

# Appendix H: Intermediation in digital advertising

## Introduction

1. This Appendix sets out in detail our current understanding of how the open display advertising market works. It supports our analysis of the barriers to competition that we have set out in Chapter 5 of the main report. The structure of the appendix is set out in the table below.

**Table H.1: Structure of the Appendix**

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## How intermediation in open display works

### *Overview of the intermediation value chain*

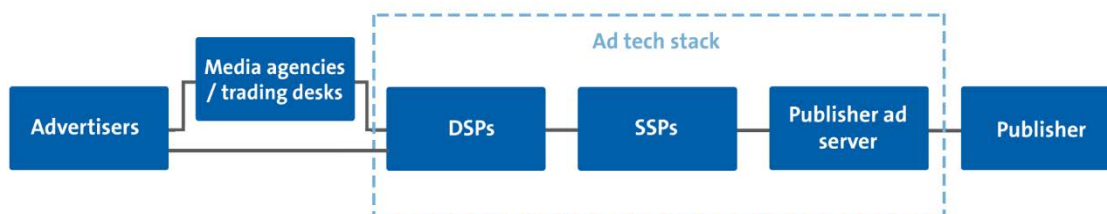
2. Many operators of online content that attracts consumer attention monetise the services they provide, at least in part, through digital advertising. Some of their advertising space (or inventory) is sold at fixed price through direct deals with specific advertisers or media agencies. The vast majority of digital advertising, however, is now sold ‘programmatically’.<sup>1</sup> The defining feature of programmatic buying is that the decision on whether to buy a particular impression is made in real time, making use of information not only about the environment (eg webpage) in which the ad will appear, but also about the internet user in front of whom the ad will be placed.
3. Social media platforms have sufficient scale to run their own self-service interfaces for programmatic trading – these are often referred to as ‘walled

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<sup>1</sup> Following the IAB, we define programmatic trading as ‘the use of automated systems and processes to buy and sell inventory’. See Internet Advertising Bureau UK, [The Programmatic Handbook](#), page 8.

gardens'. In order to make programmatic trading possible for smaller operators of online content, which we denote with the term 'publishers', a complex ecosystem has emerged, including a range of intermediaries between advertisers and publishers – the so called 'ad tech stack'. A simplified version of the intermediation value chain is provided in the figure below.

**Figure H.1: Simplified scheme of the intermediation value chain**



Source: CMA.

4. On the demand side, the main participants in the ecosystem include:
  - Advertisers – who are interested in serving ads to consumers; their aim can be increasing consumers' awareness of their brands or inducing a direct response (eg a purchase) from consumers seeing the ad. Advertisers' aims affect their preferences over which consumers to target with the advertising campaign. Advertisers use advertiser ad servers to store the ads, deliver them to publishers, and keep track of this activity. The role of advertising ad servers is not discussed in this note, but we plan to extend our analysis to them in the second half of our study.
  - Media agencies – large advertisers often use the services of media agencies to plan and deliver an advertising campaign. Media agencies can offer in-house trading desks, which provide the technical expertise to execute programmatic media buying.
  - Demand Side Platforms (DSPs) – provide a platform that allows advertisers and media agencies to buy advertising inventory from many sources. DSPs bid on impressions based on the buyer's objectives and on data about the final user.
  
5. On the supply side, the main participants include:
  - Publishers – operate websites or apps and want to monetise their services selling digital advertising.
  - Supply Side Platforms (SSPs) – provide the technology to automatize the sale of digital inventory. They allow real-time auctions by connecting to multiple DSPs, collecting bids from them and performing the function of

exchanges.<sup>2</sup> They can also facilitate more direct deals between publishers and advertisers.

- Publisher ad servers – manage publishers’ inventory and are responsible for the decision logic underlying the final choice of which ad to serve, based on the bids received from different SSPs and the direct deals agreed between the publisher and advertisers.

6. The advertising ecosystem also includes further participants involved in the provision and management of data and in advertising analytics:

- Data suppliers – A wide range of companies provide data that can be used to augment the user data already possessed by advertisers and publishers and enhance the ability of targeting advertising to specific types of audiences.
- Data Management Platforms (DMPs) – allow other participants along the value chain (advertisers, DSPs, SSPs and publishers) to manage and analyse their data, integrate it with third-party data, and use it to create audiences that can be used for targeting purposes.
- Advertising analytics services – used by advertisers to measure the performance and impact of advertising campaigns.

7. In a typical real-time transaction, when a user opens a webpage (or uses an app), an automated process is put in motion through which

- 1) Multiple SSPs receive ad requests for the advertising space available on the web page. In turn, SSPs send bid requests to multiple DSPs.
- 2) DSPs evaluate the advertising opportunity based on the objectives of the campaigns of all their customers (advertisers and media agencies) and automatically generate bids to be sent to SSPs.
- 3) SSPs then rank the bids received based on price and on priority levels that may have been set by the publisher and send the winning bid to the publisher.
- 4) Finally, the publisher ad server compares the bids received, together with any pre-existing direct deals between the publisher and specific advertisers, and decides which ad is to be served on the webpage.

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<sup>2</sup> Advertising exchanges used to be separate from SSPs. The two functions, however, have largely been merged into the same operators.

8. While this general process applies to all programmatic transactions, there are many variants to it, which differ in the ways in which SSPs are contacted and submit their bids and in the type (if any) of pre-existing agreements between the publisher and advertisers. In order to understand the different paths that ad requests and bids can follow, it is helpful to look at how the intermediation ecosystem has evolved through the last ten years. A brief history of advertising intermediation is developed in the next section.

### ***The evolution of the intermediation ecosystem***

9. The advertising intermediation ecosystem is complex. In part, this complexity is the result of the way it has developed (and continues to develop) organically to solve the technical problem of allocating advertising inventory in an efficient way, responding to the changing needs of advertisers and publishers. A review of the industry's development shows the important role played by Google, and in particular by its publisher ad server. On the one hand Google has been an important source of innovation; on the other hand, concerns about Google's market power have led to further innovations from other market players.

### ***The emergence of real-time bidding***

10. When digital advertising was in its infancy, publishers sold most of their inventory through direct deals with advertisers and media agencies, reflecting the way advertising was traditionally sold in the offline world. The deals typically specified the number and type of impressions to be delivered within a certain time span, and the agreed price for those impressions. However, the volume of available impressions cannot be perfectly estimated in an online context, as it depends on the number of visits to the publisher's website. Publishers, therefore, had to find a way to sell 'remnant' inventory, which had not been pre-sold through a direct deal.
11. This provided a space for ad networks, which could buy remnant inventory from various publishers and repackage it before selling it to advertisers. The agreements between ad networks and publishers were based on pre-agreed prices for the available inventory. A publisher having a piece of inventory for which no direct deal applied would therefore contact the various ad networks and ask whether they were interested in buying the impression at the pre-agreed price. Publishers would rank ad networks according to the agreed prices and would first call the ad network that agreed to the highest price; if that ad network did not buy the impression, the second one in the list would be called, and so on. This process was managed by the publisher's ad server,

where direct deals were included as 'guaranteed line items' and the various ad networks appeared as separate 'remnant line items'.

12. Over time, however, there was a realisation that, as the value of an impression depends on the identity of the user seeing the ad, allowing advertisers to flex their bids in real time based on information about the user could increase the efficiency of advertising campaigns. New services emerged to allow advertisers to collect and make use of user information, while ad exchanges allowed real-time bidding for impressions. Ad networks evolved into or were replaced by today's SSPs. Real-time bidding typically took the form of second-price auctions. The attractiveness of a second-price auction is that it incentivises bidders to reveal their valuation of the impression, as it is always optimal for bidders to bid exactly the value they assign to the impression.

### *Dynamic Allocation*

13. With the introduction of real-time bidding, the traditional way in which publisher ad servers worked became inefficient. SSPs continued to be ranked in a waterfall-like sequence within the ad server. The ad server was instructed to contact first the highest ranked SSP and offer the impression for sale. If the SSP submitted a high enough bid it would secure the impression; if the SSP did not buy the impression, the ad server would contact the SSP ranked next in the waterfall, and so on until the impression was finally sold. This type of sequential call of the SSPs became known in the industry as 'daisy chaining'.
14. However, this waterfall setup was inefficient and led to sub-optimal yield. The reason is that the ad server did not allow publishers to rank SSP partners in the waterfall in accordance with the actual bid (expressed in cost per thousand impressions, or 'cost per mille' (CPM)) they would submit. Instead, SSPs were ranked according to their estimated bids (expressed in CPM), ie the bids the publisher expected them to submit once called by the ad server. Such estimates were typically based on the average past performance of each SSP. That means publishers could lose potential revenue, as for a given impression it might be the case that an SSP was willing to submit a high bid but was never given the chance to do so, as the impression was already sold to the SSP higher in the waterfall.
15. As a way to partially address this inefficiency, the ad server DoubleClick for Publishers (DFP), which was acquired by Google in 2008, introduced Dynamic Allocation. Under Dynamic Allocation, DFP established a 'floor price' based on the highest price of any of the publisher's booked, static remnant line items (which a publisher 'booked' by manually configuring the estimated price of each remnant line item) and then sent a bid request to its own

exchange (AdX). AdX would run its real-time auction and secure the impression if it could submit a bid above the price floor. In this way, AdX was the only SSP able to insert its real-time demand within DFP. While all other SSPs were stuck with their estimated demand, AdX was able to compete against them and secure impressions on the basis of its real-time demand. In 2014, Google introduced Enhanced Dynamic Allocation, which extended the principle of dynamic allocation to 'guaranteed line items', ie 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.

### *The introduction of header bidding*

16. Dynamic Allocation did not completely solve the inefficiencies inherent in the 'waterfall' system; moreover, it gave AdX an advantage that other SSPs considered unfair. From 2015, therefore, a new technology began to be used by publishers to allow all SSP partners the chance to compete against each other on the basis of their real-time demand – header bidding. Under (client-side) header bidding, when a user accesses a publisher's webpage, the user browser calls simultaneously all the publisher's SSP partners that participate in header bidding before it calls the ad server (for that reason header bidding has also been referred to as pre-bidding). All the SSPs get the chance to view the impression at the same time and submit their respective bids.
17. Header bidding provided several advantages to publishers:
  - It provided a more efficient allocation process compared to the waterfall; the increased price competition among multiple SSPs in real time led to a higher price per impression (yield).
  - Each step down the waterfall took additional time. As more time passed, there was an increased likelihood that the user might have left the page by the time the ad creative serves, causing miscounting and discrepancies, as well as a loss of revenue for that impression. This could also have a negative impact on load times for the page if the page was configured in a manner such that the ad creative load times slowed down the content on the actual page from loading. Header bidding solved these issues.
18. These benefits determined the widespread adoption of header bidding among publishers. According to eMarketer, over 65% of the top 1,000 sites in the UK

have adopted Header Bidding;<sup>3</sup> media agency IPG Mediabrands told us that around 80% of the Comscore UK top 100 publishers are now engaging in header bidding.

19. Google, however, decided not to participate in header bidding. This decision, combined with the working of Dynamic Allocation, resulted in AdX maintaining an advantage over other SSPs where ads are delivered through Google's Ad Server (DFP). When an impression is available, the user's browser calls first the publisher's SSP partners, which submit their bids to the header bidding auction. The browser then contacts DFP. Within DFP, the bids of the SSP partners are matched with price priority line items. Until the recent transition to a Unified Auction (discussed below), as a result of Dynamic Allocation DFP selected the line item with the highest price (which in that case corresponds to the highest bid from the header bidding auction) and then sent a bid request to AdX with it as its price floor. This was the so called 'last look' advantage. It is worth stressing that '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.
20. While beneficial to publishers in terms of yields, header bidding also introduced some challenges.
  - Header bidding can be difficult to implement and requires both advertising operations and development resources. Publishers often struggle to have the development resource required to implement it.
  - The addition of extra code on the webpage, which client-side header bidding requires, can slow down the publisher's website, thereby detracting from the sites' user experience.
21. As an alternative to client-side header bidding, some ad tech companies have developed server-side header bidding, where the auction among SSPs takes place in a remote server controlled by a third party (the provider of the server-side header bidding solution) instead of the user browser. This minimises impacts on the site load speed. The main issue with this solution is that the number of partners available is generally reduced and, most significantly, it generally leads to less revenue. The reason is that participating SSPs are not directly called by the browser – where they can retrieve their user IDs from their cookies – but are contacted by the provider of the solution. That results in lower cookie sync rates, which in turn means that buyers will be reluctant to submit a bid (or will submit a lower bid). It is also worth noting that visibility

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<sup>3</sup> See [E-Marketer, UK Header Bidding Adoption, Aug 2018 & Nov 2018](#).

and data on bidding is generally either lost or more difficult to obtain on the server side. For these reasons, server-side header bidding has proven less popular among publishers.

### *Google's Exchange Bidding*

22. As a response to publishers' uptake of header bidding, Google introduced its own proprietary version of server-side header bidding – Exchange Bidding – allowing non-Google SSPs to integrate into its ad server auction. Exchange Bidding was originally developed in 2016 and became available to publishers in April 2018. Google's internal documents show that its desired outcome was the following:
- 1) Exchange Bidding being a superior product, the industry would have stopped investing in header bidding; publishers would have embraced Exchange Bidding and stopped using header bidding.
  - 2) Access to inventory would then have been a sufficient incentive for SSPs to participate in Exchange Bidding.
  - 3) The revenue share charged to participants in Exchange Bidding,<sup>4</sup> added to the fees charged by the SSPs themselves, would have prevented DSPs from switching from AdX to other SSPs.
  - 4) As a result, revenue would have increased for both publishers and AdX. Moreover, being part of every transaction, Google would have benefitted from 'data network effects'.
23. While a major reason for the introduction of Exchange Bidding appears to be protecting Google's revenues from the impact of header bidding, Google's internal documents also show that [REDACTED]. One example of this approach was the decision not to give AdX a 'last look' advantage over the SSPs participating in Exchange Bidding (this advantage was removed by Google during the beta period in response to customer feedback). However, some publishers are concerned that the Exchange Bidding auction is non-transparent and it cannot be verified whether AdX maintains an advantage.
24. Exchange Bidding, recently renamed as Open Bidding, has proved successful and is widely adopted by publishers. It has not led, however, to the demise of header bidding.

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<sup>4</sup> Exchange bidders are charged either 5% or 10% of the value of the winning bid, depending on the type of inventory.



### *The move towards first-price auctions*

25. When real-time bidding was introduced, exchanges initially ran second-price auctions, where the highest bidder wins the auction but pays the second-highest bid. In the last few years, however, exchanges have moved towards a first-price auction model, where the winner pays the amount it bids. With Google's exchange moving to a first-price auction in 2019, the large majority of auctions are now run as first-price. There were two factors behind the transition to first-price auctions: the first is related to publishers' incentive in the context of repeated second-price auctions; the second has to do with the implications of the sequential auctions resulting from the introduction of header bidding.
26. The fact that auctions are repeated gives publishers the ability and incentive to use floor prices to increase their short-term revenues. This strategy is typically executed when a publisher reviews their bid landscape data and compares it to their revenue reporting. If they notice that their auction closing prices (the auctions' second prices) are significantly lower than their highest bids, the publisher may raise their floor prices to increase their revenue in the short term. Over time, this behaviour eroded trust in the benefits of a second-price auction, as advertisers, anticipating the behaviour of publishers, have the incentive to bid less than their valuation for the impression. One common practice was the use of soft floors. A soft floor is a price threshold the publisher chooses for an auction – above the floor, bids are evaluated on a second-price basis and below the floor, they are evaluated on a first-price basis. When soft floors are deployed non-transparently, bidders are even less sure of the optimal bidding strategy.
27. The introduction of header bidding created an environment where the bids submitted by SSPs participate in a final first-price auction. In this context, exchanges began running makeshift second-price auctions, where they would utilize artificial floors or static pay-to-bid ratios to increase their ability of winning the final auction. The auctions run by the exchanges, therefore, began looking more and more like first-price auctions.
28. Under these pressures, the move to first-price auctions ratified what was already taking place in practice and made the auction mechanisms more transparent.

### *Google's Unified Auction*

29. In 2019, Google transitioned to a Unified Auction, in which the winning header bidding SSP, the DSPs bidding into Google's exchange and the SSPs participating in Open Bidding take part in a unified first-price auction within

Google's publisher ad server (now integrated with its exchange and called Google Ad Manager). As part of this transition, Google has made the policy decision to remove its 'last look' advantage over header bidders. 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.

30. The transition to Unified Auction has been accompanied by changes to how publishers are allowed to set floor prices. Specifically, publishers using Google Ad Manager are no longer allowed to set different floor prices for different buyers (eg SSPs or DSPs). Google's internal documents show that this was an integral part of the design of the Unified Auction and 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. Publishers' concerns with unified floor prices are discussed in Chapter 5 of the main report. [✂]
31. Google has also implemented a change to the bidding information that publishers receive from Google Ad Manager. Some publishers have expressed the concern that this change will make it impossible to verify whether the Unified Auction is run fairly and may result in Google maintaining an advantage over third-party intermediaries. These concerns are analysed in Chapter 5 of the report.

### ***Transaction types***

32. This section describes the different types of programmatic transactions available to publishers and advertisers.<sup>5</sup>
33. Programmatic transactions can be divided in the following categories:
  - Open Auctions, where any advertiser can bid for the impression;
  - Private Marketplaces (PMPs), used when publishers want to limit the number of advertisers eligible to buy an impression and, typically, to sell more 'premium' inventory. PMPs include

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<sup>5</sup> It should be noted that there is still a fraction of digital advertising that is not sold programmatically, but through 'insertion orders', that is, direct agreements between a publisher and an advertiser (or media agency) specifying the number of impressions to be shown in a specified period of time, the pacing of the ads and their placement within the publisher's website, and the price.

- (i) private auctions, where multiple bidders participate in an invite-only auction; and
  - (ii) preferred deals, where a single advertiser contracts with a single publisher to purchase inventory with specific deal terms for a 'first-look' advantage before the inventory is made available on an auction.
- Programmatic Guaranteed transactions, which are one-to-one deals in which the full transaction details are agreed in advance between publisher and advertiser. They reflect the traditional direct campaigns but are executed via programmatic pipes, bringing some of the benefits of programmatic advertising transactions to the process. The automated process increases the efficiency of what had previously been direct deals performed manually; moreover, unlike in insertion orders, advertisers and publishers can layer on additional targeting for personalised advertising in real time.
34. Compared to Programmatic Guaranteed transactions, PMPs allow advertisers and publishers to layer on additional targeting. Moreover, PMPs are integrated within the real-time bidding (RTB) ecosystem and integrate campaign data alongside other RTB transactions, which allows for better frequency capping and cleaner attribution. On the other hand, PMPs do not provide the parties with the ability to guarantee or reserve inventory. Programmatic Guaranteed inventory is typically sold at a higher price than PMP, which in turn is generally more expensive than Open Auction inventory.

#### *Advantages and disadvantages of the different transaction types*

35. Advertisers and publishers can use a combination of these transaction types, each of which has specific advantages and disadvantages.

#### *Open Auctions*

36. The main advantage of Open Auctions for advertisers is that they give access to hundreds of thousands of publishers, providing a much higher level of reach than other transaction types. This maximises the opportunities for effective data-driven audience targeting, as advertisers are more likely to find their best targeted consumers through the wide reach afforded by the Open Auction. This is particularly useful if the advertiser is looking to drive performance, rather than just brand awareness. Moreover, for advertisers with smaller marketing budgets, it is much easier to use Open Auctions than other transaction type, as there is no need for a direct relationship with publishers.

37. On the other hand, when using Open Auctions advertisers have less control over the placement of their ads. This may give rise to brand safety issues and make it easier for fraudulent ad inventory to be present. One intermediary told us that, in an Open Auction environment, the information that the potential buyer collects is only declaratory information from the SSP, without the possibility of checking its accuracy, veracity and authenticity.
38. From a publisher perspective, Open Auctions make it possible to access a large pool of demand and to monetise all ad impressions, including those in non-core geographies; they also allow to react to changes in traffic quickly and effectively, taking advantage of short-term peaks and troughs in the news agenda. Moreover, selling through Open Auctions requires minimal account management.
39. On the other hand, Open Auctions make it more difficult to control the quality of the advertisements that are shown on the publisher's website. They are also associated with a higher intermediation cost than other transaction types. Moreover, it may be hard for a publisher to forecast its revenue, given the real-time pricing of inventory sold in Open Auctions.<sup>6</sup> Finally, in Open Auctions inventory is typically valued for the user, rather than for the environment. This means that often a publisher's premium environment is regarded at a similar price to sites where users are less engaged and that therefore may be less effective for advertisers. One publisher submitted that this has led to a commoditisation of digital advertising, creating a vicious cycle of devaluing and reducing direct sales and reducing the incentive for publishers to invest in high quality, innovative media environments.

### *PMPs*

40. PMPs increase brand safety for advertisers, as they eliminate any potential risk of domain spoofing or fraud, which can happen in Open Auctions. However, given the more limited reach allowed by PMPs, they are best suited to brand awareness campaigns, where advertisers choose inventory that best aligns with their audience and brand. One intermediary also observed that advertisers might start buying inventory via Open Auctions and then build a network of PMPs or programmatic guaranteed deals based on the best performing inventory.
41. Publishers value PMPs because they have more control over which advertisers have access to their inventory. For sensitive publishers, especially broadcasters monetizing video inventory, PMPs offer an additional layer of

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<sup>6</sup> However, one publisher told us that revenue streams from Open Auctions are relative reliable and predictable.

compliance control when determining which campaigns will be allowed to run. Moreover, PMPs also allow a publisher to structure a bid request based on audience or contextual information that is unique to the publisher and not known to the buyer. As PMPs protect premium publishers from losing control over their data and audience, publishers may feel more comfortable sharing information with advertisers. Finally, publishers typically earn a higher revenue share for PMP transactions than they do for Open Auctions.

42. The main limitation of PMPs, from the publisher perspective, is that each PMP is typically set up individually between advertiser and publisher, which leads to operational overhead that is proportional with the number of buyers bringing demand. For this reason, PMPs (together with Programmatic Guaranteed transactions) generally benefit large, well-known and established publishers, whose inventory is sufficiently desirable to advertisers. Smaller publishers who do not have the same exposure and negotiation power are typically better off with the Open Auction model.

#### *Programmatic Guaranteed*

43. Programmatic Guaranteed transactions give advertisers similar advantages to traditional direct deals. They allow for negotiation over prices, provide visibility over ad placements and impression viewability, and allow for better creative tailoring to website content. Guaranteed purchases are particularly useful when certain supply is scarce, such as with some high-quality publishers or publisher with niche audiences, or during peak seasonal periods (eg Christmas and Easter). Guaranteed buys are used to target specific contextual environments, rather than specific users. This means that they are more typically used for top-of-funnel campaigns.
44. On the other hand, advertisers have limited access to user targeting. More generally, advertisers have limited control over a campaign once it has begun: they have to commit their budget to the publisher, regardless of campaign performance.
45. In addition to the greater control over pricing and the quality of advertisements, as in PMPs, Programmatic Guaranteed transactions give publishers greater predictability of sell-through and a steady stream of future revenue. However, Programmatic Guaranteed transactions are more difficult to execute, and one intermediary told us that there are no adequate forecasting estimation tools outside of Google. Due to over-targeting, it is possible that a publisher could enter into a guarantee and have issues delivering on the spend. Moreover, if the buyer does not respond there are cases where a costly 'pass back' occurs where the opportunity was allocated

to the guarantee, but the buyer did not respond with a bid, so the process would have to be restarted to find a fall-back partner.

### *Recent trends*

46. Most of the intermediaries who responded to our Request for Information (RFI) told us that PMPs and, even more, Programmatic Guaranteed transaction models are growing in use for premium inventory.<sup>7</sup>
47. Respondents, however, disagreed on whether the growth of PMPs and Programmatic Guaranteed is happening at the expense of Open Auctions. Some told us of a trend for premium publishers to reduce inventory sold through Open Auctions in favour of more private transaction forms and guaranteed deals. Open Auctions rely heavily on trust, since the publisher and the buyer have no direct relationship. Accordingly, if publishers' or advertisers' trust in the Open Auction transaction type decreases, a trend would emerge towards PMPs or Programmatic Guaranteed. The current movement towards PMPs can be partly due to distrust of some inventory transacted on Open Auctions. Another reason could be linked to data privacy concerns in the programmatic ecosystem.
48. Other intermediaries, however, argued that there is not a full-blown industry trend away from Open Auctions and towards more controlled setups, and that Programmatic Guaranteed transactions are mainly replacing traditional direct deals for publishers' premium inventory. One respondent submitted that publishers and buyers tend to transact new advertising formats using PMPs or Programmatic Guaranteed, but as these advertising formats mature they increasingly use Open Auction transactions. In particular, video inventory has a strong skew towards 'private-style' fulfilment models, in part because publishers of video inventory often require an additional level of compliance control in selecting the advertisements that run in this inventory. Banner inventory, however, is not moving towards or away from any particular transaction type. This may be due to the fact that this market is starting to reach a more mature point and is thus more stable.

### ***Participants in the intermediation ecosystem***

49. This section describes the roles played by the different participants in the advertising intermediation ecosystem – media agencies and trading desks, DSPs, SSPs, publisher ad servers, header bidding solutions, and DMPs. For

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<sup>7</sup> We note, however, that two intermediaries told us they expect a trend towards Open Auctions.

each type of participant, the section describes the main functions and how providers are remunerated.

### *Media agencies and trading desks*

50. Many advertisers rely on media agencies to plan and buy digital advertising. This allows them to take advantage of the agencies' technical expertise, scale, buying power and preferred trading arrangements with technology vendors and publishers.
51. Advertisers brief the agency on a campaign, outlining its overall objective, the desired outcomes and, typically, the desired business KPIs. The advertiser then sets the budget for the campaign, the target audience, the campaign duration and the creative concept and formats available. Advertisers may also provide a 'black list' or 'white list' of websites. The agency will then make recommendations on where (ie on what platforms), how (ie with what optimisation methods) and to who (ie with what audience strategy) to allocate the advertiser's budget in order to best achieve its goals. The agency will also define the channel-specific metrics that it will be using to measure the success of the given channel.
52. For the execution of the media buying plan, agencies provide the services of 'trading desks'. These are in effect a managed service, where the agency provides the talent required to operate a third-party technology (DSPs). While advertisers could use a DSP's own managed services, there might be reasons for advertisers to prefer an agency's trade desk. WPP told us that, due to the contractual structures of most WPP client engagements, typically WPP does not operate directly conflicting clients within the same agency. In contrast, third-party DSP platforms will have a significant number of competing clients using the platform. Given the potential risk of inadvertently informing competitor strategies from their own campaign activities, a DSP managed service is often therefore deemed unsuitable by clients.
53. Agencies enter into agreements with technology and media vendors. WPP told us that agreements with technology vendors relevant to digital advertising are typically negotiated at a global level and adopted by the network agencies at local market level, while agreements for media space with digital media vendors are negotiated at local market level. Agencies typically act as principal when entering into contracts with media owners and other third-party vendors on behalf of their clients. In some cases, however, advertisers contract directly with the publisher and the agency acts as an agent.
54. There is, however, a growing trend in advertisers in-housing the purchase of some or all of their digital advertising space. This trend has accelerated in the

last two years. The choice to in-house can be due to various reasons, including:

- Reducing costs by eliminating agency fees and mark-ups, and having greater transparency of the value chain costs (ie third-party data, tech fees and agency fees). This desire may have been made more pressing by historical issues around transparency from agencies in relation to the passing back of rebates to clients.
- Having better control over who is targeted and greater visibility of the value to the advertiser of the users seeing the ads. This need may be felt especially by advertisers in sectors with large amounts of fast moving, first-party data, such as travel and finance, who want to shorten the gap between data generation and data application in a controlled and secure fashion given the commercially sensitive nature of real-time transactional data.
- Having greater control over performance data. For example, American Express told us that it started purchasing Closed Display advertising directly from Google DV360 in 2018, to ensure that performance management data remained under American Express' ownership. On the other hand, data ownership seems to be achievable for advertisers in some cases even when using agencies. For example, L'Oréal has a direct global contract with Google for its tech stack, so that L'Oréal owns the data and has full transparency regardless of which agency operates the media buying.

#### *How media agencies charge for their services*

55. Media agencies typically charge either a commission-based fee, based on the amount of media spent, or a fixed fee based on agreed FTE levels. In some cases, a performance-related fee can be applied, especially in the case of advertisers who have highly measurable customer conversion events within their business.
56. Fee levels range between 2% and 25% of the media spend, depending, among other things, on the complexity of the digital channels, volume of spend, strategic complexity and the number of different brands and campaigns, and the time taken to activate across the different channels.



## *Demand Side Platforms (DSPs)*

57. DSPs enable advertisers and media agencies<sup>8</sup> to buy programmatic display advertising from SSPs and media owners. Based on parameters set by advertisers, DSPs
- make it possible to target advertising to specific audiences;
  - determine the optimal bid for each advertiser in response to each ad opportunity;
  - decide which bids to submit and into which SSPs; and
  - monitor the quality of supply.
58. When setting up a campaign, advertisers typically provide information including their budget, their key performance indicator (KPI) target, and their targeting strategy.
- In addition to the total budget of the campaign, advertisers can specify a pacing strategy, indicating their hourly, daily or weekly budget.
  - Advertisers can explicitly declare the value of an impression based on certain conditions, ie the maximum CPM bid, or they can let the DSP have the flexibility to determine the bids to optimise a chosen KPI, eg cost-per-click (CPC), click-through rate (CTR) or cost-per-action (CPA), where an action can be ads leading to a purchase, newsletter sign-up, phone call, download or other behaviour useful to the advertiser.
  - Advertisers can determine the user attributes they want to target and assign values to those attributes. They can specify targeting strategies by inventory source, content and device; they can also choose on which SSP they want to bid.
  - Advertisers can include brand safety requirements (eg whitelists or blacklists of websites, content they want or do not want their ads to appear next to) and quality requirements (eg in-view targets, view-through targets).
59. One of the main roles of DSPs is to provide advertisers with the ability to target users in real time. Targeting is largely enabled by the following elements:

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<sup>8</sup> In the rest of this section, we use the term 'advertisers' to encompass both advertisers and media agencies.

- audiences which use advertiser’s first-party data (ie a list of IDs that the advertiser wants to target or retarget) or third-party data segments (audiences created using data collected by other market participants);
  - consent signals informing ad buyers when users have given their consent to be served personalized ads, which are passed on by publisher consent management platforms through the digital ad supply chain; and
  - device IDs that come through auctions, which the DSP matches with the IDs in the target segment.
60. Once the DSP receives a bid request, it reviews all active campaigns, comparing their targeting settings with the features of the ad opportunity. A potential bid is generated for all the campaigns whose targeting criteria match the information in the bid request. The bid depends, among other things, on the estimated value of the ad opportunity for the advertiser, on the campaign’s progress against the pacing goal and on the type of auction:
- The value of the ad opportunity is determined based on the KPI specified by the advertisers, depending on the likelihood of the action that the advertiser wants to achieve.
  - The DSP may calculate an ideal spend curve so that the advertiser’s budget is distributed evenly throughout the day (with more spent during the hours when there are more users online); a bid modifier is then applied to bids to control the amount of spend. In addition, the bid can also be adjusted based on the frequency (the number of times the user has seen the creative) and recency (the amount of time that has passed since the user last saw the creative) of the user.
  - When the SSP runs a first-price auction, or uses soft floors,<sup>9</sup> many DSPs have developed machine learning algorithms to shade the bids, in order to avoid overpaying for the impression.<sup>10</sup>
61. The bids generated are ranked based on priority level and price. For example, Beeswax told us that it prioritises Programmatic Guaranteed and deal ID (ie PMP) bids; if there are multiple of these it takes the highest price; next it takes open bids and prioritises by price.
62. The number of bids submitted in response to a bid request can vary. While some DSPs submit only, or mostly, one bid, others typically submit more than

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<sup>9</sup> A soft floor works as an additional bid in a second-price auction. So, when bids are above soft floor price, the auction will clear at second price; when bids are below soft floor price, the auction will clear at first price.

<sup>10</sup> Not all the DSPs have this technology, and some rely on SSPs optimising the bid for them.

one bid. Submitting multiple bids for a single auction increases the chances of winning, as some bids may be discarded by the SSP for a reason other than the price. In those cases, the SSP is expected to utilize only the bid information from the highest-price, non-discarded bid for the relevant auction.<sup>11</sup> The number of bids sent can vary by SSP and can also depend on the general level of demand for an impression.

63. As publishers typically work with multiple SSPs, DSPs receive multiple bid requests related to the same ad opportunity. This is a result of header bidding, as multiple SSPs simultaneously try to elicit bids for the same impression. While there is currently no way to efficiently de-duplicate such requests, some DSPs have developed systems to reduce the volume of bid requests that reach them, reducing the costs they have to sustain to listen to the bid stream and respond to bid requests.
- DSPs often implement a technique known as ‘supply path optimisation’.<sup>12</sup> DSPs choose their preferred paths to supply and stop actively listening to open bid requests from non-preferred SSPs. There are multiple variables taken into consideration when deciding whether a supply source should be given preferred status; one of them is price, which is measured as an expected CPM. This can disincentivise suppliers from manipulating or otherwise inflating prices in cases where there are alternative access points to the same ad inventory through other more transparent or cost-effective suppliers.
  - Xandr has developed an adaptive system to identify (and regularly reassess) superfluous inventory with minimal probability of receiving a bid and limits these requests from being processed.
64. It is often the case, however, that the same DSP submits bids to different SSPs for the same ad opportunities. In those cases, the bids submitted may not be the same, as the DSP may receive different information from the different SSPs.
65. Finally, another function of DSPs is to monitor the quality of supply. DSPs can apply a variety of quality filters to all incoming inventory to remove traffic that may not be brand safe or fit for its customer base, or that shows signs of malware or suspicious behaviour.

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<sup>11</sup> One intermediary, however, added that, since auction mechanics are not fully transparent, DSPs run the risk of multiple bids acting as price support against each other (in the context of a second-price auction).

<sup>12</sup> Verizon Media also offers a product called Omniscope, which provides buyers with more transparency on the supply path and allows them to make decisions on their own supply path optimisation.

### *How advertisers pay for the impressions and for DSP services*

66. As DSPs submit their bids into SSPs on a CPM basis, they typically pass this cost to advertisers on the same basis. However, some DSPs allow advertisers to pay on a different basis. For example:
- Google Ads charges some advertisers on a cost-per-click (CPC) basis or based on subsequent conversions; it runs a second-price auction among advertisers, with the winning advertiser paying the minimum necessary to win the auction.
  - Criteo charges advertisers on a CPC basis. This model is possible since Criteo provides DSP services together with retargeting services, and then sells ad spaces which have been optimized and targeted using Criteo's own retargeting technology.
  - Some DSPs offer other charging models in addition to CPM, such as Viewable CPM (vCPM, where advertisers pay only if the ad is completely viewed), cost per completed view on video (CPCV), or cost per action (CPA).
67. When charging on a basis different from CPM, the DSP takes on the transaction risk. For this reason, non-CPM pricing is much more common within the 'walled gardens', where the same company controls margins on both the demand and supply side, than in advertising intermediation. While most DSPs are not offering this service, this is not perceived by them as a significant limitation. DSPs, in fact, normally have algorithms which optimise toward certain KPIs (like clicks or actions), so that the bid price and targeting is automatically adapted to the likelihood of the user or ad placement contributing positively to the KPI.
68. For their services, DSPs typically charge advertisers and media agencies a percentage of the media spend. This is usually subtracted from the bid before it is sent to an SSP, although some DSPs allow advertisers to add the fee on top of their campaign budget. Based on the information provided by DSPs responding to our RFI, fees can vary between approximately 5% and 20% of the media spend. Large customers are often able to negotiate lower fees, or to receive incentive-driven discounts (eg a reduced fee for any spend over a certain threshold). DSPs bidding directly into a publisher's header bidding solution, without going through an SSP, such as Facebook Audience Network (FAN), may charge higher fees.
69. Some DSPs adopt different pricing models. For example, Beeswax charges a flat monthly fee based on the queries per second (QPS) of traffic provided to

the customer's bidder.<sup>13</sup> One DSP, on the other hand, adopts a non-disclosed pricing model, where the CPM fee charged to advertisers includes media costs, audience data costs, quality metrics costs, service costs and technology costs.

70. In addition to the base fee, advertisers can be charged separately for additional services:
- While ad targeting is typically included in the base fee, some DSPs add an additional charge when the advertiser uses the DSP's proprietary data. Third-party data acquired through DMPs is typically charged separately and some DSPs may add a mark-up.
  - Advertisers can receive a managed service, including campaign set up, strategy, reporting and campaign optimisation, for an additional percentage fee, which can vary between 5% and 15%.
  - Additional services such as viewability measurement and pre-bid fraud blocking can carry an additional charge. An additional fee can also apply if advertisers want to receive log level data from impression served when they win an auction.
  - When advertisers do not pay on a pure CPM basis, additional fees may be charged. For example, Xandr allows its customers to pay only if the impression was viewed, while the publisher will always get paid. In that case, Xandr charges an additional percentage for taking on the transaction risk.

### *Supply Side Platforms (SSPs)*

71. SSPs allow publishers to connect with multiple sources of demand and sell their advertising inventory programmatically. SSPs initially tended to be separate from ad exchanges, marketplaces connecting buyers and sellers and hosting open real-time auctions. The two roles (SSPs and ad exchanges), however, have to a large extent merged in recent years, to the point that the two terms are often used interchangeably. SSPs typically allow publishers to sell their inventory through a variety of transaction types, including Open Auctions, private marketplaces, priority deals and programmatic guaranteed deals.

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<sup>13</sup> Beeswax also charges its customers a fee for using its 'seat' on the exchanges to purchase inventory; however, larger customers can get their own seats on the exchanges and avoid this fee altogether.

72. The main function of SSPs is to send bid requests to DSPs, receive and rank the bids, determine the winning bidder and send a bid back to the publishers. They can also provide several other services to publishers to maximise their yields, while acting at the same time to attract DSPs to their platform.
73. When ranking the bids received by DSPs, SSP take account not only of the bid price, but also of the restrictions and priority rules set by the publisher:
- Some bids may be judged to be ineligible, eg because they fail to meet the reserve price, or because the advertiser is included in the publisher's blocklist.
  - Valid bids are first ranked by priority level. For example, an SSP told us that Programmatic Guaranteed bids take priority over all other transaction types, while preferred deals are prioritised over private auction and open auction bids. A publisher can also create multiple private auctions, preferred deals and programmatic guaranteed transactions for the same ad inventory, which can be given different priority levels.
  - When multiple bids have the same priority, price becomes the deciding factor. If prices are the same, some SSPs determine the winner using a 'buyer score' based on historical data, including the average buyer CPM, the average revenue achieved by such buyer, and the ability for the buyer to actually deliver an impression if selected.
74. Once the winning bidder is determined, the value of the bid sent to the publisher depends on the type of auction run by the SSP. Most of the SSPs we received information from run first-price auctions in all, or in the majority of, cases. In such cases, the bid submitted to the publisher is the same one submitted by the winning bidder, net of the fees charged by the SSP. In some cases, however, other auction mechanisms can be used:
- Second-price auctions: the winning bidder pays the second-highest bid, typically plus 0.01 £/\$/€ CPM, which is what is sent back to the publisher (net of the SSP's fees);
  - Some SSPs allow for a mixture of first- and second-price, allowing DSPs to decide how they want to submit their bids;
  - Fixed-price auctions, where the price is pre-agreed between publisher and advertiser and there is usually a single bidder.
75. Some SSPs focus on particular ad formats, such as video or native display. SSPs can also develop proprietary ad formats. For example, Sharethrough told us that it offers a proprietary enhanced display format.

76. In addition to managing the auctions, SSPs can provide further services to publishers and buyers (DSPs). Some SSPs told us that they check the quality of both the supply and the creatives. These activities can involve:
- using automated techniques to identify and block invalid (bot) traffic;
  - auditing the domains on which the ads are served and verifying that the domain sending the bid request is what it claims to be; and
  - scanning the advertising creatives.
77. SSPs can provide yield management services. For example, Verizon Media SSP includes price floor optimization capabilities and has a yield management analyst team that provides on-demand consulting services, including recommending changes to price floors. SSPs can offer publishers the ability to sync their first-party data, or to integrate with third-party data providers. Some SSPs also automatically crawl publisher inventory and contextualise it according to the identified keywords, to facilitate contextual targeting. SSPs also bear the costs and the risks of paying publishers and collecting payments from buyers (DSPs).
78. To attract buyers to their platform, SSPs can provide various services to DSPs, including the following:
- SSPs can decide which DSPs to call for getting bids based on what kind of ad inventory DSPs are looking for and whether they are likely to submit a bid.
  - SSPs can package inventory across publishers in ways that are meaningful to buyers. For example, Rubicon Project offers 'auction packages', in which it bundles the ad inventory of different publishers which fall within a certain content category (eg sports, lifestyle) in order to make it easier for buyers to find the ad inventory they are looking for; an auction package is a form of open auction, but is curated like a PMP deal.
  - SSPs can keep a matching table of their own unique cookie User IDs and DSPs' own cookie User IDs; when submitting a bid request, they send the DSPs' specific IDs.
  - Some SSPs provide a bid shading functionality, reducing the amount of the bid that they pass to the downstream auction on behalf of the winning bidder.

### *How SSPs charge for their services*

79. SSPs typically charge publishers based on a revenue share agreement. Based on the responses SSPs submitted to our RFI, the share retained by the SSP (also known as the 'take rate') varies substantially across the industry, ranging from 5% to 35%. Even for a single SSP, the take rate can vary depending on the ad format and on the transaction type, with Open Auctions being associated with higher take rates than private marketplaces or programmatic guaranteed transactions. Moreover, take rates are often directly negotiated between SSPs and publishers, and lower take rates can be agreed with publishers that have a high volume of ad inventory, or have unique users or content; large publishers are able to achieve significantly lower rates than smaller ones.
80. Some SSPs apply variable rates: their percentage charge is not always the same for a given type of transaction but can vary around an average agreed with the publisher. This allows, for example, an SSP to reduce its fee in cases when, should the whole fee be charged, the net bid would be below the floor price set by the publisher; or to charge a lower fee when they expect to face higher competition for an impression.
81. In addition to the revenue share, some SSPs can charge additional fees, such as:
- a DSP access fee based on the risk ranking of the DSP and to account for revenue discrepancies (which arise because SSPs and DSPs have variations in the methodology for counting impressions delivered to a user); and
  - a small exchange fee charged on a CPM basis.

### *Publisher ad servers*

82. The publisher ad server plays a central role in the digital intermediation ecosystem, as it is responsible for the decision logic that determines the choice of which advert will appear at each specific piece of inventory. This does not simply involve selecting the highest bid but requires a holistic management of real-time demand and the direct deals agreed by the publisher with advertisers and media agencies. A publisher ad server should therefore maximise a publisher's revenue by taking into account prices, agreed target volumes and audiences, and frequency caps across different types of deals.



83. A critical component to a publisher ad server is therefore the ability to forecast what inventory will be available for sale in the future. Ad decisioning is based on complex pacing and decisioning algorithms based on machine learning algorithms and complex data sets.
84. Other functions of the publisher ad server relate to the provision of data and insight to the publisher, to allow it to better understand the demand for its inventory. Reporting and analytics capabilities are therefore important components of an ad serving technology.
85. A publisher ad server is not formally an intermediary, as its function is that of a tool through which publishers manage their inventory. However, the complexity of the operations carried out by publisher ad servers gives them a degree of autonomy from publishers that make them more than just a piece of software. For example, as discussed above, Google's ad server has been able to impose changes to the rules publishers must follow in selling their own advertising despite many publishers complaining about it.
86. Publisher ad servers typically charge publishers on a constant CPM basis. In some cases, the charge can become proportionally lower as the volume of ads served increases. Fee levels are typically low. Google told us that, for publishers using Ad Manager Small Business, ad serving fees [X]; for Ad Manager 360 (the version used by larger publishers), the ad serving fee is generally [X]. Our analysis suggests that this is typically below [0-5]% of the value of the ads. Smart estimates that its fees correspond to 1-2% of the value of the ads served; FreeWheel's estimate is [X]. Publishers may also be charged a flat set-up fee, while additional fees may be charged for the provision of log level data or non-core services.

### *Header bidding solutions*

87. Header bidding technology was introduced to allow multiple SSPs to compete head-to-head in real time. There are currently two models of header bidding: client-side, where the auction is run by the user's browser using code included in the publisher's webpage; and server-side, where the auction takes place in a third-party server. The advantages and limitations of each model have been described above
88. Header bidding technologies can be split into an open source technology and proprietary technologies. The open source technology is called Prebid and is the most widely used header bidding solution. The Prebid community's oversight of the code ensures neutrality and equitable bidding processes among header bidding solution providers. A proprietary solution, on the other hand, has technology and algorithms unique to the provider. While the Prebid

technology is free to use, it can be difficult for publishers to implement and maintain. Some third-party providers, however, can offer a managed service based on Prebid technology, by hosting the auction on their servers and providing an easier user interface and analytics tools.

89. Typically, publishers have direct contractual relationships with the SSPs who want to participate to header bidding. Some providers, however, offer a service that allows publishers to integrate SSPs without the need for a contractual relationship, which SSPs have only with the header bidding provider.
90. While header bidding typically allows publishers to achieve a better return for their inventory, it has some limitations (in addition to those already discussed), including:
  - some formats are not yet available in header bidding, such as audio, digital out-of-home, and many emerging video formats; and
  - in the mobile app space, the majority of demand still operates according to the waterfall model, with many key players not competing in header bidding.
91. In most cases, publishers do not pay for using a header bidding solution. SSPs bidding into proprietary header bidding solutions, however, are often charged a fee, which can vary between \$0.01 per won impression and 10% of the value of the impression. As header bidding providers are usually companies that also bid into them as SSPs, such fee is not levied to them.

#### *Data management platforms (DMPs)*

92. DMPs provide services focused on importing data, managing or enhancing that data, and delivering it back out into the advertising ecosystem, primarily for the purposes of enhancing consumer audience targeting. Data is organised to create consumer audiences (via cookies and mobile advertising IDs (MAIDs)) that are categorized into groups based on various targeting parameters. Customers can combine these different categories across first-, second-, and third-party data into audiences so that they can run more targeted advertising campaigns. DMPs are used by all parts of the digital advertising supply chain, including advertisers, media agencies, intermediaries and publishers. DMPs also allow data owners to connect with the digital ecosystem and monetise their own data.

93. While each provider tends to offer somewhat different services, the core capabilities provided by DMPs relate to data ingestion, data management and data delivery.
94. DMPs allow customers to ingest online data captured through tags (in the customer's websites) and software development kits (SDK) (in mobile applications). Customers can also onboard offline customer relationship management (CRM) data by mapping offline identifiers with online cookie or MAID identifiers (direct identifier personal data such as name and address, which may be included in CRM data, are not stored on the DMP). Customers can also use third-party data and DMPs can facilitate their customers in purchasing them.
95. Data management can include a variety of functionality aimed at categorising and analysing the data, and at building audiences. DMPs can:
- categorise the data brought into the platform by structuring it into different segments and targeting profiles (eg create rules to classify cookies/MAIDs into categories), and build audiences by combining first- or third-party data;
  - perform look-alike modelling (ie apply modelling to pre-existing audiences to uncover additional consumers that would fit the same targeting parameters); and
  - offer reporting and analytics functionalities, such as multi-touch attribution analysis to determine the impact of customers' investment in data and of their media campaigns.
96. DMPs then deliver cookies and MAID to downstream ad tech partners, so that they can be used, for example, for media targeting (by DSPs) or for analytics purposes by attribution providers or by the customer's own business intelligence tools. Segment data are typically delivered to third-party DSPs or SSPs in batches through server-to-server integrations. In some cases, a DMP can use real-time techniques to send the full list of segments attributed to a specific user in real time.
97. A critical component of all these services is data matching, which spans the following types:
- Cookie Syncing: a DMP would perform cookie syncs with data suppliers or partners to whom it delivers audience data (eg DSPs);
  - Postal to IP to Cookie Matching: a DMP may source Post Code level data from partners, which would include a list of post codes mapped to

categories. In order to associate the post code level categories to cookies, the DMP first maps the last IP address associated with a cookie to a postal code using a geo mapping library and then associates categories to a cookie based on matched post codes.

- Offline onboarding: third-party data providers may send the DMP log files that contain a partner's cookie ID and value pairs (that map to audience categories). In the presence of a cookie sync with the provider, upon receipt of a file, the DMP would match the data to its own cookie profiles. In the case of a file of MAIDs and value pairs, a direct match on the value of the MAID can be made, as MAID are unique.

98. These services can be charged through a fixed monthly fee or based on the volume of data processed.
99. In addition to the services discussed above, DMPs may also provide a third-party data marketplace that allows customers to import data directly from third-party providers. Such data brokerage services can be charged through different charging models: usage-based CPM, revenue share, or subscription licence. Data providers are typically compensated on a revenue share model where a portion of the revenue generated from the sale of their data is paid to the data provider. Some DMPs may also deposit public audiences, built from data obtained by third-party providers, for sale on DSPs. DSPs may add a mark-up when selling these segments to their customers.

### ***The technical advantages of vertical integration***

100. Several operators in the advertising intermediation ecosystem provide more than one service along the value chain. This section briefly discusses the technical advantages of vertical integration, focusing on the integration of demand- and supply-side platforms (DSPs and SSPs). The implications of vertical integration for competition among providers are discussed in a separate section.
101. Due to a set of standards and guidelines set by the IAB, supply and demand side functionalities are harmonised to a great extent. However, there are still technical differences that impact how effectively different platforms can interoperate. The main issues relate to cookie matching and to latency.
102. Each company operating in advertising intermediation, such as DSPs and SSPs, associates a user with a cookie ID. Such cookie IDs are specific to each company. As a result, if the DSP and SSP are operated by different companies, a process of cookie matching is required in order for the DSP to identify the relevant user information to associate to a given impression. This

process is prone to failure and, according to one ad intermediation provider, can result in approximately 30% failed matching. When matching fails, the DSP cannot apply audience targeting or frequency/recency management to the impression, with the result that advertisers cannot understand the real value of the impression and the bids submitted by the DSP will therefore be lower. This inefficiency is avoided when the same company operates both the DSP and the SSP, as in this case the two platforms would share the same user identifier, removing the need for cookie matching.

103. After an SSP sends bid requests, DSPs have a time limit to submit their bids. For example, Google's exchange waits [⌘] milliseconds for bidders to respond and responses received after this deadline are excluded from the auction. If the same company operates both the SSP and the DSP, it can locate them close by geographically, reducing the time needed for information to travel between the two. For example, as Google's demand-side platforms (Google Ads and DV360) [⌘], they have a very low risk of timing out and missing the auction. This means that, if they choose to submit a bid, the bid would almost certainly be registered prior to the expiry of the bid application deadline.
104. The vertical integration of SSP and DSP may also bring other operational efficiencies. For example, Xandr (which operates a DSP, an SSP and a publisher ad server) told us that there are operational efficiencies for buyers and sellers setting up PMPs using both Xandr SSP and DSP.
105. Finally, Verizon Media told us that the integration of the publisher ad server with an SSP can increase operational efficiencies, help avoid impression loss caused by redirects between different platforms and enable a holistic yield management and the maximization of revenue between different sales channels.

## **Competition in advertising intermediation**

106. Several operators in advertising intermediation agreed in their responses to our RFI that, at least historically, digital advertising has been highly competitive. For most of the existence of the online advertising market, brands and publishers have had a diversity of advertising platforms they could work with to manage their data, campaigns, and ad inventory. This diversity has spanned the ad ecosystem, from data management platforms, to buy-side technology, sell-side technology, and measurement analytics. A new company with a compelling technology could easily access programmatic identity services and inventory suppliers, and they could build integrations quickly and easily with the rest of the ecosystem.

107. There appears to be less consensus on whether this is still the case. Some respondents submitted that competition is still intense, and the ecosystem is still characterised by fragmentation, new entry and innovations. Beeswax told us that, while ad tech financing is less robust than it was several years ago, the landscape remains filled with start-ups and scaled companies, as well as giant tech companies. Outbrain noted that general software infrastructure costs have rapidly declined, and digital advertising technology has become increasingly commoditised. As a result of this commoditisation, there has been increasing competition with respect to both price and feature transparency.
108. Other respondents, however, see a decrease in competition accompanied by a process of consolidation. Adform told us that the increasing vertical integration along the supply chain puts the remaining competitors under massive pressure with regards to profitability margins and ability to sustain long-term business. One intermediary submitted that the largest four players in programmatic advertising now control the vast majority of the market, leaving everyone else to compete aggressively for a small fraction of it. Many non-vertically integrated solutions, such as individual SSPs or DSPs, have either been acquired or exited the market. A DSP told us that, as it becomes more difficult to compete with large vertically integrated B2C companies, independent companies are likely to be purchased, merged or go out of business. According to one intermediary, the effect of these developments is decreased innovation and an increasingly defeatist attitude in the industry from would-be investors who are unwilling to risk their funds in start-ups, leading to a declining number of new companies starting in digital advertising, a declining amount of new investment and a slowing pace of technological development.
109. This section examines how competition works in advertising intermediation, focusing on DSPs, SSPs, publisher ad servers, and header bidding solutions.<sup>14</sup> Each level of the value chain is first considered separately, looking at the dimensions of competition, discussing the overall competitive dynamics, and briefly describing the main providers and how they differentiate themselves. We also provide estimates of shares of supply based on the data collected so far. The last part of the section discusses the implications of vertical integration on competitive dynamics.

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<sup>14</sup> We do discuss competition between media agencies or between DMPs, as this is less relevant to the issues discussed in the report.

## ***Competition between DSPs***

110. The analysis of competition between DSPs is organised in five parts, focusing on the following aspects:

- the main dimensions of competition, ie the factors that advertisers and media agencies consider when choosing among DSPs;
- the process adopted by agencies and advertisers to select DSPs and the pros and cons of single-homing;
- the role of economies of scale and scope;
- the most significant current and expected trends in the DSP market; and
- the largest DSP providers and the main features of their services.

### *Dimensions of competition*

111. In addition to the fee level, the features that advertisers and media agencies are more interested in when choosing among DSPs are access to data, access to inventory, and technological capabilities.

112. The importance of data has been indicated by several of the advertisers and media agencies that responded to our RFI. DSPs can both provide access to their own proprietary data and allow advertisers to use first- and third-party data through integrations with DMPs. Both features are valued by advertisers, although their relative importance depends on the type of campaign.

- Publicis told us that access to specific, exclusive data sets is one reason why a decision may be taken to use a platform, but only if that data can be proven to deliver a chosen outcome. Unique data is also one of main strategic differentiators that Omnicom look for when helping clients choose a DSP.
- We have received contrasting views on the relevance of DMP integration as a competitive differentiator. On the one hand, Publicis told us that, in today's market, there are few DSPs that do not synchronise with all the major DMPs and most third-party data providers can be accessed through most DSPs. On the other hand, one large advertiser told us that access to third-party data is an important consideration for DSP selection. After GDPR Google had no appetite to use data they do not own, while DSPs such as AppNexus allow for greater use of third-party integration.

113. Access to inventory is another factor mentioned by many advertisers and media agencies as affecting their choice of DSP. Access to inventory includes two different elements: integrating with SSPs; and offering access to unique inventory.
- Integration with SSPs and audience reach have been mentioned by several advertisers and media agencies as a factor that influences their choice. On the other hand, Xandr told us that, outside of the supply controlled by companies that also provide advertising technology solutions, DSP access to supply is commoditised.
  - Access to unique inventory has been indicated by Omnicom as one of the strategic differentiators on its choice of DSP or when helping a client choose their DSP. Unique supply has also been indicated as a relevant consideration by Publicis, although this would be the case only in certain circumstances.
114. Technological capacities and the availability of specific features are another group of considerations advertisers and media agencies make when choosing a DSP. The aspects looked at can vary across advertisers and include:
- targeting capabilities;
  - brand safety controls;
  - specific features such as bid-shading and pre-bid viewability settings;
  - the ability to perform Programmatic Guaranteed transactions;
  - reporting and analytics capabilities; and
  - performance transparency and integration with ad verification partners.
115. Some respondents also mentioned that the provision by the same company of other services in addition to a DSP may be an advantage. For example, Boots' choice of DSP can be influenced by the use of wider solutions provided by the same company (eg cloud computing services). Dentsu Aegis told us that working with 'same stack' technology can both increase operational efficiency and technical functionality due to their likelihood of working more effectively as systems together, often integrating more seamlessly.
116. On the other hand, Publicis told us that one of the factors that can affect their choice is DSPs' independence from supply, noting however that while this would be preferred it is not always possible. This preference is linked to the need for transparency of supply path and auction dynamics, to ensure that



there are no conflicts of interest in a DSP's bidding decision. The potential for conflicts of interest has been mentioned by some respondents as a relevant consideration in their choice of DSP.

117. Finally, the usability of the platform can also be taken into account.

### *Single and multi-homing*

118. Publicis submitted that the choice of DSP can vary from client to client and campaign to campaign depending on the specific needs and requirements. There are typically three stages of review:

- Stage 1 – The agency network reviews all technology partners, putting them through a stringent technical and legal verification process to ensure the platforms are suitable for use by individual agencies.
- Stage 2 – The specific client account teams review if there is a need (based on client objectives and parameters) to work with a chosen DSP partner of choice. It is at this stage that some of the factors discussed above come into play.
- Stage 3 – On a specific brief-by-brief basis, the agency's planners review which DSP will best deliver the campaign. This process may require the agency to switch to specialist DSPs (for example for audio or video) or work with DSPs to access specific targeting or inventory.

119. Dentsu Aegis explained to us that, in the majority of cases, a single DSP is used for a campaign, although the agency would typically review on a campaign by campaign basis whether this was the most effective way to activate the campaign. An exception to this rule would be where using a secondary DSP allows access to unique data points or inventory. An advertiser also told us that it might use multiple DSPs for a campaign, and ultimately move its budget to the DSP that is performing the best.

120. While using multiple DSPs can help ensure competition between players, most respondents told us that the advantages of using a single DSP typically outweigh those of using multiple DSPs. These include:

- the ability to manage frequency across the entire campaign, something that is not possible when using multiple DSP's due to the lack of a common ID between different technologies;
- more effective audience management due to the presence of a consistent ID solution allowing for better retargeting and audience suppression;

- more efficient reporting as a result of using a single interface to pull data from; and
  - reduced cannibalisation where two different DSPs compete for the same impression in the auction, thereby inflating the price.
121. GDPR has also put an increased requirement on advertisers to vet the media partners they work with, to ensure understanding of the source data and associated consents. This has further limited the appetite of advertisers to support multiple DSPs.
122. On the other hand, IPG Mediabrands told us that, given the analytics capability of its own ad tech platform tools, it is able to optimise entire campaigns across multiple DSPs.
123. Of the 17 advertisers that provided us with information about the DSPs they use, six use a single (main) DSP across all their campaigns. In all such cases, the chosen DSP is Google's DV360. Four other advertisers told us they use two DSPs. In these cases, different DSPs can be used for different types of inventory, and in all cases one of the two DSPs is Google's. The other seven advertisers use multiple DSPs, although in at least two cases DV360 account for the majority of advertising expenditure.
124. The advertisers using only or primarily DV360 as DSP indicated multiple reasons for doing so:
- its access to inventory, and in particular unique access to YouTube inventory;
  - the possibility of cross-channel optimisation across search, display and YouTube advertising; and
  - holistic data integration with Google Analytics and the ability to de-duplicate data from across the Google stack, allowing a more accurate picture of effectiveness.
125. The competitive advantage that Google derives from exclusive access to YouTube has also been mentioned by several intermediaries.

#### *Economies of scale and scope*

126. Building and operating a competitive DSP is a costly enterprise. One intermediary estimates that, in today's market, the investment required to build and maintain a competitive DSP would be in the range of hundreds of millions of dollars.

127. Xandr told us that, to be competitive, a DSP must operate at a global scale. We note that some of the advertisers who responded to our RFI told us that they had global agreements with their DSPs. Due to the inherent latency requirements of the business this means that a DSP needs to operate in multiple data centres across the world.
128. Some of the costs sustained by DSPs scale with the buying volume (and so with revenue) and can therefore be considered 'variable'. These include costs in reporting, data storage, bandwidth and account management/support. On the other hand, auction traffic is a relatively fixed cost and scale with the types of formats (video, banner, native, mobile) a DSP deals with and with its geographical coverage. Given that the volume of auction requests (measured in queries per second, or QPS) is so large, competing globally requires a minimum scale to become profitable. Beeswax estimates there are 5-10 million QPS globally outside of China, which could cost \$5 million or more a month for a DSP to listen to. This means that to achieve a 50% gross margin you would need a minimum scale of \$10 million in monthly fees to the DSP or spend in the range of \$100 million or more. While there are some techniques to reduce QPS, such as supply path optimisation, DSPs with a diverse and global customer base need to maintain a high absolute QSP capacity.
129. There are also other reasons why scale is beneficial to DSPs:
- DSPs must sustain significant research and development costs, in particular in artificial intelligence and data science capabilities.
  - Scale allows DSPs to get better prices from data partners and other ecosystem vendors. A DSP told us that technology and the web ecosystem evolve so rapidly that operating a DSP amounts to constantly rebuilding a DSP; any major asset – technology, data sources, relationships, best practices – that is five years old is probably no longer commercially relevant and due for an overhaul. Research and development costs are broadly not scalable.
130. Being present in other parts of the intermediation value chain in addition to DSP services can also generate cost economies. The investments made into the DSP may also benefit other parts of the business. Moreover, Adform told us that if a company has other assets which complements the DSP, such as the data owned by Amazon or the DMP owned by Salesforce, then it would be possible to run a profitable DSP unit at a slightly lower scale than in the case off a standalone business.

### *Current and expected trends*

131. Xandr told us that, as of 2019, there are over 150 companies offering a DSP across the globe; however, there has been a significant consolidation in revenue to a smaller number of companies due to many factors, including:
- advertisers using fewer platforms as the technology matures;
  - mergers and acquisitions, and a slowdown in venture capital funds invested in new companies;
  - advantages provided by access to proprietary data and owned and operated media; and
  - the implications of privacy regulation.
132. Some providers of DSP services told us that they expect this consolidation trend to continue, impacting in particular specialist DSPs and those that do not have unique access to supply, data or identity solutions. One of the factors behind consolidation is the increasing commoditisation of the technology. This, according to Adform, is also linked to the expectation that the most relevant and prominent inventory pools will be sold under strictly controlled conditions (Private Deals, Programmatic Guaranteed) whereas smaller publishers will be left to open auction with (then) presumably lower average prices (as the inventory perceived as 'premium' is in this scenario 'locked' in the private marketplaces attracting the advertisers with significant budgets). In such set-ups the role of intelligent optimisation of inventory selection using algorithms gets marginalised as – especially in a Programmatic Guaranteed setting – the whole campaign is already pre-defined.
133. Increased commoditisation is expected to lead to growing pressure on prices. In this environment, The Trade Desk expects that only well-funded new entrants and those with particular advantages, such as direct user access, will have a meaningful chance of success. Unique access to inventory may therefore become an even more important advantage, and Adform expects that technology fees will continue to be put under pressure as the vertically integrated players such as Google or Amazon will aggressively promote their inventory by discounting or giving away for free the technology and data parts.
134. Other trends that providers of DSP services expect are an increased focus on users' identity, the convergence of digital and TV advertising, and increasing attention to measurement and transparency.

- The evolving nature of consumer privacy and data protection legislation is having a significant impact on the way that technology platforms process signals around consumer identity. With the decline of the cookie, identity has become a key issue. Xandr expects that technology platforms will more than ever be expected to solve for user identity across screens.
- The changing nature of TV consumption amongst consumers in the UK and globally will see an increasing amount of that inventory treated as, and traded in the same way as, digital video. Xandr expects that the technology platforms that will win in the next years will be the ones that, among other things, can offer marketers a unified platform to manage campaigns across TV and digital. Many DSPs are competing to position themselves as leaders in the emerging Connected TV space. Since the large tech companies like Google and Amazon offer devices and services for operating the interface and distribution by which consumers will access TV programming, they also control portions of the monetization stack for this exciting area. Google's YouTubeTV product is gaining in popularity, and like YouTube, cannot be accessed except through DV360.
- DataXu expects there will be innovation in measuring business outcomes well beyond transactional measures like views and clicks towards return on marketing spend and incremental value. Transparency around pricing and take rates is also of paramount importance to buyers.

### *Main providers*

135. There are likely to be dozens of companies providing DSP services in the UK, although most of them would have small operations. The review of the main providers in this section is based on the DSPs most often mentioned by advertisers and media agencies in their RFI responses, and on the DSPs most often listed as main competitors by those providers who responded to the RFI. Our initial estimates of the shares of supply of the main DSPs in the UK are reported in Appendix C.

### *Who the main DSP providers are*

136. Three providers have been mentioned as main competitors by every single DSP responding to the RFI; they are Google, The Trade Desk, and Amazon. Other providers mentioned several times are Adobe, Xandr and MediaMath. All these DSPs have also been mentioned by at least once by an advertiser or media agency in their RFI responses, with Google's DSP DV360 being mentioned by all respondents.

137. Facebook should also be seen as a competitive constraint, as it has been mentioned as a main competitor by most respondents to the RFI. It is worth noting, however, that no advertiser or media agency mentioned Facebook as a DSP. This may reflect the fact that Facebook Audience Network (FAN), which allows advertisers on the Facebook platform to extend their campaigns to third-party publishers, is not strictly speaking a DSP. FAN does not submit bids into an SSP, but has direct relationships with publishers, submitting bids directly into their ad server or their header bidding solution. Advertisers may see FAN as just an extension to their advertising on Facebook's owned and operated inventory, while Facebook is seen as a major competitor by both DSPs and SSPs.
138. Finally, Criteo must also be included as one of the main DSP providers although, as discussed below, it has a different business model from most DSPs. While not mentioned by advertiser and media agencies, nor by most of the DSPs responding to our RFI, it was indicated as a major competitor in [✂] internal documents.

#### *Advantages and disadvantages of the main DSP providers*

139. Based on responses from advertisers and media agencies, there are two groups of reasons for using a particular DSP: the first has to do with the advantages derived from access to exclusive inventory, use of exclusive data, and integration with other services offered by the same provider; the second group of reasons is linked to technical sophistication, customisation and level of support of the DSP services themselves. The major strengths of different DSP providers seem to generally belong to either one or the other of these groups.
140. The strengths of Google's DV360 mostly derive from its scale and links to Google's inventory, data, and other services in the ad tech ecosystem. The advantages mentioned by advertisers and media agencies include DV360's access to a vast inventory across the internet, its seamless integration with the rest of Google's ad stack, exclusive access to YouTube inventory, use of Google's proprietary data and affinity audiences. Several respondents also favour DV360 for its usability and capabilities, while the lack of transparency on its bidding algorithm or audiences, difficult integration with non-Google technologies and lack of flexibility in product development are the limitations most often mentioned.
141. Similarly to Google, Amazon is valued for its access to unique inventory and to Amazon's customer data, while it is sometimes considered to be technically inferior to other DSPs and to lack integrations with third-party technologies and the wider ecosystem. [✂] As Amazon's inventory and data is of particular

interest to advertisers in the retail sector, Amazon's DSP is likely to be an attractive solution for these types of advertisers, but much less for those operating in other industries.

142. Although we have received no views from advertisers and media agencies, it is likely that Facebook Audience Network (FAN) may be also particularly valued for its data. FAN appears to be a stronger competitor for mobile advertising than for desktop: approximately [X] % of the ad inventory filled through FAN is on mobile apps, with most of the remainder on mobile websites.
143. Adobe Advertising Cloud DSP's main strengths appear to be its integration with Adobe Analytics and the support of all types of video inventory. Adobe told us that its DSPs' integration with Adobe Analytics provides its customers with a better understanding of the performance and effectiveness of their campaigns. On the other hand, Adobe seems to be weaker in terms of reporting and usability, based on views of advertisers and agencies.
144. While Xandr is, like Google, vertically integrated along the intermediation value chain (it also offers an SSP and a publisher ad server), advertisers and media agencies responding to our RFI value it especially for the sophistication and customisation of its DSP technology. Respondents mentioned, in particular, the implementation of custom solutions and bidding algorithms, the possibility of paying for impressions based on custom viewability thresholds, and the ability to connect with a broad array of third-party technologies. Respondents also noted Xandr's low platform fees. On the other hand, some other functionalities may not be as advanced as DV360.
145. Unlike all the providers discussed so far, The Trade Desk only operates a DSP and is not involved either in other parts of advertising intermediation or in user-facing services. This is considered by advertisers and media agencies responding to our RFI as both an advantage and a potential limitation. On the one hand, respondents appreciate the fact that The Trade Desk's DSP is not biased towards external vendors and can be integrated with many different third-party products. On the other hand, a large agency told us that only having the DSP element puts The Trade Desk at a disadvantage to others within the industry. As it is common to see discrepancies between solutions offered from different companies, advertisers who invest their marketing budget within solutions offered from the same company can be in an advantageous position when it comes to reporting and accountability of media investment. The Trade Desk is also valued for its bidding technology, the level of support, service customisation and flexibility in product development.

146. Finally, Criteo, as a re-targeting specialist, has specific features and capabilities, and a business model which differs in part from that of most DSPs. Criteo reaches publishers' inventory via direct relationships with publishers or via ad exchange technology. Through direct relationships, Criteo can connect directly to the publisher's ad server when publishers use header bidding or can be given the opportunity to buy impressions before they are made available to other potential buyers. Unlike most DSPs, Criteo charges advertisers only when users engage with an ad (usually by clicking on it).

### ***Competition between SSPs***

147. The analysis of competition between SSPs is organised in six parts, focusing on the following aspects:

- the main features of competition among SSPs: the increasing commoditisation of their services, the role of network effects, and the multi-homing behaviour of SSPs' customers;
- the main dimensions of competition, ie the factors considered by publishers on the one hand and by DSPs, media agencies and advertisers on the other hand when choosing among SSPs;
- the bargaining power of publishers vis-à-vis SSPs;
- the role of economies of scale and scope;
- the most significant current and expected trends in the SSP market; and
- the largest SSP providers and how their services are differentiated.

### ***Overall competitive dynamics: commoditisation, network effects, multi-homing***

148. Several SSPs responding to our RFI told us that SSP services have been commoditised since the introduction of header bidding, especially with respect to access to inventory. Before header bidding, publishers had to decide which SSPs to connect with, how to prioritise them in the 'waterfall', how much inventory to release at what point in time, and what price to offer the inventory at. Publishers' yield management resulted in differentiation among DSPs. Under header bidding, on the other hand, all major SSPs have more or less access to the same inventory. While header bidding has been critical for allowing new SSPs to enter the market, it has made SSPs a commodity, making price and service the only real differentiators and compressing SSPs margins. The exceptions to this commoditisation of supply are those SSPs



which have ‘walled-off’ certain owned and operated inventory, to which they provide exclusive access, as is the case for Google with YouTube.

149. We have received contrasting submissions, however, on whether commoditisation extends to the whole of SSPs’ technology. On the one hand, one SSP told us that SSP is a pretty commoditised business with little innovation, apart from the ongoing incremental innovation due to changes to regulations and to the tech ecosystem. On the other hand, Rubicon Project submitted that constant innovation is required for SSPs to keep ahead or just stay afloat.
150. SSPs need to attract both sellers (publishers) and buyers (DSPs, and ultimately advertisers) to their platform. They operate in a two-sided market and some respondents indicated the presence of indirect network effects.
- On the one hand, advertisers are more willing to work with platforms that have higher access to supply, in order to achieve their goals at scale. Adform told us that it is much easier to attract DSPs in markets where it has a strong sell-side offering and that it has experience of DSPs rejecting connection without a guarantee of certain trading levels.
  - On the other hand, companies which are able to work with many advertisers (or DSPs) can provide publishers with greater demand, and access to demand is one of the main factors publishers look at when deciding which SSPs to work with.
151. The strength of network effects, however, may be limited by the fact that both DSPs and publishers tend to work with multiple SSPs.
- For example, on the publisher side, Independent Digital News & Media (IDNML) told us that, as each technology partner differs slightly in its approach, it makes sense to have a roster of partners; IDNML currently uses 6 SSPs. Similarly, Reach told us that different SSPs are stronger in serving demand for different formats; to get the best return on one’s inventory, it is useful to work with several SSPs. There are, however, costs to multi-homing. While, in theory, there is no restriction on a publisher’s ability to use multiple SSPs, there is operational overhead associated with adding additional SSPs (integration, relationship management, quality control, reporting and billing), and therefore it may not be optimal to add additional SSPs once a publisher has met 100% of the demand for its inventory.
  - DSPs also typically use multiple SSPs; however, there is currently a trend to reduce the number of SSPs to work with. An SSP told us that, as

demand partners start deactivating inventory sources, scale is of major importance to remain in the top ten inventory sources on the market.

152. While scale is therefore important for SSPs, there is no clear critical mass. Small SSPs can survive at relatively low volumes, but they need to specialise on a particular niche of the market. The critical mass for an SSP can depend on the maturity of the ad format it deals with, with publishers more likely to work with smaller SSPs for ad formats that are new to the programmatic ecosystem. The minimum scale is higher for SSPs that service the general market.

### *Dimensions of competition*

#### *Supply side*

153. In addition to the fee level, when deciding whether to work with an SSP publishers typically consider whether it gives access to incremental demand, the quality of such demand, the SSP's technical capabilities, its integration with the publishers' other systems and the rest of the tech stack, and possibly the level of transparency.
154. Working with a new SSP makes sense for publishers if it gives access to new demand and unique revenue streams. Sky, for example, considers the strength of the SSP's relationships with agencies, advertisers and DSPs. DMG Media explained that, after launch, it analyses how much money the SSP bids above the next best available price to determine the incremental value of their bid, which is more important than understanding their overall revenue. There might then be cases where a specific buyer pushes a large amount of spend through a specific SSP or pursue demand that only flows through a particular SSP. This is, for example, the case with Google Ads demand, which is only accessible through Google's exchange AdX.
155. The quality of the advertising coming through the SSP is also a relevant factor. Sky, for example, looks at whether the SSP has brand safety technology implemented into the system in order to enable the publisher to block advertisers and advertisements that it does not want to appear on its inventory.
156. Publishers also look at the sophistication of an SSP's technology. This can include various aspects, such as the speed of the code, the reporting capabilities and whether the SSP gives access to bid data, the level of latency, and the ability to set up deals and programmatic guaranteed transactions.

157. Compatibility with the rest of the tech stack is another of the main factors publishers consider when deciding whether to work with an SSP. This can include compatibility with the publisher's header bidding solution, robust DSP connections, and ability to integrate with the publisher's DMP. A related factor is the ease of SSP integration and the level of technical support. In relation to header bidding integration, DMG Media added that, for the most part, smaller SSPs will need to prove their worth via server-side integrations, ie Open Bidding or TAM, before DMG Media dedicates the resource to integrate them client-side.
158. Transparency, and specifically fee transparency, has also been mentioned as an important criterion by some publishers. DMG Media, however, told us that the lack of transparency within the ecosystem means that, more often than not, a publisher simply has to trust the SSPs.

#### *Demand side*

159. On the buyer side, the choice of SSP may be made by the DSP, the media agency or the advertisers directly.
160. Some advertisers and media agencies told us that they typically allow DSP bidding algorithms to determine from which SSPs impressions are bought. DSPs can base their choice on the scale of supply, the quality of supply, and the effectiveness of data matching services (like cookie syncing). Efficiency is another important consideration: DSPs look at metrics like bid rate (meaning how often are they interested in competing for an impression) and win rate (how often do they win the right to serve their client's ad to the impression).
161. Agencies can influence the choice of SSP in various ways, based on factors such as brand safety, fraud levels, auction and fee transparency, or historical performance. For example, WPP told us that it applies a filter on each DSP account which limits which partners it works with; the reason is to work more closely with a limited number of SSPs towards a joint code of conduct around transparency, brand safety and supply management. Similarly, Publicis may purposefully exclude certain SSPs from a campaign, because they utilise a specific format which is not deemed relevant or appropriate, they may historically have had high observed rates of ad fraud or brand safety infractions, or they have a lack of transparency (low ads.txt certified inventory). However, there are several uncontrollable factors which may limit the choice an agency can make, such as inventory exclusivity, data access, cookie syncing, latency and other technical issues, and GDPR requirements.
162. Some advertisers may decide to only use a small selection of SSPs. For example, L'Oréal uses a small selection of exchanges available on DV360

based on brand safety, inventory and data access. Advertisers can also adopt different approaches. For example, a large advertiser told us it bids on all SSPs at the start of a campaign, rather than selecting particular SSPs. As the campaign progresses, it typically observes that the majority of its spend is concentrated with approximately five SSPs, which indicates that these are the SSPs with access to the key inventory that the advertiser requires for that particular campaign. Therefore, at that stage the advertiser focuses bidding on those SSPs.

### *Bargaining power*

163. When dealing with SSPs, large publishers try to negotiate contract terms including payment terms, revenue share across different transaction types, limitation of liability, clawbacks (sequential liability clauses), as well as processes for addressing claims of issues such as bot traffic; they may also try to negotiate minimum revenue guarantee amounts. Publishers' levers are the volume of ad impressions and users they have. Smaller publishers, however, may not have much leverage and may not be able to bear the costs involved in these negotiations. Moreover, even for large publishers, their bargaining power varies significantly when dealing with different SSPs.
164. Typically, publishers are unable to negotiate the terms of their relationship with Google and Facebook. In general, publishers told us that there is no meaningful scope for negotiation with Google or Facebook, in terms of both the price and non-price aspects of the contract. In some cases, however, large publishers have been able to negotiate preferential rates with Google's AdX or the waiving of certain minimum spend commitments and set-up fees, although these may not impact on significant elements of the relationship. On the other hand, one publisher told us that the contractual terms offered by Google are not unreasonable and are simpler and less one sided than those generally contained in the first drafts of contracts sent by other intermediaries.
165. There is more scope for negotiations when publishers deal with other SSPs. For example, News UK told us that it is generally able to negotiate reasonable commercial terms when dealing with the other SSPs it uses. Similarly, another publisher told us that it is able to negotiate favourable terms with the majority of individual suppliers it works with.
166. One way of negotiating more favourable terms may be to enter into an exclusive arrangement with the intermediary. For example, one party told us it has an exclusive relationship with one intermediary (exclusivity for content recommendations) and receives guaranteed minimum revenue from this intermediary.

### *Economies of scale and scope*

167. SSP providers responding to our RFI provided a wide range of estimates for the level of investment required to build a successful SSP. Despite these differences, it appears that setting up an SSP is less costly than creating a DSP, as an SSP does not require the same infrastructure and level of integration as a DSP. Moreover, the availability of Amazon Web Services and similar technologies have significantly reduced the scale of investments.
168. Generally speaking, an SSP needs to be sufficiently large to justify the large DSPs integrating. The scale of an SSP matters for DSPs also because cookie syncing success is determined by the SSP's scale, ie its exposure to other impressions from the same user. An SSP therefore needs enough server capacity to handle the demand, enough bandwidth to handle the transfer of bid requests to DSPs and the responses, and enough data processing to be able to aggregate the tera- to peta-bytes of data that enter the platform daily. SSPs typically make use of hosting services, which constitute the main cost of running the business. These costs are proportional to the load sent to the platform, ie the volume of auctions. On the other hand, engineering and data science investments do not scale with the level of activity, although the number of publishers marginally impacts the cost of R&D, mainly for custom adaptations. In general, some cost reductions at scale can be achieved.
169. For SSPs servicing the general market, a party estimated that at least \$100 million of annualised revenue is needed in order to be marginally profitable on a year in, year out basis (and stated that this estimate assumes a very favourable cost structure that likely requires a significant investment in offshore technology resources). In order to generate \$100 million of annualised revenue, an SSP must generate more than \$500 million of ad spend. To attain that volume, an SSP would have to service multiple format types (eg desktop, mobile, video) across hundreds or even thousands of publishers and likely across several geographic markets.
170. Finally, being vertically integrated along the intermediation value chain can lead to cost efficiencies. Xandr, which in addition to an SSP operates a DSP and an ad server, told us that, as all these services share the same technical platform infrastructure, some technical investments can benefit all or most. It is also possible for certain innovations and R&D investment to take a holistic view of Xandr's product offerings and, in a single project, build features for multiple offerings.

## *Current and expected trends*

171. Some of the SSPs who responded to our RFI told us they expect to see market consolidation over the next few years, with both DSPs and publishers reducing the number of SSPs they work with in order to optimise their supply paths. This trend is already visible: Xandr told us that publishers have already started to consolidate their ad stack, while buyers have also started to collaborate with publishers to agree on 'preferred' SSPs, to ensure their media buying is routed through cost efficient, fraud-free, scaled SSPs. A publisher also told us it expects the SSP market to consolidate, with six to ten players who may specialise in different areas (eg mobile, apps, video, or PMP / Programmatic Guaranteed transactions).
172. One SSP anticipates that the SSP market will break into two distinct 'forks': there will be some competitors that focus on being very low-cost pipes and others that focus on creating more net new value through better intelligence and matching.
173. TripleLift submitted that it also expects increasing vertical consolidation along the value chain, with more SSPs integrating with the demand side. This will make it difficult for independent SSPs to compete. An internal document from one of the SSPs goes further by arguing that the SSP category itself is under great pressure and is unlikely to survive in its current form. Price pressure from DSPs and disintermediation threats, with DSPs going direct to larger publishers, mean that no independent SSP is currently in a sustainable place.
174. Disintermediation may be favoured by a wider adoption of server-side header bidding by publishers. With client-side header bidding, there are two main reasons why the intermediation of SSPs is needed:
  - Client-side wrappers cannot technically support more than ten active connections at a time. For this reason, SSPs act as intermediaries that occupy a single connection to the client-side wrapper and are then integrated with a larger number of DSP demand sources on the server side.
  - Client-side wrappers require the use of specialized client-side technology (ie JavaScript) that most DSPs are not experienced in developing and maintaining. DSPs, rather, are accustomed to integrating with supply over server-to-server connections that use the OpenRTB protocol.
175. Server-side header bidding removes these obstacles. Technically, a server-side header bidding wrapper is quite similar to an exchange: it is a server-side real time marketplace that integrates with demand over server-to-server connections that use OpenRTB. This means that for a DSP to integrate with a

server-to-server wrapper is essentially the same process as integrating with an ordinary exchange. DSPs can therefore integrate directly into the header bidding wrapper and circumvent the SSPs and other intermediaries to create a more efficient supply path.

### *Main providers*

176. Dozens of different companies currently provide SSP services. Most of them, however, have very small operations in the UK. Our initial estimates of the shares of supply of major SSPs in the UK are reported in Appendix C. Considering those SSPs that have been mentioned by at least two of the publishers that responded to our RFI, or that the SSPs in their responses to us indicated as their main competitors, it appears that the main SSPs can be divided into three groups:

- generalist SSPs, some of which also offer other services along the intermediation value chain;
- specialist SSPs, focusing on specific types of inventory; and
- a third group that could be defined as ‘content discovery platforms’.

### *Generalist SSPs*

177. Large publishers typically work with multiple generalist SSPs. Some of them are used because they give access to demand sources that could not be reached otherwise, others because they provide more flexible technology or better support.

178. Among the SSPs that give access to unique demand, Google’s AdX was indicated by most publishers who responded to our RFI as a ‘must-have’, and in some cases as the only must-have SSP, as it provides exclusive access to Google Ads demand. Another SSP with unique demand is Xandr: as the Xandr SSP is the most efficient path of supply for the Xandr DSP, there is a higher likelihood of a Xandr DSP buyer purchasing through the Xandr SSP than through another source.

179. Some publishers also include Amazon and Facebook among generalist SSPs, although strictly speaking they do not provide SSP services. Nevertheless, Facebook Audience Network bids directly into the publishers’ ad server or header bidding solution, without going through an SSP; Amazon Advertising bids into SSPs as a DSP but can also integrate directly into Amazon Publisher Services’ header bidding solution. Amazon has been indicated by one publisher as a ‘must-have’.

180. Other SSPs have been indicated by some publishers as providing better technology or support. For example, News UK described Rubicon Project as having a very efficient technology, enabling it to provide a competitive offering in the SSP market. Index Exchange was described by publishers as focusing on providing sell-side support and having unique match rates. OpenX also has unique match rates, while PubMatic focuses on mobile and app monetisation.
181. Google, Index Exchange, OpenX, PubMatic, Rubicon Project and Xandr are also the SSPs that have been listed as among the main competitors by the largest number of SSPs responding to our RFI. While generalist SSPs tend to be listed as competitors by other generalist SSPs, Google is considered a competitor also by specialist SSPs (discussed below).
182. Some of the large generalist SSPs have recently encountered difficulties. [X]

### *Specialist SSPs*

183. Some SSPs specialise in particular ad formats. There seem to be two main niches for specialist SSPs: native display and video, particularly outstream video advertising.
184. SSPs specialising in native advertising include TripleLift, Sharethrough and AdYouLike. TripleLift describes itself as the world's largest native programmatic ad exchange, enabling publishers to capture unique demand for native advertisement that is unavailable on other SSPs; it also offers custom native ad formats. Sharethrough also differentiates itself by the formats it offers, which include native display, a proprietary enhanced display format, and outstream video. SSPs specialising in outstream video advertising include Teads, Unruly and SpotX. Teads is the inventor of outstream video advertising.
185. Specialist SSPs typically compete most closely with other specialist SSPs; TripleLift told us that general SSPs are less direct competitors. The exceptions are Google and Facebook, which have been indicated as strong competitors by some specialist SSPs.

### *Content discovery platforms*

186. This third group includes companies which adopt a business model quite different from that of typical SSPs. One of the largest operators in this category is Taboola. Taboola has formed partnerships with publishers, advertisers, advertising agencies, digital advertising service providers, and mobile phone carriers and manufacturers to serve and recommend



advertisements and editorial content to audiences around the world. It recommends sponsored content, articles, videos, slideshows, and other content on the publishers' properties (typically below a header such as 'Content You May Like,' 'Recommended for You,' or 'Around the Web'), based upon each visitor's particular interests. Publishers provide Taboola with advertising inventory on their websites, ie Taboola does not submit bids in competition with other SSPs, but is given exclusivity over some space on the webpage. Taboola is given the right to sell that inventory through programmatic channels. Another large provider following a similar business model is Outbrain. Taboola and Outbrain announced their merger in October 2019.

187. Advertisers can buy the inventory offered by these platforms either directly or through third-party platforms such as DSPs. Unlike traditional SSPs, most of the inventory is sold to advertisers and paid to publishers on a CPC basis. However, both Taboola and Outbrain also offer inventory on CPM basis.
188. Taboola and Outbrain told us that their main competitors include a group of similar platforms or specialist players in native advertisement and, for Taboola, SSPs focusing on outstream video, such as Teads and Unruly. Among non-specialist SSPs, Google and Facebook were indicated as the major threats. In particular, Outbrain told us that:
  - Google is a direct competitor in all areas in which Outbrain is active. In addition, Google competes for on-page real estate with Outbrain's publishers with their 'matched content' product.
  - Facebook is directly pitching to replace Outbrain's native advertisements.
189. As for the other large generalist SSPs, Taboola told us that, while they are competitors, they are also possible partners as they bid for Taboola's supply.

### ***Competition between publisher ad servers***

190. The analysis of competition between providers of publisher ad servers is organised in three parts, focusing on the following aspects:
  - the high degree of market concentration and the possible underlying reasons;
  - the costs that publishers have to bear when switching between ad servers; and
  - the largest providers and the main features of their services.

## *Market concentration*

191. The market for publisher ad serving is very concentrated. We estimate that Google Ad Manager may account for more than 90% of all the ads served in the UK. All the publishers who responded to our RFI use Google Ad Manager as an ad server. The only other active providers mentioned by more than one respondent were Xandr and Smart. FreeWheel was also mentioned, but only as a specialist in video ad serving. They all have a minimal presence in the UK as ad server providers.
192. The number of providers has decreased recently with OpenX, Open Ad Stream, and Verizon Media deciding to stop providing a publisher ad server product. OpenX decided to close the ad server business in 2018 and completed the process in 2019. It told us that the decision was due to a series of reasons [that meant it had difficulty competing].
193. While the ability to source supply through header bidding can explain why the provision of a publisher ad server may have become less important for companies whose main business is an SSP, other issues have more directly affected competition in the provision of publisher ad server products.
194. An ad server provider told us that, following the acquisition of DoubleClick and its ad server in 2008, Google reduced the price charged to publishers by a factor of ten. Such pricing pressure made the provision of publisher ad server difficult to sustain as a standalone business. This was the main reason why Smart felt the need to expand into the provision of SSP services. Google's low pricing and aggressive marketing strategies led to a substantial growth in its share of supply in ad serving, making it difficult for other providers to maintain a significant scale.
195. Without sufficient scale, the costs involved in setting up and maintaining a publisher ad server may be too high. Xandr told us that many of the investments required to run an ad server, such as integrations with other SSPs, forecasting capabilities, ad decisioning logic, targeting, frequency capping and buying tools, and reporting, do not depend on the number of publishers using the service. Without scale, the cost of running an ad server is therefore high. This presents a barrier to entry for many potential competitors and limits the number of those that can maintain an ad serving business. On the other hand, an important component of the cost of running a publisher ad server is due to hosting costs, which are proportional to the load sent to the platform, ie the volume of auctions. Scale can provide other advantages in addition to cost efficiencies. FreeWheel told us that scale can provide an ad server with more data and insights into video advertising, which can benefit its decisioning and reporting capabilities, since data can be used to improve the

delivery of ads and insights from data can be used to improve the technology.<sup>15</sup>

196. For these reasons, and given the high switching costs for publishers (discussed below), Xandr does not anticipate many new entrants to the ad serving space, while Smart expects to see market concentration increase further.

### *Switching costs*

197. Publishers typically single-home on one ad server. It is possible, however, to have a secondary ad server. This appears to be the solution adopted by some publishers whose primary ad server is not Google Ad Manager in order to have access to Google's demand.<sup>16</sup>

198. Responders to our RFI generally told us that switching ad server is a complex and lengthy process which involves significant risks of revenue loss. The switching process is technically complex because of how deeply integrated an ad server is into a publisher's systems. News UK identified 11 main areas of work, covering an estimated 4-month period:<sup>17</sup>

- re-tagging the publisher's websites and apps;
- migrating orders, line items and creatives;
- configuring the existing Order Management Systems;
- linking the Order Management System to the new ad server;
- creating the product catalogue (eg creating a common set of ad products/segments and configuring them to the new ad server);
- programmatic migration (the header bidding wrapper would need to be re-engineered for new ad server configuration; orders would need to be created for all SSP demand sources in the new ad server; all PMP deals would need to be recreated in all SSPs with the new ad server configurations);
- data migration (eg rebuilding APIs to the DMP to the ad server; retag viewability and verification vendors to the new ad server);

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<sup>15</sup> On the other hand, scale can be a disadvantage if it results in the ad server not being sufficiently responsive to customers' needs.

<sup>16</sup> For a discussion of the limits on access to Google's demand from third-party ad servers, see Chapter 5.

<sup>17</sup> News UK noted that potential implications of the migration in other areas would also need to be considered.

- consent management (building consent management strings from the new ad server to the publisher's consent management platform);
  - reporting (integrating the new ad server with the publisher's financial reporting dashboards and migrating the new ad server to the publisher's yield management tools for programmatic ad serving optimisations and reporting);
  - testing; and
  - training (staff would require training in connection with the migration).
199. The estimated time required for the switching to take place varied significantly between publishers, from 3-6 months to 18 months (including scoping, preparation and implementation). Xandr told us that, given the costs and risks associated with switching ad server, publishers tend to go through a tough evaluation process that can take up to two years to complete.
200. In addition to the direct costs of switching, there are operational risks and the possibility of demand losses resulting from the transition. A publisher would incur a significant opportunity cost due to the time that would need to be devoted to the transition. In addition, the time and effort that the publisher would need to invest into familiarising itself with the new ad server and learning strategies to optimise revenues on the new system would hamper its ability to innovate to maximise its revenues. A publisher could also face losses from potential campaign downtime if it were unable to guarantee the smooth running of a campaign during a switch.
201. In addition, a publisher submitted a specific concern around the availability of data after the transition. Ad servers do not support the transfer of data between them. Switching would therefore mean that the publisher would lose the ability to report effectively on historical data, and the new ad server would not have the historical data needed for forecasting and other functionality until it had been in place for at least a few months. While it might be possible to access reportable data from the old ad server after the transition, mapping these with the new data is a large and costly operational overhead. The loss of historical data means that inventory forecasting is impossible and so manual workarounds that are highly labour intensive would need to be created and managed, which could be inaccurate, resulting in either over- or underselling, both of which are bad from a buyer and revenue perspective. Going forward, there would be a loss of comparable data for month-on-month and year-on-year analysis, so measuring performance becomes difficult.

202. Considering the various costs and risks, News UK estimated that migrating to a new ad server would incur significant costs for external consultation and project management, in addition to internal resourcing costs. News UK also anticipates revenue losses from migrating its campaigns, potentially arising from human errors, delivery issues, and/or technical issues. Overall, it estimated the revenue loss would amount to several hundred thousand dollars.
203. The main concern some publishers expressed around switching to a non-Google ad server, however, is not related to the costs and risks discussed above, but to the risk of not being able to access demand from Google's exchange and from Google Ads in an efficient manner when not using Google's ad server. This issue is discussed in Chapter 5 of the report.

### *Main providers*

204. As described above, Google Ad Manager is by far the most used publisher ad server in the UK. All the publishers who responded to our RFI were using it as their ad server. The other ad server providers mentioned were Xandr, Smart and FreeWheel.
205. When explaining the reasons for using Google Ad Manager, publishers told us that it is a global market leader offering multi-functional capabilities of serving all ad formats across all platforms, and far superior to other ad servers. Google Ad Manager is considered to have best-in-market features, reporting, integration of demand and tools to provide buyers with easy access to the publisher's inventory, and a very robust decision logic, at least before recent changes to unified pricing. One publisher told us that Google Ad Manager is the only ad server tool available to publishers of its scale. Another advantage of using Google Ad Manager is that, being the dominant ad server in market, more people know how to use it and it is therefore easier to recruit people who can work with it.
206. Xandr believes that its publisher ad server has superior forecasting. It also provides for 'super auctions', with multiple media types competing in the same auction. [✂] However, it does not have access to Google's demand.
207. While Xandr was mentioned by several publishers responding to our RFI, only one explicitly said that it considered it an alternative to Google. Another publisher told us that, while it used to see Xandr (then called AppNexus) as a potential alternative, it no longer does after its recent acquisition by AT&T. The publisher expects Xandr to focus on video and demand-side activities instead of trying to compete as a publisher ad server, and to prioritise the sale of AT&T inventory. On the other hand, Axel Springer, a large German

publisher who recently switched to Xandr as its main ad server, told us that it has not noted any change of approach since the acquisition by AT&T and that Xandr appears now to have greater resources to invest.

208. Smart told us that its publisher ad server is more flexible and transparent than Google's, although the additional flexibility comes with additional complexity. Smart provides an alternative to Google's Open Bidding that includes managed header bidding (client side) and server-side bidding (integration with other SSPs). However, it does not have access to Google AdX demand. One of the publishers responding to the RFI told us that Smart was, in its opinion, too small to serve a publisher of its size.
209. Finally, FreeWheel is a specialist provider that offers ad serving services to premium publishers (typically TV broadcasters/networks). FreeWheel was specifically built for broadcast quality video advertising and designed to replicate the complex broadcast rules for television advertising. It differentiates itself through its ability to serve ads across a broad array of online video platforms and internet-connected devices such as Android and iOS mobiles, smart TVs, and broadcaster set-top-boxes (STBs) in a consistent and uniform manner.

### ***Competition between header bidding solutions***

210. The analysis of competition between providers of header bidding solutions is organised in three parts, focusing on the following aspects:
- why providers along the intermediation value chain have an incentive to also provide header bidding solutions, and why publishers multi-home;
  - the most significant expected trends in the market; and
  - the providers and the main features of their services.

### ***How SSPs and publishers use header bidding***

211. The main providers of header bidding solutions are companies also active at other levels of the intermediation value chain, especially as SSPs. We have been told of two reasons why these companies may find it beneficial to develop a header bidding solution.
- Companies that operate a header bidding solution have a large degree of control over how that solution makes decisions. This includes establishing the priority of SSPs, eg which SSP is called first; setting the time-out duration and potentially preventing some header bidder partners from participating in the auction; and knowing where the publishers set their

floor price for a given ad impression. These companies also have full visibility of how each SSP performs (bid prices, speed, relative strength in specific ad categories, etc). As a result, SSPs which manage header bidding solutions have better information about the auction's performance and can use this as a competitive advantage against the other participants in the header bidding solution they manage.

- Another reason for setting up a header bidding solution is to reduce dependence on SSPs, and in particular on Google. [✂]

212. As multiple header bidding solutions exist, there are benefits for publishers in using more than one. The advantages of multiple header solutions are in the diversity in demand and the tools which each supply: some may supply better analytics and ways in which to display inventory, while others may have unique demand to their own platform. Moreover, publishers may want to test smaller SSPs via server-side integrations (such as those provided by Google or Amazon), before dedicating the resource to integrate them client-side. The ease of integration through Open Bidding and the fact that many publishers may only want to work with an SSP through it are the main reasons for SSPs to participate.

213. On the other hand, a publisher would not be likely to integrate multiple Prebid header bidding solutions, as this could result in increased page loading time and ad serving latency. As such, publishers may choose Prebid header bidding solution providers that have larger scale (eg access to more or unique demand) or that also operate other components of the advertising supply chain.

### *Expected trends*

214. Xandr told us that header bidding solutions are being developed to support new formats and channels like native, video, accelerated mobile pages, mobile app, and so on.

215. Some of the respondents to our RFI also expect server-side solutions to replace client-side header bidding. Xandr anticipates that client-side only solutions will struggle to be viable, since server-side header bidding offers more capabilities than the client-side model, including customisation. An intermediary told us it expects server-side header bidding to develop also as a result of pressures to disintermediate SSPs, given that server-side header bidding makes it easier for DSP to connect directly with publishers, as discussed above.

216. Header bidding solutions may also increasingly offer ad server-like functionalities, competing against the ad server as the primary publisher technology solution. [✂]

#### *Main providers*

217. The main providers of proprietary header bidding services are Google, Amazon and Index Exchange.
218. The most widely adopted solution is Google's Open Bidding. One of its main advantages is the close integration with the rest of Google's ad stack, in particular Google's publisher ad server. Because Open Bidding is connected to Google's ad server, less Javascript about the user needs to be loaded on the publisher's webpage, which reduces data consumption and speeds up page loading and ad serving times. Another advantage is that it is quick and easy to implement, and it allows publishers to have a single bill to Google, which manages payments to all participating SSPs.
219. On the other hand, disadvantages of Open Bidding mentioned by some of the publishers responding to our RFI include the fees charged to bidders (5% of the winning bid, which increases to 10% for app and video inventory), a perceived lack of transparency, and the relatively limited number of participating SSP partners. On this last issue, Google told us that the onboarding process for SSPs onto Open Bidding is resource intensive as it requires substantial technical support from Google and support from the Google accounts team. Google is open to working with new SSPs but, due to heavy interest from SSPs and limited onboarding resources, it has had to prioritise requests from SSPs based on publisher interest. There are also SSPs which have made the choice not to participate in Open Bidding.
220. Amazon offers two header bidding solutions – Transparent Ad Marketplace (TAM) and Unified Ad marketplace (UAM). TAM is a server-side header bidding solution that enables publishers to receive bids for ad impressions from Amazon advertisers and third-party bidders. In TAM, publishers need a contractual relationship with third-party bidders to cover terms such as payments. UAM works for publishers in the same way as TAM, except that publishers do not need to have a contractual relationship with third-party bidders.
221. Index Exchange offers a collection of web-based, client-side advertising technology solutions called Index Exchange Library, including a highly customisable header bidding solution.
222. Other providers offer services built on Prebid's open source technology.



- Xandr offers an integration layer between server-side Prebid and Xandr's publisher ad server offering called Prebid Server Premium. Prebid Server Premium has the ability to host and manage the Prebid server from within the Xandr web interface. The product includes analytics and integration with the Xandr publisher ad server.
  - In May 2019, Rubicon Project introduced a private beta version of a header bidding service called Demand Manager. With this service, Rubicon Project (i) hosts the publisher's Prebid header bidding wrapper on Rubicon Project's system; (ii) provides the publisher with a suite of tools, such as Prebid Analytics, and a configuration user interface; and (iii) operates the header bidding auction on behalf of the publisher.
223. Finally, smaller header bidding consultants also operate in the market. While they lack the scale of investment of larger operators and are likely to have lower technical capabilities, they can develop products, innovate and ramp up more quickly than a larger company, because they are solely focused on providing the header bidding solution. They also tend not to have an SSP and therefore do not participate in the header bidding auction, which is perceived by publishers as giving them a degree of independence.

### ***The competitive impact of vertical integration***

224. The advertising intermediation industry has been consolidating in recent years. Part of this process has taken place through vertical integration. As one intermediary told us, the largest companies are either acquiring smaller companies along the supply chain or, where they can afford to take the time, building extensions of their own platform stack into new parts of the supply chain. The effect is an industry of increasingly closed ecosystems that are dominating growth and spend. Vertical integration can take different forms, such as the integration of intermediation services along the value chain (eg DSP and SSP), and the integration of intermediation services with user-facing services and sources of inventory. Both types of integrations can have implications on competition at the different levels of the intermediation chain.

### ***Integration along the intermediation value chain***

225. Integrating multiple intermediation services gives companies greater flexibility in their pricing for each product or in how the products are bundled together, potentially cross-subsidising across the layers of the value chain. For example, vertical integration can allow a DSP to provide bundled pricing across a range of DSP and non-DSP services that can in turn allow the DSP element to be effectively subsidised.

226. The technical advantages of vertical integration between DSPs and SSPs, can also be a source of competitive advantage. Xandr submitted that, in cases where a DSP has an SSP in the family, it is likely that this SSP will represent the most efficient path to supply and therefore be the preferred one. In this way, any SSP that has a DSP in the family has a competitive advantage as it should expect to see the lion's share of spend from that DSP. The perception that being integrated across the supply chain increases buying efficiency for advertisers and revenue opportunities for publishers can provide a compelling argument for premium publishers to prefer to utilize these tools and services.
227. Overall, the significance of the competitive advantage of integration along the intermediation value chain is unclear. We were told the integration of DSP and DMP services, for example, did not prove to be a large competitive advantage for companies like [redacted],<sup>18</sup> which did not manage to gain significant market shares. And despite the technical advantages of DSP/SSP integration, one of the most successful DSPs in recent years has been The Trade Desk, which does not offer any non-DSP service.

*Integration between intermediation services and owned-and-operated inventory*

228. The integration of intermediation services with user-facing services (providing a proprietary source of data or inventory) or with wider marketing technology services, may prove to have a more significant impact on competition in advertising intermediation, at least in the long run. This appears to be what Google believes, as an internal document states that 'independent DSP/SSP business is not long-term sustainable; must be backed by martech [marketing technology] or proprietary inventory/data'.<sup>19</sup> The rest of this section will deal with the role of unique inventory, while the role of proprietary data will be discussed in a subsequent section.
229. The managing of demand for owned and operated inventory provides an obvious entry point into intermediation. Having large scale inventory under exclusive control (as in the case of Google, Facebook or Amazon) gives a company the resources and ability to invest in technology to fully control the logic under which the inventory is traded and, based on this, to extend into the intermediation ecosystem outside its own inventory by offering the technology at low price to smaller publishers. Most importantly, unique inventory can be used to increase the attractiveness of a company's intermediation services. We have already discussed earlier in this appendix how exclusive access to

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<sup>18</sup> Beeswax noted that the integration of DSP with advertiser ad server also did not prove successful for [redacted].

<sup>19</sup> The statement was contained in a section entitled 'what you have to believe', which we interpret as presenting statements in which senior management at Google believe.

inventory constitutes one of the main strengths of some DSPs. The same argument can extend to further stages of the intermediation value chain in the case of vertically integrated providers. [✂]

230. [✂] The argument proceeds as follows:

- [✂] demand for the unique inventory allows the company to become an important source of demand for third-party inventory, as buyers would find it advantageous to use the same platform to buy both types of inventory. [✂].
- Such advantage on the demand side can translate into an advantage on the supply side, [✂] This advantage can be strengthened by a closer integration between the demand and supply sides. [✂]

## **Targeting data in open display**

231. Data, and in particular user data, plays a crucial role in the open display market. The ability to target advertising to specific audiences allows platforms and publishers to maximise the value of inventory for advertisers. This section discusses the role of targeting data in open display and is structured into three parts:

- the first part gives an overview of the use of targeting data by different participants in the ecosystem (publishers, SSPs and DSPs);
- the second part discusses the advantages in terms of access to user data enjoyed by those intermediaries who also offer consumer-facing products; and
- the last part analyses how the evolving privacy landscape affects the availability of targeting data and the competitive dynamics between intermediaries.

### ***The use of targeting data by publishers, SSPs and DSPs***

232. Targeting in open display advertising is made possible through the use by intermediaries of the following pieces of information:

- user segments/profiles;
- location data;
- contextual data; and

- user identifiers.
233. Personalised advertising relies on the creation of user segments, based on demographic and behavioural data (see Appendix E). For some advertisers, user segments are the primary mechanism for targeting and produce most of the value of the DSP. User segments are often also central to direct deals between publishers and advertisers. Publishers can get users' behaviour data by looking at their behaviour on the website, from which interest can be inferred. They can also use the ads a user has been shown or clicked on to infer their interests or value to an advertiser. Demographic data can be obtained from user declared data (when creating an account, or through on-site surveys), inferred from users' behaviour if the behaviour matches patterns of known users in the demographic, or licensed from third-party providers. DSPs can receive user segments from advertisers themselves (or their DMP) for their own use or can acquire the data from third-party data providers. Intermediaries who also operate user-facing services have their unique sources of data.
234. Location data is used for geographical targeting. The source of this data is the IP address of the user or their latitude/longitude when the location of their mobile device is captured. It is obtained by publishers from Google Ad Manager as part of the ad serving product, or from other providers. Location data (ie the user IP addressed) is sent to SSPs and included in the bid requests.
235. Contextual data is data about the web page where the ad will appear. It is used for contextual targeting or for anti-targeting, ie to avoid the ad appearing on pages whose content is considered unsuitable. Publishers typically use third-party specialists, such as Grapeshot or Admantx, for contextual data, or use the meta-tags behind the content. Some contextual information is included in the bid request, but DSPs can also use the same specialist providers.
236. Finally, being able to identify a user and recognise each time they are encountered is crucial for DSPs and publishers; this is the role of user identifiers. Without this information it becomes impossible to match a user to segment data, to implement frequency caps (ensuring that the same user does not see the same ad too often), or to attribute conversion outcomes to a campaign. User identifiers are included in bid requests as cookies, but the availability for DSPs is typically subject to a successful cookie-matching process.<sup>20</sup>

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<sup>20</sup> For more details on the flow of data in open display, see Appendix E.

### *The use of data by publishers*

237. Publishers use first-party, third-party and contextual data to build bespoke segments and profiles of readers which they can use for targeted advertising campaigns or audience insights. This is typically the case for PMPs or other programmatic deals with specific advertisers. We have been told, however, that, as buyers have a great depth of data, they are no longer placing the same level of reliance on the publisher's data. Publishers can also decide to voluntarily provide interest data in order to allow the SSP to better understand the inventory.
238. The cost for publishers of sourcing and managing targeting data can vary significantly. Some publishers responding to our RFI indicated amounts corresponding to around (or more than) 3% of their digital advertising revenues; other publishers are spending significantly less.

### *The use of data by SSPs*

239. Access to user data is not crucial for SSPs. However, the availability of user data can be useful to SSPs, by making it possible to optimise advertising performance efficiently. In particular, if an SSP can identify whether the characteristics of an ad request are desirable, it can effectively allocate resources. For example, being able to determine whether an ad request is bot traffic (and should be filtered), or is desirable to a buyer, is critical to overall business health and marketplace efficiency. Each ad request and bid request costs money for an SSP to process. To the extent that an SSP can accurately predict the value of an impression, it can more efficiently allocate resources to gain economic leverage. The more data that is available to improve these types of algorithms, the more accurate (and, consequently, efficient) an SSP can become.
240. SSPs can also use targeting data in a similar way as publishers when they package 'deal IDs' on behalf of the publishers. Content discovery platforms, which often directly connect advertisers with publishers, can also make greater use of targeting data than typical SSPs.
241. The user information included in bid request that SSPs send to DSPs often follows OpenRTB specifications released by the IAB Tech Lab (some SSPs may use different specifications). In addition to information about the publisher's website or app and ad placement, a bid request typically includes information about the user's browser and device, location data, and the user ID (taken from browser cookies or MAID identifiers).

### *The use of data by DSPs*

242. Data is crucial for the operation of DSPs and their ability to optimise bids reflecting advertisers' campaign objectives and targeting requirements. For this purpose, DSPs augment the information contained in bid requests with data provided by advertisers and data sourced from third-party providers. This allows DSPs to offer multiple targeting options, which can include:
- contextual targeting, based on contextual information on the webpages and apps, including specific keywords appearing in the page;
  - targeting based on time of day or day of week or month, location, browser language, type of device or internet connection;
  - demographic targeting, based on known or inferred characteristics such as age, gender, or education;
  - interest-based targeting based on users' inferred interests or intent (ie what users are actively researching and planning);
  - retargeting of the advertiser's existing customers or of users who have already interacted with the advertiser (eg have visited its website);
  - targeting of 'lookalike audiences', ie users with characteristics similar to the advertiser's existing customers or to users who have interacted with the advertiser.
243. More details on targeting can be found in Appendix E.

### ***The advantages of operating user-facing services***

244. Unlike companies active exclusively in advertising intermediation, those who also operate user-facing services have the ability to directly collect user data and make the targeting possibilities allowed by such data available to the users of their intermediation services.
245. For example, Verizon Media DSP uses data from its owned and operated websites and apps and Amazon DSP uses pseudonymised information about users' interactions with Amazon services. Google, as a provider of a wide array of consumer services, can collect and combine a large amount and variety of user data. Subject to users' consent to ads personalisation, Google can collect data not only through users' interactions with customer-facing products, but also from their interactions with Google's products integrated into third-party sites and apps, and, with the exclusion of services for which Google is a 'data processor' or otherwise restricted from merging data for ads

(eg Google Analytics), can combine all this data across services into individual profiles. The data collected by Google is described in Appendix E. Facebook also collects a large amount of information from the users of its social platform (see Appendix E).

246. Operating market-leading consumer products give intermediaries an advantage in relation to the pieces of information listed above:
- In relation to user identifiers, the availability of log-in data allows companies like Google and Facebook to generate deterministic device graphs that identify the computers and mobile devices associated with a single user. This increases performance of their DSP services. While other intermediaries (DSPs and DMPs) can create device graphs allowing them to link the cookies stored on multiple devices used by the same person, these graphs are made probabilistically, ie based on modelling, and are typically less reliable than those based on user log-ins.
  - The data collected through user-facing services allows the creation of richer user segments. For example, search data from Google and data on searches for products or services in the Amazon Store can be used to create segments of users that are looking to buy specific products.
  - Google has access to detailed location data from Android mobile devices (see Appendix E).<sup>21</sup>
  - Google also excels at contextual targeting and integrates its search graph into DV360. Intermediaries, however, did not mention this as a significant advantage over using third-party providers of contextual data.
247. Access to data is an important consideration for advertisers and media agencies in their choice of DSP. WPP told us that, all things being equal, a greater availability of user-level data by a DSP might be expected to increase the ability to achieve the campaign's KPIs and, as a result, to generate increased spend with the DSP. Similarly, Publicis submitted that, inherently, platforms with stronger data capabilities will generate more cost-effective results and are more likely to be included in a media plan. Nevertheless, so far the lack of access to data sets as rich as those assembled by Google or Facebook has not made it impossible for DSPs to succeed and grow, as the case of The Trade Desk shows. The evolving privacy regulation and stricter rules on the use of third-party cookies, however, might increase the advantage of user-facing companies, as discussed in the next section.

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<sup>21</sup> Moreover, Google Ad Manager truncates IP addresses when sending the data to third-party DSPs.

## ***The implications of privacy regulation***

248. The introduction of GDPR and restrictions imposed by some browsers on the use of cookies are having a significant impact on advertising intermediation and have the potential to lead to further concentration. The main factors pushing in that direction are:

- the challenges in obtaining users' 'consent';
- restrictions to sharing data between separate entities; and
- restrictions on the use of third-party cookies.

249. While not all intermediaries have adopted 'consent' as the legal basis on which to collect and process personal information, there is increasing pressure for them to operate under a consent-only basis. The ICO's Updated report into adtech and real time bidding, published in June 2019, states that, in the ICO's view, 'the only lawful basis for 'business as usual' RTB processing of personal data is consent'.<sup>22</sup> Obtaining consent can be particularly challenging for intermediaries without direct relationships with the users. The main reasons are the following:

- Publishers have many third parties integrated on their sites; having a system in place that requires each party to separately obtain consent, or provide detailed information for each partner, would hamper their websites' usability.
- B2B companies lack brand recognition from ordinary users. It is therefore more difficult for them to gain users' trust, even if they adopt privacy-friendly practices.
- Companies without direct relationships with users have limited possibilities to offer them incentives for obtaining consent.

250. Publishers may therefore have an incentive to rely on intermediaries that, because of their ownership of user-facing platforms, can more easily obtain consent for themselves. These are mainly the large platforms like Google, Facebook and Amazon. The result can be a further consolidation of advertising intermediation to the benefit of large platforms.

251. In this regard, Verizon Media submitted that legislators did not place a duty on Data Protection Authorities (DPAs) to apply GDPR rules in a way that balances economic and individual interests and promotes innovation and

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<sup>22</sup> ICO's [Updated report into adtech and real time bidding](#), page 18.



competition in digital markets; as a consequence, a DPA could arrive at a decision with significant market impacts but government and other authorities with responsibility for the economic well-being of the UK economy would have no power to intervene. Some intermediaries also told us that the grey nature of privacy regulations creates additional opportunity for the large companies (eg Google and Facebook) to define what compliance means and further isolate smaller competitors, by restricting interoperability and the flow of data. Large companies' chosen approach to data protection tend to favour vertical integration along the ad tech stack and the creation of closed-model ecosystems. For example, Google told us that it only sends imprecise location data to third parties to reflect the principles of data minimisation and proportionality required by GDPR, whereas the same concerns do not arise for disclosures to DV360 as no third-party data sharing occurs.

252. Limits to interoperability also makes measurement analytics more difficult, not only impacting on the business of third-party analytics providers, but potentially reducing advertisers' ability to compare the effectiveness of different advertising platforms. The concern has been expressed to us that Google no longer provides advertisers with access to DV360 IDs and this restricts the ability of advertisers, agencies and third-party vendors to carry out analysis for the purposes of attribution, re-targeting, etc. Instead, Google has created its Ads Data Hub (ADH) service, which does allow some access to Google's post-campaign data and measurement analytics services in a single environment, while allowing Google to maintain end-user's privacy. However, we understand that this can be a time-consuming process and it does not permit companies to export the information to any other measurement or advertising technology partner they may prefer.
253. A further issue raised by some intermediaries is that the cost of compliance with privacy regulation can act as a barrier to entry. Any company seeking to enter into the market and compete with the larger established companies will face the same accountability costs and overheads but may not have the resources or institutional maturity to be able to do so effectively, which may make it more difficult to compete with the larger companies. We have been told that, for this reason, smaller third-party data providers have decided to exit the UK over the last year. DataXu told us the overall volume of data available that for the UK market has dropped since the advent of GDPR.
254. A related development is the increasing restrictions imposed by browsers to the use of third-party cookies. Apple's Intelligent Tracking Prevention (ITP) feature was released in September 2017 to limit the ability of ad technology companies to use third-party cookies on Apple's Safari browser; a similar decision was taken by Mozilla for its Firefox browser. There has also been a rise in search engines and other service providers that explicitly do not allow

the tracking of data, such as DuckDuckGo. Google has announced that it intends to improve consumer control by introducing new privacy-related features. This includes new controls in Chrome that will make it easier for consumers to block or clear cookies placed by third parties. Google cookies will continue to run. As Google's browser Chrome is widely adopted by users in the UK (according to StatCounter, it had a market share of approximately 50% in October 2019),<sup>23</sup> the consequences of Google's choices on third-party cookies are going to be very significant for advertising intermediation.

255. If Google takes steps to limit third-party cookies (or access to its AdID on Android), independent ad tech intermediaries' ability to target audiences and to measure the effectiveness of their services will decrease. For example, a DSP told us that, to maintain performance, it needs a volume of opted-in cookies to train the specific conversion model based on the advertiser's converters. More generally, ad tech companies will need to find alternative methods to identify users. The ways companies are currently approaching this problem include:

- Using first-party data – This is to the advantage of companies like Google, Facebook and telecom companies, since they have consumer-facing properties where end-users frequently visit and refresh their cookies. However, this is also possible for some independent publishers with log-in data. On the advertiser side there is rarely enough first-party data to use as a consistent source of identity.
- Using publishers' data – If enough publishers join together, they can potentially pass consistent identity to advertisers.
- Fingerprinting – This is a broad term meant to describe various statistical techniques for attempting to identify a given user or device in the absence of IDs passed by that device. For example, the combination of the user-agent string<sup>24</sup> and the user's IP address can be used to make a relatively unique identity. However, fingerprinting is unlikely to be compliant with privacy regulations, given the inability of the end-user to opt-out of profiling.

256. Limits to the use of cookies will not affect Google or other companies, such as Facebook or Amazon, which can rely on users' log-ins. The impact on other intermediaries has yet to be fully seen, but some intermediaries fear that the end of third-party cookies would signal the beginning of an industry-wide

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<sup>23</sup> StatCounter, <https://gs.statcounter.com/browser-market-share/desktop-mobile-tablet/united-kingdom/>. For a discussion of the methodology used by StatCounter, see Appendix C.

<sup>24</sup> A user agent is software that acts on behalf of a user, such as a web browser. When operating in a network, a user agent typically identifies itself by submitting an identification string.

revolution in the mechanisms for data-driven digital advertising, with all but the walled gardens and their closed data ecosystems forced to entirely pivot their business models. One intermediary told us that a browser ID may emerge as a replacement for the cookie ID. Browsers would then control how this ID is shared among the industry, incentivizing further market consolidation around browser-based walled gardens. More generally, Verizon Media submitted that any change to browsers' neutral posture presents an existential threat to both competition in the digital advertising market and to the ability of digital content and services providers (particularly those without logged-in users) to generate revenues to fund their content production.<sup>25</sup>

257. To an extent, the industry has already begun to adapt to a reduced availability of third-party data and cookies. Some intermediaries expect a rise in contextual targeting or are actively increasing their capabilities for contextual targeting. Some publishers told us that they are making greater use of first-party data, or are investing to build up their first-party data through subscriptions and better user-level tracking. Other publishers are looking to refocus on contextual targeting, or testing technologies that allow users to select the type of advertising they receive. However, News UK told us that a move back to more contextual-based advertising would only be achievable if publishers can limit 'data leakage' and other companies monetising their audience and data. Google and Facebook, in particular, capture huge amounts of data on publishers' users and content and can monetise this better than publishers are able to.

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<sup>25</sup> Verizon Media added that such change would also interfere with consumer preferences which are recorded via cookies and therefore with the ability of ad intermediaries to comply with GDPR.