Testing privacy preserving signals in the absence of third-party cookies on Google's display ads platforms

1. Executive Summary

As Chrome's planned third-party cookie deprecation ("3PCD") in early 2025 approaches, Google's display ad tech continue to implement and test a variety of privacy-preserving signals including Chrome's Privacy Sandbox APIs (Application Programming Interfaces) to replace third-party cookies ("3PCs") as signals for certain advertising use cases. As part of the Privacy Sandbox Commitments, Google is working under the supervision of the UK Competition and Markets Authority ("CMA") and in consultation with the Information Commissioner's Office ("ICO") to design and carry out experiments to evaluate the effectiveness of the Privacy Sandbox APIs ("PS APIs") and other privacy-preserving signals supporting key use cases post 3PCD, including advertiser targeting and measurement capabilities and publisher monetization.

This document reports the findings of Google display ads' "Combined, Chrome-facilitated"[1,2] experiment to meet the CMA obligations. The primary goal of this experiment is to understand the impact to Google's display ads products by replacing 3PCs with privacy-preserving mitigations including Chrome's Privacy-Sandbox APIs and other privacy-preserving signals available to ad tech providers and publishers. Google involved the CMA in the design of the experiment, in compliance with our requirement to test the effectiveness of the PS APIs (paragraph 17.c. of the Commitments).

Google notes at the outset that, while providing an informative input for the CMA's assessment of 3PCD under the Commitments, the experiment results themselves do not represent a complete picture of digital advertising competition post-3PCD. Specifically, despite all best efforts, limitations inherent to the experimental framework and its application mean that the results below will likely vary from actual performance post-3PCD. These results are a point in time snapshot that are specific to Chrome programmatic non-guaranteed traffic. Any future events such as performance-enhancing developments, increased adoption and optimization across the ecosystem or advertiser and publisher trends in response to 3PCD are not captured in these results. These include improvements in the APIs, increases in all participants' 3PCD readiness and substitution to privacy-preserving alternative signals (both

[1] *Combined* refers to the use of all privacy preserving mitigations together, including Chrome's Privacy Sandbox APIs i.e., Topics API, Protected Audience API ("PA API"), and Attribution Reporting API ("ARA").
[2] *Chrome-facilitated* refers to the fact that the experiment is conducted on Chrome Facilitated Testing Traffic, where Chrome provides 3PC-less traffic for the ecosystem to test.

readily available or in-development). Further, participants' use of inventories where 3PCD is less/not applicable (such as non-Chrome browsers and guaranteed/direct deal negotiations) will also not be reflected in these results.

The above notwithstanding, the experiment results indicate that the combination of Privacy Sandbox APIs with other privacy-preserving signals available to ad tech providers and publishers reduce 3PCD impact for Google's display platforms. Specifically, while the tradeoff between some degree of performance loss and enhanced user privacy is broadly expected as a result of 3PCD, the current Google buyside and sellside results indicate significant retention of pre-3PCD performance for advertisers and publishers. The results also demonstrate that, where supported and integrated effectively, the APIs are contributing meaningfully towards participants' recovery.

On the buyside, Google highlights three findings:

- **Overall Buyside Performance.** The experiment results show that post 3PCD, PS APIs contribute to recovery in campaign scale and performance.

- **Remarketing performance.** Remarketing solutions observed degraded performance from 3PCD and to a lesser extent, non-remarketing solutions observed some performance impact.

- **Google AI solutions and 3PCD.** Overall, we observe Google display ads ("GDA") campaigns that opted in for AI solutions such as optimized targeting[3] and/or conversion optimization broadly records more recovery from 3PCD impact.

With respect to sellside, Google highlights one finding:

- **Overall Sellside Performance.** Both Google Ad Manager and Google AdSense publishers observed higher recovery with PS APIs than without, indicating that PS APIs help improve publisher monetization in the absence of third-party cookies.

2. Experiment Design

We used A/B experimentation methodology across three experiment groups:

1. *Control 1*: status quo with all 3PC functionality retained and other non-3PC, non-API privacy-preserving signals available. This arm utilizes Mode A traffic from Chrome.

[3] Optimized targeting considers available signals to find audiences that can meet campaign's goals.

2. *Control 2*: baseline without 3PC functionalities nor PS APIs. Other non-3PC and non-API privacy-preserving signals remain available. This arm utilizes Mode B traffic from Chrome.

3. *Treatment*: treatment without 3PC but with PS APIs and other non-3PC privacy-preserving signals. This arm also leverages Mode B traffic from Chrome.

We diverted Control 1, Control 2 and Experiment groups in this experiment using Chrome-provided traffic labels. Using the label for diversion, observations in this report generally apply to web traffic including Desktop/Mobile Web (non-iOS)[4], and also Chrome Custom Tab from Android apps.

For clarity, we note:

1. Using Chrome-provided traffic labels for diversion excludes certain traffic scope from the experiment. Notable exclusions are Incognito and ePD unconsented traffic, which are potentially less likely to be affected by 3PCs (e.g. if users are already blocking 3PCs). By excluding this traffic, the experiments captured relatively more affected traffic and thereby understated recovery relative to the general population.

2. There will be many signals outside of the Privacy Sandbox APIs that are available for the industry post 3PCD. Google's ad platforms applied, on all three experiment arms, the currently available privacy-preserving mitigations planned for ongoing use after 3PCD. For more details on this, see "Other Key Privacy Safe Mitigations" in Appendix 1.

3. While the intention is to reflect as close to the end state as possible, getting all systems components to the end-state readiness was not viable for the Q1'24 timeline. For instance, certain ad features were not fully developed and ready to test. If such feature support wasn't complete but Google's display ads platforms planned to incorporate it by 3PCD, Google removed them from the experiment.
    a. Google Buyside excluded not yet supported campaigns from all arms of the experiment if feasible.
    b. Google Sellside excluded not yet supported traffic - notably instream video - from all arms of the experiment.

The table below outlines the overall configurations applied for the experiment setup:

Table 1: Experiment Setup

1	**Duration**	Jan 29th '24 - March 10th '24
2	**Experiment Groups**	CONTROL 1: 3PC retained + other non-3PC, non-API privacy-preserving signals (status quo) - 0.75% using Mode A

[4] Chrome on iOS isn't a Chromium browser. Therefore, no labels were passed and there are no PS APIs.

3		CONTROL 2: No 3PC and No PS APIs. Non-3PC and non-API privacy-preserving signals remain available - 0.25% using Mode B
4		TREATMENT ARM: No 3PC and Yes PS APIs. Other non 3PC-signals privacy-preserving remain available - 0.75% using Mode B
5	**PS APIs Tested**	Topics API, Protected Audiences API (aka PA API), Attribution Reporting API (aka ARA)
6	**Environments Supported**	Traffic where Chrome labels are available on, after checking ePD consent.
7	**Publisher Inventory Type**	Programmatic non-guaranteed only
8	**Google's Buysides Included**	Google display ads (GDA), Display & Video 360 (DV360)
9	**Google's Sellsides Included**	Google Ad Manager (GAM), Google AdSense
10	**External Buyers (DSPs) and SSPs included**	The participation of all DSPs and SSPs in the test is at their discretion.

3. Analysis

3.A. Business Metrics and Traffic Segments Reported

3.A.1 Buyside

Buyside Metrics[5]

- % Change in Spend by Advertisers
- % Change in Conversions per Dollar (CPD)
- % Change in Clicks per Dollar
- % Change in Clicks per Impressions
- % Changes in Conversions per Impressions or Clicks

Google notes the following with respect to the metrics above:

Note 1: When computing conversion-based metrics, all conversion sources relevant in each arm were used. Specifically, we used 3rd-party-cookie (3PC) conversions in Control 1 but not in other arms.

[5] Raw values for treatment, control 1, and control 2 are provided in Appendix [3]

Note 2: Due to an issue with conversion attribution in our production pipeline, approximately 15% of DV360's conversion data is missing for the first three weeks of the experiment. Therefore, DV360 analyses use only the last 3 weeks of data for conversion metrics. For non-conversion metrics, the full 6 weeks of data is used.

Note 3: Click per Dollar is not the most representative metrics to draw on 3PCD impact for DV3 and GDA, especially given that advertisers on these platforms typically optimize for viewable impressions or conversion events instead of clicks.

Buyside Segmentations:

- **Buyside Platforms**: Segmentation by advertiser platform purchasing Display network inventory: **Google display Ads ("GDA")** vs **Display & Video 360 ("DV360")**.

- **Remarketing vs Non-Remarketing Segmentation.** We provide two relevant definitions of remarketing segmentation:[6]
    - **Non-Blended Remarketing Slice**: Segmentation approximates the performance of campaigns that employ only userlist targeting as the targeting strategy.
    - **Blended Remarketing Slice**: All campaigns in this segmentation use userlist targeting, and they may also employ additional targeting techniques such as optimized targeting or in-market audience.

- **Compare campaigns with and without AI solutions**: Segmentation by whether campaigns are leveraging optimized targeting or conversion optimization. This aims to capture 3PCD impact on campaigns with more/less adoption of AI solutions.

3.A.2 Sellside

Sellside Metrics[7]

We present the following metrics for programmatic non-guaranteed transactions:

- % Change in publisher revenue
- % Change in impressions
- % Change in revenue per 1000 impressions (RPI)

We note that for revenue per impression we provide confidence intervals of the numerator and denominator individually in this report.

[6] Depending on the business model, either of these definitions could be more meaningful. For GDA, only ~70% of campaigns that employ userlist targeting make use of other targeting types concurrently, so blended segmentation may be more meaningful. For DV360 and GDA's agency clients, the non-blended segmentation would be more meaningful.

[7] Raw values for treatment, control 1, and control 2 are provided in Appendix [3]

Sellside Segmentations:

- **Ad Serving Platform:** Segmentation by publisher monetization platform used to manage ad inventory: **Google Ad Manager ("GAM")** vs **AdSense.**
    - Google Ad Manager is a publisher ad management platform, whose impression volumes are predominantly accounted for by medium to large publishers. These publishers tend to be more sophisticated and often have direct sales teams alongside programmatic as sources of demand.
    - AdSense is a publisher ad network for smaller publishers who often do not have direct sales teams, and monetize through programmatic demand on Google's AdSense ad network
- **Buying door:** Segmentation by the following buying doors on Google's sellside: **Google Display ads (GDA)** vs **Display Video 360 (DV3)** vs **Authorized Buyers (AB)**
    - Authorized Buyers are third-party DSPs and ad networks who purchase ad inventory programmatically on Google's sellside platforms.

Noteworthy sellside traffic excluded from the report:

- **Instream Video traffic**: The Topics and Protected Audience APIs are not yet supported on instream video traffic, hence the traffic is excluded from the report.
- **Guaranteed transactions**: for certain inventory such as guaranteed reservations and Programmatic Guaranteed ("PG"), a publisher and a buyer negotiate a price and terms for inventory that's reserved (guaranteed) for that buyer. We exclude these inventory from the report because they are guaranteed to serve, hence they are not impacted by 3PCD to the same extent as non-guaranteed transactions.
    - For many Google Ad Manager publishers, guaranteed transactions comprise a large portion of their revenue. For these publishers, the overall 3PCD impact to their revenue would be lower than this report implies. We've also anecdotally heard from publishers that they're investing more heavily in direct, guaranteed transactions with advertisers as a 3PCD revenue mitigation strategy, which could even lead to an increase in a publisher's guaranteed revenue.
- **Non-programmatic, non-guaranteed transactions**: publishers using Google Ad Manager as their ad server can book non-guaranteed line items to represent any non-guaranteed demand they might have outside of Google's programmatic offerings. This can include header bidding demand, for example. Google is not involved in the payment flow for these transactions, therefore they're excluded from the report.

3.B. How to interpret the results

3.B.1 Notable caveats and considerations applicable to both buyside and sellside results

Notable caveats and considerations: Our intention is to produce testing results that are meaningful for evaluating the real world impact of 3PCD. However, we also acknowledge that, as has the CMA, due to limitations inherent to the experiment framework, the results will likely deviate from the actual impact once 3PCD comes into effect. In this respect, we note the following considerations:

- **Limitations of A/B testing:** Interpreting the difference between the control and treatment groups as the "treatment effect" makes A/B testing an appealing testing methodology. However, there are limitations to this experiment framework. While diverting on browser (i.e. as this experiment diverts on Chrome Label) was the most viable alternative, it had limitations to work as an ideal diversion unit that can assign non-interacting groups of entities into control and treatment. Also, the limited traffic % of the experiment made statistical inference around rare events such as deep conversions particularly unreliable.

- **Chrome Mode A/B label and its implications on the experiment:** As noted earlier, the experiment diverted on the Chrome-provided label. This diversion method had additional limitations worth noting. Only a fraction of traffic provided by external SSPs included Chrome labels, meaning Google Buyside's results primarily reflect performance observations on Google's Sellside Platform inventory.

- **Upcoming implementation & optimization for 3PCD-readiness:** As of the Q1 '24 testing date, Google's buyside and sellside platforms were still progressing towards full feature support. Absence of unsupported features implies that the experiment results only partially reflect participants' recovery relative to the 3PCD end state.

- **Absence of industry 3PCD readiness:** Absence of widespread 3PCD readiness and testing from the industry likely impacted auction dynamics. Specifically, if third-parties had not invested in integrating PS APIs or alternative privacy-preserving signals, the results likely understated third-parties' recovery relative to the post-3PCD state. The absence of widespread 3PCD readiness would have also reduced auction pressure, potentially leading to publisher revenue being lower than in a counterfactual scenario with greater auction pressure.
    - Moreover, the reduced auction pressure would have impacted advertiser spend by Google's buyside platforms but the direction of the impact is ambiguous as the lower auction would mean impressions are less expensive (potentially

decreasing spend) but more impressions could be won due to the lower competition (potentially increasing spend)

- **Long-term effects of 3PCD:** The experiment results only captured certain advertisers' performance at the time of the experiment. As such, the results do not account for the long-term effects of 3PCD as advertisers respond to e.g., changes to campaign tactics based on performance and reporting (e.g. scale and ROI); other DSPs' product offerings; or alternative privacy preserving signals.

- **Limitations of Conversion-based Metrics:** Conversion-based metrics, while a useful proxy to measure Return on Investment ("ROI"), have certain limitations. For one, even amongst advertisers who value the same user actions (i.e. conversions), only a portion of them choose to track conversions. As such, the reported conversion numbers do not wholly represent all desired user actions that took place and therefore tracked conversions are naturally incomplete. For another, there is no consensus among advertisers on the definition of conversions.

- **Interpreting Change in Conversion metrics:** As noted earlier, different conversion sources are used in each of the experiment arms. The difference impacts not only how conversions are measured but also how we optimize for these conversions. Due to this interdependency, we kept conversion sources for optimization and measurement consistent for each arm. For example, while ARA was available for conversion measurement in Control 1, we used 3PC for conversion measurement because the optimization system in Control 1 is designed to optimize using 3PC based conversions. As a result, we used the conversion sources most relevant for each arm for both measurement and optimization purposes, which were different for each arm.

Difference between GDA and DV360: GDA and DV360 are different types of ad buying tools with different business models and feature sets. Therefore, we caution against assumptions that the same underlying factors are driving differences between Google Ads and DV360's results. Some notable differences between these buying tools are the following:

- *3P Features & Adoption:* 3P features (e.g. DMP, 3p ad server, 3P data providers) have an outsized impact on DV360 as a large % of DV360 campaigns use some form of 3p features. These 3P features - which are common on DV360 but less common on GDA - need to be integrated and tested by 3p providers to be compatible with Protected Audience API. 3P feature support will be higher in the 3PCD end-state compared to when the experiment was conducted. In order to evaluate the utility of the API at the time of the experiment, campaigns with such features were removed across all experiment arms from the analysis.

- *Advertiser goals and expectations:* Many of GDA advertisers optimize towards ROI goals (e.g. conversions) whereas many of DV360 campaigns also optimize towards impression reach and quality (e.g. viewable impressions).

3.B.2 Notable caveats and considerations applicable to the sellside results only

- **Difference between GAM and AdSense:** GAM and AdSense serve different needs via different business models. Therefore, we caution against assumptions that the same underlying factors are driving differences between GAM and AdSense's results.
    - GAM as an ad management platform is best for publishers who need granular controls, often have significant direct sales, and work with multiple SSPs for their programmatic monetization.
    - AdSense is an ad network that is best for publishers with fewer resources to dedicate to ad management and so desire a simpler and more automated product.

4. Findings & Summary of Results

Overall, the experiment results indicate that leveraging PS APIs and other privacy-preserving signals and features help reduce 3PCD impact across advertisers and publishers.

4.A. Observations from Overall Buyside

Comparing Treatment to Control 1, DV360 observed -13.7% [-15.9%, -11.5%] [8] in spend and -31.5% [-36.6%, -25.8%] in CPD for all campaigns. Looking at CPD for campaigns where conversion is the primary campaign goal, DV360 observed -4.3% [-12.4%, 7.4%] in CPD. GDA observed -10.8% [-12.2%, -9.4%] in spend and -2.6% [-3.7%, -1.5%] in CPD for all campaigns. For conversion optimized campaigns, GDA observed -2.4% [-3.7%, -1.0%] in CPD. Both DV360 and GDA observed higher recovery with the PS APIs and other alternative privacy-preserving signals versus without, as demonstrated by higher spend and CPD recovery in Treatment relative to Control 2.

4.B. Observations from Remarketing Slice:

Given heavy reliance on 3PCs for the remarketing use case overall, remarketing campaigns observed relatively larger declines in performance. To capture the nuances of 3PCD impact on remarketing, we provide two versions of remarketing slices described above. We only provide comparisons to Treatment and not Control 2 because there is no userlist targeting without 3PC or PA API in Control 2.

[8] Note that the numbers in square brackets refer to 95% confidence intervals.

1. Non-Blended Remarketing Slice: Compared to Control 1, Treatment showed -50.6% [-58.2%, -40.9%] in spend and 79.3% [46.9%, 111.7%] in CPD for DV3 and -44.7% [-47.1%, -42.1%] in spend and -9.1% [-15.8%, -1.8%] in CPD for GDA. Both GDA and DV3 observe more acutely degraded spend as userlist targeting is highly 3PC dependent.
2. Blended Remarketing Slice: Compared to Control 1, Treatment showed -47.2% [-51.3%, -42.3%] in spend and -0.3% [-15.4%, 16.6%] in CPD for DV360 and -14.9% [-16.6%, -13.1%] in spend and -3.1% [-4.5%, -1.6%] in CPD for GDA. GDA observes relatively higher recovery than DV360 as a higher portion of GDA campaigns adopt optimized targeting, which enables campaigns to spend on impressions outside of a given userlist.

As mentioned in the caveat sections above (Section 3.B.1) external factors are likely to have affected the observations of remarketing.

4.C. Observations from Optimized Targeting Slice:

Primary Reported Metric (% change)	Compared to Control 1 (3PC)	w/ OT (GDA)	w/o OT (GDA)
Spend by Advertisers	Control 2 vs	-1.2% [-3.2%, 0.8%]	-38.6% [-39.8%, -37.5%]
	Treatment vs	-0.7% [-2.7%, 1.4%]	-20.6% [-21.9%, -19.2%]
Conversions per Dollar (MH CPD)*	Control 2 vs	-1.6% [-2.5%, -0.7%]	-9.0% [-10.7%, -7.3%]
	Treatment vs	-2.3% [-3.6%, -0.9%]	-3.5% [-5.8%, -1.2%]

Overall, Spend and CPD for Campaigns with OT were higher than those without for GDA.

For DV360, we were not able to effectively evaluate the performance of OT in this experiment. This was largely due to the use of OT across remarketing and non-remarketing campaigns combined with the incomplete state of ARA integration (discussed more in the below section) at the time of the experiment, which affects a larger portion of Campaigns with OT enabled.

4.D. Additional Commentary on DV360 Observations

We provide the following commentary with respect to DV360 to contextualize and assist in the interpretation of DV360's results:

- **DV360's Reliance on Attribution Reporting API (ARA):** DV360 shows a significant recovery lift between Control 2 and Treatment CPD. This can be explained by the

majority of DV360's conversions being View-through-conversions (VTCs), which can only be measured using ARA. This result is in spite of the current incomplete state of ARA integration. Click-through conversions (CTCs), which make up most of GDA's conversions and are only partially reliant on ARA.

- **Future Improvements:**
  - Remarketing / PA API: For campaigns that are included in the experiment, certain features (e.g. recency targeting) were not ready for testing, affecting applicable campaigns in the Treatment arm only. We therefore expect the treatment arm to understate advertisers' performance relative to once these features are available (later this year), all else equal.
  - Conversion measurement / ARA - Investment is ongoing to complete ARA integration and optimize configuration prior to 3PCD. Other quality and transmission loss work should subsequently improve the conversion coverage and CPD as well as the Spend.

- **Nuances of DV360 Remarketing Recovery:**
  - DV360 spends heavily on external SSPs, but their readiness and testing were inconsistent during the time of the experiment.
  - As mentioned above, DV360's remarketing slice excludes campaigns that depend on 3P features across all experiment arms.
  - During the experiment we observed CPD higher in Treatment than in Control. This is likely to normalize overtime with spend increasing and CPD decreasing.

4.E.1. Display & Video 360

Table 1.1: Display & Video 360 Campaigns Sliced by Remarketing

Primary Reported Metric (% change)	Compared to Control 1 (3PC)	RMKT (Blended)	NON-RMKT (Blended)	RMKT (Non-Blended)	NON-RMKT (Non-Blended)	Overall
Spend by Advertisers	Control 2 vs	-58.4% [-61.8%, -54.9%]	-16.6% [-19.4%, -13.5%]	nan% [nan%, nan%	-18.5% [-21.1%, -15.5%]	-23.7% [-26.2%, -21.1%]
	Treatment vs	-47.2% [-51.3%, -42.3%]	-6.8% [-9.5%, -4.2%]	-50.6% [-58.2%, -40.9%]	-11.2% [-13.3%, -8.7%]	-13.7% [-15.9%, -11.5%]
Conversions per Dollar (MH CPD)*	Control 2 vs	-85.8% [-89.1%, -81.2%]	-87.1% [-88.8%, -85.2%]	nan% [nan%, nan%]	-86.9% [-88.6%, -85%]	-87% [-88.5%, -85.2%]
	Treatment vs	-0.3% [-15.4%, 16.6%]	-34.7% [-39.7%, -29.5%]	79.3% [46.9%, 111.7%]	-34.6% [-39.8%, -29.3%]	-31.5% [-36.6%, -25.8%]
Clicks per Dollar	Control 2 vs	16.3% [12.8%, 19.8%]	11.4% [9.7%, 13.3%]	nan% [nan%, nan%]	11.6% [9.9%, 13.3%]	11.7% [10.2%, 13.4%]
	Treatment vs	-3.8% [-9.4%, 2.5%]	5.9% [4.9%, 7%]	-23.8% [-36.9%, -6.6%]	6% [5%, 7.1%]	5.1% [4%, 6.2%]

Conversion Rate (MH CVR)*	Control 2 vs	-87.1% [-90.5%, -82.9%]	-87.5% [-89.1%, -85.6%]	nan% [nan%, nan%]	-87.4% [-88.9%, -85.5%]	-87.5% [-89.1%, -85.7%]
	Treatment vs	-9.3% [-21.9%, 4.4%]	-38.6% [-43.2%, -33.8%]	60% [34.4%, 87.7%]	-38.6% [-43.4%, -34%]	-35.8% [-40.4%, -31%]
Click-through rate (MH CTR)	Control 2 vs	10.4% [6.4%, 14.5%]	10.8% [8.9%, 13%]	nan% [nan%, nan%]	10.9% [8.9%, 12.9%]	10.8% [8.7%, 12.9%]
	Treatment vs	-18.2% [-24.8%, -12.7%]	6.1% [4.6%, 7.7%]	-43.1% [-52.9%, -33.4%]	5.9% [4.4%, 7.5%]	3.8% [2.1%, 5.3%]

Table 1.2: Display & Video 360 Campaigns Sliced by the use of Conversion Optimization.

Primary Reported Metric (% change)	Compared to Control 1 (3PC)	/w CO	w/o CO	Overall
Spend by Advertisers	Control 2 vs	-68.1% [-71.6%, -63.9%]	21.2% [18.8%, 23.6%]	-23.7% [-26.2%, -21.1%]
	Treatment vs	-38.3% [-41.7%, -34.4%]	11.3% [9%, 13.5%]	-13.7% [-15.9%, -11.5%]
Conversions per Dollar (MH CPD)*	Control 2 vs	-38.8% [-45.6%, -31.3%]	-90.2% [-91.6%, -88.5%]	-87% [-88.5%, -85.2%]
	Treatment vs	-4.3% [-12.4%, 7.4%]	-38.9% [-43.9%, -32.5%]	-31.5% [-36.6%, -25.8%]
Clicks per Dollar	Control 2 vs	46.9% [37.8%, 57.6%]	8.3% [6.5%, 10.1%]	11.7% [10.2%, 13.4%]
	Treatment vs	14.7% [11%, 18.7%]	3.4% [2.2%, 4.7%]	5.1% [4%, 6.2%]
Conversion Rate (MH CVR)*	Control 2 vs	-42.8% [-49.5%, -35.4%]	-90.6% [-92%, -89%]	-87.5% [-89.1%, -85.7%]
	Treatment vs	-18.4% [-25.9%, -10.2%]	-41% [-46.6%, -35.6%]	-35.8% [-40.4%, -31%]
Click-through rate (MH CTR)	Control 2 vs	65.3% [57.9%, 72.8%]	6% [4%, 8.6%]	10.8% [8.7%, 12.9%]
	Treatment vs	13.9% [9%, 18.3%]	1.9% [0%, 3.8%]	3.8% [2.1%, 5.3%]

4.F.2 Google display Ads

Table 2.1: Google display Ads Campaigns Sliced by Remarketing

Primary Reported Metric (% change)	Compared to Control 1 (3PC)	RMKT (Blended)	NON-RMKT (Blended)	RMKT (Non-Blended)	NON-RMKT (Non-Blended)	Overall
Spend by Advertisers	Control 2 vs	-31.3% [-32.8%, -29.7%]	9.3% [7.6%, 11.1%]	nan% [nan%, nan%]	16.0% [14.4%, 17.6%]	-20.3% [-21.6%, -18.9%]

	Treatment vs	-14.9% [-16.6%, -13.1%]	0.2% [-1.2%, 1.6%]	-44.7% [-47.1%, -42.1%]	4.6% [3.4%, 5.8%]	-10.8% [-12.2%, -9.4%]
Conversions per Dollar (MH CPD)	Control 2 vs	-3.1% [-4.0%, -2.1%]	-5.7% [-7.0%, -4.4%]	nan% [nan%, nan%]	-2.0% [-2.8%, -1.2%]	-3.7% [-4.4%, -2.9%]
	Treatment vs	-3.1% [-4.5%, -1.6%]	-1.1% [-3.2%, 1.2%]	-9.1% [-15.8%, -1.8%]	0.0% [-1.4%, 1.5%]	-2.6% [-3.7%, -1.5%]
Clicks per Dollar	Control 2 vs	6.6% [5.8%, 7.5%]	2.4% [1.7%, 3.1%]	nan% [nan%, nan%]	3.1% [2.6%, 3.6%]	5.1% [4.6%, 5.7%]
	Treatment vs	5.2% [4.5%, 5.9%]	0.2% [-0.6%, 1.0%]	4.0% [2.7%, 5.2%]	1.7% [1.2%, 2.2%]	3.5% [3.0%, 4.1%]
Conversion Rate (MH CVR)	Control 2 vs	-8.7% [-10.0%, -7.4%]	-9.0% [-10.5%, -7.5%]	nan% [nan%, nan%]	-5.1% [-6.0%, -4.2%]	-8.8% [-9.8%, -7.8%]
	Treatment vs	-8.7% [-10.1%, -7.3%]	-4.0% [-5.9%, -2.1%]	-22.6% [-27.4%, -17.4%]	-2.6% [-3.8%, -1.4%]	-7.7% [-9.0%, -6.3%]
Click-through rate (MH CTR)	Control 2 vs	-0.9% [-1.5%, -0.3%]	-1.7% [-2.1%, -1.2%]	nan% [nan%, nan%]	0.2% [-0.1%, 0.6%]	-1.2% [-1.6%, -0.8%]
	Treatment vs	-17.1% [-17.7%, -16.5%]	-6.3% [-6.8%, -5.9%]	-54.1% [-54.5%, -53.6%]	-4.8% [-5.2%, -4.5%]	-13.7% [-14.0%, -13.3%]
Conversion Value Per Dollar	Control 2 vs	-15.8% [-16.0%, -15.6%]	-5.4% [-6.2%, -4.7%]	nan% [nan%, nan%]	-5.5% [-5.8%, -5.3%]	-15.2% [-15.4%, -15.0%]
	Treatment vs	-19.9% [-20.1%, -19.7%]	3.3% [2.5%, 4.0%]	-22.7% [-23.1%, -22.4%]	-8.2% [-8.5%, -8.0%]	-18.7% [-18.9%, -18.6%]
Video Completion Rate	Control 2 vs	-0.2% [-1.2%, 0.7%]	0.8% [0.4%, 1.3%]	nan% [nan%, nan%]	0.6% [0.2%, 1.0%]	0.6% [0.2%, 1.0%]
	Treatment vs	11.1% [10.3%, 12.0%]	10.3% [9.9%, 10.6%]	nan% [nan%, nan%]	10.4% [10.1%, 10.7%]	10.4% [10.1%, 10.7%]

Table 2.2: Google Display Ads Campaigns Sliced by the use of AI Solutions

Primary Reported Metric (% change)	Compared to Control 1 (3PC)	/w OT[9]	w/o OT	/w CO[10]	w/o CO	Overall
Spend by Advertisers	Control 2 vs	-1.2% [-3.2%, 0.8%]	-38.6% [-39.8%, -37.5%]	-23.4% [-24.8%, -21.8%]	-8.1% [-9.1%, -7.1%]	-20.3% [-21.6%, -18.9%]
	Treatment vs	-0.7% [-2.7%, 1.4%]	-20.6% [-21.9%, -19.2%]	-10.4% [-12.1%, -8.7%]	-12.4% [-13.3%, -11.5%]	-10.8% [-12.2%, -9.4%]
Conversions per Dollar (MH CPD)	Control 2 vs	-1.6% [-2.5%, -0.7%]	-9.0% [-10.7%, -7.3%]	-2.2% [-3.0%, -1.3%]	-17.5% [-20.8%, -14.1%]	-3.7% [-4.4%, -2.9%]
	Treatment vs	-2.3% [-3.6%, -0.9%]	-3.5% [-5.8%, -1.2%]	-2.4% [-3.7%, -1.0%]	-5.5% [-10.1%, -0.6%]	-2.6% [-3.7%, -1.5%]

[9] OT = Optimized Targeting
[10] CO = Conversion Optimization

Clicks per Dollar	Control 2 vs	4.8% [4.0%, 5.6%]	5.6% [4.7%, 6.4%]	6.9% [6.1%, 7.7%]	0.5% [0.1%, 0.9%]	5.1% [4.6%, 5.7%]
	Treatment vs	3.8% [3.0%, 4.5%]	3.2% [2.4%, 4.0%]	5.7% [4.9%, 6.4%]	-2.5% [-2.8%, -2.2%]	3.5% [3.0%, 4.1%]
Conversion Rate (MH CVR)	Control 2 vs	-6.5% [-7.5%, -5.4%]	-14.6% [-16.8%, -12.4%]	-7.8% [-8.9%, -6.7%]	-18.2% [-22.1%, -14.2%]	-8.8% [-9.8%, -7.8%]
	Treatment vs	-6.8% [-8.4%, -5.2%]	-9.8% [-11.9%, -7.5%]	-8.2% [-9.5%, -6.8%]	-2.3% [-7.1%, 2.8%]	-7.7% [-9.0%, -6.3%]
Click-through rate (MH CTR)	Control 2 vs	-1.8% [-2.4%, -1.1%]	-0.4% [-1.0%, 0.2%]	-1.6% [-2.2%, -1.0%]	-0.0% [-0.5%, 0.4%]	-1.2% [-1.6%, -0.8%]
	Treatment vs	-12.8% [-13.3%, -12.3%]	-14.7% [-15.3%, -14.2%]	-15.7% [-16.3%, -15.2%]	-7.1% [-7.5%, -6.7%]	-13.7% [-14.0%, -13.3%]
Conversion Value Per Dollar	Control 2 vs	-14.8% [-15.1%, -14.5%]	-15.3% [-15.6%, -15.1%]	-14.9% [-15.1%, -14.7%]	-20.5% [-21.5%, -19.4%]	-15.2% [-15.4%, -15.0%]
	Treatment vs	-16.3% [-16.6%, -16.0%]	-19.8% [-20.0%, -19.6%]	-18.4% [-18.6%, -18.3%]	-26.6% [-27.5%, -25.6%]	-18.7% [-18.9%, -18.6%]

4.G. Observations from Overall Sellside

Both GAM and AdSense publishers observed higher recovery with PS APIs than without, indicating that PS APIs help improve publisher monetization in the absence of third-party cookies.

Comparing Treatment (with Privacy Sandbox) to Control 1:

- Ad Manager publishers observed -20.65% [-21.90, -20.40]% in publisher revenue
- AdSense publishers observed -18.37% [-18.81, -17.94]% in publisher revenue

In contrast, comparing Control 2 (no Privacy Sandbox) to Control 1:

- Ad Manager publishers observed -34.08% [-34.34, -33.82]% in publisher revenue
- AdSense publishers observed -21.72% [-22.24, -21.20]% in publisher revenue

4.H. Other Sellside Observations

Google sellside sees relatively more impressions in treatment prior to widespread readiness of 3P SSPs

We observed 8.76% [8.56, 8.96]% more programmatic impressions on Ad Manager in Treatment versus Control 1. As mentioned in the absence of industry 3PCD readiness section above, 3P SSPs likely haven't yet scaled out their integrations while Google's sellside platforms have, which results in programmatic demand from Google's sellside platforms across GDA, DV360, and AB winning a higher share of impressions during our test.

Google's sellside platforms have invested heavily in integrating with and testing the PS APIs and other privacy centric solutions to help our publishers navigate third-party cookie deprecation. We've only recently begun to see other SSPs scale their support for the Privacy Sandbox, and we're encouraged to see progress across the ecosystem on adopting the PS APIs. We expect that as 3P SSPs scale out their integrations, their bids will become more competitive.

Impact varies across buying doors. All buying doors are impacted, but to different extents leading to impression share shifts.

Comparing both Treatment and Control 2 to Control 1, we see a decrease in RPI across all buying doors.

However, the impact across buying doors differs. This leads to impression shifts between buying doors. For example GDA impressions are higher in both Treatment and Control 2 compared to Control 1 because the impact to GDA is lowest at the time of the experiment. We expect that as other buying doors scale out their integrations, their bidding will become more competitive leading to them winning a greater share of impressions (and therefore GDA gaining fewer, or even losing, impressions).

Authorized Buyers (AB) has the highest recovery using PS APIs. Comparing Control 2 to Control 1, AB observed -60.73% [-61.00, -60.46] % drop in revenue, showing sizable reliance on 3PCs. Comparing Treatment to Control 1, AB observed-19.06% [-19.55, -18.57] %, showing the highest revenue recovery with PS APIs compared to other buying doors, and notably showing a lower impact than DV360. That being said, we caution that the recovery might not be reflective as 3P DSPs may still be tuning their bidding algorithms in preparation for their own testing.

4.I. Sellside metrics

Table 3.1: Sellside metrics (programmatic non-guaranteed) segmented by ad serving platform

Primary Reported Metric (% change)	Compared to Control 1 (3PC)	Ad Manager	AdSense
Publisher revenue	Control 2 vs	-34.08% [-34.34, -33.82] %	-21.72% [-22.24, -21.20] %
	Treatment vs	-20.65% [-20.90, -20.40] %	-18.37% [-18.81, -17.94] %
Impressions	Control 2 vs	-4.95% [-5.22, -4.69] %	-6.83% [-7.35, -6.31] %

	Treatment vs	8.76% [8.56, 8.96] %	-4.33% [-4.68, -3.97] %
Publisher revenue per impression	Control 2 vs	-30.64% [-34.34, -33.82] % / [-5.22, -4.69] %	-15.98% [-22.24, -21.20] % / [-7.35, -6.31] %
	Treatment vs	-27.04% [-20.90, -20.40] % / [8.56, 8.96] %	-14.68% [-18.81, -17.94] % / [-4.68, -3.97] %

Table 3.2: Sellside metrics (programmatic non-guaranteed) segmented by buying door

Primary Reported Metric (% change)	Compared to Control 1 (3PC)	GDA	DV3	AB
Publisher revenue	Control 2 vs	-16.65% [-17.05, -16.25] %	-35.15% [-35.32, -34.98] %	-60.73% [-61.00, -60.46] %
	Treatment vs	-9.04% [-9.37, -8.70] %	-24.74% [-24.92, -24.55] %	-19.06% [-19.55, -18.57] %
Impressions	Control 2 vs	6.74% [6.46, 7.02] %	-3.88% [-4.10, -3.67] %	-19.77% [-20.42, -19.13] %
	Treatment vs	21.89% [21.68, 22.11] %	2.11% [1.93, 2.29] %	-15.32% [-15.76, -14.87] %
Publisher revenue per impression	Control 2 vs	-21.91% [-17.05, -16.25] % / [6.46, 7.02] %	-32.53% [-35.32, -34.98] % / [-4.10, -3.67] %	-51.05% [-61.00, -60.46] % / [-20.42, -19.13] %
	Treatment vs	-25.37% [-9.37, -8.70] % / [21.68, 22.11] %	-26.29% [-24.92, -24.55] % / [1.93, 2.29] %	-4.42% [-19.55, -18.57] % / [-15.76, -14.87] %

5. Appendices

Appendix 1 - Other Key Privacy Safe Mitigations

The following mitigations will be available across all three experiment groups:

1. Contextual data and optimizations
2. Secure Signals for DSPs (Authorized Buyers) integrating with GAM and AdSense, and

and external SSPs integrating with GAM via Open Bidding.

3. Publisher First Party Data, which includes Publisher Provided Identifier aka PPID, Publishers First-Party Cookies, and Publisher Provided Signals aka PPS
4. Exchange Provided Identifier aka EPID for third party exchanges (DV360 only)
5. Non-3PC based solutions for measurement of click based conversions
6. Machine Learning (ML) based on all available/applicable signals