G&K claim that “Google’s control of the ad server and Google’s refusal to participate in header bidding” have caused header bidding “not [to] reach its full potential.” But they do not put forth any evidence to support that claim.¹²⁷ Real-world evidence and CMA observations undercut their claim.

Third-party data shows that publisher adoption and use of header bidding and other types of unified auctions has grown substantially over the last two years, and that there is both a popular open-source version of header bidding (Prebid.org) as well as several successful providers of proprietary header bidding or similar unified auctions, such as Amazon, AT&T’s Xandr, Index Exchange, PubMatic and Rubicon Project.¹²⁸ For example, eMarketer reports that 79.2% of top publisher sites have adopted header bidding.¹²⁹ This, in turn, has attracted popular buy-side platforms. For example, in December 2019, The Trade Desk, one of the world’s most popular DSPs (along with Amazon’s DSP, ahead of Google’s DV360),¹³⁰ joined Prebid.org as a “Leader Member.”¹³¹

Notably, third-party reports also show that publishers simultaneously use header bidding together with Google’s Open Bidding and its ad exchange. For example, one report shows that 95% of publishers using AdX also use client-side header bidding, 85% of publishers using

¹²⁶ This argument applies to *ad buyer-specific* price discrimination. It does not apply to *advertiser-specific* price discrimination because a publisher may have a preference for one advertiser over another and might lose out if a hypothetical trade were made between the low-value winner and high-value loser. For example, a publisher could prefer not to have a competitor advertise on its website, even if that advertiser would value the opportunity to do so very highly. For this reason, advertiser-specific price discrimination may be efficient and is indeed permitted.

¹²⁷ See *Trust Me, I’m Fair* at 9.

¹²⁸ *What is Prebid?*, Prebid.org, <http://prebid.org/overview/intro.html> (“Prebid.js is the most widely used header bidding ‘container’ or ‘wrapper’ on the web.”); *Unified Ad Marketplace*, Amazon, <https://aps.amazon.com/aps/unified-ad-marketplace/>; Sarah Sluis, *AppNexus And Index Exchange Launch Server-Side Header Bidding With Mutual Support*, AdExchanger (Jan. 30, 2017), <https://www.adexchanger.com/platforms/appnexus-index-exchange-launch-server-side-header-bidding-mutual-support/>; *Header Bidding with OpenWrap*, PubMatic, <https://pubmatic.com/products/header-bidding/>; *With Demand Manager, Rubicon Project Introduces Prebid as a Service*, Rubicon Project (May 9, 2019), <https://rubiconproject.com/insights/press-releases/with-demand-manager-rubicon-project-introduces-prebid-as-a-service/>.

¹²⁹ Top publishers defined by source as, “[t]op 1,000 sites that use programmatic to sell ads among Alexa Internet’s top 5,000 sites.” Ross Benes, *Five Charts: The State of Header Bidding*, eMarketer (May 30, 2019), <https://www.emarketer.com/content/five-charts-the-state-of-header-bidding>.

¹³⁰ James Hercher, *Ad Buyers Starting To Use The Trade Desk DSP Over Google, According To Advertiser Perceptions Report*, AdExchanger (Dec. 3, 2019), <https://adexchanger.com/online-advertising/ad-buyers-starting-to-use-the-trade-desk-dsp-over-google-according-to-advertiser-perceptions-report/>.

¹³¹ Press Release, *The Trade Desk Joins Prebid.org, Bolstering Buy-Side Contributions*, The Trade Desk (Dec. 5, 2019), <https://www.thetradedesk.com/press-releases/the-trade-desk-joins-prebid-org-bolstering-buy-side-contributions>.

Google's Open Bidding also work with Amazon's unified auction solution, 56% of publishers using Google's ad exchange, client-side header bidding and Amazon's unified auction solution, and 27% of publishers using Google's ad exchange use Google's Open Bidding, client-side header bidding, *and* Amazon's unified auction solution.¹³² This multi-homing makes any hypothetical foreclosure effects unlikely.

In fact, the CMA observed that while Google's Open Bidding has been "successful," it "has not led, however, to the demise" of header bidding.¹³³ Header bidding's well-recognized deficiencies, rather, explain why other solutions remain attractive in this highly competitive space.

A historical and empirical review thus shows that there is no support for G&K's mistaken claims that Google's Dynamic Allocation or its decision not to have AdX or Google Ads participate in header bidding auctions were anticompetitive.

E. Empirical Evidence Shows Ad Tech Is Highly Competitive And Dynamic

Real-world evidence also refutes G&K's claim that Google's innovations have left the ad tech ecosystem bereft of viable competition. To the contrary.

G&K claim that, notwithstanding the constant dynamic change and presence of numerous significant competitors, "the ad tech industry is far from being 'competitive.'" In doing so, they also apparently characterize other vertically integrated and household names like Amazon, AT&T, Comcast, Facebook and Verizon as "fringe competitors."¹³⁴ To support that position, they cite a few news articles that call Google "dominant" (solely based on Google's size) and assert that Google is "forcing its rivals to either exit the market or turn into fringe players," pointing to a few providers that have written down investments, shelved products, exited the market, or been acquired.¹³⁵

That is hardly evidence of a lack of competition. First, churn is consistent with a competitive market, and second, significant new entry, expansion and innovation has taken place as well. Indeed, as shown immediately below, the *very same articles* that G&K rely on, indicate that the market exits and investment write-downs referenced by G&K were due to fierce competition. The ad tech space thus actually is a highly competitive and dynamic marketplace. G&K's various papers implicitly acknowledge this constant innovation given that they needed to revisit their theories in less than a year's time to keep up with product changes.¹³⁶ A healthy, competitive ecosystem means that not all participants can keep up. That is especially so when competition is not just static, on price, but also highly dynamic, through innovation and rapid

¹³² *US Publisher Programmatic Revenues 2019*, Roxot, <https://roxot.com/report/sell-side-programmatic-us-2019>. The source refers to "Exchange Bidding," which has since been renamed "Open Bidding."

¹³³ *CMA Appendix H* ¶ 24.

¹³⁴ *Trust Me, I'm Fair* at 43-44.

¹³⁵ *Google's (Forgotten) Monopoly* at 18-19; *Trust Me, I'm Fair* at 44-45.

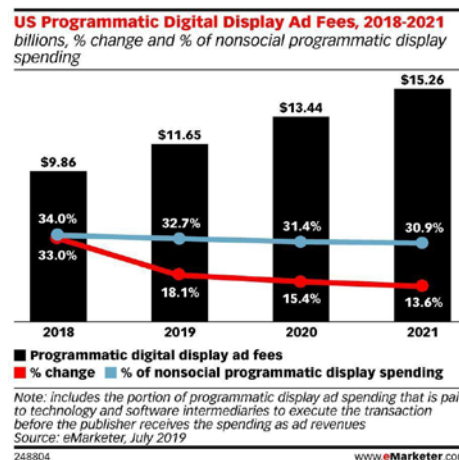
¹³⁶ See *An EU Competition Law Analysis* (published in Dec. 2018); *Trust Me, I'm Fair* at 1 (published in Oct. 2019).

change. The antitrust laws are about protecting competition, not individual competitors.¹³⁷ Trying to protect individual competitors or market participants, when a marketplace is as dynamic as ad tech, carries significant risk of stifling competition and innovation, rather than promoting or protecting it.

1. Studies Show Programmatic Ad Spend Is Growing While Ad Tech Fees Are Declining As A Percentage Of That Spend

The ad tech space displays two key features of a highly competitive space: growing output and declining prices. According to eMarketer, US programmatic ad spending has been growing year-over-year by large double digit figures.¹³⁸ Meanwhile, in another eMarketer report it was observed that during the same time period “[c]ompetition across almost all vendor categories has helped bring prices down.”¹³⁹ As the chart below from the eMarketer study covered in that report depicts, ad tech fees as a share of the total spend on non-social programmatic advertising have decreased in the last several years and are projected to continue to do so.

Figure 3¹⁴⁰



¹³⁷ *Brown Shoe Co. v. United States*, 370 U.S. 294, 370 (1962); Makan Delrahim, *Merger Enforcement Decisions Under Uncertainty and Imperfect Information*, U.S. Department of Justice (June 7, 2018) at 4, <https://www.justice.gov/opa/speech/file/1092146/download>; Neelie Kroes, *Preliminary Thoughts on Policy Review of Article 82*, European Commission (Sept. 23, 2005), https://ec.europa.eu/commission/presscorner/detail/en/SPEECH_05_537 ("My [Neelie Kroes, then European Commissioner for Competition] own philosophy on this is fairly simple. First, it is competition, and not competitors, that is to be protected. Second, ultimately the aim is to avoid consumers harm."); *Case C-413/14 P Intel v Commission*, European Court of Justice (Sept. 6, 2017) ¶ 134, <http://curia.europa.eu/juris/document/document.jsf?text=&docid=194082&pageIndex=0&doclang=en&mode=lst&dir=&occ=first&part=1&cid=8396130>.

¹³⁸ Lauren Fisher, *US Programmatic Ad Spending Forecast 2019*, eMarketer (Apr. 25, 2019), <https://www.emarketer.com/content/us-programmatic-ad-spending-forecast-2019>.

¹³⁹ Alison Weissbrot, *EMarketer: Ad Tech Gets A Tax Cut As Programmatic Fees Decline*, AdExchanger (Aug. 5, 2019), <https://adexchanger.com/analysts/emarketer-ad-tech-gets-a-tax-cut-as-programmatic-fees-decline/>.

¹⁴⁰ *US Programmatic Digital Display Ad Fees, 2018-2021 (billions, % change and % of non-social programmatic display spending)*, eMarketer (July 1, 2019), <https://www.emarketer.com/chart/229878/us-programmatic-digital-display-ad-fees-2018-2021-billions-change-of-nonsocial-programmatic-display-spending>.

Consistent with these trends, there are many reports, including several sources cited by G&K, of increasing price pressure and commoditization in ad tech.

- For example, according to a December 2018 New York Magazine report cited by G&K,¹⁴¹ “Verizon claimed that Oath [its ad tech business] ‘has experienced increased competitive and market pressures throughout 2018 that have resulted in lower than expected revenues and earnings.’ These are pressures it expects to continue.”¹⁴²
- Similarly, a December 2018 AdExchanger report cited by G&K,¹⁴³ observes that Rubicon Project “slashed [its take rate] in half,” that “[t]o compete, OpenX’s competitors have lowered take rates,” and that “ad buyers turn off the remaining exchanges, like OpenX, with higher fees. Layoffs could allow OpenX to lower take rates.”¹⁴⁴
- An October 2018 Digiday report likewise observed that DSPs and SSPs have reduced their fees,¹⁴⁵ and a November 2016 AdExchanger report cited by G&K¹⁴⁶ explains that Facebook exited the third-party ad server business at that time in part because “[i]t’s also hard to sell people on technology once that tech starts to get commoditized.”¹⁴⁷

2. Ad Tech Is A Crowded Marketplace At All Levels

This price competition and commoditization is driven by a diverse and crowded marketplace. Despite recent mergers and acquisitions, there continues to be a large number of significant competitors, including vertically integrated players and point players. A few of them, including Google, are listed below with an indication of their product offering across the ad tech stack.

¹⁴¹ See *Trust Me, I’m Fair* at 44 n. 129.

¹⁴² Simon Owens, *Verizon Made a \$9 Billion Bet on Digital Media. Here’s Why It Failed*, *Intelligencer*, New York Magazine Intelligencer, (Dec. 13, 2018), <http://nymag.com/intelligencer/2018/12/why-verizons-usd9-billion-bet-on-digital-content-failed.html>.

¹⁴³ See *Google’s (Forgotten) Monopoly* at 7-8 n. 32.














¹⁴⁴ Sarah Sluis, *OpenX Lays Off 100 Employees and Pivots to Video*, AdExchanger (Dec. 18, 2018), <https://adexchanger.com/platforms/openx-lays-off-100-employees-and-pivots-to-video/>.

¹⁴⁵ Tim Peterson, *Flatter and Fairer: Marketers and Publishers Hack Away at Ad Tech Fees*, Digiday (Oct. 1, 2018), <https://digiday.com/media/marketers-and-publishers-ad-tech-fees/>.

¹⁴⁶ See *Google’s (Forgotten) Monopoly* at 8 n. 33.

¹⁴⁷ Allison Schiff, *Facebook Shatters Atlas Ad Server, Ending Its Assault on DoubleClick; Atlas to Live on as Measurement Pixel*, AdExchanger (Nov. 18, 2016), <https://adexchanger.com/platforms/facebook-shatters-atlas-ad-server-ending-assault-doubleclick-atlas-live-measurement-pixel/>.

Figure 4¹⁴⁸

	Buy-side		Sell-side		
	Ad Serving	Buying platform/ Ad network	Ad Exchange/ SSP	Header/ Open bidding	Publisher Ad Server
	X	X	X	X	
	X	X	X	X	X
	X	X	X	X	X
	X	X	X		X
		X	X		
		X	X		X
			X	X	
		X	X	X	X
	X ¹⁴⁹	X			
		X			
	X	X			
			X	X	
			X	X	X
			X	X	X

In addition to ad tech providers that are vertically integrated along the ad stack, there are several that are vertically integrated in that they sell both their own ad inventory (as a publisher) and ad tech products that facilitate the sale and purchase of ad inventory of other publishers. Examples besides Google include Amazon, AT&T’s Xandr, Comcast, Facebook, Microsoft, Twitter and Verizon Media.¹⁵⁰

Other ad tech players are successful specializing in ad tech. For example, The Trade Desk is reportedly the “fastest growing demand-side platform in the industry,”¹⁵¹ with a market cap north of \$14 at some points in early 2020,¹⁵² and major customers like Procter & Gamble.¹⁵³ It reportedly was recently competing head to head with AT&T’s Xandr in a “bake off” to secure Walmart as a client.¹⁵⁴ Criteo, an advertiser platform and ad network, has a reported US market

¹⁴⁸ Citations for this figure have been provided in Appendix 2, Sections 1-2, 4-6.

¹⁴⁹ Adobe provides advertiser ad serving functionalities through a partnership with Flashtalking.

¹⁵⁰ See Appendix 2, Section 8.

¹⁵¹ *About Us*, The Trade Desk, <https://www.thetradedesk.com/careers/about-us>.

¹⁵² *The Trade Desk Inc (TTD)*, YCharts, https://ycharts.com/companies/TTD/market_cap (as of May 1, 2020).

¹⁵³ Jack Neff, *P&G Shakes Up Tech Providers Behind Global Programmatic*, AdAge (May 4, 2017), <https://adage.com/article/digital/p-g-shakes-tech-providers-global-programmatic/308920>.

¹⁵⁴ James Hercher, *Walmart Media Group Tests Xandr And The Trade Desk For DSP Role*, AdExchanger (Jan. 31, 2020), <https://www.adexchanger.com/online-advertising/walmart-media-group-tests-appnexus-and-the-trade-desk-for-dsp-role/>.

cap of hundreds of millions of dollars.¹⁵⁵ On its own, Rubicon Project—which offers an ad exchange and publisher ad server functionality—claimed to reach more than 1 billion consumers,¹⁵⁶ and grew 32% year-over-year by mid 2019 (beating expectations).¹⁵⁷ Ahead of its now completed combination with Telaria, Rubicon Project claimed it would be the “world’s largest independent sell-side advertising platform;”¹⁵⁸ and now has a combined market cap of roughly \$750 million.¹⁵⁹ Ad exchange Index Exchange, listed in 2019 as one of the fastest growing Canadian tech companies with a reported four year growth rate of 509%,¹⁶⁰ handles 90 billion requests everyday (more than the New York Stock Exchange),¹⁶¹ and was recently selected by GroupM (the largest media buyer in the world) to receive a majority of GroupM’s demand.¹⁶² MediaMath, which has a similar business model as The Trade Desk operating a DSP was valued at an estimated \$1 billion in 2018.¹⁶³ OpenX, another ad exchange, reportedly has 450 million unique users and 30 billion impressions per month.¹⁶⁴

There are also several highly successful specialized ad tech companies focused on mobile apps. For example, AppLovin was expected to achieve over \$1 billion in revenue in 2019 and to IPO.¹⁶⁵ Fyber in November 2019 reported 20% year-over-year programmatic business growth.¹⁶⁶ IronSource was also expected to achieve approximately \$1 billion in revenue in

¹⁵⁵ See *CRTO: Criteo S.A. American Depositary Shares*, Nasdaq.com, <https://www.nasdaq.com/market-activity/stocks/crto> (as of Apr. 29, 2020).

¹⁵⁶ *Who We Are*, Rubicon Project, <https://rubiconproject.com/about-rubicon-project/>.

¹⁵⁷ Timothy Green, *Why Shares of the Rubicon Project Rocketed Higher Today*, Yahoo! Finance (Aug. 1, 2019), <https://finance.yahoo.com/news/why-shares-rubicon-project-rocketed-180100933.html>.

¹⁵⁸ Press Release, *Rubicon Project and Telaria Agree to Combine to Form Largest Independent Sell-Side Advertising Platform, Poised to Capture Growth in Connected TV*, Rubicon Project, (Dec. 19, 2019), <https://rubiconproject.com/insights/press-releases/rubicon-project-and-telaria-agree-to-combine-to-form-largest-independent-sell-side-advertising-platform-poised-to-capture-growth-in-connected-tv/>.

¹⁵⁹ *RUBI: The Rubicon Project, Inc. Common Stock*, Nasdaq.com, <https://www.nasdaq.com/market-activity/stocks/rubi> (as of Apr. 30, 2020).

¹⁶⁰ See *Technology Fast 50 Winners*, Deloitte (2019), <https://www2.deloitte.com/content/dam/Deloitte/ca/Documents/technology-media-telecommunications/ca-en-fast50-winners-2019-aoda.pdf>.

¹⁶¹ Index Exchange, *Life As An IX Engineer*, Index Exchange (Jan. 22, 2020), <https://www.indexexchange.com/life-as-an-ix-engineer/>.

¹⁶² Alison Weissbrot, *GroupM Partners With Index Exchange As Hold Cos Lean Into SSPs*, AdExchanger (Mar. 2, 2020), <https://www.adexchanger.com/agencies/groupm-partners-with-index-exchange-as-hold-cos-lean-into-ssps/>.

¹⁶³ Lara O’Reilly, *Ad-Tech Company MediaMath Raises \$225 Million*, Wall Street Journal (July 10, 2018), <https://www.wsj.com/articles/ad-tech-company-mediamaath-raises-225-million-1531220400>.

¹⁶⁴ *Break Free*, OpenX, <http://welcome.openx.com/breakfree#>.

¹⁶⁵ Mark Maurer, *AppLovin Gears Up for IPO Under New CFO*, Wall Street Journal (Nov. 22, 2019), <https://www.wsj.com/articles/applovin-gears-up-for-ipo-under-new-cfo-11574434800>.

¹⁶⁶ *Fyber N.V., Q3 2019 Results Statement*, Fyber (Q3 2019), <https://investors.fyber.com/assets/media/fyber-nv-q3-2019-interim-financial-statement-secured.pdf>.

2019.¹⁶⁷ And Blackstone-owned Vungle claims to reach 60,000 mobile apps and 1 billion unique devices and to work with publishers such as Zynga, Pandora and Microsoft.¹⁶⁸

Yet other popular ad tech providers include AdColony, AdGlare, Adzerk, Amobee, AppLovin, Chartboost, Clinch, Extreme Reach, Flashtalking, InMobi, Innovid, ironSource, PubMatic, Roku's dataxu, SpotX, Taboola and Outbrain (in a pending merger), Teads, Unity, Weborama, Zedo and many others.¹⁶⁹

3. In Addition To Price Competition, There Is Constant Dynamic Competition In Ad Tech

G&K's theories are about product changes that DoubleClick made in 2007. A brief review of how much the competitive landscape has changed in ad tech since then, as well as the review in Section IV above of how real time bidding and Google's Ad Manager product evolved during that time, illustrates just how dynamic the marketplace has been. Appendix 3 provides a timeline and supporting sources for this Section.

In 2007-08—when DoubleClick launched AdX and Dynamic Allocation and Google later acquired DoubleClick—Microsoft, Yahoo!, AOL and WPP were among the significant players in ad tech.¹⁷⁰ Each of them made several acquisitions in ad tech around that time and the immediate years following, and owned ad servers and ad networks or ad exchanges. For example, Microsoft acquired aQuantive (Atlas) (\$6 billion) and AdECN, Yahoo! acquired the remaining 80% of Right Media for \$680 million and BlueLithium, TACODA, Quigo and Adtech, and WPP acquired 24/7 Real Media. These remained among the largest players in ad tech for some time, along with Google (after it acquired DoubleClick). Meanwhile, around the same time, several specialized ad tech players entered the marketplace, including ones that subsequently have become significant players with innovative technologies and products like AppNexus (now AT&T), Criteo, FreeWheel, InMobi, MediaMath, PubMatic, OpenX, Outbrain, Rubicon Project, Taboola and TubeMogul (now Adobe).

Then, in the 2009-2013 timeframe, industry trends drove another wave of innovation, entry, expansion and repositioning, with mobile app and social media advertising kicking off, the formation of the OpenRTB consortium in 2010 and the adoption of the OpenRTB's real-time bidding protocols by the IAB in 2012. During this timeframe, then new but now significant players like AppLovin, Chartboost, dataxu, MoPub and The Trade Desk entered the ad tech

¹⁶⁷ Melissa Zeloof, *CVC Funds to Partner With IronSource*, PRWeb (Oct. 4, 2019), https://www.prweb.com/releases/cvc_funds_to_partner_with_ironsource/prweb16625187.htm.

¹⁶⁸ Press Release, *Blackstone Closes Acquisition of Vungle, a Leading Mobile Performance Marketing Platform*, Vungle (Sept. 30, 2019), <https://vungle.com/news/blackstone-closes-acquisition-of-vungle-a-leading-mobile-performance-marketing-platform/>.

¹⁶⁹ See Appendix 2.

¹⁷⁰ *Statement of Federal Trade Commission Concerning Google/DoubleClick*, Fed. Trade Comm'n, at 5-6 (Dec. 20, 2007), https://www.ftc.gov/system/files/documents/public_statements/418081/071220googledc-commstmt.pdf; see also *Case No COMP/M.4731 – Google/ DoubleClick*, European Commission (Nov. 3, 2008) at 34-35, ¶¶ 112, 115, https://ec.europa.eu/competition/mergers/cases/decisions/m4731_20080311_20682_en.pdf.

marketplace, while household names like Apple, Facebook and Twitter entered through acquisitions. Apple acquired mobile ad network Quattro, and launched its iAd network (2010), Facebook acquired the Atlas Advertising Suite (including ad serving systems) from Microsoft (2013) and Twitter acquired the MoPub mobile ad network and mediation platform (2013). During the same timeframe, Google acquired AdMob (2010), Invite Media (2011) and AdMeld (2011), broadening its portfolio of ad tech products for advertisers and publishers.

Since 2014, the significant growth of mobile app, social media, video and programmatic advertising, as well as the convergence of TV and Internet advertising with digital TV, has attracted yet another wave of innovation, entry, expansion and repositioning, including by major corporates like Amazon, AT&T, Comcast, Facebook and Verizon. For example:

- In 2014: Google launched the innovative Enhanced Dynamic Allocation in Ad Manager; Amazon launched its DSP and acquired Twitch for \$970 million (which added substantial new owned and operated ad inventory to Amazon's arsenal); Facebook launched its Facebook Audience Network (FAN) and acquired LiveRail (a video ad exchange); Comcast acquired FreeWheel (a popular video ad serving platform); Yahoo! acquired Flurry (mobile apps analytics) and BrightRoll (a programmatic video ad platform); Alliance Data acquired Conversant (formerly ValueClick) for \$2.3 billion; and InMobi launched what was reportedly "the world's largest mobile native advertising exchange."
- In 2015-16: Google enabled cross-device measurement across the web, support for native ads across DoubleClick products, and the introduction of Programmatic Guaranteed; Prebid.org was founded and released its first prototype header bidding solution; Verizon entered ad tech through its acquisitions of AOL (\$4.4 billion) and Millennial Media; Microsoft purchased LinkedIn for \$26 billion; ironSource acquired Supersonic to form a mobile ads platform (reportedly covering 1 billion monthly users and expected to generate \$450 million in sales); Facebook's FAN became a \$1 billion business; Google announced beta testing of its Exchange Bidding technology; Comcast acquired StickyAds (a video ads SSP); OpenX launched its header bidding technology; pure-play DSP The Trade Desk went public, at over a \$1 billion market cap; Amazon launched its Transparent Ads Marketplace server-side header bidding solution; and Adobe acquired DSP TubeMogul.
- In 2017: Google's DV360 (then called DBM) was the first DSP to adopt ads.tx, the IAB's anti-fraud solution; AT&T, WPP and DISH acquired INVIDI, a leading addressable TV advertising platform; AppNexus and Index Exchange launched a cross-supported header bidding solution; Adobe capitalized on its acquisition of TubeMogul and launched its Advertising Cloud solution; Amazon's DSP reportedly became the most popular DSP; Singtel's Amobee acquired popular DSP Turn; and Verizon acquired Yahoo! for \$4.5 billion and combined it with AOL and Millennial Media.
- In 2018: Studies showed that the large majority of top publishers transacting programmatically had adopted header bidding; Microsoft launched its Microsoft

Audience Network; AT&T closed its acquisition of Time Warner valued at almost \$110 billion, acquired AppNexus for reportedly around \$1.6 billion, and launched a consolidated offering under the Xandr brand; Singtel's Amobee acquired video ad platform Videology; and Twitter's MoPub, AdColony, AppLovin, FAN and TapJoy announced a partnership to bring header bidding to the mobile app world.

- In 2019: Facebook reportedly generated half of all display advertising revenues; Google launched its unified first-price auction in Ad Manager; Amazon acquired Sizmek's popular ad server, further expanding its offering across the ad stack; Facebook's FAN reached 2 billion users and 40% of apps; Twitter's MoPub connected 55,000 apps to 130 DSPs and processed 1 trillion monthly app ad requests that reached 1.4 billion devices; web browser Opera launched a native advertising platform; The Washington Post expanded its Zeus ad tech offering; Blackstone acquired ad tech company, Vungle; popular content recommendation ad networks Taboola and Outbrain announced their merger; publisher ad server and ad exchange, Smart, acquired DSP LiquidM, thus integrating across the buy and sell side of the ad stack; TikTok announced the launch of a self-serve platform; Roku acquired popular DSP dataxu; Amazon and The Trade Desk's DSPs were ranked the two most popular DSPs; and The Trade Desk's proprietary "unified ID" solution was incorporated into Prebid's header bidding tool.
- In 2020: The Trade Desk's market cap first exceeded \$14 billion; Rubicon Project acquired Telaria to form what they claim to be "the world's largest independent sell-side advertising platform"; CVS began to pitch a new ad network; Walmart announced the launch of a self-serve ad platform; Comcast announced the launch of "One Platform" for advertisers to buy video ad inventory and target audiences across NBCUniversal content, wherever it is shown; Comcast's FreeWheel launched a "unified decisioning" platform where direct-sold and intermediated programmatic demand can be considered alongside each other, much like what Google's Enhanced Dynamic Allocation does in Ad Manager; and in late April it was reported that "Amazon [a]dvertising . . . [i]s [b]ooming," and that Amazon's "advertising revenue was up by about 40% in Q1 compared to the year before," amounting to, most of, \$3.9 billion for the quarter.¹⁷¹

It is during this 2007-2020 time period that G&K claim Google has exercised market power to foreclose rivals and stifle competition. The above overview of but a few examples of innovation, entry, expansion and repositioning during that same time period strongly indicate that no such foreclosure or stifling of competition has taken place. Quite the opposite. Indeed, it is worth considering whether any company could accumulate, much less exercise durable market power in such a dynamic environment. As Google's frequent product changes show, one can only keep up in such a rapidly changing industry by constantly innovating.

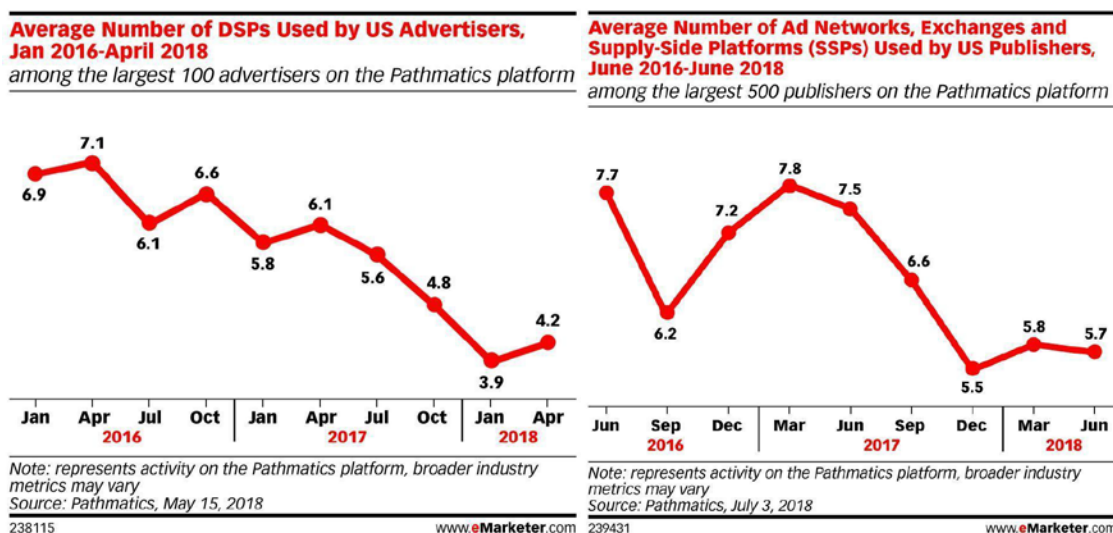
¹⁷¹ James Hercher, *Amazon Advertising (And The Rest Of Its Business) Is Booming, But Profit's On Hold* (Apr. 30, 2020) <https://www.adexchanger.com/ecommerce-2/amazon-advertising-and-the-rest-of-its-business-is-booming-but-profits-on-hold/>. Note that Amazon does not disclose its advertising revenues. They are reported as 'Other' revenue. See *Id.*

It is true, as G&K note, that along the way, a few companies have repositioned, shut down products, written down investments or exited certain parts of the ad tech business altogether. As discussed, for example, Facebook and Verizon shut down ad serving products to focus their efforts on other parts of their ad tech businesses, reportedly due to trends of commoditization and price compression. And, Apple shut down its iAd mobile app ad network (though recent reporting suggests it may be “developing a closed-loop ad platform aimed at helping developers monetize their apps and acquire new users”).¹⁷² But that is not at all unusual and to be expected in a highly competitive and dynamic marketplace. And, it certainly seems like there has been a lot more significant entry and expansion in ad tech, than there have been market exits, including in the areas where some have chosen to shut down products.

4. Multi-Homing Facilitates Entry And Expansion

Industry statistics show that advertisers, agencies and publishers regularly use multiple competitive ad tech solutions and providers at the same time. For example, as pictured below, eMarketer reports that the 100 largest US advertisers on Pathmatics’ platform each use an average of four DSPs and the 500 largest US publishers each use an average of almost six “Ad Networks, Exchanges and SSPs.”¹⁷³

Figure 5¹⁷⁴



¹⁷² Andrew Blustein and Ronan Shields, *Apple Is Quietly Ramping Up Its Ad Game With Search Ads*, AdWeek (Apr. 24, 2020), <https://www.adweek.com/programmatic/apple-is-quietly-ramping-up-its-ad-game-with-search-ads-expansion/>.

¹⁷³ *Average Number of DSPs Used by US Advertisers, Jan 2016-April 2018*, eMarketer (May 15, 2018), <https://www.emarketer.com/chart/219189/average-number-of-dsps-used-by-us-advertisers-jan-2016-april-2018-among-largest-100-advertisers-on-pathmatics-platform>; *Average Number of Ad Networks, Exchanges and Supply-Side Platforms (SSPs) Used by US Publishers, June 2016-June 2018*, eMarketer (July 3, 2018), <https://www.emarketer.com/chart/220505/average-number-of-ad-networks-exchanges-supply-side-platforms-ssps-used-by-us-publishers-june-2016-june-2018-among-largest-500-publishers-on-pathmatics-platform>.

¹⁷⁴ *Id.*

Such multi-homing of different competitive solutions lowers barriers to entry and expansion and facilitates switching.¹⁷⁵ Regulators have made these very observations in relation to the ad tech space specifically. For example, in its in-depth review of Google's acquisition of DoubleClick, the European Commission (EC) found that:

[T]he prevalence of multi-homing suggests that the participation by a publisher or an advertiser to an ad network (e.g., AdSense) does not imply that they are unable or unwilling to participate in another ad network, that is to say their participation to an ad network is not exclusive. This may result from the fact that the fixed cost of joining an ad network is either very low or non-existent (as indicated by the notifying party). Multi-homing is also enabled by the interoperability of the ad serving technology allowing publishers and advertisers to provide instructions across several networks.¹⁷⁶

Similarly, the U.S. Department of Justice observed in its review and clearance of Google's acquisition of Admeld that "web publishers often rely on multiple display advertising platforms and can move business among them in response to changes in price or the quality of ad placements. This use of multiple display advertising platforms lessens the risk that the market will tip to a single dominant platform."¹⁷⁷ While the industry has evolved substantially since this time, as the above eMarketer statistics show, the finding that advertisers and publishers multi-home on display ad intermediation providers remains true today.

5. Publishers And Advertisers In-Source

Another competitive dynamic in ad tech is that publishers and advertisers can and regularly do turn to internally-developed advertising technology instead of third-party solutions. For example, the IAB recently reported that in Europe, 39% of programmatic-active brands have "fully moved buying functions in-house" and 47% have "partial [in-house] capabilities."¹⁷⁸ Major brands including AllState, Ally Financial, Anheuser-Busch, Clorox, L'Oreal, Netflix, Procter & Gamble, Sprint, StubHub and Unilever, have moved portions of their marketing in-house.¹⁷⁹

¹⁷⁵ *Competition Policy for the Digital Era*, Publications Office of the European Union (May 20, 2019) at 37-38, <https://op.europa.eu/en/publication-detail/-/publication/21dc175c-7b76-11e9-9f05-01aa75ed71a1/language-en>.

¹⁷⁶ *Case No COMP/M.4731 – Google/ DoubleClick*, European Commission (Nov. 3, 2008) at 80, ¶ 305, https://ec.europa.eu/competition/mergers/cases/decisions/m4731_20080311_20682_en.pdf.

¹⁷⁷ *Statement of the Department of Justice's Antitrust Division on Its Decision to Close Its Investigation of Google Inc.'s Acquisition of Admeld Inc.*, U.S. Department of Justice (Dec. 2, 2011), <https://www.justice.gov/opa/pr/statement-department-justices-antitrust-division-its-decision-close-its-investigation-google>.

¹⁷⁸ *European Programmatic In-Housing: Adoption Rate, Benefits, Depth, and Types of In-House Buying Functions*, IAB (Apr. 22, 2019), <https://www.iab.com/insights/2019-european-programmatic-in-housing/>; *Benefits, Challenges and Key Steps to Building Internal Capabilities*, IAB (May 2018) at 3, https://www.iab.com/wp-content/uploads/2018/05/IAB_Programmatic-In-Housing-Whitepaper_v7a.pdf

¹⁷⁹ Kristina Monllos, *Marketers Feel Growing Pains as In-house Agencies become a Necessity*, Digiday (Oct. 11, 2019), <https://digiday.com/marketing/marketers-feel-growing-pains-house-agencies-become-necessity/>; Claude Denton, *Why Corporations are Starting Their Own In-house Ad Agencies*, Next Web

Similarly, as discussed above, many publishers sell their owned and operated ad inventory (and sometimes the inventory of other publishers) through their own “self-serve” platforms.¹⁸⁰ Many larger publishers likewise also use their own, internally-developed ad servers, a largely commoditized function. Examples of publishers who use their own internal ad servers include Amazon, eBay, Etsy, Facebook, LinkedIn, Pinterest, Reddit, Snapchat and Yelp.¹⁸¹ Some publishers even offer their internally-developed ad tech to other publishers as well. For example, The Washington Post recently started offering its internal Zeus supply-side tool to third-party publishers, and is tripling its investment in that product.¹⁸² There are also ad tech vendors that offer publishers APIs to help them develop their own internal ad serving systems, such as Adzerk.¹⁸³ This ability to turn to in-house solutions for functions like ad serving form an additional competitive constraint on ad tech providers. The EC already recognized this in its decision clearing Google’s acquisition of DoubleClick in 2008, indicating that shares were much lower when in-house solutions were taken into account.¹⁸⁴ As the above-mentioned examples illustrate, that is clearly still the case today.

6. Popularity Of Google’s Ad Tech Does Not Reflect Market Power

There is no question that some of Google’s ad tech products are popular. But the thriving and highly dynamic ecosystem described above is at odds with popularity or shares of traffic translating into market power. Agencies investigating ad tech should take into account the following:

First, it is important to keep in mind that ad tech products often process or intermediate transactions between publishers and advertisers (for sale and purchase of ad impressions and placement of the ad to capture that impression), or have a related function. Proper assessment of antitrust theories around such products therefore may require evaluating the impact of firm conduct on both constituencies and how each would likely respond to the conduct.

(Feb. 18, 2018), <https://thenextweb.com/contributors/2018/02/18/corporations-starting-house-ad-agencies/>.

¹⁸⁰ Examples were provided in Section II.A. See also, Appendix 2, Section 8.

¹⁸¹ Chris Shuptrine, *What is an Ad Server? The Definitive Guide* (2020), Adzerk (Apr. 7, 2019), <https://adzerk.com/blog/what-is-an-ad-server/>; Chris Shuptrine, *Server-Side Ad Serving: The Future of Monetization*, Adzerk (Feb. 21, 2020), <https://adzerk.com/blog/server-side-ad-serving/> (listing Snapchat).

¹⁸² Shoshana Wodinsky, Q&A: *The Washington Post’s Programmatic Team Isn’t Afraid of Experimentation*, AdWeek (May 16, 2019), <https://www.adweek.com/programmatic/qa-the-washington-posts-programmatic-team-isnt-afraid-of-experimentation/>; Sara Fischer, *Scoop: Washington Post Tripling Investment in Revenue Technology Zeus*, Axios (Mar. 10, 2020), <https://www.axios.com/washington-post-zeus-investment-revenue-technology-f8ce436c-7a4e-4583-a1d3-db9a87295574.html>.

¹⁸³ See Chris Shuptrine, *What is an Ad Server? The Definitive Guide for 2019*, Adzerk Blog (Apr. 7, 2019), <https://adzerk.com/blog/what-is-an-ad-server>.

¹⁸⁴ *Case No COMP/M.4731 – Google/ DoubleClick*, European Commission (Nov. 3, 2008) at 37, ¶ 120, https://ec.europa.eu/competition/mergers/cases/decisions/m4731_20080311_20682_en.pdf (“Moreover, in-house ad serving supply should also be taken into account when assessing the market power of DoubleClick.”).

Second, and relatedly, there are complex threshold questions to answer about what ad tech products actually constitute a distinct relevant market before one can calculate share. There are many pathways for advertisers and publishers to transact, several of which are substitutable in whole or in part, such that they may well form price constraints on each other. For example, while direct ad sales may have historically been distinct from intermediated ad sales, with the advent of self-serve platforms, programmatic direct/programmatic guaranteed, and private marketplaces, that distinction has blurred.¹⁸⁵ Programmatic direct and private marketplaces are expected to account for 83% of all programmatic display advertising in 2020.¹⁸⁶ Similarly, calculating separate shares for publisher-side ad servers may not be meaningful because that excludes ad networks, SSPs and header bidding auctions, while publishers can and do use those as partial or complete substitutes for ad servers.

Third, in ad tech, there is the risk that shares are mistakenly overstated by confining them to a particular ad format, which might exclude important competitors, since there is significant interformat competition in online (and offline) advertising.¹⁸⁷ In recent years, ad targeting capabilities of different ad formats have become increasingly comparable.¹⁸⁸ In addition, various software tools have emerged and evolved that enable advertisers and agencies to compare return on ad spend—a function of price and performance—from different ad formats and channels in real-time and shift their spend accordingly.¹⁸⁹

Fourth, as discussed and recognized by the EC a long time ago, in-sourcing is prevalent both on the advertiser and publisher-sides of the marketplace.¹⁹⁰ For example, there are several publishers that use their own ad serving technology or sell their owned and operated ad inventory through their own “self-serve” platforms (e.g. Facebook, Amazon, LinkedIn, Pinterest, Snapchat etc.). The CMA’s study appears to recognize that for advertisers, such platforms are substitutes for independent buying platforms or ad networks that offer access to ad inventory of

¹⁸⁵ See Rashmita Behera, *Programmatic Direct: 5 Questions to Ask Before Starting*, AdPushUp (Jan. 18, 2019), <https://www.adpushup.com/blog/what-is-programmatic-direct/> (“Programmatic Direct is a direct deal between seller and buyer, eliminating the need for ad exchange parties.”).

¹⁸⁶ See Lauren Fisher, *Private Marketplace Ad Spending to Surpass Open Exchange in 2020*, eMarketer (Jan. 21, 2020), <https://www.emarketer.com/content/private-marketplace-ad-spending-to-surpass-open-exchange-in-2020>.

¹⁸⁷ See, e.g., Ginny Marvin, *80% of Amazon advertisers plan to increase budgets in 2019*, Marketing Land (Oct. 25, 2018), <https://marketingland.com/80-of-amazon-advertisers-plan-to-increase-budgets-in-2019-250489> (indicating that, with Amazon’s increasing popularity as an advertising destination, advertisers were planning to shift substantial ad spend from “other marketplace spend,” “paid social,” “print, TV, audio, outdoor,” “display,” and “search spend” towards Amazon).

¹⁸⁸ See *Drive Successful Paid Social Campaigns With Adobe Media Optimizer Social Ad Management*, Adobe (July, 2016), <https://www.adobe.com/content/dam/acom/en/solutions/amo/pdf/54658.en.amo.overview.social-ad-mgt-solution.pdf> (discussing a client that found that Adobe Media Optimizer led to a realization that social (in this case Facebook), search, and display were “just as efficient” as one another).

¹⁸⁹ See, e.g., *Adobe Media Optimizer is now Adobe Advertising Cloud*, Adobe, <https://www.adobe.com/advertising-cloud/media-optimizer.html> (“Our programmatic ad buying solution . . . unites search, display, social, and TV into a single platform so you can find the best way to consistently deliver audience-relevant content”).

¹⁹⁰ *Case No COMP/M.4731 – Google/ DoubleClick*, European Commission (Nov. 3, 2008) at 49-50, ¶¶ 176-178, https://ec.europa.eu/competition/mergers/cases/decisions/m4731_20080311_20682_en.pdf.

unaffiliated publishers.¹⁹¹ This suggests that attempts to define a separate market around (ad tech for) “open display” vs. “owned & operated” ad inventory may not be appropriate. For advertisers, there may not be a meaningful difference when they try to optimize their return on ad spend and to that end buy through platforms for open display and owned and operated inventory. Indeed, as discussed, there are several providers in ad tech that are also publishers and provide platforms for advertisers to buy both ad inventory on their owned and operated properties as well as on third-party publisher properties.

Fifth, since multi-homing and mixing and matching of ad tech vendors and products is prevalent among advertisers and publishers, calculating share can be tricky because the same impressions can flow through multiple providers. More importantly, it also means shares may shift easily and therefore do not translate to market power. Illustrative are reports that Google’s DV360 fell to third most popular DSP as advertisers began shifting spend to The Trade Desk and Amazon.¹⁹² Another, similar reason why shares might not be meaningful is when there is significant bidding competition for contracts. The EC observed this with respect to publisher ad serving in its review of the Google/DoubleClick acquisition.¹⁹³

Finally, given the large number of competitors in ad tech, as well as regular entry and expansion events, ensuring complete and up to date market information is another challenge in attempting to calculate reliable shares. In its recent attempt to calculate shares for particular narrow ad tech product categories, the CMA observed this reliability challenge and risk of overstating share in its recent Interim Report.¹⁹⁴

F. There Is No Evidence Of Monopolistic Rents

Despite all of the hallmarks of a competitive marketplace discussed above, over the course of several articles, G&K claim that “weakened competition across the ad tech value chain may have enabled Google to extract monopolistic rents in ad intermediation, by securing additional undisclosed margins on top of its disclosed commissions.”¹⁹⁵ They seem to suggest that Google is earning a supracompetitive margin to the extent Google Ads charges an advertiser more than what Google pays a publisher in its AdX auction on Ad Manager to win an impression

¹⁹¹ See *Online Platforms and Digital Advertising Market Study Interim Report*, Competition and Markets Authority (Dec. 18, 2019) ¶ 5.35, https://assets.publishing.service.gov.uk/media/5dfa0580ed915d0933009761/Interim_report.pdf [hereinafter *CMA Interim Report*] (“Media agencies told us that similar advertising formats and audiences are available on owned and operated platforms and in open display advertising and that the targeting techniques available are also roughly the same. Consequently, advertisers would largely see these channels as substitutable . . .”).

¹⁹² James Hetcher, *Ad Buyers Starting To Use The Trade Desk DSP Over Google, According To Advertiser Perceptions Report*, AdExchanger (Dec. 3, 2019), <https://adexchanger.com/online-advertising/ad-buyers-starting-to-use-the-trade-desk-dsp-over-google-according-to-advertiser-perceptions-report/>.

¹⁹³ *Case No COMP/M.4731 – Google/ DoubleClick*, European Commission (Nov. 3, 2008) at 36-37, ¶ 117, https://ec.europa.eu/competition/mergers/cases/decisions/m4731_20080311_20682_en.pdf.

¹⁹⁴ *CMA Interim report* at 19 (Note to Figure 2, “Google shares may be overestimated.”).

¹⁹⁵ *Trust Me, I’m Fair* at 10.

for that advertiser.¹⁹⁶ They also seem to suggest that Google is able and incentivized to do so as a result of being vertically integrated across the buy and sell-side of ad tech, and that it represents an abuse resulting from that vertical integration.¹⁹⁷ Their positions are mistaken in a number of respects.

First, G&K do not appear to appreciate the value Google creates for advertisers and publishers through the impression-to-click conversion carried out by Google Ads. Google Ads runs an internal auction-like process for advertisers (“internal auction”),¹⁹⁸ separately and before Google Ads in turn bids in the auction that takes place on AdX. This is common in the industry.¹⁹⁹ Many ad buying platforms and ad networks do that. In the case of Google Ads, most advertisers in its internal auction bid on a cost-per-click (CPC) or sometimes cost-per-action (CPA) basis.²⁰⁰ Those advertisers only pay when users click on their ads (in case of CPC) or if the ad leads to some other kind of action beyond a click (in case of CPA).

Once the winning advertiser has been established in that internal auction, Google Ads then, in an attempt to secure the impression for that advertiser, participates in the AdX auction, together with many other ad buyers (including many third-party DSPs). AdX and most other ad exchange auctions involve bidding on ad impressions (not clicks). As explained, ad impressions refer to any time a user opens a publisher’s website in their browser, or loads an app with ad slots. Google Ads pays what it bids for any ad impression it wins on AdX, so that the publisher selling that ad impression (on its website or app) always gets paid.²⁰¹ Since a click is a relatively rare event, most of the instances in which Google Ads gets to deliver an ad involve Google paying the publisher and receiving nothing in return from the advertiser.

This system is highly procompetitive. It means that Google promotes market liquidity by, on the one hand, only requiring advertisers to pay when their ads trigger a click or conversion, while on the other hand ensuring that publishers are guaranteed to receive payment in accordance with the bid for every impression they sell on AdX. Google thus eliminates risk for both advertisers and publishers. In addition, its system optimizes incentives for publishers to generate high

¹⁹⁶ *Id.* at 11.

¹⁹⁷ See *An EU Competition Law Analysis* at 35-36.

¹⁹⁸ The internal processes that ad buyers like DSPs or ad networks use to select the advertiser campaigns for which they will submit bids in ad exchanges are often referred to as auctions because they are run in a similar way. While these processes are auction-like, it is important to note that they do not necessarily result in an actual sale of an impression (since the impression may be won by a competing DSP or network, or remain unsold). In that sense, they are distinct from ad auctions run by or for publishers, in which actual ad impressions are sold.

¹⁹⁹ Jordan Linville, *How A DSP Can Increase Win-Rates Through Multi-Bid*, PubMatic (Oct. 31, 2017), <https://pubmatic.com/blog/dsp-can-increase-win-rates-multi-bid/>.

²⁰⁰ See *Choose a Bid That Works For You*, Google, <https://support.google.com/google-ads/answer/2471184?hl=en>; *Set Target CPAs for Ad Groups*, Google, https://support.google.com/google-ads/answer/6335556?hl=en&ref_topic=3122863.

²⁰¹ *How Google Ad Manager works with Google Ads*, Google, <https://support.google.com/google-ads/answer/2472739?hl=en> (“If Google Ads wins the auction, the advertiser(s) in the winning ad unit will pay no more than what is required to rank higher than the next advertiser, on a CPC basis, when a user clicks on the ad or completes another valid event in connection with the ad. The publisher will be paid the higher of the highest net bid value in the Ad Manager auction or the minimum CPM.”).

quality free content and incentives for advertisers to grow their spend. After all, by paying publishers for traffic (rather than just clicks), Google gives them incentives to generate the content that will attract the most users (generate useful/interesting content). And by only charging advertisers for clicks (or actions), advertisers can have faith that they are paying for ads that are shown to the right people, which provides advertisers incentives to invest more in relevant ads. It, therefore, also gives Google optimal incentives to deliver ads to publishers that are most likely to be clicked (or lead to conversions) by users.

Of course this model creates risk for Google, because the reality is that the vast majority of ad impressions do not lead to clicks.²⁰² So Google has to pay publishers without in turn receiving any payment from advertisers. Accordingly, it must be the case that, on most transactions, Google has a negative balance: it pays money but does not receive anything. That only works well if Google estimates click through rates reliably. If Google systematically overestimates the number of clicks on (or conversions related to) the ads, then it will pay publishers more than it charges advertisers in the aggregate. That means Google could be left with a negative balance not just on individual transactions, but overall.

Google has invested to develop and operate algorithms and machine learning to assess and manage this risk and make it profitable.²⁰³ As any company would be, Google is entitled to earn a return for creating such value by taking on risk and thus reducing it for customers.

Second, we see no basis for G&K's claim that Google is extracting secret monopoly rents. Google's 2018 Form 10-K discloses that, in the aggregate, Google pays third-party publishers using Google's ad tech products around 70.8% of the amount Google charges advertisers and ad buyers for the ads shown on those third-party publisher properties.²⁰⁴ In other words, Google retains slightly less than 30% of those revenues as payment for the services it provides in the aggregate, covering the services Google provides on the buy-side and sell-side with respect to the ads shown on those third-party publisher properties. Third-party reports indicate that this is in line with industry average; hardly evidence of the monopolistic rents G&K

²⁰² Rimma Kats, *How Often Do Consumers Intentionally Click Mobile Ads?*, eMarketer (Nov. 28, 2017), <https://www.emarketer.com/content/b23d8933-4f9b-4850-a9cd-71d3005c6f23> (indicating that 59% to 73%, of users, depending on age, reported they either "never" or "rarely" clicked on mobile ads in 2017).

²⁰³ See *About Bidding on Impressions*, Google, <https://support.google.com/google-ads/answer/2630842?hl=en> ("Google estimates how many clicks the ad might receive in 1,000 impressions [CPM]").

²⁰⁴ *Alphabet Inc., Annual Report (Form 10-K)*, U.S. Securities and Exchange Commission (Feb. 4, 2019) at 32, <https://www.sec.gov/Archives/edgar/data/1652044/000165204419000004/goog10-kq42018.htm>. As a result of changes to the reporting in the 2019 10-K, a comparable figure is not available for 2019. However, Google's Q3 2019 earnings reveal this number was largely unchanged mid-year, at 69%. *Alphabet Announces Third Quarter 2019 Results*, Google, https://abc.xyz/investor/static/pdf/2019Q3_alphabet_earnings_release.pdf.

suggest.²⁰⁵ The CMA's observations also seem to suggest that Google is in step with industry averages.²⁰⁶

Third, Google Ads earning a return for its service seems to have nothing to do with Google being vertically integrated along the ad stack. Many non-vertically integrated ad buyers first run an internal auction-like process for advertisers, and then bid into an ad exchange. We see no reason why Google Ads could not manage its bids on AdX much like it does today even if Google Ads were owned by a third-party rather than Google. That is especially so since Google Ad Manager provides third-party ad buyers the same "minimum bid to win" information as Google Ads to optimize future bids on AdX or Open Bidding. So competing ad buyers should be able to manage bids between their internal auction-like process and the Ad Manager auction like Google Ads. That suggests that G&K are incorrect when they imply that the margin Google Ads earns is connected to vertical integration between Google Ads and AdX.²⁰⁷

Finally, G&K's suggestion that it is anticompetitive for Google to make both a buy-side and sell-side margin likewise is misplaced.²⁰⁸ While they are interrelated services, buy-side tools (like Google's and Criteo's) and sell-side tools (like Google's and Rubicon Project's) each provide distinct services to different customers. So there is nothing unusual about earning a margin for each service. As an example, Criteo disclosed that it received \$2.3 billion in revenue in 2018 and paid traffic acquisition costs of \$1.33 billion, implying a revenue retention rate of around 42%.²⁰⁹ This rate only relates to buy-side services, since Criteo does not offer sell-side services. The Trade Desk, a DSP, reportedly took 18.5% of ad spend for its buy-side services in 2018, and was forecasted to increase that percentage to 20% in 2019.²¹⁰ Sell-side tool providers, like Rubicon Project and PubMatic, charge sell-side fees.²¹¹ If anything, one would expect the returns targeted by Google Ads to be lower due to Google's vertical integration across the buy and sell-side than they would have been absent such vertical integration. Since buy-side and sell-side tools are interrelated (reductions in the price of one are likely to positively affect the demand for the other), we should expect a vertically integrated provider of each of them to prefer lower prices compared to a situation where there are multiple different providers along the supply chain.

²⁰⁵ *US Programmatic Digital Display Ad Fees, 2018-2021 (Billions, % Change and % of Nonsocial Programmatic Display Spending)*, eMarketer (July 1, 2019), <https://www.emarketer.com/chart/229878/us-programmatic-digital-display-ad-fees-2018-2021-billions-change-of-nonsocial-programmatic-display-spending>.

²⁰⁶ *CMA Interim Report* ¶ 2.57 (reporting average weighted fees are around 18% for DSPs and around 22% for "SSP/ad networks").

²⁰⁷ See *Google's (Forgotten) Monopoly* at 15.

²⁰⁸ *Id.* at 15.

²⁰⁹ *Criteo S.A., Annual Report (Form 10-K)*, U.S. Securities and Exchange Commission at 61, <https://www.sec.gov/Archives/edgar/data/1576427/000157642719000014/criteo10-k2018.htm>.

²¹⁰ James Hercher, *How The Trade Desk Has Evolved For The Next Stage Of DSP Growth*, AdExchanger (Feb. 27, 2019), <https://www.adexchanger.com/online-advertising/how-the-trade-desk-has-evolved-for-the-next-stage-of-dsp-growth/>.

²¹¹ Until recently, some sell-side tool providers (not Google) apparently used to charge buy-side fees in addition to their sell-side fees, even though they did not offer buy-side tools. See, e.g., Sarah Sluis, *Rubicon Got Rid of Its Buy Side Fees But Who Else Is Charging Them*, AdExchanger (Nov. 8, 2017), <https://www.adexchanger.com/platforms/rubicon-got-rid-buy-side-fees-else-charging/>.

Indeed, given the value Google Ads creates and the fact that other buy-side tool providers—such as Criteo and The Trade Desk—all charge a separate fee for their services, it would seem to be unreasonable to suggest on the one hand that Google Ads should be run as a separate business from Ad Manager and on the other hand that it should not be able to make a profit, as G&K seem to argue. Surely, if Google were to do that, yet other critics might complain that Google Ads margins were too low. There should be a wide band of pricing within which a business is safe from competition law claims that fees are either too high or too low.

VI. CONCLUSION

G&K have written a host of articles about Google’s advertising technology business over the last year and a half, claiming that several of its product designs and practices around them are anticompetitive because they purportedly disadvantage competing ad tech providers and enable Google to extract “hidden monopolistic” rents.

As detailed in this paper, their allegations are unsubstantiated and mistaken in a number of respects. First, their centerpiece complaint about what they characterize as a “last look” advantage for Google’s Ad Manager exchange over rival exchanges participating in header bidding auctions was actually a procompetitive innovation, developed almost a decade before header bidding emerged, which promoted sales growth and efficiency to the benefit of advertisers and publishers. As the CMA observed, it was not designed to disadvantage rivals. Second, contrary to G&K’s unsupported claim, it no longer exists since Google moved to a unified first-price auction. Third, Google’s launch of a competitive alternative to header bidding (Open Bidding) instead of having AdX participate in it, was entirely understandable given the significant and well-recognized drawbacks of header bidding. It was also procompetitive since it offered an additional option that solved many of the problems of header bidding. Fourth, the changes and innovations Google introduced with its launch of Open Bidding and move to a unified first-price auction are reasonable measures to attempt to balance the interests of users, publishers and advertisers, which is important for the long-term viability of any multi-sided marketplace. G&K focus on one constituency—certain large news publishers—but even for that constituency, it is important to protect the long-term viability of the ecosystem.

Despite these significant weaknesses in their theories, G&K proceed to discuss what antitrust remedies might be imposed on Google, including a breakup of Google’s ad tech business. In virtually every jurisdiction in the world, before imposing a remedy, particularly one as draconian as divestiture, a competition authority must find (after a rigorous investigation): (i) that a firm has market power in a relevant market (that is, the power to raise price by reducing output in a relevant market), (ii) has engaged in exclusionary conduct (i.e. conduct that reduced or is likely to reduce output), (iii) that materially forecloses competition (not just competitors), (iv) the foreclosure has led to anticompetitive effects that outweigh any procompetitive benefits from the conduct and (v) the remedies to be imposed will be effective, reasonable and proportionate to mitigate the anticompetitive effects.

Here, these prerequisites are absent. To the contrary. The public record indicates that ad tech is a highly dynamic and price competitive space at all levels, characterized by entry, expansion and innovation, growing output and declining prices. Google faces stiff competition for all of its ad tech products from players of all shapes and sizes, from well-known names like Adobe, Amazon, AT&T, Comcast, Facebook, Twitter and Verizon, to highly successful industry specialists like MediaMath, OpenX, Rubicon Project and The Trade Desk. The frequent emergence of new products and technologies also put competitive pressure on Google's products. And features of the industry such as multi-homing, mixing and matching and in-sourcing further preclude any one player from amassing market power.

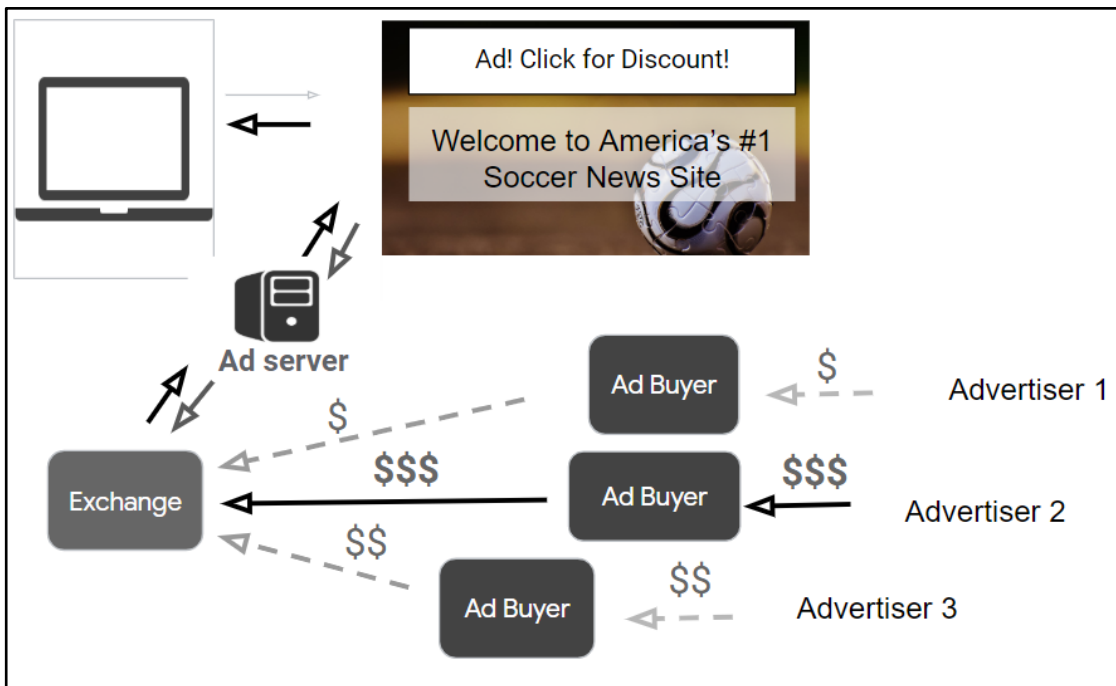
The proof is in the pudding: third-party reports show that ad tech fees have steadily declined while programmatic ad spend continues to see double digit growth as a result of competition. Countless large publishers have adopted header bidding, a supposedly foreclosed or marginalized rival technology. The very reports G&K cite in their papers speak of commoditization and downward fee pressure in ad servers and other ad tech. These outcomes are inconsistent with their theories that Google is extracting "hidden monopolistic" rents.

G&K thus have not established any key elements of a cognizable theory of antitrust harm. Real-world evidence shows that Google has consistently worked to protect the user experience, while enhancing publisher sales and increasing advertiser returns on ad spend, including by making significant investments in fostering interoperability with its competitors' products. That is not to suggest we think that Google does so out of altruism. To the contrary, Google's main product, Search, benefits from the vibrant, open and ad-supported Internet that a competitive ad tech sector helps to sustain. It would be counterproductive for Google to attempt to undermine competition in ad tech, since it would risk damaging its core search business.

**APPENDICES TO:
CLEARING UP MISCONCEPTIONS ABOUT GOOGLE'S AD TECH BUSINESS**

Appendix 1

The image below is a simplified representation of how an ad impression on a publisher's website may be auctioned in real time, while a user navigates to a website in its browser and the browser loads the website. In today's ad tech world, this process can be substantially more complex than is visualized below, especially when a publisher uses an auction of auctions technology like header bidding to sell its ad impression, where multiple ad exchanges are called to compete to auction the ad impression. In the example below, when the user navigates to a website, in the time in which the page is loading, at a basic level the following happens. A call is made to the publisher's ad server, which calls the exchange, the exchange then calls various ad buyers (which can be DSPs, ad networks or ad agency trading desks), those ad buyers submit bids in the exchange for advertisers, and the advertiser represented by the winning bid in the ad exchange auction wins the right to fill the impression slot with their advertisement. The publisher's ad server then communicates with the advertiser ad server to serve the right ad creative for that impression.



Appendix 2 - Examples of Competitor Offerings (including Figure 4)

1. Figure 4 - Buy-side - Examples of Competitors Offering Ad Serving:

- **Adform:** *Ad Serving*, Adform, <https://site.adform.com/products/integrated-advertising-platform/ad-serving/> ("Maximize the reach and return of your ad spend.").
- **Adobe:** Adobe provides advertiser ad serving functionalities through a partnership with Flashtalking. Keith Eadie, *Adobe Advertising Cloud Debuts Partnership with Flashtalking*, Adobe (Sept. 26, 2018), <https://theblog.adobe.com/adobe-advertising-cloud-debuts-partnership-with-flashtalking/> ("In addition, Advertising Cloud customers will be able to seamlessly activate Flashtalking's pre-certified ad serving solutions").
- **Amazon:** Taylor Peterson, *What Amazon Acquisition of Sizmek's Ad Server and DCO Business Might Mean for Advertisers*, Marketing Land (June 5, 2019) <https://marketingland.com/amazon-scoops-up-sizmek-s-ad-server-and-dco-business-carving-out-a-space-in-the-walled-garden-triopoly-262029> ("With the acquisition, Amazon will own both Sizmek's ad server and DCO, which means it can collectively deliver ads to selected inventory while hosting ad assets and rich data.").
- **AT&T's Xandr:** *About Xandr Invest*, Xandr, <https://docs.xandr.com/xandrinvest/invest-about.html#Tech> ("The Xandr platform is a real-time bidding system and ad server built on top of the Xandr computing cloud."); Invest is Xandr's advertiser facing product. *Xandr Invest*, Xandr, <https://www.xandr.com/platform/invest-dsp/> ("Xandr Invest is the strategic buying platform built for the future of advertising.").
- **MediaMath:** *Ad Serving*, MediaMath, <https://www.mediamath.com/media/ad-serving/> ("MediaMath Ad Serving provides a fully-integrated ad serving solution within our DSP.").

2. Figure 4 - Buy-side - Examples of Competitors Offering Buying platforms / Ad networks:

- **Adform:** *Demand Side Platform*, Adform, <https://site.adform.com/products/integrated-advertising-platform/demand-side-platform/> ("Powered by Odin, Adform's advanced AI, the DSP adheres to the highest industry standards while powering data-driven advertising for performance, branding, and prospecting campaigns.").
- **Adobe:** *One Demand-Side Platform to Rule Them All.*, Adobe, <https://www.adobe.com/advertising/demand-side-platform.html> ("While some DSPs bring together some of these mediums, our DSP brings together everything.").
- **Amazon:** *Amazon DSP*, Amazon, <https://advertising.amazon.com/products/amazon-dsp> ("Amazon DSP is a demand-side platform that enables advertisers to programmatically buy display and video ads.").
- **AT&T's Xandr:** *AT&T Consolidates its Open Programmatic Spend on the AppNexus DSP*, Xandr, <https://www.xandr.com/news/at-consolidates-its-open-programmatic-spend-on-the-appnexus-dsp/> ("AT&T will consolidate its programmatic advertising spend on the open exchange through Xandr's Demand-Side Platform (DSP), the AppNexus Programmable Platform (APP).").
- **MediaMath:** *Ad Serving*, MediaMath, <https://www.mediamath.com/media/ad-serving/> ("MediaMath Ad Serving provides a fully-integrated ad serving solution within our DSP.").
- **Smart:** Marieke Buis, *Smart Acquires DSP LiquidM*, Smart (Dec. 18, 2019), <https://smartadserver.com/press-releases-2/smart-acquires-dsp-liquidm/>.
- **The Trade Desk:** James Hercher, *Ad Buyers Starting To Use The Trade Desk DSP Over Google, According To Advertiser Perceptions Report*, AdExchanger (Dec. 3, 2019), <https://adexchanger.com/online-advertising/ad-buyers-starting-to-use-the-trade-desk-dsp-over-google-according-to-advertiser-perceptions-report/> ("Google's Display and Video 360 demand-side platform is in a tough fight as offerings from Amazon and The Trade Desk equal or exceed Google's usage rates, according to Advertiser Perceptions' quarterly tracking report.").
- **Twitter:** *Measurement*, Twitter, <https://developer.twitter.com/en/docs/ads/measurement/overview/twitter-audience-platform> ("The Twitter Audience Platform (TAP) is a network where advertisers can expand the reach of their campaigns beyond Twitter through devices served by MoPub.").
- **Verizon Media:** *Solutions for Advertisers*, Verizon Media, <https://www.verizonmedia.com/advertising/solutions#/platforms> ("With curriculum for both our DSP and native marketplace, you can enhance your skills or strengthen your team.").

3. Examples of Buy-side Competitors Not Highlighted by Figure 4

- **Amobee:** *Introduction to Amobee DSP*, Amobee, <https://www.amobee.com/research-insights/introduction-to-amobee-dsp/> ("The Amobee DSP makes it easy to tap into the power of programmatic ad buying . . .").
- **Clinch:** *Individualized to Perform*, Clinch, <https://clinch.co/> ("Next Generation Ad Server to create, deliver and manage your multi-screen ad campaigns. Whether you need a mobile, rich media or video ad server, Clinch enables you to get it done!").
- **Criteo:** *The Easy-to-Use Platform for Hard-to-Believe Results.*, Criteo, <https://www.criteo.com/technology/advertising-platform/> ("Create campaigns in minutes and enjoy total control over setup, management, and measurement with our easy-to-use self-service platform.").
- **Extreme Reach:** Sandy Drayton, *Ad Serving Deserves AdBridge*, Extreme Reach (May 17, 2019), <https://extremereach.com/blog/ad-serving-deserves-adbridge/> ("But the headaches of delayed campaigns, formatting issues and uncertainties around Talent & Rights compliance are a thing of the past when assets are managed and ad served with AdBridge.").
- **Flashtalking:** *Primary Ad Serving*, Flashtalking, <https://www.flashtalking.com/primary-ad-serving>, ("Flashtalking is the leading independent global ad server for advertisers who value control of their data and wish to separate media sales from delivery and measurement.").
- **Innovid:** *Make Sure Your Ads Look Amazing on Every Screen and Every Platform—Every Time.*, Innovid, <https://www.innovid.com/marketer-solutions/ad-serving-solutions/> ("Quality Ads Served Globally. Guaranteed.").
- **Roku's dataxu:** Sarah Perez, *Roku Buys Adtech Platform Dataxu for \$150 million*, TechCrunch (Oct. 22, 2019) <https://techcrunch.com/2019/10/22/roku-buys-ad-tech-platform-dataxu-for-150-million/> ("Roku is beefing up its advertising business with the acquisition of Boston-based dataxu, a demand-side platform . . .").

- **Weborama:** *Weborama Weborama Campaign Manager: Ad Server Platform*, Weborama, <https://weborama.com/en/adserver-weborama/>, ("Weborama Campaign Manager: Ad Server Platform; Discover the unique assets of the adserver with a high level of intelligence, transparency & independence that more than 1000 brands and agencies use worldwide").

4. Figure 4 - Sell-side - Examples of Competitors Offering Ad Exchanges / SSPs:

- **Adform:** *Supply Side Platform*, Adform, <https://site.adform.com/products/integrated-advertising-platform-for-publishers/supply-side-platform/> ("Inspired by our Private Marketplace, the Adform SSP is a publisher-first solution that closes the gaps in your selling strategy.")
- **Amazon:** *Report: Amazon, Google Vie for Top Spot Among Supply-side Platforms*, SmartBrief (July 16, 2019), <https://www.smartbrief.com/s/2019/07/report-amazon-google-vie-top-spot-among-supply-side-platforms> ("Google and Amazon captured the first and second spots respectively in the supply-side platform (SSP) space in terms of ease of use, auction dynamics and ability to monetize publisher inventory, according to the 2019 Advertiser Perceptions report")
- **AT&T's Xandr:** *Xandr Monetize*, Xandr, <https://www.xandr.com/platform/monetize/> ("With Prebid-powered header bidding technology, deals capabilities, and curated premium demand, the Xandr SSP powers your monetization needs providing advanced controls to manage demand partners across all channels and formats.")
- **Comcast:** *Rae Paoletta, FreeWheel Launches Ad Product Suite, Boosts Competition with Roku*, AdExchanger (Oct. 15, 2018), <https://www.adexchanger.com/digital-tv/freewheel-launches-ad-product-suite-boosts-competition-with-roku/> ("FreeWheel integrated StickyAds' SSP into its ad server in order to make transacting easier for publishers.")
- **OpenX:** *OpenX Ad Exchange*, OpenX, <https://www.openx.com/publishers/adexchange/> ("The OpenX Ad Exchange provides publishers and app developers complete control over their entire advertising platform with superior customer support and dedicated Yield Analysts."); *Id.* ("The highest quality programmatic ad marketplace, purposefully built for supply partners")
- **PubMatic:** *Jordan Linville, SSP Log-Level Data: An Overlooked Treasure Trove*, PubMatic (Apr. 16, 2019), <https://pubmatic.com/blog/ssp-log-level-data-improved-bidding-strategies/> ("As a global SSP, PubMatic processes over 55 billion daily ad impressions.")
- **Rubicon Project:** *Rubicon Project and Telaria Complete Merger Following Stockholder Approvals*, Rubicon Project (Apr. 1, 2020) <https://rubiconproject.com/insights/press-releases/rubicon-project-and-telaria-complete-merger/> ("Rubicon Project (NYSE:RUBI), the global exchange for advertising, and Telaria (NYSE: TLRA), the complete software platform that optimizes yield for leading video publishers, today announced the closing of their previously announced merger, creating the world's largest independent sell-side advertising platform, poised to capture growth in CTV.")
- **Smart:** *Unified Auction. Transparency & Control. 100% Value Path Optimization.*, Smart, <https://smartadserver.com/publishers#section-01> ("The market's most powerful ad server & natively integrated SSP.")
- **Twitter (MoPub):** *Franklin Ramirez et al., In High Demand: Dissecting Today's DSP Landscape and Up-Leveling Your Ad Inventory*, MoPub (Sept. 10, 2019), <https://www.mopub.com/2019/09/10/dsp-landscape> ("Publishers can enlist a supply-side platform (SSP) such as MoPub to help connect them to the DSPs that are best suited for their business and help them to maximize the value of their ad inventory.")
- **Verizon Media:** *James Hercher, Verizon Media Brings DOOH Supply To SSP, Completing Its Stack For Outdoor Screens*, AdExchanger (Dec. 10, 2019), <https://www.adexchanger.com/platforms/verizon-media-launches-a-doooh-ssp-completing-its-stack-for-outdoor-screens/> ("Verizon Media, the telco giant's ad tech and content unit, added digital out-of-home (DOOH) supply to its SSP on Tuesday.")

5. Figure 4 - Sell-side - Examples of Competitors Offering Header bidding / Open bidding analogues:

- **Amazon:** Amazon has two offerings, UAM and TAM. *Unified Ad Marketplace vs Transparent Ad Marketplace*, Amazon, <https://aps.amazon.com/aps/2018/03/05/unified-ad-marketplace-uam-vs-transparent-ad-marketplace-tam> ("Header bidding methodology").
- **AT&T's Xandr:** *Introducing Xandr Monetize*, Xandr (Sept. 5, 2019), <https://www.xandr.com/news/introducing-xandr-monetize/> ("The launch of Xandr Monetize also introduces Prebid Server Premium, Xandr's simplified server-side header bidding solution, for both SSP and ad server customers.")
- **Comcast:** *James Hercher, Why CTV Is The Trade Desk's Biggest Focus Of 2020*, AdExchanger (Nov. 7, 2019), <https://www.adexchanger.com/online-advertising/why-ctv-is-the-trade-desks-biggest-focus-of-2020/> ("The Comcast ad tech business FreeWheel, the largest SSP for OTT inventory, introduced a header-bidding solution that increased inventory from its supply partners for The Trade Desk by more than 300%.")
- **OpenX:** *OpenX Header Bidding*, OpenX, <https://www.openx.com/publishers/header-bidding/> ("OpenX Bidder was first to introduce header bidding to publishers and remains the highest performing solution available.")
- **PubMatic:** PubMatic offers header bidding and a mobile equivalent of header bidding. *Header Bidding with Openwrap*, PubMatic, <https://pubmatic.com/products/header-bidding/> ("OpenWrap is the only Prebid first wrapper solution that provides transparency while empowering publisher control and accelerating innovation through open source with enterprise tools. Optimize your integration mix of client- and server-side demand across all formats, including desktop, mobile web and in-app, video and more, and future-proof your ad-decisioning strategy."); *Id.* ("PubMatic's OpenWrap SDK brings the benefits of a unified auction and advanced deal models to app developers")
- **Rubicon Project:** *Introducing Demand Manager for Publishers*, Rubicon Project, <https://rubiconproject.com/header-bidding-for-publishers/> (Rubicon Project's powerful, Prebid monetization solution gives publishers control. Built on Prebid, bundled with tools, and wrapped in service.")
- **Twitter (MoPub):** Twitter (MoPub) offers a mobile equivalent of header bidding. *Advanced Bidding: In-app Header Bidding Reimagined*, MoPub, <https://www.mopub.com/advanced-bidding> ("Building upon our years of expertise in mobile-first mediation and real-time bidding, Advanced Bidding is the complete reimagination of header bidding for the mobile app environment.")

6. Figure 4 - Sell-side - Examples of Competitors Offering a Publisher Ad Server:

- **Adform:** *Programmatic Publisher Ad Server*, Adform, <https://site.adform.com/products/integrated-advertising-platform-for-publishers/programmatic-publisher-ad-server/> (describing Adform's "Programmatic Publisher Ad Server").
- **AT&T's Xandr:** *Xandr Monetize*, Xandr, <https://www.xandr.com/platform/monetize/> ("Built first for the programmatic world with openness and transparency at its core, Xandr's ad server improves ad performance and profitability through superior yield optimization.").
- **Comcast:** Rae Paoletta, *FreeWheel Launches Ad Product Suite, Boosts Competition with Roku*, AdExchanger (Oct. 15, 2018), <https://www.adexchanger.com/digital-tv/freewheel-launches-ad-product-suite-boosts-competition-with-roku/> ("The Comcast-owned ad server built off its legacy ad exchange, enhanced by technology from its acquisition of StickyAds in 2016, for its updated ad product suite, DRIVE. The new exchange is designed to let marketers more easily buy over-the-top (OTT), set-top box video on demand and digital video inventory from any of FreeWheel's opted-in publishers.").
- **PubMatic:** *The Future of Monetization. Delivered.*, PubMatic, <https://pubmatic.com/solutions/publishers/> (page is titled "Programmatic Ad Server for Publishers").
- **Smart:** *Unified Auction. Transparency & Control. 100% Value Path Optimization.*, Smart, <https://smartadserver.com/publishers#section-01> ("Reach top quality buyers via an SSP natively integrated into the ad server.").
- **Twitter (MoPub):** *The Leading Monetization Platform for Mobile App Publishers and Developers*, MoPub, <https://www.mopub.com/> ("MoPub's robust ad serving tools, interface, and analytics provide the control, transparency, and flexibility developers need to power their revenue strategies.").

7. Examples of Sell-side Competitors Not Highlighted by Figure 4:

- **AdButler:** *AdButler Self-Serve*, AdButler, <https://blog.adbutler.com/moving-dfp-adbutler/> ("AdButler exists in the same space as DFP (they're both ad servers) . . .").
- **AdColony:** *Grow With Us*, AdColony, <https://www.adcolony.com/publishers/>, ("Maximizing app economies for today's top mobile publishers").
- **AdGlare:** *AdGlare: White Label Ad Server For Publishers, Advertisers and Agencies*, <https://www.adglare.com/>.
- **AdZerk:** AdZerk offers smaller publishers APIs to help them develop their own internal ad serving systems. Chris Shuptrine, *What is an Ad Server? The Definitive Guide for 2019*, Adzerk Blog (Apr. 7, 2019), <https://adzerk.com/blog/what-is-an-ad-server> ("Adzerk is the market leader in server-side ad serving, enabled through APIs.").
- **AppLovin:** AppLovin offers a mobile equivalent of header bidding. *Full-stack Monetization Based on In-app Bidding*, AppLovin, <https://www.applovin.com/max/> ("With MAX, advertisers get equal access to all ad inventory and bid simultaneously, which drives more competition and higher CPMs for developers."); *Full-stack Monetization Base on In-app Bidding*, AppLovin, <https://www.applovin.com/max/> (quote from embedded video at 00:46:00:50 "The results that I saw [were] about a 20% increase in ARPDAU from previous other mediation platforms.").
- **Chartboost:** Xier Dang, *Playable Ads and the Future of Programmatic — A Q&A With CrossInstall*, Chartboost, <https://www.chartboost.com/blog/playable-ads-and-the-future-of-programmatic-a-qa-with-crossinstall/> ("Looking back in 2019, the Chartboost Exchange grew to be one of our top 4 exchanges sources at a few different points throughout the year.").
- **Clinch:** *Individualized to Perform*, Clinch, <https://clinch.co/index.html> ("Next Generation Ad Server to create, deliver and manage your multi-screen ad campaigns.").
- **Epom:** *About Epom*, Epom, <https://epom.com/about> ("Epom Ad Server offers two distinctive products for publishers, ad networks & ad agencies: White Label Ad Server [&] White Label DSP").
- **Extreme Reach:** Sandry Drayton, *Extreme Reach Launches AdBridge for Sellers, A New Ad Distribution Platform for Sell-Side Teams and Their Advertising Partners*, Extreme Reach (June 3, 2019) <https://extremereach.com/press-releases/extreme-reach-launches-adbridge-for-sellers-a-new-ad-distribution-platform-for-sell-side-teams-and-their-advertising-partners/>
- **Fyber:** Fyber offers a mobile equivalent of header bidding. *We are Fyber!*, Fyber, <https://www.fyber.com/> ("This includes providing the world's first and only mechanism to achieve a true state of header bidding for the mobile app environment."); *Fyber Fuels Publisher Growth With New Ad Server*, Fyber (Mar. 10, 2016), <https://www.fyber.com/announcements/FYBERNewAdServer.pdf>.
- **Index Exchange:** Index Exchange offers a header bidding solution. Sarah Sluis, *AppNexus And Index Exchange Are The Header Bidding Leaders*, AdExchanger (Sept. 7, 2017) <https://www.adexchanger.com/platforms/appnexus-index-exchange-header-bidding-leaders/> ("AppNexus and Index Exchange have the broadest adoption of their adapters and wrappers, according to the first-ever Header Bidding Index – a report from ServerBid, an Adzerk spinoff that builds wrappers for the demand side."); *For Publishers*, Index Exchange, <https://www.indexexchange.com/publishers/> ("Focusing on the needs of publishers, we've created a singularly focused, neutral, transparent ad exchange that puts publishers fully in control of their page and pricing.").
- **InMobi:** Ginny Marvin, *InMobi Scoops Up AerServ for \$90 Million*, Martech Today (Jan. 10, 2018), <https://martechtoday.com/inmobi-acquires-aerserv-mobile-programmatic-advertising-209303>, ("Additionally, InMobi says header bidding will be available in-app for the first time with its ad exchange.").
- **ironSource:** ironSource offers a mobile equivalent of header bidding. *LevelPlay*, ironSource, <https://www.ironsrc.com/in-app-bidding> ("LevelPlay opens up app developers' inventory for a real-time bidding auction, requesting ad sources to bid on each impression simultaneously."); *ironSource Launches Stand Alone Ad Server: installCore Fusion*, ironSource (May 2, 2020), https://www.prweb.com/releases/ironsource_2014/installcore_12/prweb12361081.htm ("ironSource, the world's leading digital delivery platform, today announced the launch of installCore Fusion, allowing publishers to deliver their own downloads with their own installer, while

- using installCore's superior ad server to monetize each installation."); *Maximum Revenue, Minimum Hassle*, ironSource, <https://www.ironsrc.com/mediation/> ("The ironSource mediation platform makes monetization management straightforward and easy.").
- **Outbrain**: *Native Ad Server*, Outbrain, <https://www.outbrain.com/publishers/native-ad-server/> ("The only end-to-end platform to manage serving and selling built for native advertising.").
 - **SAS**: *Moving Beyond the Ad Server*, SAS, ("After using three independently managed applications to meet its ad serving needs, an online real estate advertising company opted instead for an end-to-end platform via SAS Intelligent Advertising for Publishers.").
 - **Smart**: *Unified Auction. Transparency & Control. 100% Value Path Optimization.*, Smart, <https://smartadserver.com/publishers#section-01> ("Reach top quality buyers via an SSP natively integrated into the ad server.").
 - **SpotX**: *Platform*, SpotX, <https://www.spotx.tv/platform/> ("Built for optimal efficiency in the complex video ad landscape, SpotX's complete video ad serving platform empowers publishers to simplify workflows while maximizing yield.").
 - **Taboola**: Adam Singolda, *Tribune Publishing: One of the Biggest Publishers in the US Now Uses Taboola Feed*, Taboola (Nov. 8, 2018), <https://blog.taboola.com/tribune-publishing-taboola-feed/> ("Taboola Feed serves sponsored content, video, and organic recirculation in a continuous feed of 'cards' that appear below articles, similar to social feeds, providing engaging and brand-safe experiences.").
 - **Teads**: *Teads Unveils Teads For Publishers (TFP) Empowering Publisher Sales Teams To Massively Scale Video & Display Inventory*, Teads (Sept. 19, 2019), <https://www.prnewswire.com/news-releases/teads-unveils-teads-for-publishers-tfp-empowering-publisher-sales-teams-to-massively-scale-video--display-inventory-300921539.html> ("Teads] is rolling out the offering as an extension of its enterprise-class ad server and supply-side platform (SSP) which allow publishers to sell either directly or programmatically through private marketplace (PMP) Deal IDs.").
 - **Triton**: *Industry-Leading Audio Advertising Solutions*, Triton, <https://www.tritondigital.com/solutions/audio-advertising> ("We provide the most advanced dynamic ad insertion (DAI) technology on the market, enabling audio publishers to effortlessly monetize their content through the dynamic insertion of targeted audio ads").
 - **Unity**: Ralph Hauwert, *State of Unity*, Unity (Mar. 19, 2020), <https://blogs.unity3d.com/2020/03/19/state-of-unity-2020-in-this-together/> ("Finally, our monetization network continues to fuel creator success on the millions of titles in the market and bring the right players into your game.").
 - **Vungle**: *Exceed Your Potential*, Vungle, <https://vungle.com/monetize/> ("Reimagine the way your app makes money by showing innovative content from global advertisers – designed to help you monetize your users without compromising on experience.").
 - **Zedo**: *Fully-Featured Ad Server and Ad Serving Tools for Direct Sales*, Zedo, <https://www.zedo.com/ad-server-technology/> ("Specialized Ad Serving tools for Publishers, Advertisers & Ad Networks").

8. Examples of Publishers that Operate Their Own Platform:

- **Amazon**: Amazon's solution can be used to buy ads off of Amazon as well. *Amazon Advertising*, Amazon <https://advertising.amazon.com/> ("Grow your business by reaching relevant audiences on and off Amazon using this new self-service advertising solution.").
- **AT&T's Xandr**: AT&T's solution can be used to buy ads off of AT&T as well. Alison Weissbrot, *AT&T Folds Xandr Into WarnerMedia* (Apr. 30, 2020) <https://www.adexchanger.com/tv-2/att-folds-xandr-into-warnermedia/>.
- **Best Buy**: Kristina Monillos, *Best Buy Touts First-party Data Capabilities as it Looks to Build its Media Business*, Digiday (Oct. 14, 2019) <https://digiday.com/marketing/best-buy-touts-first-party-data-capabilities-looks-build-media-business/> ("Advertisers can choose from a variety of ad units including native app units, targeted banner ads, shopper funnel emails, high-impact takeovers, dynamic creative and in-store video, which uses the TVs and computers within the Best Buy retail locations.").
- **Comcast**: Comcast's solution can be used to buy ads off of Comcast as well. Ryan Joe, *NBCU Will Use FreeWheel To Traffic Its Linear And Digital Inventory. Is Converged Buying Nigh?*, <https://www.adexchanger.com/digital-tv/nbcu-will-use-freewheel-to-traffic-its-linear-and-digital-inventory-is-converged-buying-nigh/> (Jan. 30, 2019) ("FreeWheel said Wednesday that it will handle decisioning for NBCUniversal's digital and linear inventory. Both FreeWheel and NBCU are owned by Comcast.").
- **CVS**: CVS's product has not yet launched, but it is reported that CVS has pitched the offering to marketing agencies. Kristina Monillos, *CVS is Ready to Launch a New Ad Network*, Digiday (Apr. 23, 2020) <https://digiday.com/marketing/cvs-is-readying-the-launch-of-a-new-ad-network/> ("The offering will be fully managed services with ad placements on CVS.com, including display and search, as well as off-site placements on Google, Facebook and Instagram that use CVS data.").
- **eBay**: eBay's solution can be used to buy ads off of eBay as well. *Ad Solutions*, eBay, <https://ebayadvertising.com/ad-solutions/> ("Extend your reach across premium partner sites and fuel campaigns with the power of eBay's shopper data.").
- **Etsy**: Etsy's solution can be used to buy ads off of Etsy as well. *Introducing Etsy's Risk-Free Advertising Service*, Etsy (Feb. 26, 2020) <https://www.etsy.com/seller-handbook/article/introducing-etsys-risk-free-advertising/729663416588> ("As an Etsy seller there are two ways you can advertise: on Etsy and across the web.").
- **Facebook**: Facebook's solution can be used to buy ads off of Facebook as well. *Decide Where to Run Your Ad*, Facebook, <https://www.facebook.com/business/ads#basics> ("Next, choose where you want to run your ad—whether that's on Facebook, Instagram, Messenger, Audience Network, or across them all.").
- **Kroger**: Kristina Monillos, *As Retail Media Heats Up, Here's Everything Kroger Has Done to Compete with Amazon*, Digiday (Feb. 14, 2020) <https://digiday.com/marketing/retail-media-heats-heres-everything-kroger-done-compete-amazon/> ("[B]rands that use Kroger's Precision Marketing (KPM) and use the self-service ad platform will now be able to view in-store and online sales results attributed to the campaigns they run across Kroger properties.").
- **LinkedIn**: *Advertise on LinkedIn*, LinkedIn, <https://business.linkedin.com/marketing-solutions/how-to-advertise-on-linkedin> ("The five steps below demonstrate how to run a self-service ad campaign on LinkedIn using Sponsored Content, Message Ads, Dynamic Ads, and Text Ads . . . Powered by Campaign Manager, LinkedIn's all-in-one advertising platform.").

- **Microsoft:** Microsoft's solution can be used to buy ads off of Microsoft as well. *Grow Your Business With Microsoft Advertising*, Microsoft, <https://about.ads.microsoft.com/en-us/h/a/microsoft-advertising/works> (Listing: Bing, Aol, Wall Street Journal, NBC, and Yahoo! under "Where will my ads appear?" This list contains Microsoft and non-Microsoft properties).
- **Pinterest:** Pinterest Launches Self-Serve Platform for Promoted Pin Advertisers, Digiday (Sept. 20, 2017) <https://digiday.com/marketing/pinterest-self-serve/> ("On September 19, Pinterest introduced a self-serve tool for brands that use Promoted Pins.").
- **Reddit:** Tamar Weinberg, *Reddit Launches a New Self-Serve Ad Platform*, Marketing Land (Mar. 31, 2017) <https://marketingland.com/reddit-new-self-serve-ad-platform-210756> ("Reddit is upping its game in the advertising space, with an announcement that they have just launched a revamped self-serve platform for its advertisers."); *We've launched a completely revamped self-serve ads interface!*, Reddit (2017), https://www.reddit.com/r/changelog/comments/62fake/weve_launched_a_completely_revamped_selfserve_ads/ ("We've launched a completely revamped self-serve ads interface!").
- **Snapchat:** Garrett Sloane, *Snapchat Goes After Discerning Brands With New Exclusive Ad Platform*, Ad Age (Apr. 26, 2019) <https://adage.com/article/digital/snapchat-goes-after-discerning-brands-new-exclusive-ad-platform/2167196>, ("Just ahead of the NewFronts, Snapchat has announced that it's entering the upscale ad market with a new product blending its automated ad platform with an upfront way to pay for ads and reserve inventory in Shows, the highest class of videos on the app.").
- **Target:** Target's solution can be used to buy ads off of Target as well. Dan Berthiaume, *Target Joins Digital Ad Platform Club*, Chain Store Age (May 6, 2019), <https://chainstoreage.com/technology/target-joins-digital-ad-platform-club> ("One new feature of Roundel is that in addition to pushing out targeted, timed messages on Target's own platforms, it can deliver personalized promotions via more than 150 external partner platforms. These include Pinterest, PopSugar and NBC Universal.").
- **TikTok:** *Connecting Brands Today With the Consumers of Tomorrow*, TikTok, <https://ads.tiktok.com/homepage/> ("Reach diverse audiences around the world through TikTok Ads, an all-in-one marketing solutions platform across some of the world's fastest-growing mobile apps").
- **Tripadvisor:** Greg Sterling, *TripAdvisor Launches Self-Service Ad Platform for SMBs*, MarketingLand (Nov. 20, 2019) <https://marketingland.com/tripadvisor-launches-self-service-ad-platform-for-smb-271523> ("TripAdvisor has launched a new self-service ad product: Media Manager.").
- **Twitter:** Twitter's solution can be used to buy ads off of Twitter as well. *Advertise on Twitter*, Twitter, <https://ads.twitter.com/login> ("Get your messages in front of people not yet following you by promoting your Tweets"); MoPub, <https://www.mopub.com/> ("MoPub, a Twitter company, provides monetization solutions for mobile app publishers and developers around the globe.").
- **Walmart:** Allison Schiff, *Walmart Launches Self-Serve Ad Platform, But Retail And Audience Data Isn't Available – Yet*, AdExchanger (Jan. 3, 2020) <https://www.adexchanger.com/search-2/walmart-launches-self-serve-ad-platform-but-retail-and-audience-data-isnt-available-yet/> ("On Friday, Walmart Media Group (WMG), the retail giant's advertising arm, released a self-serve portal so advertisers can directly buy on-site search and sponsored product ads on walmart.com.").
- **Verizon Media:** Verizon Media's solution can be used to buy ads off of Verizon Media as well. *Native Advertising*, Verizon Media, <https://gemini.yahoo.com/advertiser/home> ("The combination of our premium owned-and-operated sites, along with our publishing partners, set us apart from other native ad networks, as well as single site solutions.").
- **Yelp:** *Self Service Advertising*, Yelp https://biz.yelp.com/support/self_service_advertising ("Yelp's Self Service program provides all Yelp's free tools plus a simple advertising solution to drive more customers to your business").

Appendix 3 - Timeline of Notable Entry, Expansion, Innovation and Transaction Events

The graphic and table that follow show a non-comprehensive timeline of notable entry, expansion, repositioning and innovation events, as well as mergers and acquisitions, since 2000. The graphic contains a subset of the events included in the table. Acquisitions and mergers have been denoted below using a "/" (e.g. Google/DoubleClick). Links to sources are provided as part of the table.

Year	Company	Event	Link
2001	Flashtalking	Flashtalking founded	Business Wire
2001	Smart	Smart (then Smart Adserver) founded	Smart
2002	Adform	Adform founded	Adform
2003	Right Media	Right Media founded	Inc.
2004	AOL	AOL acquisition of Advertising.com	IT World
2005	Criteo	Criteo founded	Venture Beat
2005	Telaria	Telaria founded	Money
2005	Amobee	Amobee founded	MobileMarketing
2006	Outbrain	Outbrain founded	Outbrain
2006	PubMatic	PubMatic founded	PubMatic
2007	MediaMath	MediaMath founded	MediaMath
2007	Taboola	Taboola founded	Taboola
2007	Rubicon Project	Rubicon Project founded	Rubicon Project
2007	OpenX	OpenX founded	OpenX
2007	InMobi	InMobi founded	InMobi
2007	FreeWheel	FreeWheel founded	FreeWheel
2007	TubeMogul	TubeMogul founded	Markets.co
2007	Invite Media	Invite Media founded	Web Archive

Year	Company	Event	Link
2007	DoubleClick	DoubleClick announced launch of AdX, and Dynamic Allocation in operation (Both prior to closure of Google acquisition of DoubleClick)	New York Times; Web Archive
2007	Microsoft	Microsoft acquisition of ScreenTonic	Gigaom
2007	AOL	AOL acquisition of Adtech	Reuters
2007	MediaMath	MediaMath founded	MediaMath
2007	Yahoo!	Yahoo! acquisition of remaining 80% of Right Media (reportedly largest exchange) for \$680 million	Business Wire
2007	WPP	WPP acquisition of 24/7 Real Media	WPP
2007	Microsoft	Microsoft acquisition of AdECN	Microsoft
2007	Microsoft	Microsoft acquisition of aQuantive (Atlas) for \$6 billion	Microsoft
2007	AppNexus	AppNexus founded	USA Today
2007	AOL	AOL identified as largest display ad network	Adweek
2007	AOL	AOL acquisition of TACODA	Mashable
2007	Yahoo!	Yahoo! acquisition of BlueLithium	Yahoo! 10-K
2007	AOL	AOL acquisition of Quigo	Business Wire
2008	AdColony	AdColony founded	Insight Partners
2008	Microsoft	Microsoft acquisition of YaData announced	Venture Beat
2008	Google	Google acquisition of DoubleClick closed	Google ; CNBC
2008	Microsoft	Microsoft acquisition of Rapt announced	TechCrunch
2008	Microsoft	Microsoft acquisition of Navic Networks announced	TechCrunch

Year	Company	Event	Link
2009	dataxu	dataxu founded	Forbes
2009	The Trade Desk	The Trade Desk founded	The Trade Desk
2010	MoPub	MoPub founded	MoPub
2010	Apple	Apple acquisition of Quattro	Computerworld
2010	Google	Google acquisition of Invite Media	All Things D
2010	Apple	Apple launched iAd network	Apple Newsroom
2010	OpenRTB	OpenRTB Consortium founded	IAB
2010	Google	Google acquisition of AdMob	TechCrunch
2011	Chartboost	Chartboost founded	Chartboost
2011	MoPub	MoPub processing 1 billion monthly ad requests	MoPub
2011	Google	Google acquisition of Admeld	Reuters
2011	Yahoo!	Yahoo! acquisition of interclick	Business Wire
2012	AppLovin	AppLovin founded	AppLovin
2012	IAB	IAB adopted OpenRTB as standard	IAB
2012	OpenX	OpenX acquisition of LiftDNA	OpenX
2012	Singtel	Singtel acquisition of Amobee announced	AdExchanger
2012	Rubicon Project	Rubicon Project acquisition of Mobsmith	Rubicon Project
2012	MediaMath	MediaMath acquisition of Tap.Me	AdExchanger

Year	Company	Event	Link
2013	Facebook	Facebook acquisition of Atlas	TechCrunch
2013	Twitter	Twitter acquisition of MoPub	TechCrunch
2014	Google	Google launched Enhanced Dynamic Allocation	CMA Interim Report, App'x H, ¶ 15
2014	Amazon	Amazon DSP launched	AMZ Advisers
2014	Oracle	Oracle acquisition of BlueKai	Oracle
2014	Comcast	Comcast acquisition of FreeWheel	Vox
2014	Facebook	Facebook launched Facebook Audience Network (FAN)	Facebook
2014	Twitter (MoPub)	MoPub processing 130 billion monthly ad requests	Twitter Blog
2014	InMobi	InMobi launched its mobile native ad exchange	Businesswire
2014	Facebook	Facebook acquisition of LiveRail	TechCrunch
2014	Amazon	Amazon acquisition of Twitch for \$970 million	TechCrunch
2014	Yahoo!	Yahoo! acquisition of Flurry	TechCrunch
2014	Alliance Data	Alliance Data acquisition of Conversant (formerly ValueClick) for \$2.3 billion	Los Angeles Times
2014	Yahoo!	Yahoo! acquisition of BrightRoll	Yahoo!
2015	Prebid	Prebid.js, original header bidding tool, launched	Prebid
2015	Google	Google launched cross-device measurement across the web, support for native ads across DoubleClick products, and Programmatic Guaranteed	DoubleClick Publisher Blog
2015	Verizon	Verizon acquisition of AOL for \$4.4 billion	CNBC
2015	Verizon	Verizon acquisition of Millennial Media	Vox

Year	Company	Event	Link
2015	ironSource	ironSource acquisition of Supersonic	TechCrunch
2016	Google	Google launched Exchange Bidding, its improvement on header bidding (and predecessor to Open Bidding)	Google Ad Manager Blog
2016	Comcast	Comcast acquisition of StickyAds	Business Insider
2016	OpenX	OpenX launched header bidding tool	OpenX
2016	The Trade Desk	The Trade Desk issued IPO at over \$1 billion market cap	Business Insider
2016	Amazon	Amazon launched header bidding tool (TAM)	WSJ
2016	Facebook	Facebook's FAN projected to generate \$1 billion in annual revenue	Business Insider
2016	Adobe	Adobe acquisition of TubeMogul	Adobe
2016	Microsoft	Microsoft acquisition of LinkedIn for \$26 billion	WSJ
2017	AT&T	AT&T, WPP and Dish joint acquisition of INVIDI	Luma
2017	AppNexus & Index Exchange	AppNexus and Index Exchange launched cross-supported header bidding solution	Index Exchange
2017	Adobe	Adobe launched Advertising Cloud	TechCrunch
2017	Amazon	Amazon DSP identified as most popular DSP	AdExchanger
2017	Amobee	Amobee acquisition of Turn	TechCrunch
2017	Oracle	Oracle acquisition of MOAT	Vox
2017	Verizon	Verizon acquisition of Yahoo! for \$4.5 billion	CNBC
2017	Google	Google is first DSP to adopt IAB's new Ads.txt anti-fraud tool	Martech; PPC Land
2018	Twitter (MoPub)	MoPub launched mobile header bidding tool	MobileMarketing

Year	Company	Event	Link
2018	Fyber	Fyber launched mobile header bidding tool	Fyber
2018	Header bidding	Header bidding adopted by 75%+ of top publishers transacting programmatically	Adzerk, Ad Tech Insights Report
2018	Microsoft	Microsoft launched Microsoft Audience Network	Search Engine Land
2018	GDPR	GDPR goes into effect	Vox
2018	Twitter (MoPub)	Twitter (MoPub) announced partnership with FAN, AdColony, AppLovin and TapJoy	MoPub
2018	AT&T	AT&T acquisition of Time Warner valued at almost \$110 billion	Fortune
2018	PubNative	PubNative introduced novel “hybrid” header bidding tool	AdExchanger
2018	AT&T	AT&T acquisition of AppNexus for \$1.6b+	AdExchanger
2018	Amobee	Amobee acquisition of Videology	Amobee
2018	AppLovin	AppLovin acquisition of MAX announced	AdExchanger
2018	AT&T	AT&T launched consolidated offering under Xandr brand	AT&T
2019	Facebook	Facebook reportedly generates half of global “display ad revenue”	Motley Fool
2019	Facebook	Facebook’s FAN reaches 2 billion users and 40% of apps	Seeking Alpha
2019	Google	Google began transition to unified first price auction	Google
2019	Opera (Browser)	Opera launched Opera Ads native advertising platform	Opera
2019	The Trade Desk	The Trade Desk’s proprietary “unified ID” solution incorporated into Prebid’s header bidding tool	The Trade Desk
2019	Amazon	Amazon acquisition of Sizmek’s ad server	Yahoo Finance
2019	Twitter (MoPub)	MoPub connected 55,000 apps to 130 DSPs and processed 1 trillion+ monthly app ad requests that reached 1.4 billion devices	Twitter Blog

Year	Company	Event	Link
2019	Washington Post	Washington Post expanded Zeus ad tech offerings	AdExchanger
2019	Blackstone	Blackstone acquisition of Vungle	Blackstone
2019	Taboola	Taboola acquisition of Outbrain announced	S&P Global
2019	Rubicon Project	Rubicon Project acquisition of RTK.io	AdExchanger
2019	TikTok	TikTok launched self-serve ad platform	Digiday
2019	Roku	Roku acquisition of dataxu	BusinessWire
2019	Amazon	Amazon's DSP is most popular DSP; The Trade Desk's DSP is second most popular	AdExchanger
2019	Smart	Smart acquisition of LiquidM announced	Digiday
2020	Walmart	Walmart launched self-serve ad platform	AdExchanger
2020	Comcast	One Platform launched	Reuters
2020	Rubicon Project	Rubicon Project acquisition of Telaria	Rubicon Project
2020	Comcast	FreeWheel launched "unified decisioning" platform where direct-sold and intermediated programmatic demand can be considered alongside each other	AdExchanger
2020	The Trade Desk	The Trade Desk valuation first exceeds \$14 billion	YCharts
2020	CVS	CVS began pitching new ad network	Digiday